

London School of Economics and Political Science

*Designing for Mod Development:
User creativity as product development strategy on the firm-
hosted 3D software platform*

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fulfilment of the requirement for the degree of Doctor of Philosophy

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Declaration

I confirm that the work presented in this thesis for the examination for the PhD degree of the London School of Economics and Political Science is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Abstract

The thesis is designed to improve our understanding of user participation in Web-based development practices in the commercial setting of the 3D software industry. It aims to investigate whether the creative capacities of users and their contributions to the online firm-hosted 3D platform are indicative of a novel configuration of production that influences the processes of product development across firm boundaries.

The thesis mobilizes the user participation literature developing in media research as its main theoretical framework. It builds on insights derived from work on user participation in media sites as seen through a cultural lens, in particular, as developed in Henry Jenkins' notions of 'participatory' and 'convergence culture'. The user participation literature is supported by a combination of insights drawn from work on communities of practice and user-centred innovation so as to offer a more robust approach to examine and appreciate the firm-hosted 3D platform as a site of user participation. More specifically, the conceptual framework for the study provides a basis for an examination of the ways a software developer firm encourages user participation in a market and of how this enables and facilitates particular modes of user creativity. These are shown to shape and maintain a firm-hosted platform that aids product development efforts that are expected to benefit the developer firm. An empirical study of the platform, *Second Life*, provides the basis for the analysis of firm-user interactions which are shown to underpin a distinctive firm learning process in the context of product development that occurs across permeable firm boundaries.

The thesis yields insight into the way a developer firm invites its user base to partner with it in product development, indicating how aspects of user participation associated with non-market dynamics are embedded in commercial activity and professionalism. The pivotal role of users is revealed in the design, development and sustainability of a firm-hosted 3D product. The findings point to interesting relationships between the distinctive creative capacities of users and the range of capabilities afforded by the firm-provided design space. Variations in user participation and contributions to product development suggest that particular patterns of learning opportunities occur. The analysis yields several new concepts including a 'modification effect market' which are used to extend existing conceptualizations of user participation in digital development practices in the commercial setting of the 3D software industry.

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For me, my Second Life has been a mixture of Kerouac's *On the Road* (1955), Fowles' *The Magus* (1965), and Auster's *Travels in the Scriptorium* (2006). And the road goes on, and whither it is bound, I do not know.

Ulvenhout, March 2009

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List of acronyms

3D	Three-Dimensional
AIM	AOL Instant Messenger
API	Application Programming Interface
As & Os	Achievements and Objectives
AWG	Architecture Working Group
BSD	Berkeley Software Distribution
BOS	Bristol Online Survey
CoD	Call of Duty
CoP	Communities of Practice
DMCA	Digital Millennium Copyright Act
DIY	Do It Yourself
EU	European Union
EULA	End-User License Agreement
F/OS	Free and Open Source
FLOSS	Free/Libre/Open Source Software
FPS	First Person Shooter
GNU	GNU's Not Unix
GPL	General Public License
HTML	HyperText Markup Language
IP	Intellectual Property
IRC	Internet Relay Chat
L\$	Linden Dollar
LES	Leading Edge Status
LPP	Legitimate Peripheral Participation
LSL	Linden Scripting Language
MMORPGs	Massively Multiplayer Online Role-Playing Games
MUD	Multi-User Dungeon
NoP	Networks of Practice
NCoP	Networked Communities of Practice
PC	Personal Computer
PCA	Principal Component Analysis
PS3	Playstation 3
RSS	Really Simple Syndication
SaaS	Software as a Service
SDK	Source Development Kit
SL	Second Life
TESC	The Electric Sheep Company
ToS	Terms of Service
URL	Uniform Resource Locator
US	United States
XML	Extensible Markup Language

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Chapter 1 Introduction

Day, my, day, my, day, my, day, my

- Tomahawk¹

1.1 Introduction

This chapter provides an introduction to the research which is concerned with a ‘participatory turn’ reflected in the claimed democratization of World Wide Web technologies. The availability of relatively cheap and easy-to-use tools and applications such as game developer toolkits and wikis encourages users to participate in Web-based development practices. This research is designed to enhance our understanding of user participation in the commercial setting of the three-dimensional (3D) software industry with the aim of highlighting the creative capacities of users and their contributions to product development on a Web-based firm-hosted platform. The study aims to yield insight into the development and organization of firm-user interactions where both commercial and non-commercial production modalities interact. It gives particular attention to the ways participation and practices are structured and organized across permeable firm boundaries.

The structure of this chapter is as follows. Section 1.2 introduces the study by describing my first encounters with, and interest in, the 3D software of Second Life. In Section 1.3 the objective of this study is outlined and contextualized in the main theoretical framework and supportive themes that underlie the present study. Section 1.4 draws out the scientific and managerial relevance of the research. In Section 1.5 the structure of the study is outlined, which is followed by a brief conclusion in Section 1.6.

¹ Tomahawk, *God Hates a Coward*, *Tomahawk* (Ipecac Recordings, 2001).

1.2 A playmate enters a playground

This thesis is about user participation in Web-based 3D development practices, known as mod development, in the commercial setting of the 3D software industry, and which is part of a larger, recent phenomenon of users who increasingly participate on firm-hosted Web sites. It is designed to improve our understanding of how these users collaborate and share knowledge and ideas relevant to their participatory experiences and usage of the firm-hosted 3D platform, and how they improve, develop, and maintain new 3D platform-related products and services that may benefit the developer firm.

Research into popular sites for user participation such as YouTube have shown that users form communities in the pursuit of a shared enterprise, captured by the conceptualizations of *participatory* and *convergence culture* (Jenkins, 1992, 2006). Yet, how the process of organizing practices of mod community members across firm boundaries is carried out, or how a framework can be developed for the investigation of interdependent relationships developing between multiple spheres of economic activity that underpin the firm-hosted 3D platform, have not been systematically investigated in the literature. By using a single-case study approach to examine Second Life (www.secondlife.com) this thesis sets out to illuminate the relationship between mod community membership and the developer firm, and offers an original account and conceptualization of user participation in the context of firm-hosted 3D platform development which involves a distinctive innovation and learning process.

The first time I heard about Second Life was at the 2003 State of Play conference in New York. The developer firm, Linden Lab, introduced Second Life as a 3D Web-based environment where users, rather than the developer firm, construct, deconstruct, and reconstruct digital objects such as the houses and clothes shaping and maintaining Second Life. Rather than offering a developer-imposed narrative, Second Life is mostly a product of user communities that are central to the design and maintenance of the platform. This draws attention to a type of user who not only consumes what Linden Lab has put in front of her/him, but who has an interest in participating in practices with others bringing their competencies as artists, programmers, and businessmen, etc. into her/his Second Life experience. This has resulted in a thriving 3D environment that allows for vibrant social interactions,

knowledge exchanges, and the improvement and development of 3D products and services contributing new dimensions to the Second Life experience.

Moreover, Linden Lab generated quite a buzz in the room when it announced at the conference that the intellectual property rights of these user-made contributions rested in the hands of their respective creators. This was seen as a dramatic departure from what was common in the larger games industry. These strategic arrangements seemed to point to a dynamic relationship between the roles of the developer firm and the user base underpinning the development of the 3D platform which seemed to capitalize on the integration of within-firm and external labour processes. Consequently, users appeared to be more than mere end users. Instead, they are users from whom, arguably, the developer firm could learn in the further advancement of the Second Life product.

I wanted to check it out but life took over until in 2006 Second Life gatecrashed worldwide, in the on- and offline headlines. With news headlines such as Second Life Will Save Copyright (Wired, 20/11/06), Get a (Second) Life (Financial Times, 17/11/06), Talent-Spotting in Virtual World's (BBC News, 21/6/06), and A Virtual World's Real Dollars (BusinessWeek, 28/3/06), Second Life was presented as a rather open and extensible platform for development (cf. Au, 2008; Ondrejka, 2007).² And so, on an early Saturday morning in London while I was still in my PJs, I installed Second Life on my Mac and created a female avatar by the name of Rocketgrrrl Tripp.³

The prefab avatar raised from the digital trenches was a rather average looking young woman dressed in jeans and a tee shirt, so I spent some time toying around with the appearance editor. After a while I had created Rocketgrrrl more to my liking by changing her into a raven-black longhaired, big blue eyed woman wearing black latex-like pants and a jacket, and knee-length black boots. Now ready to explore Second Life I tried to figure out how to walk the newcomer's route guided by instruction signposts in such a manner that I was actually able to read those signs. This was difficult. Impatiently I gave up trying to read them and checked out the interface menu instead. By clicking around I accidentally hit 'search' and somehow arrived in a nightclub. A very handsome punk rocker approached me and asked me whether I was interested in

² See <http://secondlife.com/news/> for Second Life news archives and press releases between 2002 and 2008.

³ An *avatar* is usually a prefab or self-created digital persona controlled by the user. It enables users to participate and interact in games and other game-like environments.

making some Linden Dollars (L\$) by 'camping' in the club. I had no idea what he meant. I tried to sit down on a bar stool next to him, but one of my legs was not bending and my arms stood up straight as if I wanted to reach for the disco ball on the ceiling. Time to log off. Nearly six hours had past. Still puzzled by what it was that I actually had been doing in Second Life I could not come up with anything other than 'not much'.

That same evening, however, I logged back on and found myself still in the same nightclub and I was relieved to notice that my posture had turned back to normal. Not knowing where to go, and knowing only that I did not feel like staying in the club, I stumbled outside and, like a drunk person, tried to walk without bumping too much into things over vast lands filled with avatars, shops, residential houses, parks, boats, and nothing but emptiness. What I encountered was mostly in a state of 'under construction'. Right there and then, I could see avatars on their land chatting using the lingo like 'rezzing' and suddenly new objects would appear from out of nowhere. I spent that evening just standing here and there to watch other avatars build. That experience would exemplify the way I was going to spend most of my Second Life. It is during those times that I encountered and talked to other Second Life users, in all shapes and sizes, building, texturing, and scripting a living and a social life in the various corners of the platform.

From early on it was quite clear that the creative capacity of Second Life could be evidenced in these practices of development, customization, and visual socialization that were made possible by purposively firm-designed systems, the so-called editor or toolkit, that put modification activities in the hands of users. However, what constitutes user participation in the firm-hosted 3D environment, and the relation between mod communities with the developer firm as co-participants in product development underpinned by structures for participation and organization of practices across firm boundaries, have not been systematically investigated. This study, therefore, is designed to learn more about the increasing importance attributed to user participation in mod development practices, and the growing significance of social software in the context of the firm-hosted 3D environment.

The next section introduces the theories and methodology that guide this study.

1.3 Approaching the playground

Rap music, the Jubilee Debt Campaign, the Linux open source software movement and The Sims computer game have all left their mark on the world in the last decade. Rap infects all popular culture. The Jubilee campaign led to billions of dollars of developing world debt being written off. Linux is one of the biggest challengers to Microsoft. The Sims is one of the most popular computer games ever. These developments have one thing in common: they were all driven by Pro-Ams, innovative, committed and networked amateurs working to professional standards. This emerging group, the Pro-Ams, could have a huge influence on the shape of society in the next two decades. (Leadbeater and Miller, 2004: 9).

Say good-bye to today's experts and cultural gatekeepers – our reporters, news anchors, editors, music companies, and Hollywood movie studios. In today's cult of the amateur, the monkeys are running the show. With their infinite typewriters, they are authoring the future. And we may not like how it reads (Keen, 2007: 9).

A significant paradigm shift is now underway. The rise of what is now described as social software or Web 2.0 environments stands to have a profound impact on social practices, the media, economic and legal frameworks, and democratic society itself (Bruns, 2007: 1).

From these illustrations, the overarching idea announcing the decline of the marginal productivity of the user can be heard. Facilitated by user-friendly and attractively priced (or gratis) software technologies, emerging sites for user participation are “all forms of digital culture, networked in technology [...] and collaborative in principle” (Uricchio, 2004: 86). Think Myspace profiles, YouTube videos, Wikipedia entries, and World of Warcraft avatars. In 2006 Time Magazine acknowledged this growing importance of user participation by naming ‘you’ Person of the Year.⁴ This *participatory turn* (OECD, 2007) is viewed as a new or, alternative, logic that seems to favour new over old production-consumption configurations that, to some degree, assume that user participation with particular attention to creative and collaborative practices on open and transparent (and often, firm-hosted) platforms, are empowering and are the way of the future. And, while some consider this a dreadful development that has a detrimental effect on our culture, others hail it as the way forward to sustain growth and innovation in society.

With this proliferation of digital technologies firm production boundaries are said to become increasingly porous as a result of having a growing number of users participate in copying, cutting, pasting, and adding to existing media materials. Turning to the theoretical insights developing in work on participatory cultures in media sites (Bruns, 2007; Burgess and Green, 2009; Hartley, 2008; Jenkins, 1992, 2006) users are

⁴ See <http://www.time.com/time/magazine/article/0,9171,1569514,00.html> (accessed 14/09/08).

well-known to engage in the production of meaning, whether of cultural texts, corporate intentions, or the technology itself. Especially since the 1990s media researchers have shown an increasing interest in this linkage between new technologies and users, looking in particular at the formation of new social collectivities and ‘bottom-up’ redefinitions of cultural practices⁵ (Baym, 2000; Consalvo, 2007; Jenkins, 1992; Klein, 1999; Livingstone, 1991). These studies have aimed to examine online sites of user participation (and dissatisfaction) that relate firm-produced/provided media content to (often unexpected kinds of) official and unofficial ‘grassroots’ user practices such as fansubbing, machinima, and mash-ups.⁶ More specifically, these studies have tended to yield insight into aesthetic status and social power by casting the work of participating users as ‘transgressive’ (against the perceived economic interests of the producing/providing media firm, such as file-sharing networks) or as at least, ‘unintended’ (not considered by the producing/providing media firm but also not perceived as harmful, such as fan fiction). Such actions were thus seen as users taking basic materials provided by commercial media firms and actively re-appropriating and redistributing those materials as cultural practices.

While this blurring of production and consumption practices is not a new phenomenon it has become more salient in the context of digital technologies facilitating those diverse practices on a wider scale, engaging firms to look at the consequences for commercial interests.⁷ In many cases, participatory Web sites represent successful illustrations of a rapidly evolving (yet often subtle) relationship of collaboration with users across firm boundaries at a time where it has become “increasingly clear that the Internet is not only embedded in people’s lives but that with the rise of a more “participative web” its impacts on all aspects of economic and social organization are expanding” (OECD, 2007: 15) coinciding with a strong interest and

⁵ This is not new as generations of researchers have focused on the determining effects of technology, the producing corporations, and the public – the latter understood both as creators and audiences. However, the recent proliferation of digital technologies has particularly reactivated debates regarding the aesthetic status of new, technologically enabled expressive forms, and again challenges regarding the role of commerce in the production of culture have been mounted. Digital technologies have made questions regarding originality and reproducibility particularly difficult, and they have blurred the lines among producer, distributor, and consumer to a far greater extent than previous media forms (cf. Gasser and Ernst, 2006; Jenkins, 2004; Uricchio, 2004).

⁶ *Fansubbing* refers to fans that provide Japanese animation/manga with subtitles for the enjoyment of non-Japanese speakers. *Machinima* is a technique that typically makes use of games to create short films. *Mash-up* is the practice of laying the vocal/music from one song over another song.

⁷ See Jenkins (1992, 2006) for a brief historical context of user participation evidenced from folk culture where stories were told, retold, reworked and so on.

awareness of the importance of firm-engagement with those active users.

With its focus on active media spectatorship, collaboration, and creativity, the user participation literature associated with the concepts of participatory and convergence culture developed in the media research literature guide the main theoretical framework of this study. However, although this literature has made many valuable contributions relevant to the topics investigated in this thesis, insufficient attention has been given to the development and organization of firm-user relationships on firm-hosted 3D platforms where both commercial and non-commercial production modalities interact underpinning product development. This may be due to a rather functional understanding of user participation which cannot fully explain the growing significance of the role of mod communities in knowledge production and innovation in the context of the developer firm.

A first supporting theme in the main theoretical framework is offered by the *communities of practice perspective* which assists us in the investigation of learning relationships between the developer firm and users underpinning product development across firm boundaries (Lave and Wenger, 1991). Participation in mod communities can be approached in terms of enculturation practices such as apprenticeship and mastery. On the basis of shared beliefs and common interests communities are formed, and work towards enculturating newcomers into communal belief systems, skills, and practices from those who have already mastered the group's social and material practices. In addition, such Web-based communities have been found to be effective in enabling and facilitating (voluntary) knowledge sharing (Scarborough and Swan, 2001). Through these networked communities of practice people are said to develop and share the capacity to create and employ knowledge which can assist in advancing user creativity that underlies the organization of product development (Brown and Duguid, 1991; Nonaka, Toyama, and Nagata, 2000). More specifically, through participation and practices, users can exchange information and are regarded as being part of the firm's dynamic knowledge base, arguably providing the firm with opportunities to learn (Grant, 1996; Wenger, 1998). This information- and practice-based perspective is therefore expected to yield insight into the underlying dimensions of the growth of knowledge and sharing practices across firm boundaries with the aim of highlighting knowledge contributions as a potential source of competitive advantage (Benkler, 2006; Foray, 2004; Freeman, 1991; Lundvall, 1996).

The literature concerning *user-centred innovation* provides a second supporting theme (von Hippel, 2005). In a more traditional view of innovation, firms take on most, if not all, product development, while, in the users-as-innovators model, users are viewed as valuable innovators in the stages of idea generation and the process of product development (Jeppesen, 2004; Lüthje, 2004). Following the line of argument associated with rapidly expanding user participation and enhanced networked connectivity, consulting with users has become an important focal point for firms. Consequently, firms appear to be actively encouraging and facilitating user participation in the innovation process which may be evidenced in purposively designed and provided toolkits. Providing toolkits for innovation and (co-)design is a means of systematically outsourcing certain design and innovation tasks from the firm to the user, assisting users in improving and developing new products and services (von Hippel, 2005). In this way, users are presented with a broader palette to participate, better equipping them to advance and develop products according to their own interests and needs, while contributing to product development (Thomke and von Hippel, 2002). From this theoretical lens, the developer firm may be seen to benefit from a relatively low cost approach to acquiring user-provided information such as user-contributed ideas, improvements and developments of products and services underpinning the overall knowledge base of the firm (Allen, 1977; Foray, 2004).

Thus, whereas the development and organization of firm-user relationships in the context of 3D platform development is underplayed in the user participation literature, the communities of practice literature and user-centred innovation field can support this investigation by illuminating aspects of knowledge production and firm-provided toolkits which underpin learning relationships, allowing a more comprehensive understanding of product development across firm boundaries. However, with many accounts in the user-centred innovation literature having developed an individualistic approach to users-as-innovators such as in the investigation of motivations for innovating and ways of contributing, and with a somewhat narrow understanding of communities of practice involving ideas of community membership, user and firm 'cultures' have been rather simplistic addressed in these traditions compared to the user participation literature (see Chapter 3). As a result, these lines of research play a subsidiary role in this thesis, providing the contextual themes in support of the main theoretical framework of this study.

In the light of this discussion and my primary interest in the *dynamics* or the iterative firm-user interactions underpinning Second Life, this thesis aims to investigate:

Q How is user participation constituted and maintained on the firm-hosted 3D platform, and with what implications for product development across firm boundaries?

The research design for this study involves using a mixture of quantitative and qualitative data and methods. An online survey was conducted among Second Life users, resulting in 434 responses. The survey asked respondents about general Second Life characteristics such as length and type of membership and about particular features and uses of the platform such as motivations, design, information and communication behaviour. First life demographics of users such as gender, income, and employment status were also collected. Semi-structured interviews were conducted with eight Linden Lab employees and thirteen Second Life users. The interviews with Linden Lab employees highlighted aspects of their roles within Linden Lab, their interactions with users, and their perceptions of learning opportunities. The interviews with Second Life users addressed their interests, usage patterns, contributions to the platform, and their interactions with other users and Linden Lab employees. In addition, online documents were collected and examined thematically drawing from the Second Life blog, forums, mailing lists, and public bug tracker (JIRA). The documents were used to examine the ways in which the developer firm and users interact in ways which are shown to further product development. The analysis of the data pointed to interesting relationships between the distinctive creative capacities of users and the range of capabilities afforded by the firm-provided 3D platform which underpin the advancement of Second Life.

1.4 Reverse engineering the thesis

The impetus for this study was evidence of this participatory turn in user participation in digital development practices (OECD, 2007). Arguably spearheaded by the open source model of software development associated with the bazaar and gift-giving models (Benkler, 2006; Raymond, 1999), this emergent and rapidly evolving user-generated development of intangible goods or products is reflected in the claimed

democratization of Web technologies. With the availability of affordable and accessible tools for content production and distribution, user participation is emerging as a creative infrastructure that is associated with pervasive knowledge-intensive and information-rich user-created content activities. An important thread in discussions concern the dynamics of user participation as a significant aspect of the knowledge-based economy (OECD, 2005; United Nations, 2008) or of ambiguous terms such as network society (Castells, 2001), learning economy (Lundvall and Johnson, 1994), or the information society (cf. Crawford, 1983; Foray, 2004; Fuchs, 2007; Robins and Webster, 1999). All these concepts emphasize the prominent role of information/knowledge and the use of digital information and communication technologies associated with new opportunities for user participation in digital content development.

How is user participation conceptualized in the scholarly literature? Perhaps the most dominant discourse concerning user participation is associated with the notion of Web 2.0. O'Reilly (2005) has coined this term to refer to businesses that seek ways to understand and make use of new technologies such as the Internet to capture 'the wisdom of crowds' (Surowiecki, 2004), or 'collective intelligence' (Lévy, 1997) of users. Many, fully-fledged and not so fully-fledged, terms, concepts, and models have been coined to capture this 'participatory turn' associated with Web 2.0, among which the most prominent are convergence culture (Jenkins, 2006; cf. 'participatory culture', Jenkins, 1992), democratizing innovation (von Hippel, 2005), produsage (Bruns, 2007), wealth of networks (Benkler, 2006), and wikinomics (Tapscott and Williams, 2006).

More specifically, the overarching idea points to a shift from a static perspective on Web content delivery towards a more dynamic perspective where Web tools and applications such as file-sharing networks, social software, wikis, really simple syndication feeds (RSS) and application programming interfaces (API) are put into the hands of users who are regarded as participants rather than end users. User participation from a Web 2.0 perspective tends to be associated with a convergence of production, distribution, and consumption practices and a blending of user-creativity, collaboration, and sharing enabled and assisted by, for example, social software using wikis and networking sites (Aufderheide and Jaszi, 2008; Green, 2008; Jenkins, 2006). These are said to be shaping new hybrid spaces where user involvement involves the generation of user experiences and "the collaborative and continuous building and extending of existing content in pursuit of further improvement" (Bruns, 2007: 3).

User participation in creative (or, creation) practices appears to be an increasingly large-scale phenomenon at least in the Western world where user creativity is largely informal, occurring in contexts where there appears to be no (apparent) authoritative entity and users voluntarily perform unassigned 'work tasks' (cf. Van Wendel de Joode, 2005; Raymond, 1999). These users that make, often voluntary, contributions may well be experts in certain areas yet they tend to be approached as 'amateurs', 'hobbyists', and 'fans' as user participation tends to occur outside the professional realm (Jeppesen, 2004; Keen, 2007; Postigo, 2008). Within this context, user participation has evoked debates in the social, economic, and policy domains which may be associated with increased user autonomy and diversity, new forms of media, different ways of doing business, and the need to address policy issues such as broadband access, privacy protection, and intellectual property protection (Benkler, 2006; Green, 2008; Leadbeater and Miller, 2004; OECD, 2007).

In addition, some studies suggest the ubiquity of opportunities for user participation that are accessible to 'all' and which empower the users (Burgess, 2007). While others see the linkage of Web tools and applications to user positions as "a brave new world where the spirits of commonality are finally merged with the interests of capitalism" (van Dijck and Nieborg, forthcoming: 12). The idea of a participatory Web seems to have become attached to a certain 'magic' or 'hype' and concrete claims and instances of such empowerment are implied rather than manifest in the empirical evidence (cf. Woolgar, 2002). Little attention has been given, for example, to the factors and distinctive relationships involved in different participatory modalities. Differences between more active and passive users are often assumed away, and the adoption of various technical and social designs is claimed to lead 'magically' to building a critical mass of participation (Burgess, 2007; Li and Bernoff, 2008; Tapscott and Williams, 2006).

In the context of the rapidly evolving computer/video games and 3D software industries supported by online network technologies, this study seeks to contribute to our understanding of user participation in an online firm-hosted 3D environment. It seeks to remedy gaps and weaknesses in the existing user participation literature about these firm-user interactions which are frequently based on intuitive claims about user participation. Moreover, in the user participation literature there is so far only an incomplete picture of the role of user participation in these commercial environments.

Consequently, this study aims to yield insight into the dynamics between the developer firm and users with particular attention to the ways the developer firm develops user participation into a market and the ways in which that market enables and facilitates particular modes of mod development that are shown to shape and maintain a firm-hosted platform as a site at which the developer firm can be seen to learn.

In addressing some of the aspects that have remained largely unexplored in the user participation literature, the main theoretical framework is supported by several insights developed in work on communities of practice and user-centred innovation. However, this study's focus is not about the aesthetic and social qualities of user participation or the technological characteristics of software modularity, interoperability or the wider innovation system that underpins such developments. Rather, it is about specific aspects of product development across firm boundaries illuminating the growing significance of mod communities in knowledge production and innovation which are associated with the emerging knowledge-based economy.

From the perspective of the firm, the study contributes insight into the challenges faced by a developer firm that seeks to structure and organize user participation. The study highlights specific ways in which the developer firm may benefit or learn from user creativity through motivating, integrating, and coordinating particular tasks of employees and users which are shown to foster a particular firm-user dynamic in the labour market. In particular, the study yields insight into the ways a firm can learn from user participation in development practices across its boundaries, guided by firm-designed toolkits as a potential learning resource. As a result of this focus, this study offers some rich insights for practitioners who are involved in the phenomenon of user participation on firm-hosted 3D platforms.

1.5 Playlist

The 'playlist' supporting this study is organized into nine chapters.

Chapter 2 introduces the study by providing a basic background about contemporary game/3D culture on the Internet. Against the increasing popularity of participatory Web applications associated with user-generated content attention is drawn to the modification practices of computer-based First Person Shooters games, virtual

worlds, and 3D collaborative platforms.

Chapter 3 presents the theoretical background and conceptual framework for this study. Theories focusing on user participation, user-driven innovation, and networked communities of practice are discussed and applied to modification practices in the setting of a firm-hosted 3D platform. The conceptual framework for the study is developed to explicate the underlying dynamics of firms that encourage and facilitate user contributions guided by an understanding of user outputs as external resources on the 'demand side' of innovation.

Chapter 4 presents the research methodology. The firm-hosted 3D platform Second Life is introduced as the research site for data collection. The chapter sets out the research methods used to collect the quantitative and qualitative data that are the basis for the analysis in this study, i.e. an online survey, semi-structured interviews, and online documents. The data collection procedure and methods of data analysis are outlined and the strengths and drawbacks of the approach are discussed.

Chapter 5 presents the empirical findings concerning the design capabilities of Second Life users. The results focus on the analysis of disparities between the capabilities of Second Life users. Attention is drawn to the different participation patterns and communication behaviours associated with Second Life membership. Different modes of user participation are related to the organizational characteristics and culture of the developer firm.

Chapter 6 presents the empirical findings with respect to the design space. The design space is the area for user participation in mod development practices. The analysis examines the characteristics of the Second Life platform yielding insight into the functionalities of the design space associated with the firm-provided toolkit that enables and facilitates user participation.

Chapter 7 presents the empirical analysis of knowledge contributions made by users and employees of Linden Lab. The analysis yields insight into user participation on the firm-hosted platform by linking the design capabilities and design space to various communication practices. The findings demonstrate that Second Life is a site where various contributions by both users and the developer firm generate ideas about discovering, developing, and refining creative practices associated with firm learning that contribute to ongoing product development.

Chapter 8 provides an analytical synthesis of the results concerning production

modalities underlying the firm-user interactions on the firm-hosted platform and considers this in the light of the conceptual framework for this study and the broader theoretical implications.

Chapter 9 concludes this study with a contemplation of the main research findings about user participation on firm-hosted 3D platforms summarizing the principal theoretical, methodological, and empirical contributions of this study. The chapter discusses some of the limitations of the study and outlines opportunities for future research.

1.6 Conclusion

This chapter has set out the design of this study which contributes to the understanding of the roles of users in a firm-hosted 3D platform. Overall, the analysis draws attention to: the motivational, participatory, and behavioural patterns of user design capabilities; the functionalities of the firm-provided toolkit in relation to multiple modalities of mod development; and the role of knowledge contributions in cultivating and maintaining learning relationships. The findings suggest that firm-hosted mod development is a complex configuration of overlapping commercial and non-commercial production modalities, linking the developer firm and mod developers in product development of the 3D platform which influence the firm's learning opportunities. This complex configuration yields several terms such as 'modification effect market' that enable an improved understanding of user participation in the context of commerce.

Chapter 2 User creativity in the games and 3D software industries

A perfect place

- Mike Patton⁸

2.1 Introduction

As a 3D platform Second Life can, in its execution, be positioned in the domains of the games and the larger 3D software industry. This chapter provides a basic background on user participation in modification practices which is considered to be one of the most rapidly evolving features of present-day game development. Without setting out to achieve a complete overview of these emerging practices (which would be a thesis in itself), this chapter draws on several prominent instances where 3D software developer firms invite users to participate in product development serving as a stepping stone to interpret, assess, and appreciate the conceptual framework presented in Chapter 3. In this chapter, the modification practices of computer-based First Person Shooters, virtual worlds, and 3D collaborative platforms, are discussed.⁹

The structure of this chapter is as follows. Section 2.2 focuses on various aspects of user creativity (or, mod development) in the commercial setting of the games and 3D software industries that increasingly seek to engage and facilitate user participation. Section 2.3 describes the characteristics of computer-based First Person Shooters, virtual worlds, and 3D collaborative platforms. Section 2.4 yields insight into the roles of toolkits, engines, and interfaces in the context of generating opportunities for mod development in game/3D design. Section 2.5 offers some concluding remarks.

⁸ Mike Patton, *A Perfect Place, A Perfect Place* (Ipecac Recordings, 2008).

⁹ In this study, *game* refers (particularly) to computer games and *3D environments* refer to *virtual worlds* and *3D collaborative platforms*. The term *platform* refers to the hardware (e.g. console) or software system on which gaming and/or 3D-related development takes place.

2.2 Designing for mod development

At the inception of computer gaming (Spacewar!, 1962), programming consisted of tens of lines of code that, roughly fifty years later, has evolved into a social significant and high risk, technologically advanced, capital intensive, proprietary practice and billion dollar industry (cf. Malliet and de Meyer, 2005; Postigo, 2003). Millions of people worldwide regularly play games. Currently, the average gamer is 35 years old (25% were younger than 18, 49% were between 18 and 49, and 26% were over 50). More than half of the gamers are male (60% vs. 40% female). However, 33% of 18+ women in comparison to 18% of boys aged 17 or younger, play games (ESA, 2008).¹⁰ Games are played on *consoles*, such as Xbox 360 (e.g. Halo 3 by Bungie Studios) and PlayStation 3 (PS3) (e.g. Guitar Hero III by Harmonix Music Systems); *handhelds*, such as PlayStation Portable and Nintendo DS; *computer games* (e.g. Call of Duty 4 by Infinity Ward); and, engage in online *massively multiplayer online role-playing games* (MMORPGs) (e.g. World of Warcraft by Blizzard Entertainment).¹¹ Many, if not all, of contemporary game devices offer online gaming services like Xbox Live allowing gamers to compete online and download content such as game demos, TV shows, and movies fitting the participatory Web phenomenon.

User creativity within the gaming context has enthusiasts and amateur developers toying and tinkering with their favourite games despite the inherent complexity of game development. Such user modification practices can be located along with the emergence of, for example, the radio industry (Hartley and Notley, 2005; Takahashi, 2000), scientific equipment (Lettl, Herstatt, and Gemuenden, 2006), and automobile industry (Franz, 2005). For games it is commonly referred to as *modding*. This is short for the practice *to modify* a game executed by a *modder* (or, in this study, *mod developer*)¹² with a *modification* or *mod* as outcome¹³ (cf. 'hacker' in Levy, 2001; Raymond, 1999). Within the domain of computing, both hardware and software can be modified. Examples of hardware modifications are 'computer case modding' such as by

¹⁰ See Entertainment Software Association (ESA) for more information: <http://www.theesa.com/> (accessed 16/10/08).

¹¹ See for a further breakdown Kerr (2006).

¹² In this study, *mod developer* refers to all users participating in creative endeavours involving mod development unless it is specifically stated how the term should be interpreted.

¹³ The term *mod* has been used as umbrella for the many variants of user-generated game materials and practices neglecting to address the different functionalities among mods such as client-side maps and server-side game stats plug-ins for First Person Shooter games. As this present study focuses on only one particular case study, the development of a more nuanced perspective is beyond the scope of this research.

adding light (Sotamaa, 2005), and ‘modchips’ that are typically used to circumvent region codes of game consoles (Domke, 2006).¹⁴ There exist many variants of game software modifications varying from *partial conversions* like gameplay mods, such as slightly altered maps or skins, to *game-additions* (or, ‘add-ons’) such as server tools or single player missions, and to *total conversion* modifications.¹⁵

In this study, *user participation in mod development is understood as an act of user creativity in a cultural, social, and economic context*. More specifically, mod development constitutes a domain consisting of a “set of symbolic rules and procedures,” a field of “gatekeepers” of the domain, and the mod developer him/herself (Csikszentmihaly, 1996: 23). Or, in other words, “creativity is any act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one” and a creative individual is “someone whose thoughts or actions change a domain, or establish a new domain” (Csikszentmihaly, 1996: 25-26). Modding can also be conceptualized as a non-zero-sum collaborative effort. It refers to the emergent attribute of collaboration witnessed in various mod teams (Nieborg and van der Graaf, 2008). This means that “a new whole is forming” by contributions made by mod developers that “could not have been generated if the efforts had been individualistic” and subsequently “the ‘non-zero-sumness’ of collaboration therefore does not stipulate that such an outcome is greater or better, but rather different” (Elliott, 2007: 33).

Rather than “imagined conceptualizations” mod developers are increasingly approached as important components of game/3D development suggesting a co-construction of game/3D development occurring between developer firm and mod developers (Taylor, 2006a). Developer firms that seek to engage users in participatory ways can, for example, provide access to software and tools; open up (parts of) the underlying technology; disperse information via wikis and manuals, and so forth; and, provide a (semi-)legal framework to facilitate and condition user-generated contributions (Frederiksen, 2006; Jeppesen and Molin, 2003; Nieborg and van der Graaf, 2008). In doing so, these firm practices render modification activities of existing games and other 3D environments to users from which the developer firm can potentially benefit (see Chapter 3). In these instances, an emerging mod culture and the

¹⁴ In the case of console modding a distinction is made between *soft* and *hard* modding in which the former refers to software mods (such as changing data on Xbox 360’s hard drive) and the latter to hack the BIOS of the device, for example, to run unsigned code (i.e. ‘hacking’) (Burke and Craiger, 2006).

¹⁵ Early examples are Doom (1993) and Half-Life (1999). Although there are earlier instances, game modification practices really took off in the mid- to late-1990s (Dovey and Kennedy, 2006).

democratization of innovation appear to go hand-in-hand (von Hippel, 2005). From this viewpoint, it is important to stress that mod development is not used in a technologically deterministic way where, for example, the toolkit or game engine, impact upon the developer firm and user base. Rather, mod development is investigated in reciprocal firm-user dynamics evolving in practice-based communities that appear to encapsulate users-as-developers in different stages of the product life cycle for which the theoretical framework is developed in the next chapter.

The next section addresses the kinds of game and 3D environments that allow for user participation.

2.3 All the games that are fit to mod

We spent a lot of time bringing people from the mod community out and people who had websites for Call of Duty 1 and 2 [CoD] which both had a heavy PC component to it. We went through and had exhausted meetings with those guys on what they wanted and I think we really opened up [CoD4] for modders and they should be really excited to get their hands on it. They were pleasantly surprised to see a lot of the things that we had already added to the game. And some of them were saying 'you know you are putting modders out of business here'. [...] I really cannot wait for [...] our PC fans to crack up a copy of [CoD 4: Modern Warfare] and have add it with their buddies (Grant Collier, Studio Head at Infinity Ward, 2007).¹⁶

For over fifteen years modding has been mainly a PC-centred affair. This in contrast to the console-based multiplayer mode that only made its entry in the early 2000s and where user-generated content and (with a few exceptions) mod communities have yet to blossom. For example, only as recently as November 2007, the PC-version of the shooter game Unreal Tournament III (Epic Games) was dropped with the Unreal Engine 3 toolset that as 'an unique feature' allowed user-created content to be exported to PS3.¹⁷ For this reason, the remainder of this chapter will mainly concentrate on those PC-based areas where mod development has been prevalent, namely, First Person Shooters (FPS), virtual worlds, and 3D collaborative platforms.

Among the most popular market-based genres developed for PC games are strategy games (33.9%), MMORPGs (18.8%), family entertainment (14.3%), and shooters (11.6%) (ESA, 2008: 5; cf. 'game genres' in Apperley, 2006). About half of the gamers reported to play online games (56% male vs. 44% female) of which 16%

¹⁶ See http://www.gametrailers.com/remote_wrap.php?mid=26494 (accessed 31/01/07).

¹⁷ See <http://udn.epicgames.com/Three/UT3ModHome.html> (accessed 4/02/08).

reported to play action/sports/strategy/role-play games and 11% engaged in ‘persistent’¹⁸ and multiplayer universes (ESA, 2008: 9). Although substantial evidence is lacking, it seems that of these PC-based genres FPS and role-playing games are most frequently modified (Jeppesen, 2004; Postigo, 2008). In particular, FPS modding has “a strong history of fan involvement in modification” (Postigo, 2008: 60). Also, it has been suggested that FPS mod culture has become “institutionalized” and the interest of both the developer firm and mod developers in technologically advancing FPS games “may well contribute to the ongoing technological interplay between both parties” (Nieborg, 2005: 3). So for example, Infinity Ward, the developer firm of the shooter CoD4, implemented the gameplay mode that is referred to as ‘hardcore’ and typically constitutes the first mod that modders create (that is, a ‘realism mod’, such as having no ‘head-up display’¹⁹, and no ‘regenerative health’²⁰) in the game. Infinity Ward had not only learned and picked it up from the mod community of previous CoD series, the firm had also hoped with this mode in place to encourage mod developers to “think of whole different kinds of mods.”²¹

Another, more recent and rapidly increasing PC-based mod format is associated with 3D developments that appear to be less game-like, or not games at all. Virtual worlds and especially 3D collaborative platforms seem to move away from more FPS game-like attributes towards an architecture or operating system that is more similar to the Internet (and in particular, its Web 2.0 features) but with 3D simulation features, of which Second Life is the most extreme example (see Section 4.3). In other words, those virtual environments where user experiences arise mostly from user-generated content rather than from the more structured experiences associated with many PC games. The popularization of persistent, open-ended, and 3D online environments, commonly referred to by the terms MMORPGs, or virtual worlds, is seen as the vanguard of a new generation of gaming. They take advantage of accessibility, relatively cheap and fast Internet connections, and advanced graphical standards of current computers (Castronova, 2005; Steinkuehler, 2005). Such environments are generally characterized

¹⁸ *Persistence* refers to an already existing 3D environment before and after the user logs on/off. This implies that events and interactions driven by other users through their avatars, occur even when the user is not logged on and that may impact upon the next sessions.

¹⁹ This refers to the visual display of information on the game’s user interface.

²⁰ This means that when the player is losing strength or is about to die in-game, s/he cannot use in-game tricks such as eating candy to strengthen her/his health in order to continue to play.

²¹ See http://www.gametrailers.com/remote_wrap.php?mid=26494 (accessed 31/01/07).

in terms of:

- Persistence;
- Graphical (re)presentation;
- Interactivity where users' interactions (through their avatar) affect the results of other users' avatars;
- Adhering to the laws of physics;
- Accommodating simultaneous access for a large number of avatars; and,
- Utilizing an exchange system of virtual assets, such as currency, items, and realty.

Within the confines of this thesis, *I propose to make a distinction between virtual worlds (or, MMORPGs) and 3D collaborative platforms whereby the former focuses on the game aspect in a world based on a genre such as fantasy and sci-fi, while 3D collaborative platforms are thoroughly malleable.* In addition, virtual worlds tend to be motivated by quests and tasks in a narrative form that is typically created by the developer firm, while 3D platforms tend to be more community-based. If any narration is available it is likely to be created by users (cf. Yee, 2006). This study focuses particularly on the 3D (collaborative) platform *Second Life* (Linden Lab) that is neither genre- nor narration-based in contrast to various other virtual worlds. Furthermore, the 3D platform is here understood as an advanced geometric software simulation that provides simultaneous access to a large number (50,000+) of users. It generates and sustains a mechanism for the supply and demand of user-created content. Participation on the platform is guided by using a self-created avatar to interact in real time with other avatars and simulated objects that are present in the persistent environment.

From these three perspectives, it can be gathered that there exist several formats of game designs that can be characterized by a perpetual state of development and allow users to be creative or innovative in different ways. Four participatory modes for user creativity, that may overlap, can be distinguished (Haddon, 2005; Sotamaa, 2005):

- Involvement in design and re-design of games/3D-related technologies and applications, such as hardware modifications;

- Involvement in creating new practices utilizing games/3D-related technologies and applications in new ways, such as new skins and maps for games;
- Involvement in dispersed meta creative design activities concerning games/3D-related technologies and applications, such as maintaining a Web site or wiki for an avatar or game; and,
- Involvement in the generation of particular (new) usage patterns, practices, and meanings surrounding games/3D-related technologies and applications within the wider community or subculture, such as norms.

Achieving mod developers to participate in creative practices is directly connected to the user's own, shared participation in mod development within the boundaries set by the developer firm (Malaby, 2006). Put aptly by Benkler (2006: 75) "the commercial provider offered a platform and tools, while the users wrote the story lines, rendered the "set," and performed the entire play." User-generated content as mod development is therefore the heart of the experience and malleable within the boundaries set by the developer firm. But what are the parameters to play with? The next section draws attention to the technological underpinnings and implications for certain possibilities for user participation in exemplary FPS, virtual worlds, and 3D platforms.

2.4 Of toolkits, engines and interfaces

The internal product development process of a developer firm can be understood to operate along with (the development of) external mod development practices (Bogost, 2007). One important motivation for this argument lies in the workings and underlying logic of the game engine and, in many cases, software editors and/or game/3D development toolsets, that are employed by both the developer firm and, in a variety of modes, by mod developers. First, the role of toolkits is addressed which is followed by a discussion of the game engine and interface.

2.4.1 Toolkits

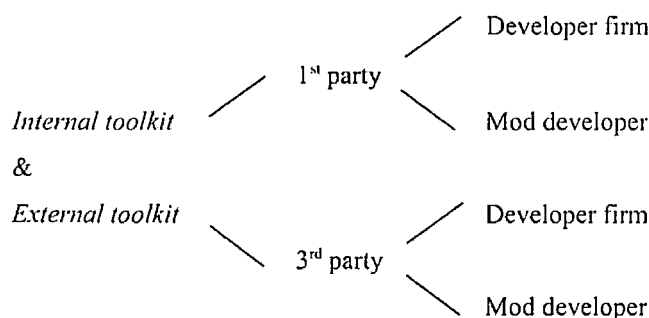
Toolsets or -kits (used interchangeably in this study) are specialized software applications that are necessary for particular parts of the game development process,

such as level editing and script compilation (Jeppesen, 2004; Prügl and Schreier, 2006; West and Gallagher, 2006). They come in a variety of forms. There are specific *within-firm toolsets*. The firm equips its developers with tools they need in order to work. These tools may be internally designed but can also be third party developed like commercial-off-the-shelf graphics packages such as Maya, and Photoshop. *End user toolkits* may be developed and provided by the developer firm. These toolkits appear to vary from being completely identical to the tools used internally, to specifically designed end user tools. They may also be third party tools that come with the product or, if allowed and compatible, used on the mod developers' own account. And lastly, again if allowed and possible, mod developers may develop their own tools to mod the game, world or platform. Furthermore, both first and third party toolkits may be located internal and external to the game/3D environment.

In general, tools appear to be custom-released by the developer firm for a specific environment, albeit, those tools are frequently re-used for other games and other 3D settings (i.e. internally developed, licensed to third party developers, and mod communities). For example, game developer Valve has included its Source Development Kit (SDK) with first party tools such as Faceposer, Valve Hammer editor, Half-Life Model Viewer, and third party tool Softimage|XSI EXP which was also used internally to develop the FPS Half-Life 2. In addition, for some tools (part of) the source code is also available such as for the Half-Life Model Viewer that enables users to mod the Viewer toolkit itself as well. Figure 2-1 provides a general overview of the ways toolkits may be utilized.

Figure 2-1

Overview toolkits for mod development



Toolkits may or may not be shipped along with the game, virtual world or 3D collaborative platform. However, if tools do get released it typically is, at minimum, the level editors that are needed to develop a ‘level’ which, for example, can be a particular building or street.²² An example that I have briefly touched upon in Section 2.3 is UT3 that ships the Unreal Engine 3 Editor with the PC-version and allows the produced mods to be played on PS3. Rather than mere editing levels, the toolset (or, editor) facilitates, for instance, the creation of whole new levels and game modes. In practical terms this means that gamers have to buy both versions, namely for PC and PS3 which is quite expensive as newly released games cost between US\$ 50 and US\$ 60. The release of toolkits seems to be part of an industry-wide trend, coinciding with low-cost digital distribution platforms, of ‘episodic games’ such as Half-Life 2 episodes, and ‘expansion packs’ such as The Sims. These practices contribute to shorten release cycles and lower prices yet when accumulating costs of purchased content over time, it appears to disfavour the gamer and/or mod developers (Nieborg, 2008).

2.4.2 *Engines and interfaces: first person shooters*

Not only toolkits can facilitate mod development. Typically it is the game engine that enables and supports mod practices. For FPS, the game engine typically consists of several components and includes a graphics rendering system, modules for artificial intelligence, physics, scripting, networking, and other features (Moore and Sward, 2007). The game engine is the developer firm’s intellectual property, or proprietary technology (Bogost, 2007).²³ The development of the game engine is a very high risk and costly affair and, therefore, the engine often serves as development platform for multiple games. For example, Valve’s Source engine is the vanguard for the Half-Life 2 series, the sequel Team Fortress 2, and the recent developed Portal. In addition, the game engine is frequently licensed to third party developers. As game engines are portable and can be used to work and develop on multiple platforms, they are often referred to as game middleware (Mayer, Bekebrede, and Stegers-Jager, 2007). For example, the Unreal Engine 3 was used by 2K Games to develop Bioshock and the US Army used it for America’s Army 3.0. These practices are facilitated by the engine’s *modular design* that allows other developers to, for example, build engine plug-ins for

²² With a *level editor* a particular part or objective (‘level’) of the game/3D environment can be designed.

²³ Nowadays, game engines just like games have an ongoing development cycle involving constant updating. For example, there are currently three versions of the Unreal Engine (Epic Games).

offloading software routines (or, libraries) like Havok (Moore and Sward, 2007; Nieborg and van der Graaf, 2008; cf. Langlois, 2002).²⁴

For only a minority of developer firms the game engine is also a ‘canvas’ that enables and facilitates mod development.²⁵ Not many developer firms open up their engine for mod development nor can the engine technology itself be modded (cf. Jeppesen, 2004). Examples of developer firms that encourage and facilitate user participation in FPS modding are Valve (Source engine), id Software (id Tech), and Epic Games (Unreal engine). Mod developers tend to get access to (parts of the) game code and a firm-designed toolkit that allow them to customize and design essential parts of the game.²⁶ For example, Valve prohibits mod developers to access the Source code for the renderer, networking, physics, and sound system. However, for the parts that are unlocked, if compatible, third party tool sets like graphic editors and first party toolkits may also be used.²⁷ The game engine is thus not “infinitely adaptable” nor “content neutral” (Dovey and Kennedy, 2006: 57).

2.4.3 Engines and interfaces: virtual worlds and 3D collaborative platforms

In August 2007 id Software expressed its interest in developing Quake Zero, a FPS based on the code base assets of Quake III: Arena, as a free Internet application; not as a stand-alone game but rather as part of a community-based service.²⁸ This step seems to parallel the increasing popularity of Internet-based 3D environments such as Habbo Hotel (Sulake Corporation), Runescape (Jagex Ltd.), Club Penguin (New Horizon Interactive), Webkinz (Ganz), and Guildwars (ArenaNet). Currently, World of Warcraft is by far the most popular virtual world and Second Life seems to be the most extreme example of a 3D collaborative platform. The remainder of this section joins the previous FPS discussion by drawing on the ‘under-worlds’ of World of Warcraft and Second Life. Although, the rationale for the focus on Second Life in this study has not yet been presented, this section locates the importance of Second Life in emerging firm-hosted mod development and mod culture (see Section 4.3).

²⁴ Within this context, modularity also means that parts of the engine can be upgraded without ‘breaking the code’.

²⁵ See John Carmack (Doom, Quake and Wolfenstein series) on the importance of enabling game technology at <http://www.1up.com/do/newsStory?cid=3161743> (accessed 6/02/08).

²⁶ Partly facilitated by the engine’s modularity the developer firm tends to close off some parts of the engine for mod developers, this in contrast to third party licensees and first party developers.

²⁷ Personal communication with Tom Leonard, software engineer at Valve (10/08/07).

²⁸ See <http://wire.ggl.com/2007/08/22/quakecon-2007-john-carmack-keynote-video/> (accessed 6/02/08).

2.4.3.1 *World of Warcraft*

World of Warcraft runs a client-server system architecture for which the client software needs to be purchased. Users install client software on their computers in order to connect to remote server software that continuously runs the virtual world. In order to run these environments network protocols, security (e.g. to prevent cheating; cf. Consalvo, 2007) and a (relational) database design must be in place.²⁹ Maintenance requires sufficient servers and bandwidth, and support. One reason for this is that insufficient resources for maintenance or an acceptable level of user populations per server may lead to lag (and frustration) among users (Esbensen, 2005). Like many other virtual worlds the system architecture of World of Warcraft is such that the world is run on separate servers. This is commonly referred to as ‘shards’ (McFarlane, 2005). It means that the world is split up into a number of parallel environments through clustered servers, all of which run parallel instances of the same world but with different sets of users (Ye and Cheng, 2006). The drawback of the deployment of shards is that it splits up the user base by dispersing users over separate, non-interacting environments.³⁰ More specifically, the shard model is based on a fundamental distinction between static and dynamic content at the level of the (mostly) static environment and the (mostly) dynamic user (Rosedale and Ondrejka, 2003). As such, users cannot interact with any other potential user at any given time when s/he is exploring or playing on another server.

Mod development for World of Warcraft is enabled and facilitated by the developer firm’s API-based user customization tools (Gilbert and Whitehead II, 2007; Nardi and Kallinikos, 2007). These tools can only be used to mod the user interface via so-called ‘addons’ (i.e. files located in the mod developer’s game folder that enhance her/his interaction with World of Warcraft, such as created in XML) and ‘macros’ (i.e. combinations of actions that are executed in one go).³¹ Third party tools are not allowed. Nor are, for example, outside-world developed macros. In fact, those are considered ‘exploits’ – and, against the Terms of Service (ToS) - and can lead to some kind of punishment, and even to being banned (Consalvo, 2007; Taylor, 2006b). Users have thus full control over the ‘look and feel’ of toolbars, hot keys, and macros that assist in making alterations to, for example, the built-in player, menu buttons, and even the entire

²⁹ See http://www.gamasutra.com/resource_guide/20030916/lee_01.shtml (accessed 17/10/08).

³⁰ See <http://www.technologyreview.com/Infotech/19378/?a=f> (accessed 4/02/08).

³¹ See http://www.wowwiki.com/Interface_Customization (accessed 17/10/08).

standard World of Warcraft interface can be modded (and thus replaced) to induce its functionality. Furthermore, mods can be stand-alone, built on libraries, and can be a combination of several individually created mods.

2.4.3.2 *Second Life*

According to the ToS Linden Lab perceives its own role as that of service provider in enabling and facilitating online user interactions on a platform where users, gratis or for a subscription fee, are free to choose, develop, and modify the service environment.³² This seems to push Second Life in the direction of approaching an advanced level of a social network service that is intertwined with 3D attributes. More specifically, Second Life is a *Web-based 3D collaborative platform* that constitutes the so-called Second Life Viewer, or, client application (see Section 6.3.2). The Viewer enables its user (also known as ‘residents’) to access and interact with the 3D platform and others.³³ The Viewer is similar to a Web browser à la Firefox in that both are software applications that connect to Web servers (‘the grid’) and retrieve, or render, respectively, 3D content or Web pages on the user’s screen. Thus, the Viewer looks after the display and interaction of users with text, (moving) images, sound, etc., located in Second Life or a Web page.

Second Life is not operated using shards. Instead, the 3D collaborative platform is designed according to a topologically tiled grid. This means that the ‘four nearest neighbours’ connected simulators look after the physics, run scripts, manage the objects and the overall land within a fixed square region of space (Rosedale and Ondrejka, 2003). So, when objects move around the physically simulated platform, their representation is transferred (along with, for example, scripts, objects, and textures) from simulator to simulator when they cross over the ‘boundaries’. More specifically, each server runs a physics simulation (recently upgraded to Havok 4) that looks after interactions among all objects – non/moving and non/physical - in a certain part of the platform.³⁴ Assets are digital items, such as the shape and appearance of an avatar, textures and sound clips, and are stored in a MySQL database.³⁵

Second Life has also a built-in toolkit, that is, the ‘browser’ and ‘tool’

³² See <http://secondlife.com/corporate/tos.php> (accessed 2/02/08).

³³ See https://wiki.secondlife.com/wiki/User_Interface_Improvements (accessed 6/02/08).

³⁴ See https://wiki.secondlife.com/wiki/What%27s_Changed_With_Havok4 (accessed 17/10/08).

³⁵ See <http://dev.mysql.com/tech-resources/interviews/ian-wilkes-linden-lab.html> (accessed 17/10/08).

functionalities are integrated (cf. Forge of Halo 3 for Xbox 360), allowing users to build, script, and texture (see Section 6.3.1). For example, with a 3D modelling tool users can build buildings, vehicles, furniture, and so forth that can be used, exchanged, or sold, and with the Linden Scripting Language behaviour of in-world objects, can be managed and controlled.³⁶ Certain graphics, animations, and sounds can also be externally created such as with third party animation editors like Poser, and uploaded into Second Life.³⁷ The underlying technologies used are a mixture of proprietary, free, and open source software, such as Apache (for the operating system) and Mono (a simulator upgrade). Since January 2007, (part of) the Second Life Viewer has been open sourced under version 2 of the GNU General Public License with a FLOSS exception.³⁸ As a result, user-modded Viewers such as a graphic Viewer ‘Nicholaz Edition’³⁹ have been created and made available for everyone to use. In the future, Linden Lab may move towards standardizing the Second Life protocol and continue to open source its client and servers (cf. Gallagher and Park, 2003; see Sections 6.3.2 and 6.3.3).

2.5 Conclusion

This chapter has drawn attention to the growing significance of mod development in the contemporary games and wider 3D software industries. Developer firms of several FPS, virtual worlds, and 3D collaborative platforms actively support mod development yet they somewhat limit access by granting access to, in most cases, certain parts of the engine (generally for technical and artificial reasons), and by providing particular toolkits, and (binding) legal agreements. World of Warcraft allows its users only to mod the interface, toying with any non-interface files is prohibited and may lead to suspension of one’s account. From this perspective, FPS modding can be seen as the most innovative and sophisticated instance of modding for PC games. Yet in comparison to Second Life’s seemingly open and extensible platform, PC-modding is legally and economically rather limited.

Developer firms seem, therefore, to work with a certain idea of users in mind. This may help them to make certain trade-offs during the development process

³⁶ See http://en.wikipedia.org/wiki/Linden_Scripting_Language (accessed 3/02/08).

³⁷ See <http://blog.secondlife.com/2006/09/02/free-poser/> (accessed 3/02/08).

³⁸ This is an additional clause granting its usage with several other free software packages. See http://secondlifegrid.net/programs/open_source/licensing (accessed 16/10/08).

³⁹ See <http://nicholaz-beresford.blogspot.com/> (accessed 4/02/08).

embedding the platform with particular forms of usage that users can engage in, negotiate with, and remake and that may provide the developer firm with input and feedback. In other words, the (strategic) position of the developer firm towards encouraging and facilitating user participation can be viewed as a rather complex dynamic between opening up and closing off parts of the product development process and this may have a profound cultural, social, and economic impact.

Yet, not much systematic attention has been paid to several of these aspects underpinning what constitutes mod development in the commercial context of the developer firm. In the remainder of this study, Second Life provides the setting for building the framework to investigate the ways in which product development is achieved in dynamic firm-user interactions. The next chapter develops and discusses the theoretical underpinnings and conceptual framework of this study to understand, assess, and appreciate mod development on the firm-hosted platform.

Chapter 3 The I in participation, innovation, and learning

Another perfect place

- Mike Patton⁴⁰

3.1 Introduction

In this chapter the theoretical and conceptual foundations of this study are introduced, discussed and defined. The user participation literature developing within media theory constitutes the main theoretical framework. Yet, whereas the user participation literature has yielded a comprehensive understanding of users as active and creative participants in media consumption, less attention has been given to the systematic identification of the underlying dynamics of user participation in the commercial context of the firm that underpin the firm-hosted 3D platform. Therefore, the user participation literature is supported by a combination of insights brought about in work on communities of practice and user-centred innovation, illuminating the role of users in knowledge production and development practices using firm-provided toolkits so as to aid product development efforts across firm boundaries.

The structure of this chapter is as follows. Section 3.2 introduces the user participation literature, thereby focusing on the intertwining of relatively cheap and easy-to-use Web technologies, facilitating user creativity in the participation of digital development practices and a growing number of firms that seek to lever and promote user participation on their Web-based platforms. It discusses and assesses the topics concerning participation in cultural production, commerce, and labour that seem to underpin a reworking of the organization of firm-user relationships. Section 3.3 examines subsidiary research that links user creativity to a knowledge-based view of the firm. User participation is shown to signal practices of peer production that offer opportunities for collective learning to take place in what have been termed communities (or, networks) of practice. Section 3.4 focuses on the subsidiary understanding of user participation as actively engineering a distinctive aspect of the domain of innovation that situates innovation across permeable boundaries of the firm. Particular attention is drawn to the toolkits for user innovation perspective. This is

⁴⁰ Mike Patton, Another Perfect Place, *A Perfect Place* (Ipecac Recordings, 2008).

situated in discussions concerning who, why, and what users innovate, modularity and generativity, and entrepreneurship. Section 3.5 concludes the chapter and develops the conceptual framework for this study.

3.2 “You’re analog players in a digital world”⁴¹

According to a recent study from the Pew Internet & American Life project, teens (aged 12 to 17) and ‘Generation Y’ (aged 18 to 32) are more likely than older generations to use the Internet for entertainment and communication purposes (Jones and Fox, 2009).⁴² Findings have shown that these groups are more likely to have an interest in online sites where they can play and download videos, games, and music, and can engage in social networking sites. Some 78% of teens (vs. 50% of Generation Y) indicated that gaming is their favourite online activity, followed by using email (73%). Moreover, earlier findings have reported that some 64% of all teens have created online media content, and about one-third of these teens have shared it with others (Lenhart, Madden, Macgill, and Smith, 2007)⁴³. Looking at user-created content practices in an European context, research has found that one-third of all Internet users between 16 and 74 have participated in online messaging, peer-to-peer networks, and Web page creation (OECD, 2007).⁴⁴ Especially, those aged between 16 and 24 have been engaged in creation activities. Some 13% of all EU Internet users have contributed on a “regular” basis to blogs and 12% have “at least once a month” downloaded podcasts (OECD, 2007: 22). With YouTube, Wikipedia, Facebook, MySpace and Twitter ranking among the world’s most popular Web sites, we are witnessing actively involved users in, what have been referred to as, *participatory cultures* which tend to underpin an apparent connection between user creativity associated with Web 2.0 applications and tools, and some kind of novel configuration between (media) industries and consumers with particular attention to a shift in power relations.⁴⁵

In the early 1990s Henry Jenkins introduced the term *participatory culture* in the

⁴¹ Ocean’s Thirteen (Warner Bros. Pictures, 2007).

⁴² See <http://pewresearch.org/pubs/1093/generations-online> (accessed 6/02/09).

⁴³ The study was based on N = 935 parent-child (aged 12-17) pairs in the US.

⁴⁴ Based on the following countries: Finland, Norway, Iceland, Portugal, Luxembourg, Hungary, and Poland. Internet World Stats provides more information concerning Internet penetration worldwide. See <http://www.internetworldstats.com/> (accessed 15/10/08).

⁴⁵ See <http://www.alexa.com/topsites> (accessed 8/7/09).

context of his interest in media spectatorship. His early work focused on incremental user activity in Star Trek fandom which appeared at a time where fans tended to be considered as only marginal to the way mass media was produced and consumed. By drawing on Michel de Certeau's work on active readership, fans were described as 'rogue readers' underpinning de Certeau's model of appropriation (Jenkins, 1992). More specifically, based on ethnographic accounts Jenkins suggested that fans were 'textual poachers' which referred to their ability to borrow and inflect media images and products by which they construct and understand their own identity.⁴⁶ Thus, fans appropriated content from mass media and reshaped it to serve their own needs and interests involving a continuous process of the production and manipulation of meanings.

This influential work draws attention to the multifaceted nature of people's relationships with media investigated in audience research, in particular, the branch of audience reception research that concerns the interpretative analysis of audience reception. A range of research has occurred especially focusing on the interaction between the text and reception underlying extensive debates concerning active-passive and homogenous-divergent perceptions of audiences (Fiske, 1987; Hall, 1980; Morley, 1993). From this perspective, Livingstone (2007: 19-20) concludes that "research has clearly shown that audiences are plural in their decodings, that their cultural context matters and that they cannot be presumed to agree with textual analysis [...]" and, in order to "elucidate when and where and under what circumstances different kinds of sense-making occur", more research is needed into the many parameters underpinned by textual and social determinations.

In the context of digital technologies such as the Internet interpretative activities draw particular attention to the parameters underpinning media design and use, extending the conceptualization of active audiences, especially, as users of and participants in online cultural production. In addition to the production of meanings, users actively engage in shaping, altering, and distributing media texts, or content (Burgess, 2007; Livingstone, 2003). These emerging online sites of, what Bruns has termed, *produsage* (a combination of production and usage) such as social networking sites and citizen journalism, point to a moving away from industrial practices towards

⁴⁶ Products such as movies and games are conceptualized as *texts* upon interaction with users informing meanings/pleasures (Fiske, 1987).

'user-led online environments' (Bruns, 2007; cf. 'pro-am' in Leadbeater and Miller, 2004, and 'prosumer' in Toffler, 1970). Moreover, these user-led sites seem to underpin an information-based model rather than a trichotomous industrial model of production, distribution, and consumption. From this viewpoint, the status of the product (as information and/or intangible) is understood as a dynamic that is collaboratively produced by participants who are all producers and users (or produsers) of information and knowledge, and which, in Bruns view, makes the term 'product' obsolete.

Participation has become an important term in developing a framework to understand the online media practices that have emerged and have been associated with some kind of shift in connection between online media consumption and production. When Jenkins (1992) introduced the concept of *participatory culture* it was precisely to distinguish between active media spectatorship as user participation in online cultural production and a kind of consumer culture emphasizing the mere consumption of corporate media content. In this view, users are migratory, socially connected, and resistant, describing a 'collective intelligence' where users have more control over the flow of information brought to them by firms (cf. Lévy, 1997). From this perspective, Jenkins (2006a: 5) has defined a participatory culture as a culture,

1. With relatively low barriers to artistic expression and civic engagement
2. With strong support for creating and sharing one's creations with others
3. With some type of informal mentorship whereby what is known by the most experienced is passed along to novices
4. Where members believe that their contributions matter
5. Where members feel some degree of social connection with one another (at the least they care what other people think about what they have created).

Involvement in a participatory culture can therefore range from community membership based on shared interests, to active engagement in practices such as collaborative problem solving and digital development. This implies that all members may contribute according to their own desire, needs, and skills to do so. In his work on *convergence culture* Jenkins (2006) further explores the relationship between media spectatorship and participatory cultures at a moment where we can witness an increasing interest of firms in user (arguably, at times, similar to 'fan-like') activities for reasons such as revenue opportunities and re-enforcing consumer commitments. This 'collision' of firm and user interests draws attention to the interplay between the structured commercial agenda of media firms and the, generally, differently purposed

agenda and appropriations of users within participatory communities. At stake is the interplay between structure and agency that alters the logic by which both firms and users process information and media content. By exploring different types of user engagement with media entertainment, such as spoiling (à la *Survivor* (CBS, 2004) and transmedia storytelling (à la *The Matrix* (Warner Bros., 1999), Jenkins has sought to illuminate the changes occurring in a top down firm-driven and a bottom up user-driven relationship underpinning many contemporary Web-based participatory platforms.

Of particular interest in this study is this linkage between user participation in creative practices and commercial practice which has been associated with technological advancement associated with Web 2.0 and the perception of 'production' as 'culturalized', and is conceptually known as participatory culture. In developing the framework for the investigation of this topic other lines of enquiry were, at different times, considered such as actor-network theory and those developed within cultural studies. The next section explains why these might have provided alternative directions but were dismissed.

3.2.1 Roads not pursued

In the examination of the specific formations of various actors such as mod developers, firm developers, and the toolkit underpinning the development of the firm-hosted 3D platform, actor-network theory (ANT) can offer guidance in explaining the extent of interrelations among different elements involved in appropriating, designing, and regulating, etc. product development across firm boundaries. ANT stems from an interest in social order developing in work within the sociology of science and technology (Callon, 1986; Latour, 1999; Law, 1992). It seeks to reveal sociotechnical processes through networks of relations consisting of human and non-human actors (e.g. technologies). The different entities within those networks, whether human or non-human, are considered to have no a priori essence or substance before their networked association, rather this is derived via the connections routed through them. Connections are thus not natural but emerge historically (Ritzer, 2004).

In its offering of a social embedding of technology ANT can support the investigation of the materiality of flows between the developer firm and user base with particular attention to power asymmetries (cf. Schäfer, 2008). However, whereas this may draw particular attention to the relative positions among involved actors within

those networks, the dynamics of action largely remain unexplained (Couldry, 2003; Silverstone, 1994). In other words, ANT seems to prefer to focus on the establishment of networks leaving less room for addressing the dynamics concerning, among others, individual agency, the generation of interpretations, and network changes over time. Consequently, although ANT might have been pursued to yield insight into certain aspects of the organisational dynamics in the context of product development across firm boundaries, it would have remained rather silent in investigating the qualities of user participation and aspects of (individual) agency in knowledge production and innovation underpinning product development.

Another line of enquiry that might have provided an alternative route to study user participation and creativity is cultural studies which informed my 'first academic life' and spurred my interest in firm-user relationships.⁴⁷ Notwithstanding the seemingly risky business of defining cultural studies in the context of interdisciplinary and international research topics and approaches, cultural studies have had a strong political engagement with culture (cf. van Heur, 2008). More specifically, cultural studies have tended to yield insight into the active and participatory role played by audiences/users in 'culture', that is, in the construction and negotiation of meanings and interpretations (Ang, 1991). An analytical framework frequently employed encapsulates 'industry-text-audience' relationships (cf. Burgess, 2007). It suggests that, if we are interested in meanings, media firms responsible for the production of products can only be understood in dynamic relationships with audiences. As outlined earlier, whereas the firm was viewed as the sole producer of products and audiences/users were seen as producers of meanings in relation to the product/text, especially since the 1990s, research has shown that users are consumers and producers of meanings and texts (Hartley, 2004). Rather than focusing on meaning production based on the interaction between products and audiences, those studies have tended to focus on processes of production through the interaction of author/production, text/product, and audience/consumer (while refraining from developing an overly economic focus).

This line of investigation seems to offer a valuable framework to investigate contemporary user participation on the firm-hosted platform yet it has not been pursued

⁴⁷ By linking a cultural studies perspective of 'conflict' (or, 'resistance') to a 'consensus'-driven theory of communicative action I investigated how the Hollywood actor became textually and culturally produced and constructed into a popular media figure, highlighting the advance of the actor's bankability in the movie industry (MA, Utrecht University, 1999).

in the present study. Why? The answer can be found in cultural studies' predominant interest in the investigation of the (determining) status and processes of meaning making in relation to media as texts or structures of production. Such an emphasis is considered somewhat limiting in the attention it can direct to the investigation of concatenated organizational forms associated with particular cultural practices and learning relationships, where participation across firm boundaries is linked by the organization of production.

What does the user participation literature has to say about user participation in the context of commerce? The next section links user participation to the notions of the cultural and creative industries.

3.2.2 *User participation, creativity, and commerce*

A considerable amount of research is available that concentrates on media (and arts) as cultural and creative industries with particular attention to the economic and social benefits of creativity. Both terms tend to be applied in season and out of season, seemingly suffering from diverse definitions and lacking a robust understanding concerning 'creative activity' (cf. Higgs, Cunningham, and Bakhshi, 2008).⁴⁸ Adding to the confusing mix is the frequent interchangeable application of the terms creative industries and cultural industries.⁴⁹ Generally, the creative industries are said to differ from the cultural industries in their focus on novel and wider applications of creativity rather than concentrating on, especially, subsidized art forms (Cunningham, 2002; Pratt, 2004). More specifically, the creative industries are said to extend the cultural industries by their incorporation of copyright, or, where creativity is seen as input and intellectual property as output (Galloway and Dunlop, 2006). As a result, the creative industries seem to have been defined by an (perhaps) implicit industrial outlook, that is, what and how things are produced in terms of industrial activity and material in/outputs. Potts, Cunningham, Hartley, and Ormerod (2008) have argued that such a perspective is

⁴⁸ Whereas the cultural industries can be said to describe a 1930s cultural critique associated with the Frankfurt School; a 1970s and 1980s reconsideration of existing commercial industries as cultural; practices concerning the applied arts; and, neoclassical economics in the context of subsidized arts (Cunningham, 2002; Flew, 2002), the term 'creative industries' tends to be linked to the 'new economy' where a new configuration is said to exist between firms and users associated with technological and organizational innovation (Cunningham, 2002; Flew, 2002; Mansell, 2004).

⁴⁹ See for critical comparison between cultural and creative industries Galloway and Dunlop (2004)'s discussion of creativity, intellectual property, symbolic meaning, use value, and methods of production (cf. 'cultural economy' in Pratt, 2008).

limiting due to building on many features of the service economy and because of their association with what was previously considered a non-market economy of cultural public goods.

However, the association of creative industries with novel configurations of firm-user relationships with particular attention to decreasing marginal activities of user participation, may yield substantial market value. Within this context, Hartley (2008: 8) calls for a rethink of 'industry'. This is informed by the idea that participation is a multifaceted dynamic by encapsulating all "agents involved in the system, not just inherited corporate structures" as participants. Potts et al. (2008) propose to view the creative industries as an emergent market economy instead of as an industry. This means a preoccupation,

not with the character of inputs or outputs in production or consumption *per se*, or even with competitive structures, but with the character of the markets that coordinate this industry. We think they are both complex and social, and that this offers a useful analytic foundation. The central fact about creative industries markets, then, is that complex social networks play at least as significant a coordination role as price signals (Potts et al., 2008: 3).

Such an approach to creative industries joins the market and social networks associated with participatory cultures together and, in this capacity, may underlie opportunities for innovation and learning across firm boundaries that potentially benefit (the growth of) the firm. In this regard, *creativity, as a mode of innovation and an area of economic activity, is not understood on an individual basis but rather is a process that is evoked in a context and organization of actants, knowledge, networks, and technologies* (Pratt, 2004). More specifically, user participation in production (and consumption) practices is said to be constituted in networks of practitioners stressing 'information feedback' over individual preferences or price signals, suggesting a move beyond the investigation of 'media power' towards the 'growth of knowledge' (Potts et al., 2008). Put aptly by Hartley (2008: 8):

Where the media (in the guise of 'cultural industries') were regarded as the social technology of ideological control in the modern industrial era, the creative industries may be regarded as the social technology of distributed innovation in the era of knowledge-based complex systems.

Potts et al. (2008: 4) suggest that the 'social network market' typically arises from non-market dynamics that are brought into a commercial setting and tends to operate in the "complex borderland between social networks and established markets".

Three riveting illustrations where ‘Web 2.0 is put to work’ are MySpace, YouTube, and Flickr that all may bring particular technology and expertise to the tables of respectively News Corp., Google, and Yahoo! but mostly they bring in a vast and rapidly growing community of users. This particular perspective draws attention to (emergent) markets that are demand-driven. *Rather than a linear or causal ‘chain’ of production associated with a supply-driven approach, the ‘social network market’ which is built upon in this study, is viewed as a dynamic underpinned by a (relatively) open system where everybody (firms and individuals) can come up with ideas and these may be taken up and dispersed into the network and retained by commerce* (Hartley, 2008; Potts et al., 2008; cf. Pratt, 2008).

In its ‘commons-like’ approach with respect to a commercial platform, the social network market perspective seems to be cut from a similar cloth as Benkler’s (2006) ‘commons-based peer production’.⁵⁰ This concept describes the collaborative, or, relational characteristics of the *wealth of networks* underpinning user participation as important social, political, and economic force in the emergence of the ‘networked information economy’ that, so Benkler claims, operates “radically decentralized, collaborative, and non-proprietary” in the absence of market signals and managerial commands (Benkler, 2006: 60). With particular attention to users’ creative endeavours (as a new kind of folk culture) underlying a more transparent and malleable cultural production system, user participation can contribute to ‘cultural freedom’ underpinning the efficacy of individuals in a more democratic culture of non-market-based participation and self-reflexivity. For example, Wikipedia is indicative of individual creative efforts and large-scale (mass) collaboration without the assertion of exclusive rights or, in many cases, markets, yet Wikipedia seems to play a significant role in the production of information, knowledge, and culture.

Benkler also acknowledges that firms such as IBM⁵¹ now increasingly seek to adopt those commons-based peer models as they can serve as a solution space and an alternative information source guiding demand and supply. While he does not offer a particular frame of reference to interpret the commons-based peer production

⁵⁰ Also both perspectives make frequent references to literatures stemming from evolutionary and experimental economics and evolutionary biology.

⁵¹ IBM takes both a supply-side and demand-side approach to its business strategy. Despite its many patents, IBM works very hard to adapt its business model to free software like the Linux kernel, donating patents to the Free Software Foundation, hiring expertise from the developer community, etc. which has resulted in rapidly increasing revenues (Benkler, 2006; Hamel, 2007; Tapscott and Williams, 2006).

perspective, Benkler does foresee a key challenge for firms to come up with the means to interact with and, perhaps integrate, these (voluntary) social processes like Wikipedia without destabilizing or undermining the motivational structure and commitment that make them work. From this perspective, in order to develop such a conceptual framework, Benkler (2008) calls for a reassessment of human motivation and organization models which, in his view, needs to incorporate a wider understanding of human nature, action, and systems to represent a more collaborative and open system of cooperation. Thus, where the social network market in the context of the creative industries is proposed to replace 'the industry' the commons-based peer production is seen as an alternative mode of production and, thus, does not replace the industry (or, markets and firms).

Amidst questions about how to conceptualize the relationship between user participation and the firm, particularly, one issue concerning (free) labour, demands our attention. This is discussed next.

3.2.3 *All work and no play?*

With the 'collision' of user participation and the commercial world, attention is increasingly directed towards the apparent link between the work put in by users and (the circumstances of) employment. More specifically, as a growing number of users, in general, and mod developers, in particular,⁵² voluntarily dedicate hour after hour working for free on mod projects, research has sought to address the grey areas of work, leisure, and, to a lesser extent, ownership.

A Pew study on technology usage and the working lives of Americans reported that 84% of the respondents are in the employment of others, while the remaining 16% are self-employed (Madden and Jones, 2008).⁵³ Some 62% of the respondents use the Internet and email at work. They are called 'networked workers' and are more likely to access and use technologies such as cell phones, computers, and personal digital assistants outside of the work context. Networked workers are found to work more frequently from home than those that do not use these technologies to do their job. The study reported that 56% of the networked workers occasionally work from home, while

⁵² See also research on user participation in open source projects dealing with issues such as labour processes and/or commerce (Berdou, 2007; Raymond, 1999; van Wendel de Joode, 2005), business models (Feller, Fitzgerald, Hissam, and Lakhani, 2005), and licensing (Lakhani and Panetta, 2007).

⁵³ The study was based on N = 2,134 adults in the US and included 1,000 full-time and part-time adult workers.

20% of the respondents said they perform work at home on a (near) every day basis which is slightly higher than the results for all respondents (respectively 45% and 18%). Furthermore, workers with an income of US\$ 75,000+ tend to work more from home than those that make less than US\$ 30,000 (69% vs. 30%). The study also asked respondents about their social networking, video sharing sites, and gaming 'habits'. Some 35% of the respondents use social networking sites for personal and professional purposes and use them at work and at home. Online videos are watched by 53% of the respondents of whom only a small percentage strictly watches videos at work (3% at workplace vs. 37% from home). One in four employed Internet users reported to play online games at home, while only 3% reported that they game at the workplace. Yet, 43% of those aged 18 to 29 reported gaming both at home and at work.

The growing number of people that (occasionally) work from home seems to coincide with a scholarly interest in new ways of organizing work that is more decentralized and associated with information and communication technologies (Malone, 2004). At the same time, a call for 'creativity' can be heard; "creativity, once considered to be the work of God, or latterly the work of the god-like artist-genius, has been democratized. Today, politicians, business leaders, footballers and schoolchildren aspire to be 'creative'" (Bilton, 2007: xiii). In contemporary society creativity suggests a kind of 'talent-led economy' where,

work comes to mean much more than just earning a living; it incorporates and overtakes everyday life. In exacting new resources of self-reliance on the part of the working population, work appears to supplant, indeed hijack, the realm of the social, re-adjusting the division between work and leisure, creating new modes of self-disciplining producing new forms of identity (McRobbie, 2002: 99).

With creativity as a key element of cultural production underlying the creative industries, work and 'play' appear to become increasingly blurred suggesting that the organization of work cannot be understood separately from the domestic sphere concerning personal (and social) interests. For example, Lee (2007) has shown that 'creative workers' in London increasingly have a 'portfolio career' stressing a work-leisure flexibility underlying a perpetual entrepreneurial outlook to work where they 'commodify' themselves. Deuze, Martin, and Allen (2007: 350) have studied the working lives of 'gameworkers' and found that many make substantial sacrifices (particularly concerning working hours and copyright issues) to "call themselves game

developers.” Perhaps unsurprisingly, game developers are often hired from the mod community (Postigo, 2003; Sotamaa, 2007).⁵⁴ For example,

Valve contacted one of the other guys and so a couple of them came out here and then there was a business deal. It’s like the dream in the back of your mind, you don’t really expect for, especially someone like Valve, I mean a small studio maybe, but for Valve to come down and say, “Go work for us, you make a game,” you know, that was just unbelievable.⁵⁵

The employment of gamers/developers seems to be an important strategy to incorporate intellectual property underscoring Valve’s success with the incorporation of former mods such as Counter-Strike, Team Fortress, and Day of Defeat (cf. Dovey and Kennedy, 2006). By tapping into the heart of the gaming community developer firms appear to aim to incorporate those gamers/developers with the passion, skills and drive to make only the best of the best. The biggest challenge is spotting potential new hires that can work in an environment thriving on “very smart and talented people that are self-directed and yet know how to work with others and juggle their expectations.”⁵⁶ As diverse and industry-wide successful hires have indicated modding is, in many cases, a collaborative effort where mod developers from all over the world donate time and skills and work together on various aspects of production and development (Nieborg, 2005; Postigo, 2008; Sotamaa, 2007).

The various kinds of inputs provided by mod developers can provide value to the developer firm and (extended) community at large through their – in many cases, freely shared – knowledge and labour contributions (cf. Humphreys, 2005).⁵⁷ Free labour through value-adding practices balances somewhere in between paid and voluntary work and seems to be a sign of the times of the creative industries (Postigo, 2007; Terranova, 2000; Yee, 2006a). The main obstacles of ‘precarious playbour’ for mod developers are the “recognition of their status as creators of value for the industry and gamers alike, claiming their intellectual property rights and overcoming the ideological representation of modding as mere hobby” (Küchlich, 2005: 7). Indeed, mod

⁵⁴ For instance, expos and mod contents organized by developer firms can count on interest from mod developers. In general, winners can receive US\$ 50,000+ in prize money and/or a commercial license, and, in some cases, may get acquired by the developer firm à la The Desert Combat mod (Nieborg and van der Graaf, 2008).

⁵⁵ Interview with John Morello, mod developer of Day of Defeat, animator at Valve (24/08/06).

⁵⁶ Interview with Yahn Bernier, software developer at Valve (24/08/06).

⁵⁷ See Pine and Gilmore (1999) regarding value creation. They distinguish between work that produces value from something new (origination), from something done (execution), from something improved (correction), and from something used (application).

developers operate in a firm-hosted community from which the developer firm continuously seeks to benefit, albeit by proxy. More specifically, firms regard mod development as attractive sources for free brand creation à la game-turned-mod-turned-commercial-title Counter-Strike (Valve), extensions of the game's shelf-life, increased loyalty, innovation, and recruitment (Küchlich, 2005; West and Gallagher, 2006), while users seem to be drawn by activities such as problem solving, hacking, self-expression, and portfolio-building (Behr, 2007; Jeppesen, 2004; Sotamaa, 2007a).

Whereas both mod developers and developer firms actively appropriate and rework digital resources, it is typically only the developer firm that can claim full rights over their products and the firms have developed legal contracts outlining what can and cannot be done with the product (see Chapter 2); "the consequence is that we are less and less a free culture, more and more a permission culture" (Lessig, 2004: 8). Issues of artistic appropriation and fair use may have been dealt with in other media contexts such as music and film to "balance the rights of original creators' rights of intellectual property with subsequent creators' rights to expressive re-imaginings of that original material", yet legal scholarship concerning games/3D environments has tended to concentrate on the underlying code rather than user experiences (Baldrice, 2007: 684). The rights of mod developers tend to be bound by the firm's End-User License Agreement that typically denies any type of ownership and, as such, contributes to an unbalanced sketch of firm-user relationships in product development (Humphreys, 2008). The legal pay-off for user participation in development practices in games/3D environments remains pretty marginal in terms of legal protection and ownership rights associated with user creativity (cf. Koster, 2006; Sawhney and Prandelli, 2000).

Within this context, one might wonder how mod developers perceive of this 'industry gain' of the 'labour of love' they put in creation practices (in a romanticized picture of working) at night and in the wee hours of the morning within the confines of their homes. Who are all those 'you's' that are claimed to indulge in online cultural production? (Burgess, 2007; Tapscott and Williams, 2006). Without much systematic research readily available on user participation in an online context, the few studies that have appeared present a rather bleak picture, indicating that a relatively small percentage of users are actual creators (e.g. of blogs, upload videos, game mods).⁵⁸ For

⁵⁸ The definition of a creator is also contested as, in different studies, it tends to refer to a wide variety of low-skill, intermediate-skill, and high-skill activities such as publishing, uploading, (re)mixing, and modding.

example, in a study of American adult online consumers Forrester Research (2008) has shown that, among those people who use the Internet regularly, some 52% are inactive, some 33% are spectators, while only 13% are actual creators (Li and Bernoff, 2008). Nielsen (2006) introduced the '90-9-1 rule' to explain participation in wiki media, thereby attributing some 90% to readers, some 9% to minor contributors, and only 1% to active contributors (cf. 'social media pyramid' in Horowitz, 2006; 'participation gap' in Jenkins, 2006). The majority of users seem therefore to consist of those who like to be entertained by reading, watching, and downloading content contributed by others. Research has also insufficiently addressed motivations for participation which may be motivated by a communal desire associated with a shared enterprise or interest but may also be driven by individual needs or interests (van Dijck and Nieborg, forthcoming). Moreover, in the investigation of user participation no distinction tends to be made between users of firm-hosted and not-for-profit communities (cf. de Valck, 2005; Schäfer, 2008).

What is known about users participating in the context of games/3D environments? Although a rapidly growing body of scholarship can be detected in the evolving field of games/3D environment research, robust accounts of player characteristics are lacking. One reason for this may be related to a lack of access to game populations which has resulted in a tendency to rely on convenience samples. Studies have suggested, however, that gamer populations seem to be wide and diverse underpinned by differences in game genres and platforms (contrary to a more stereotypical perception of gamers as isolated teenage males). One well-known taxonomy of virtual world players, albeit developed without statistical data, was developed by Bartle (1996) which distinguishes between achievers, socializers, explorers, and killers. With Bartle's taxonomy in mind Yee's study (2006), based on data from 30,000 MMORPG players, sought to develop a taxonomy of players based on MMORPG demographics, motivations, and experiences. Insight was yielded into, among others, the relationship between the avatar and the offline personality, playing with real life romantic partners, and economic profitability from digital sales (cf. Turkle, 1995). Other illustrations of classifications have been based on game design and play styles (Sotamaa, 2007a), learning and guilds (Steinkuehler, 2005), and relative involvement, role-playing and scepticism towards the usefulness of MUDs for developing friendships (Utz 2000). Only a handful of studies have examined the

motivations of players who develop modifications. Based on interviews with thirty modders of *Operation Flashpoint* Sotamaa (2004) found five motivational dimensions for participation: playing, hacking, researching, artistic work, and cooperation. Similar findings can be found in Behr's work (2007) for which she interviewed fourteen modders of different mod communities, while adding the motivations facing challenges and gaining recognition. In addition to motivations, she also considered usage patterns of the modding technology in terms of communication, behaviour, perceived social norms, and restrictions. While showing similar motivational patterns, mod developers could be classified in terms of usage patterns as committed youngsters, experienced leaders, part-time modders, and project-oriented modders.

So what can we take-away from the review of the user participation literature in the context of the present study? With its focus on democratizing aspects of user creativity, or, in other words, social advancement through technological progress associated with Web 2.0, the user participation literature offers a good starting-point for the investigation of the firm-hosted 3D platform as a site of participatory culture. There are, however, weaknesses in the theoretical, empirical, and methodological approaches in the existing literature. One weakness is related to the apparent link between user participation and technological advancement. Too readily research tends to overestimate (or, 'hype') the creative capacities of users and their contributions to product development, while aspects of (such as variations in) the design and use of technologies (e.g. software routines, toolkits) tend to be under-exposed, or even absent from many discussions. Moreover, scholars have been quick to relate this kind of social progress through user participation to the organisation of the media industry, where some kind of shift in the power relations between media firms and users seems to be implied rather than systematically investigated. Also, insufficient attention has been given to the ways users may participate on the firm-hosted platform (in contrast to not-for-profit platforms), what they may contribute, and how and with what frequency they may interact with others. On a similar note, a blind spot seems to have developed concerning the role of the firm, directing our attention from 'firms as producers' to 'firms as platform (or, service) providers' coinciding with a shift in legal contracts, and which, arguably, underpins the extent of user participation.

As this study aims to highlight the unfolding dynamics between the various

participants involved in product development, rather than concentrating only on the roles of users-as-participants on the firm-hosted 3D platform, the investigation is supported by themes within the communities of practice tradition and the user-centred innovation literature. In doing so, this study seeks to address and remedy some of the weaknesses of the user participation literature underpinning the identification and analysis of the constituents involved in the development and organization of product development across firm boundaries. These two subsidiary literatures are used to draw particular attention to interdependencies developing between the firm, users, and technologies on the firm-hosted 3D platform, thereby illuminating the growing significance of users in knowledge production and innovation associated with the emerging knowledge-based economy.

3.3 “You’re so money and you don’t even know it!”⁵⁹

A growing number of firms looks at the (emergent) properties of online communities such as social networking sites to acquire, engage, and retain customers. Communities are viewed as meeting points for firms and users where knowledge and information can be generated and exchanged and transactions executed (Hagel and Armstrong, 1997; de Valck, 2005). In this marriage of commerce to customer loyalty user participation in the firm-hosted setting holds the ‘key to wisdom’ (cf. ‘witkey’ in Zhou, 2008). More specifically, the rise of user creativity is said to downplay professional expertise associated with a closed and proprietary-based understanding of the firm, favouring the growth of knowledge associated with open networks encompassing all participants, across firm boundaries. Complementing the creative industries perspective discussed above, user creativity on the firm-hosted platform is said to produce knowledge that may create learning opportunities for the firm. These converging firm-user dynamics occurring in communities, or networks, of practice draw attention to the importance of the role of knowledge in social and economic development stressing the “need to continuously harness new technologies and processes to develop knowledge societies that are people-centred, inclusive and development oriented” (Unesco, 2007: 1; Lave and Wenger, 1991).

The next sections discuss the communities of practice perspective (Section

⁵⁹ Swingers (Independent Pictures, 1996).

3.3.1) with the aim of highlighting the make-up of firm-user learning dynamics underpinned by a knowledge-centric view of the firm (Section 3.3.2).

3.3.1 Communities of practice

Since the early 1990s a substantial literature can be observed focusing on the role of communities in knowledge production and innovation that, in various research contexts, is informed by concepts such as epistemic communities (Haas, 1992), communities of consumption (Kozinets, 1999), and communities of practice (Lave and Wenger, 1991). Here, I take an interest in communities of practice (CoP) theory for its application in management and organization studies drawing attention to a knowledge-based view of the firm built around communities.

Lave and Wenger (1991) originally developed the notion of CoP to understand learning as a situated activity outside the formal education system. In five accounts of apprenticeship in rather small and tight-knit communities of, respectively, Mayan midwives in Yucatan, Vai and Golan tailors in Liberia, quartermasters in the US navy, US supermarket butchers, and non-drinking alcoholics, they have provided an understanding of learning as a social process encapsulating a group of people engaged in a shared practice. The learning model, in Lave and Wenger's theory, involves a process of 'legitimate peripheral participation' (LPP) which highlights an interdependent relationship between being a newcomer and being an insider in the community. LPP draws attention to ways in which outsiders become new participants and learn (preferred) ways of participating, reframing participants' ways of thinking, interests, shared practices, and identities, and so forth binding the community. Thus, LPP provides insight into the process whereby newcomers entering a community learn practices from the old schoolers. This process involves some sort of contribution from the apprentice to the community and when s/he masters these peripheral practices an increase in her/his legitimacy can mean (slowly) progressing inwards from the periphery to becoming an established and fully participating member. For example, in World of Warcraft (Blizzard Entertainment) peripheral participation is built into the character's beginner's level enculturating new players into the community.

Newcomers are given simple quests to help them adjust to their virtual environment [and] offer instructions and guidance as to where and what a player needs to achieve, [while] other players [...] act as teachers or classmates to aid the new player in adjusting to the game's social functions" (Lau, 2005: 10).

This linear direction moving from the outskirts towards becoming more embedded in the practices of the (core) community points to the notion of power. Access and transparency are hereby relevant.

To become a full member of a community of practice requires access to a wide range of ongoing activity, old-timers, and other members of the community; and to information, resources, and opportunities for participation. [...] Transparency when used here in connection with technology refers to the way in which using artefacts and understanding their significance interact to become one learning process (Lave and Wenger, 1991: 100-101).

Certain authority levels therefore exist that explicitly or tacitly permit or refuse someone's membership status. This was illustrated in Lave and Wenger's study on butchers in US supermarkets where achieving the status of legitimate apprentice did not automatically mean the right to move towards participation in the more advanced practices of the community. Understanding power in terms of acceptance and denial seems somewhat limited, however. For example, Berdou (2007) has shown that in many Free and Open Source (F/OS) communities inequality remains an issue after a newcomer has been accepted as a member. She argues that the open and fluid character of the community may widen the idea of membership yet with many formal and informal rules in place a sense of hierarchy may become re-established. Moreover, not every newcomer may have a desire to move to centre stage and achieve full participation. Some members that are considered to contribute peripheral practices such as administrative tasks may not necessarily be interested in becoming core programmers (Berdou, 2007). This seems to challenge Lave and Wenger's study of fairly independent and unconnected CoP (cf. Østerlund and Carlile, 2005). A more complex and multi-levelled perspective of CoP seems therefore desirable in the context of variances in user participation in software development at the invitation of modern-day firms.

Wenger (1998: 127) has developed the notion "constellations of interconnected practices" to stress the configuration of diverse but related CoP such as firms where CoP do not (per se) align with a business unit or team. Rather they can, for instance, emerge across teams or firm boundaries.

Organizations are social designs directed at practice. Indeed, it is through the practices they bring together that organizations can do what they do, know what they know, and learn what they learn. Communities of practice are thus key to an organization's competence and to the evolution of that competence (Wenger, 1998: 241).

In an organizational context the CoP perspective has been applied with particular attention to knowledge sharing within and across CoP, highlighting what Brown and Duguid (2001) have referred to as “networks of practice” (NoP). They argue that the idea of community leads us to believe that the firm is quite culturally homogenous but with diverse practices at hand the firm resembles more a “community-of-communities” of practice (Brown and Duguid, 1991; cf. Swan, Newell, Scarbrough, and Hislop, 1999). With the notion NoP Brown and Duguid have sought to encapsulate multiple and interconnected forms of social alignment and to predominantly stress the flow of varying yet equally important degrees of proximity of information or relationships constituted by loose epistemic groups. The terms network and community are not clear-cut and have received much scholarly attention, yet, generally it can be said that network refers to (somewhat) loosely coupled groups of members that may never come across one another (cf. de Valck, 2005; Feenberg and Bakardjieva, 2004; Rheingold, 1993; Wenger, 1998). It seems therefore that NoP is more appropriate in the context of Web-based applications such as forums, F/OS projects, and 3D environments, although both NoP and CoP have been widely (often, interchangeably) applied. This study builds on the perspective of a *constellation of practices that are networked in principle* stressing different dynamics and interdependencies among networked CoP (NCoP) where the fluid boundaries between the different practices are constantly fine-tuned.

The next section continues the discussion of the role of CoP theory in an organizational setting.

3.3.2 *The wisdom of the firm*

The importance of communities as facilitators of knowledge production, sharing, and application has, especially since the mid-1990s, coincided with a move in theories of the firm towards a knowledge-based view of the firm.⁶⁰ In this knowledge-based view, the production of knowledge is understood as the most important resource, or activity, of the firm and is a key source for competitive advantage (Nonaka, 1991; Spender, 1996; Teece, 1998). The success of firms or individuals is reflected in their capability to learn associated with the generation, exchange and utilization of new

⁶⁰ This perspective is said to have succeeded a ‘first generation’ of interest in a knowledge-centric view of the firm (associated with knowledge management) that was information technology- and systems-based suggesting that there has been a shift from collecting knowledge to perspectives on connecting people (Huysman and de Wit, 2004; Scarbrough and Swan, 2001).

knowledge, competence, and skills; it can be said that the firm or individuals generate wealth in proportion to their capacity to learn and share their creations (Foray, 2004; cf. learning economy' in Lundvall, 1996).

Notwithstanding long-standing debates that have sought to define knowledge, within the confines of this study, knowledge is understood as a (cognitive) capability. Knowledge can be defined by 'what we know', in other words, it involves the mental processes that are inaccessible to us (Polanyi, 1969). Information, on the other hand, is about expressing what we know such as through the written word or photographs. Therefore, the reproduction of knowledge can be said to concern learning, while the reproduction of information deals with duplication (Benkler, 2006). And whereas the marginal costs of information reproduction are close to zero, knowledge reproduction relies on a "master-apprentice system [...] or on interpersonal transactions among members of the same profession or community of practice" (Foray, 2004: 4). For example, using a cognitive ethnography methodology Steinkuehler (2005) selected a single unremarkable utterance of re-occurring collaborative practice in the virtual world Lineage (NCsoft) and used functional linguistics to yield insight into the nature of a given practice in-world, and the way language-in-use was situated and tied to the larger community marking membership within that community.

This draws attention to an aspect of *transferability* of knowledge which effectively underlies the sustainability of competitive advantage (Grant, 1996; Kakiyama and Sørensen, 2002). There is a considerable literature in which scholars have debated knowledge in terms of the tacit/codified distinction (Duguid, 2005; Johnson, Lorenz, and Lundvall, 2002). Different terms have been used to describe aspects of knowledge such as know-how and know-what (Brown and Duguid, 1998), soft and hard knowledge (Hildreth and Kimble, 2002), and information and know-how (Kogut and Zander, 1992). Generally speaking however, one camp has argued that tacit (or, implicit) knowledge is (unconsciously) known and cannot be accessed without becoming invalid and, therefore, remains unarticulated (Polanyi, 1969), while another camp has stressed that, albeit difficult, tacit knowledge can be made explicit through joint activities or interpersonal interactions (Nonaka, 1991; Senker, 1995; Teece, 1998). The perspective of this study is that *knowledge (rather than being captured) can be demonstrated through people's expressions and practices in relation to a social learning context of the networked community.*

A knowledge-based view of the firm increasingly recognizes communities as effective organizational means enabling and facilitating complex (tacit) knowledge sharing. Communities have been documented to support (voluntary) knowledge sharing, inform the development of relationships, nurture new knowledge, stimulate innovation, and share knowledge within and across firm boundaries (Blanchard and Markus, 2002; Lueg, 2003; Wenger, 1998). Attention has been drawn to the growing importance of networked sites, or communities, as repositories of knowledge (and innovation) advocating a view of learning that is profoundly linked to the conditions within which it is learned. The knowledge-based perspective understands learning as an interactive process where knowledge is a collective asset dispersed among networked firms and individuals, while enhancing competences of both (Lundvall, 1996). As I have outlined above, increasingly firms encourage user participation on the firm-provided platform. Through these networked communities users are seen to engage in various practices and exchange information, providing a basis for the firm's ability to know and learn, highlighting users as part of the firm's dynamic knowledge base. More specifically, where the firm actively seeks input from its users as external knowledge sources, firm boundaries can be defined by its knowledge base rather than by the firm's production function alone (Foray, 2004; Jeppesen, 2004; Sawhney and Prandelli, 2000).

When firms open up to inflows and outflows of knowledge for the advance of product development several challenges lie ahead such as attracting and motivating users to participate, allocating and coordinating in- and outputs between the firm and the user base, and accessing, filtering, and incorporating user contributions. The investigation into the underlying dynamics of the production, distribution, and application of knowledge and its impact on economic development has been wide and diverse and with different theoretical positions and contributions clear-cut lines and robust constructs for further investigation are not easily distilled. Furthermore, a substantial literature has concentrated on issues such as the accessibility and diffusion of knowledge yet has tended to bypass the organization of processes by which firms manage to stimulate, access, and convert (external) knowledge into specific competences and capabilities (cf. Washida, Kinoshita, and Awata, 2006). On another note, the adoption of CoP in a commercial setting raises an important question that has not been much addressed and which concerns the characterization of the CoP. In this view, the community tends to offer a structure of interdependence that can be

characterized by relations of a minimal hierarchy and organizational heterogeneity associated with bottom-up and egalitarian accounts of power (Powell, 1990). However, the community associated with, particularly within, the firm tends to be brought about by completing tasks and is generally related to financial rewards. Lastly, with the ‘explosion of information’ associated with the proliferation of digital technologies underpinned by concepts such as the ‘networked information economy’ and the ‘learning economy’, it may become increasingly difficult for firms to recognize and keep up with significant trends that may confer sustainable competitive advantage.

The next section discusses user participation in the context of research on innovation by users.

3.4 Toolkits for Extreme Makeover: Home Edition™

Since the early 2000s or so, home improvement shows have been filling the ether. For example, in *Trading Spaces* (RIVR Media, 2000) two neighbours receive US\$ 1,000 and a carpenter to redecorate a room in each other’s house and in *Extreme Makeover: Home Edition* (ABC, 2004) a team of professionals gives families ‘new hope’ by rebuilding their homes. Since we cannot all be Ty Pennington or Martha Stewart, these kind of TV shows teach people at home the tricks of the ‘build and decorate’ trade. They demonstrate and explain which tools to use in what situation, how to use them, and so forth, enabling and facilitating people to transform their homes in a dream house according to their own liking. This ‘tinkering and toying’ to personalize one’s living space links user participation to customization, highlighting the role of tools. User participation in the commercial setting of games and 3D software firms as set out in Chapter 2 is in many cases stimulated and facilitated by user toolkits, assisting users in activities such as writing and publishing code. Such a ‘democratizing’ tendency of user-centred innovation has received considerable scholarly interest. However, before I turn to this discussion, how is the term innovation used in this study?

The term innovation in the context of user participation in mod development is broadly viewed as aspirational, interactive, and integrative. *Innovation entails ways of seeing and doing such as ideas, objects, and practices that are perceived as new by an*

adopting unit (Rogers, 2003).⁶¹ Innovation also concerns the organization of firm-user interactions shaping and maintaining the firm-hosted 3D product rather than highlighting the role of the individual or specific points of within-firm innovation (cf. Fontana and Sørensen, 2005).⁶²

In this section I seek to consider some of the issues associated with the user-centred innovation perspective. First, I discuss the role of toolkits in innovation practices. This is followed by a consideration of who, why, and what users innovate.

3.4.1 *Toolkits for user innovation*

Arguably, innovation is as old as mankind. As a field of research, however, a substantial literature has emerged since the 1960s focusing on the sources of innovation and information, thereby recognizing that some of the most important new products and processes have been developed by user firms and end users (Fagerberg, 2003; Freeman, 1991; von Hippel, 2005). Given the scope of this study, the review concentrates primarily on innovation by (end) users (as in ‘private people’ or, consumers) which has shown a predominant concern with issues that arise from the tension between need information (generated by users) and solution information (generally originated by developer firm) which is conceptualized as *information stickiness*.

Successful product development deals effectively with information costs, where the firm is seen as being interested in economizing on the acquisition of reliable need information that assists in delivering a product tailored to users’ specific needs (while improving the knowledge base of the whole firm; cf. Franke and Piller, 2004). Firms and users tend to know different things, finding expression in the development of different types of innovations, thereby emphasizing that developer firms tend to focus on innovations based on known needs and users seem to stress functionality (von Hippel, 1994). It can be costly, however, to move information from one site to another.⁶³

⁶¹ Typically a distinction is made between *invention* and *innovation*, whereby invention is associated with first occurrences and innovation is said to refer to the commercial introduction (Arthur, 2006; Fagerberg, 2003). In this study the term innovation is more widely defined and is being generally used to refer to (production) practices concerning user participation/creativity without regard to the nuances in the existing innovation literature about the relationships between innovation, creativity and/or production or economists’ conceptions of innovation, creativity, and knowledge.

⁶² Innovations can be incremental and continuous, or more radical and discontinuous (or, first of type) associated with opening up new product categories and markets (cf. Antorini, 2007). See Rosenø (2005) for a discussion regarding the relationship between product innovativeness and innovation management practices calling for more nuanced innovativeness typologies.

⁶³ Sticky information can result from issues such as information access, e.g. tacit information tends to be costly as it is typically accessed and acquired through apprenticeship systems (von Hippel, 2005).

User needs can also shift upon product usage and devalue outdated user information stored by the developer firm (Jeppesen, 2004). Moreover, Franke and von Hippel (2002) have shown that developer firms tend to disregard a substantial number of within-segment variations in user needs because considering the needs of this ‘crowd of one’ would be costly in terms of design, production and/or marketing.

The stickiness of information, however, is not immutable. Stickiness can be reduced via investment to that end. In particular, new or improved products can be developed without having to transfer sticky information from users if they fulfil particular design tasks. Firm-provided toolkits have been shown to assist in this practice of systematically outsourcing certain design and innovation tasks from the locus of the firm to users. Toolkits tend to lower the threshold by enabling and facilitating user participation in product development, supporting users to create products that correspond to their individual needs (Piller and Walcher, 2006; von Hippel and Katz, 2002). As a result, the product development practice is repartitioned into sub-tasks between the firm and users, co-locating “problem solving tasks with sticky need-related information in the consumer setting”, which draws attention to *modularity* (Jeppesen, 2004: 17; see Section 2.4.2). A modular system can be understood as,

a nearly decomposable system that preserves the possibility of cooperation by adopting a common interface. The common interface enables, but also governs and disciplines, the communication among subsystems (Langlois and Garzarelli, 2006: 9).

Modularity as a product development strategy can offer a number of advantages (Brusoni and Prencipe, 2001; Langlois and Garzarelli, 2006). First, a modular system eases the task of coordination and downplays unexpected interactions. Second, modularity (particularly associated with the degree of standardization of the interface) allows firms to upgrade per module, or throughout the product life cycle. Third, modularity reduces production costs and time because, for example, different modules can be simultaneously developed and tapped into local knowledge (cf. ‘collective intelligence’ in Lévy, 1997). Several disadvantages of modularity include a possible decrease, especially in the short term, in overall product performance and, in comparison to non-compound systems, a modular system is more complex and, hence, a more thorough understanding of connections between modules is necessary in order to develop the system (Langlois and Robertson, 1992; Ulrich, 1995).

Toolkits can allow users different modalities in design possibilities, ranging from having very simple scope ('low-end') such as having the choice to select between various options like size and colour, to granting users the opportunity to come up with new products ('high-end') (Thomke and von Hippel, 2002). The more basic type of toolkit is typically used to exploit mature markets, while the more advanced kind tends to be used in the exploration of new and/or opportunities for products and services. Furthermore, it has been shown that high-end (or, expert) toolkits tend to pose a greater challenge to users and, consequently, demand a more advanced skill level, while low-end toolkits can be used by nearly any user (Franke and Schreier, 2002). Five important attributes have been shown to make toolkits useful or successful for the firm. Toolkits can (1) facilitate dynamic trial-and-error learning; (2) allow for a solution space in assisting and enabling (particular) design creation; (3) be (relatively) user-friendly; (4) provide libraries, modules, and other components for usage and inclusion; and (5) generate user-generated contents such as mods, that can be appropriated, (re)produced, and integrated by the developer firm (von Hippel, 2005).

Section 2.3 highlighted that, especially, FPS, virtual worlds, and 3D collaborative platforms tend to be purposely designed and equipped with a toolkit, enabling and guiding mod developers in unlocking (some of) the capabilities of the software's core. What can we learn from the use of toolkits in the games and 3D software industries? In their study on The Sims (Maxis) Prügl and Schreier (2006) sought to go beyond a solution-based perspective on the utilization of toolkits in the innovation process by investigating how users actually manage this invitation to participate. Based on 177 questionnaires and an estimated total population of 950 file creators (Mage = 26), they examined types of innovative practices, the handling of firm-provided toolkits, and peer relevance of user-generated outputs. Their study found that,

[...] users were not content with the toolkits offered by the developer firm [...] Instead, they tried to surpass the limits of the design freedom provided in firm-constructed toolkits by employing tools from related fields and by expanding the scope of existing tools or even creating their own toolkits. According to their underlying needs, users chose the appropriate toolkit from a broad range of available applications. Thus, different types of users employ *different types of tools*, which in turn lead to different types of innovation activities (Prügl and Schreier, 2006: 247).

Jeppesen (2004) came to a similar conclusion when he pointed to a so-called 'firm-constructed design limit' that constructs the space for user-driven innovation (cf.

'solution space' in von Hippel, 2001; 'third place' in Jenkins, 2006). On the basis of the relation between the employment of user toolkits and the need for developer firms to support their gamers, Jeppesen described the way a game developer sets technical limits to what the mod developer can do with the engine, graphics structure, and the editor. Jeppesen and Molin (2003: 379) have argued that there is,

a tension between a learning consumer community and deliberate firm strategy, which the computer games firms exploit intensively. [...] The firm's strategy concerns taking advantage of technological opportunities offered by ICT to unite consumers and to create tools that form the basis of a 'community-of-practices', which generates innovations. In other words, it is the creation of a solution space and a place to meet that generate consumers' learning and hence innovation.

From this perspective, the user-centred innovation framework can be said to position mod development underpinned by the qualities of the toolkit, within the established, capital-intensive boundaries of the proprietary technology of the developer firm (cf. Nieborg and van der Graaf, 2008). This draws attention to the issue of *generativity* that Zittrain (2008: 70) has defined as "a system's capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences." In this context, Zittrain (2008) has argued that the qualities that gave rise to the success of the Internet now seem to be losing strength. Nowadays, it seems less easy for users to modify Internet-centred products and services in contrast to the firm and/or selected partners.

Internet users are again embracing a range of "tethered appliances," reflecting a resurgence of the initial model of bundled hardware and software that is created and controlled by one company. This will affect how readily behavior on the Internet can be regulated, which in turn will determine the extent that regulators and commercial incumbents can constrain amateur innovation, which has been responsible for much of what we now consider precious about the Internet (Zittrain, 2008: 8-9).

Another issue concerns the application of user toolkits in support of the firm's competitive position. Research has primarily concentrated on the short term of toolkits for user-centred innovation, but what happens when savvy users learn the 'trade' and develop a competitive relationship with the developer firm? (von Hippel, 2005). In addition, not much systematic attention has been given to heterogeneous user needs and characteristics in relation to the supply of different toolkits and the role of firm support to sustain the quality of user-generated contributions for application in the firm (and community) (Jeppesen, 2004).

This section has highlighted a distinction between firms that tend to pursue innovation in order to benefit from capturing (economic) value from sales and/or licensing, and users who innovate in order to benefit from their own or their peers' contributions through direct use, while typically benefiting less so economically. Particular attention was given to the role of the toolkit as interface between the firm and users. Toolkits can serve as design and information instrument underpinning the *design space*, and which makes the issue of a novel configuration of generating and capturing value between firms and users explicit, particularly, concerning revamping business models and management mind-sets (Thomke and von Hippel, 2002). But what kind of innovating practices do users participate in? Moreover, who are these users, and what are their motivations? The next section yields some answers.

3.4.2 *On users who innovate*

Users have been shown to participate in innovation-related practices in areas such as industrial, consumer, and information products. In the industrial context, von Hippel's (1976) seminal study on a sample of 111 scientific instrument innovations found that instrument users (both user firms and end users) were responsible for developing, prototyping and field-testing nearly 80% of innovations (i.e. first of type, major and minor functional improvements) that were indicated as the most significant (cf. Lettl, Herstatt, and Gemuenden, 2006). User contributions in the consumer products area have occurred in various product categories. For example, Lüthje (2004) surveyed the innovation activities and characteristics of 153 users of outdoor consumer products (such as clothing and equipment) for climbing/mountaineering, hiking, cross-country skiing, and mountain biking. He found that 37% of the respondents had come up with ideas to produce new or enhanced products and about 9% had actually been involved in building prototypes and/or products such as wet weather walking boots (cf. Franke and Shah, 2003; Lüthje, Herstatt, and von Hippel, 2005). In his study on software-based music instruments Frederiksen (2006) explored communication patterns underlying user-driven innovation. Rather than focusing on the end results of user-driven innovations ('hard') for the firm or user, Frederiksen primarily examined user communication ('soft') in online forums on the firm-hosted community of Propellerhead Software and the ways the developer firm sourced user information for internal innovation purposes (cf. Allen, 1977). Among other things, the study found that

the firm showed greater interest in user provided information than in user provided modifications and/or add-ons.

Although in the user-centred literature a perspective has evolved focusing on individual innovators, more recently, an increased focus on 'community-based innovation' can be detected (Antorini, 2007; Frederiksen, 2006; Jeppesen, 2004). The underlying idea is that users inspire, assist, and collaborate with each other in innovation practices. These *innovation communities* are,

nodes consisting of individuals or firms interconnected by information transfer links which may involve face-to-face, electronic, or other communication. These can, but need not, exist within the boundaries of a membership group. They often do, but do not need, incorporate the qualities of communities for participants [...] (von Hippel, 2005: 96).

With a focus on a community based on shared interests and innovation-related practices, this outlook is quite similar to the CoP perspective. Research into innovation communities has indicated, that users tend to rely mostly on each other for innovation-related information than, for example, on Web site resources (Lüthje, 2004); and users in several sports communities collaborate, provide, and receive quality innovation-related assistance supporting the innovation process, yet when they find themselves in a competitive setting the members share less (or nothing) (Franke and Shah, 2003). Also, F/OS projects have been studied in this context, for example, in terms of the cost of joining, contributing, and specialization of newcomers in developer communities (Krogh, Spaeth, and Lakhani, 2003), and the managerial challenges encountered when software firms seek to interrelate with F/OS communities for purposes such as value generation (Dahlander and Magnusson, 2005).

Not every user who innovates is Mozart, or Will Wright, or John Carmack for that matter (Benkler, 2006). Von Hippel (1986) has shown that a small group of users tends to be ahead on market trends prior to adoption by the masses. Moreover, they can point out what they consider to be flaws (in terms of needs and solutions) from which the firm can learn, increasing the likelihood for a successful release in the mainstream market (Lilien, Morrison, Searls, Sonnack, and von Hippel, 2001). These users who find themselves at the leading edge of soon-to-be-trends,

expect attractive innovation-related benefits from a solution and so are motivated to innovate, and [...] they experience the need for a given innovation earlier than the majority of the target market (Jeppesen, 2004: 14).

This so-called 'lead user' construct, coined by von Hippel (1986), consists of the variables 'ahead of the market', 'level of expected benefit', and 'level of innovation'.⁶⁴ It tends to be empirically tested on the basis of dividing users into dichotomous 'lead user' versus 'non-lead user' categories. In their study on sports communities Franke and Shah (2003) also examined some lead user characteristics in relation to innovators and non-innovators such as 'ahead of the trend' and 'time in community'. They found in their sample that innovators displayed the characteristics of 'ahead of the trend' and 'benefit from innovation' more strongly than non-innovating users (cf. Lüthje, 2004). Jeppesen and Molin (2003) studied mod communities and identified three types of user engagement, namely, modders who came up with innovative applications (referred to as 'innovators'); users that were actively engaged in using and experimenting with games; and, users who used products more passively (i.e. the more casual gamer) (cf. Prügl and Schreier, 2006).

Morrison, Roberts, and Midgley (2004) have sought to validate the lead user construct by introducing the variable 'leading edge status' (LES) that was tested on a sample of innovating and non-innovating users of Australian libraries. Among other things, they found that the distribution of LES was unimodal indicating that a dichotomous understanding of lead users versus others is somewhat arbitrary and "throws away valuable information" (Morrison et al., 2004: 361; cf. Franke and von Hippel, 2002). Yet, a more nuanced approach towards the empirical investigation of characteristics among different users as innovators fulfilling different roles associated with various levels of involvement has remained largely unexplored. Furthermore, an overly strong reliance on personal experiences/needs of lead users may dampen successful mainstream adaptation because of certain differences between lead users and mass users (cf. 'debunked influentials hypothesis' in Watts and Dodds, 2007). However, in the case of niche markets, the experience/needs of lead users can be very helpful because they tend to have quite similar attributes to within-firm developers (Kujala, 2003).

Why do users participate in innovation practices? Research has shown that users engage in innovations if their use benefits exceed their costs (von Hippel, 2005). Thus, users tend to innovate because they seek to satisfy their own needs. In general, however,

⁶⁴ Various mechanisms can be used to identify lead users such as pyramiding, specialized events, tracking of download figures, and user communications on Web sites (Frederiksen, 2006; Prügl and Schreier, 2006; von Hippel, 2005).

research has tended to examine motives independently, highlighting a number of intrinsic motivations such as enjoyment, learning, and the process of participation, and extrinsic benefits such as firm and peer recognition and career advancement (Antorini, 2007; Jeppesen and Frederiksen, 2006; Lakhani and Wolf, 2003; Shah, 2006).

Research has also shown that users, in case of freely shared developments, can out-compete closed, firm-innovators because they seem to be able to gather more capable and diverse participants than firms can, and when developments are freely shared all participants can share and use the best contribution any participating user has developed (Baldwin, Hienert, and von Hippel, 2006; von Hippel, 2005). This seems to present opportunities for mod developers to commercialize their contributions and benefit beyond mere personal use yet substantial evidence of entrepreneurship is lacking and contested. For example, whereas von Hippel's (1976, 1988) study on scientific instruments indicated that users rarely founded firms (cf. Lettl, Herstatt, and Gemuenden, 2006), Shah (2000) found that 100% of first of type innovations in sports equipment tended to be developed through 'learning-by-doing' by a handful of rather young and technically unsophisticated lead users, 71% of whom, founded small (lifestyle) firms to produce their innovations for profit.⁶⁵ It has been suggested, however, that personal characteristics and information possessed by the entrepreneur may account for starting up a firm and that the likelihood of user entrepreneurship may relate to opportunity costs (Shah and Tripsas, 2004). Furthermore, open product design, modular product architecture, and stage in the industry life cycle can positively advance the commercialization of user-driven innovations (cf. Hienert, 2004).

The next section presents the conceptual framework for this study.

3.5 Conceptual framework

This study is designed to enhance our understanding of the development and organization of user participation in the commercial setting of the 3D software industry by highlighting firm-user dynamics across permeable firm boundaries that underlie product development on the firm-hosted 3D platform. In conceptualizing user participation in the commercial setting of the firm underpinned by the claimed

⁶⁵ Start-ups were preferred over patenting and licensing to capture innovation-related benefits. Over time, some of these start-ups transited into major players in the sport equipment market such as Burton Snowboards (Shah, 2000).

democratization of Web technologies evidenced in the creative capacities of users and their contributions in digital development practices, this research engages with the user participation literature as its main theoretical framework and is supported by themes developing in communities of practice theory and the user-centred innovation literature.

This study adopts the perspective that user participation on the firm-hosted 3D platform is an emerging site of *participatory culture* which is part of the creative industries, and indicative of a blending together of social networks and market and, in this capacity, may generate considerable market value. This view offers the opportunity to build on the concept of ‘social network market’ by examining non-market dynamics connected with user participation (which tends to be associated with the idea of free labour) in the commercial setting of the firm-hosted platform.

User participation is investigated as a dynamic process evoked in a context and particular organization of the roles of different groups of contributors (including the developer firm and individuals) that are networked in a constellation of practices (NCoP) underlying product development with the aim to highlight the interdependencies developing between the firm, users, and technologies on the firm-hosted 3D platform. In this study, *variations in several participation patterns among contributing users* (operationalized through the design capabilities, see Chapter 4) are empirically investigated to come to a more robust insight into differences in creative capacities among user contributions and the implications for the product development process across firm boundaries.

By drawing on insights from the toolkits for user innovation perspective, this study investigates how user participation is embedded in commerce on the firm-hosted platform, *thereby directing particular attention to technical and artificial qualities of the toolkit* (operationalized through the wider ‘design space’, see Chapter 4) that underpin the use and design of the 3D platform. The supply of different toolkits is also examined in connection with variations in the characteristics of users such as different roles and degrees of involvement; so as to elaborate on firm-user interactions in terms of the role of the firm-as-provider and the ways users may participate, what they may contribute, and how and with what frequency they may interact with others on the firm-hosted platform (in contrast to not-for-profit platforms) which is further expected to yield insight the commercialization of user contributions and the implications for the firm’s competitive position. Thus, in this study, *firm-provided user toolkits* are

empirically investigated to come to a more robust understanding of the organization of firm-user relationships with particular attention to variations in participation patterns and functionalities of the design space and implications for product development.

From this perspective, the firm-hosted 3D platform as a site of participatory culture underpinning product development, is investigated as a *repository of knowledge* (that can be demonstrated) *mobilizing the investigation of learning as an interactive process between the developer firm and users* (operationalized through learning by design, see Chapter 4), and which is associated with the emerging knowledge-based economy. This includes the strategy of the developer firm to engage users in creation and sharing practices on the firm-hosted platform providing a basis for the firm's ability to know and learn. In this examination, this study considers the organization of processes by which the developer firm seeks to: enable, facilitate, and manage (external) knowledge into specific competences and capabilities, and relate available information to various aspects of learning opportunities; for which the implications are also considered for the subsidiary communities of practice perspective.

In sum, the conceptual framework developed in this study guides the investigation towards a more robust understanding of the development and organization of firm-user relationships that underlies the integration of user participation into mainstream business and the implications for product development. This investigation is organized around the overarching research question that was introduced in Chapter 1:

Q1 How is user participation constituted and maintained on the firm-hosted 3D platform, and with what implications for product development across firm boundaries?

The examination of this question is guided by three working hypotheses that are derived from the foregoing discussion and further explained in Section 4.2:

H1 Users on the firm-hosted platform 3D platform are likely to participate in mod development.

H2 The user's experience level in using first and third party toolkits is positively related to mod development.

- H3 User involvement in knowledge contributions on the firm-hosted 3D collaborative platform is likely to strengthen crossover learning opportunities between the developer firm and users.

A further elaboration of the methodology for this study is presented in the next chapter.

Chapter 4 ‘Rezzing’ methodology

Hello, hello, I’m at a place called Vertigo

- U2⁶⁶

4.1 Introduction

This chapter sets out the methodology for this research. The objective of this study, as I have explained in Chapter 3, is to examine various aspects of user participation in product development on the firm-hosted 3D collaborative platform. To grasp the development and organization of dependencies between the developer firm and mod developers, a methodology is called for that examines firm-user dynamics built around divergent practices. In order to achieve this, the methodology combines quantitative and qualitative methods to investigate one case study. The 3D platform Second Life, developed and operated by Linden Lab, is chosen as the research site for data collection by using a Web-based survey, semi-structured interviews, and online documents.

This chapter is organized as follows. Section 4.2 outlines the research design developed in this study with particular attention to the operationalization of the research question and working hypotheses. Section 4.3 describes the rationale for selecting Second Life as a single case study which is followed by a presentation of some basic background information concerning the platform. In Section 4.4 the principal research methods used for data collection are set out and discussed, that is, survey design, interview guides, and a document database. Section 4.5 discusses the analytical framework for both the quantitative and qualitative data. Section 4.6 summarizes the main aspects of this chapter.

⁶⁶ U2, Vertigo, *How to Dismantle an Atomic Bomb* (Island, 2004).

4.2 Researching user participation

The previous chapter outlined the main theoretical framework grounding in the user participation literature and supported theoretical themes to conceptualize the intertwining of relatively cheap digital technologies facilitating user participation in the production and distribution of digital practices, and firms that are increasingly shown to lever and promote user participation on their Web-based platforms. Drawing on these foregoing lines of research, several working hypotheses are set out below that define the conceptual boundaries of this research, guiding the examination of user participation in firm-hosted digital development practices. These hypotheses are stated as propositions but they should be read as indicators of a likelihood of the relationships described.

The first hypothesis developed for this study concerns users as participants in digital development practices. In this study, the developer firm and users of the firm-hosted 3D collaborative platform are approached in situ as a dynamic relationship involving product development opportunities across firm boundaries. More specifically, the locus of product development concerning the firm-hosted 3D platform occurs in networks of interactions among the developer firm and users rather than in distinct activities in the isolation of the developer firm. The firm-hosted 3D collaborative platform is indicative of a mixture of commercial and non-commercial contributions where the developer firm and users verbalize, visualize, and materialize development practices underlying (emergent) social and economic contexts. From this perspective, studies have tended to hail the numerous, and accessible to 'all', opportunities for user participation in the context of the Internet (Benkler, 2006; Burgess, 2007; Jenkins, 1992, 2006; von Hippel, 2005). This kind of 'magic' attributed to the creative capacities of users and their contributions to product development across firm boundaries is said to point to a 'participatory turn' underpinning the ubiquity of user participation in terms of readiness, interest, and capabilities of users (Jeppesen and Molin, 2003; OECD, 2007; van Dijck and Nieborg, forthcoming). This is captured by the following working hypothesis:

H1 Users on the firm-hosted platform 3D platform are likely to participate in mod development.

The firm-hosted 3D platform has been shown to be embedded with particular forms of usage that “actual users then engage [with] in an ongoing act of negotiation with devices and systems, often re-inscribing and remaking them” and which may provide the developer firm with information that may support product development efforts (Taylor, 2006a: 2; cf. ‘feedback theory’, Mindell, 2000). On various occasions developer firms have been shown to provide or grant access to first and third party toolsets that implicitly shape particular mod development practices (Jeppesen, 2004; Thomke and von Hippel, 2002). When developer firms release toolkits to systematically outsource some development tasks by inviting users to modify and create content and code (or, ‘donate labour’), users can adapt the platform in such a manner that it corresponds to their own interests and needs. More specifically, developer firms can provide toolkits that allow users to combine the parts of the source code and/or interface with new externally created environments, scenarios or even total rebuilds that are often freely dispersed on the Internet. The provision of toolkits appears to motivate and assist users to learn and contribute more to the platform, because they can engage in (and, bend) practices towards ends they value. This introduces the second working hypothesis:

H2 The user’s experience level in using first and third party toolkits is positively related to mod development.

In this research, the firm-hosted 3D collaborative platform provides a representational instance of both individual and collective practices that may function as sites for online learning, where networked members can share knowledge and may learn from knowledge they receive from others, and, particularly, from which the firm may be seen to benefit. The acquisition of knowledge is regarded as a social process and is inextricably bound up with the conditions within which it is learned. In particular, the purposively firm-provided toolkits as a modular system may be a potential aide for user-to-user learning and, more specifically in this study, firm-user learning. Learning involves becoming a participant in some type of NCoP which offers a site of a joint repertoire of knowledge, that is understood and continually negotiated by the group bound together through reproductive practices (Lave and Wenger, 1991). In other words, users are bound and apprenticed into ways of thinking and shared practices of

the community, drawing attention to the issue of transferability underlying the sustainability of competitive positions (e.g. users who seek to commercialize their mods; Baldwin, Hienerth, and von Hippel, 2006; Shah and Tripsas, 2004).

Within a commercial setting of the developer firm, user participation is a case of consulting with users, who may provide the developer firm with ideas about discovering, developing, and refining the platform (cf. Humphreys, Fitzgerald, Banks, and Suzor, 2005). The developer firm may generate the initial code, but that resource is instantiated in a structure constituting of a constellation of NCoP. In other words, users and (representatives of) the developer firm seemingly intersect, constituted around communication of shared practices and platform use that allow for opportunities for individual and collective development to happen, highlighting the learning curve underlying product development (Allen, 1977; Foray, 2004; Frederiksen, 2006). Such opportunities for learning can be investigated so as to better understand the composition and structure of firm-user relationships, which is examined in the last working hypothesis:

H3 User involvement in knowledge contributions on the firm-hosted 3D collaborative platform is likely to strengthen crossover learning opportunities between the developer firm and users.

In the pursuit of operationalizing these lines of investigation, this study has identified three constructs, respectively, design capabilities, design space, and learning by design that serve as units of analysis in the empirical investigation of this research. The *design capabilities* construct informs the empirical investigation of particular participation patterns of the developer firm and users by linking user participation and platform membership to the organization of the developer firm (see Chapter 5). The *design space* construct guides the examination of the functionalities of the firm-hosted platform that underlies creative and interpretative practices contributing to platform development across permeable boundaries (see Chapter 6). The *learning by design* construct builds on the design capabilities and the design space in order to investigate mod development in relation to the capacity of learning opportunities forming between the developer firm and mod developers (see Chapter 7). Table 4-1 presents an overview

of these constructs that guide the investigation and operationalization of the principal research question underpinned by the conceptual framework.

Table 4-1

Operationalization of the study

Central research question

Q How is user participation constituted and maintained on the firm-hosted 3D platform, and with what implications for product development across firm boundaries?

Overarching theoretical question

Is mod development on the firm-hosted 3D collaborative platform an indication of a novel configuration of production underlying product development impacting learning?

Operationalization

Design capabilities

H1 Users on the firm-hosted 3D platform are likely to participate in mod development.

- How does community membership characterize users as mod developers?
- How does the organization of production relate to labour processes across firm boundaries?

Design space

H2 The user's experience level in using first and third party toolkits is positively related to mod development.

- What are the functionalities of the design space?
- How is mod development perceived by the developer firm? And what are the implications for transferability?

Learning by design

H3 User involvement in knowledge contributions on the firm-hosted 3D collaborative platform is likely to strengthen crossover learning opportunities between the developer firm and users.

- What are the mechanisms underlying crossover learning opportunities?
- What are the implications for firm learning?

This section has provided a basis for the empirical investigation of firm-user dynamics underlying product development so as to aim to moving beyond 'marvelling' at the phenomenon of user participation in Web-based environments. This study has chosen Second Life as a case study for which the rationale is motivated next.

4.3 “You only live twice”⁶⁷

This study uses the *single case study* as a research strategy to investigate user participation in a segment of the 3D software industry. Clearly, there are limitations to a case study design based on a single firm and/or firm-hosted community. However, the choice for the single case study that was developed here, has been heralded by scholars and media professionals alike as a rather extreme and unique case (Yin, 2003). More specifically, this study combines elements of the intrinsic and instrumental case study by drawing attention to the case for its own interest value and to point to some (theoretical) aspects larger than the case itself, and which underpins the critical analysis and theoretical contributions this study seeks to make in the examination of the prerequisites for and the conditions of a contemporary phenomenon associated with user participation on the Internet which has remained largely undocumented (Stake, 1995). Thus, although the case study may not represent a ‘sample’ and the approach outlined in this research may not be easily transferable or applicable in other firms or industries, this exploratory study is *generalizable* to the theoretical propositions – and consequently, provides a basis for analytical generalizations (Bryman, 2004). More specifically, the analysis provides a basis for generalization (only) to particular types of users, certain toolsets, and limited sorts of user-generated practices in the context of user participation in a commercial setting on the Internet (Yin, 2003). Future research replicating data collection in other case studies may strengthen generalizability (see Chapter 9).

The search and selection of a suitable case study, i.e. a firm-hosted site of participatory culture, was guided by the following criteria: (1) a media or software firm fostering and employing contributions made by users; (2) the provision of some type of toolkit that allows users to create content; (3) an abundance of such contributions; (4) an online networked platform hosted by the firm in which the firm is also present; (5) a large number of active users (traffic); (6) allowance for variation among users in terms of community participation, that is, in terms of user communication and digital development (cf. de Valck, 2005). It was desirable for the platform and user base to have been around for some time in order to decrease the likelihood of early start-up problems and, more importantly, for there to be a better chance of some community

⁶⁷ You Only Live Twice (Danjaq, 1967).

practices being in place.

Guided by these criteria various online sources such as search engines and blogs covering the media industries were searched and colleagues/friends were consulted. There seemed to be many options. However, my personal interest in games and/or 3D environments narrowed it down and after examination, several candidates did not meet all criteria and were dismissed. This brought me in May 2006 to embark on my Second Life of software developer and service provider Linden Lab, founded in 1999 by Philip Rosedale.⁶⁸ This choice is in line with the criteria set out above:

- Second Life has over 16 million users (December 2008)⁶⁹ and has existed for more than five years;
- Second Life hosts a collaborative, immersive, and open-ended empty 3D environment that is being inhabited, designed and developed by its so-called ‘residents’ who own the intellectual property right over these contributions;
- Second Life provides users with an interface with a built-in toolkit that can be used to build, script, and texture the platform, and by accessing the source code of Second Life, the platform can be modded externally; and,
- Second Life is a highly sociable and communicative platform used internally by Linden Lab and externally to interact with the user base.

Second Life allows users to access vast stretches of land and islands⁷⁰ that can be used for seemingly endless possibilities such as building a shop front, renting out a music venue to performing artists, a gathering space where avatars can take classes, form self-help groups to discuss depression or still-birth, or establishing a disaster simulation environment to train rescue workers for real threats like terrorist attacks. In this capacity, Second Life offers numerous ways for people to ‘immerse in products’ which, especially in 2006, attracted many companies and non-profit organizations as it makes Second Life an ideal 3D platform for direct interaction, feedback and promotion. For example, Reuters was quick to set up its digital headquarters, Adidas opened a retail space, BBC Radio 1 has held live broadcasts such as Radio 1’s Big Weekend, IBM has

⁶⁸ Linden Lab has employs about 200 Lindens and has offices in San Francisco, Mountain View, Seattle, Boston, Davis, and Brighton (UK).

⁶⁹ See http://secondlife.com/whatis/economy_stats.php (accessed 5/12/08).

⁷⁰ This depends on the type of registration and membership fee. There are levels of membership, but the basic one is free. See <http://secondlife.com/whatis/pricing.php> (accessed 12/12/08).

used the platform as a meeting space (both internally at IBM and externally with clients), Philips has used its digital office for consumer feedback and testing, the Berkman Center for Internet & Society has live-streamed events such as luncheons and lectures in-world, and Sony BMG owns a building to promoting and selling music downloads. Real money can be made through Second Life's currency, the Linden Dollar (L\$) which is connected to the Exchange Market (LindeX) where users can convert earned L\$ to real US Dollars (and vice versa).

Second Life thus illustrates how inputs for development arise outside the boundaries of Linden Lab. More specifically, Linden Lab offers a 3D collaborative platform where individual users and Linden employees ('Lindens') intersect, constituted around communication of shared practices and platform (or product) use and, in this capacity, creates opportunities for individual and collective development to take place. As the key technological features seem easily transferable and the mode of communication is relatively low-cost, the conditions are likely to favour the formation and function of an active community of contributors. In such a set-up Linden Lab and Second Life users may share knowledge, ideas and innovations, organizing and facilitating dispersed users to collaborate, share information, and learn about product use. From Linden Lab's perspective, Second Life seems to allow for a low-cost interface to its users through which they can monitor what particular users do, how they communicate about problems and needs, how alterations are made by users, and what appear to be the most urgent issues among Second Life users. Particularly, development-related information, provided and exchanged on the platform and on Second Life Web sites (such as the Official Second Life Blog and Second Life forums), and the contributions themselves can guide the observation of ways in which Linden Lab invites and supports user participation in content, front end (interface), and back end (other source code) mod development practices.

In this view, Second Life is a particularly radical model of user participation in digital development practices, where any John or Jane Doe or a powerful firm can engage in mod development highlighting an environment which is home to different levels of power, wealth and influence underlying software development, entrepreneurship, education, philanthropy, and politics. Second Life is a firm-hosted 3D collaborative platform where firm-users can,

acquire, share, and build knowledge [that] dramatically impact the rate of innovation for all who use them. [It] can change innovation everywhere. By creating a culture of experimentation, exploration, and collaboration, [Second Life] makes radically decentralized approached, reduced costs, and collaboration across geographic distance available to those with access (Ondrejka, 2007: 27-28).

In order to participate in all of these activities the only thing the user has to do is to download the free Second Life installer software, register (for free or a fee) to get an avatar, and start Second Life.

4.3.1 *Entering Second Life*

On 6 May 2006 I opened a free basic account to start my Second Life.⁷¹ There were only two choices of avatars, one for each gender. These were without any flair (and felt like marking you ‘in-world’⁷² as someone needing guidance (and pity), or, conversely for immediate in-world predatory behaviour). Like everyone, my avatar Rocketgrrrl Tripp entered Second Life via ‘Orientation Island’ which was an isolated and ‘protected’ place where you could learn the necessary skills to actually ‘get a (second) life’ (see Section 1.2).⁷³ Basically, you are guided through an introductory session to learn to control the avatar’s body (so as to avoid, for example, the ‘chat hop’⁷⁴) and learn how to communicate using chat, instant message, and, more recently, voice. From Orientation Island my avatar was sent to ‘A Welcome Area’ where I could hang out with other newcomers (that were as badly dressed and expressed as bad behaviour as I initially did) and Second Life users who like to frequent the Welcome Area. It was also my first experience with ‘lag’.⁷⁵ From here you were on your own and you could start wandering or flying around to explore the vast digital lands.

⁷¹ If you are between 13 and 17 years old you can join Second Life, but you have only access to the Second Life Teen Grid (teen.secondlife.com). Anyone of 18 years and older automatically joins Second Life. Users of either platform have no access to the other platform.

⁷² The term *in-world* is used to refer to the situation where a user is logged into Second Life and is represented on the platform by means of her/his avatar.

⁷³ The interface is such that you see your avatar’s back aligning the user with the avatar’s point of view.

⁷⁴ The avatar suddenly jumps up into the air when one tries to unsuccessfully open the chat window.

⁷⁵ *Lag* means that everything in-world becomes delayed, because there are too many things going on at once in a simulator, such as too many avatars wearing too much bling-bling.

Screenshot 4-1 Orientation Island (December 2008)⁷⁶



You may be on your own, but you are not alone. What is Second Life in numerical terms?⁷⁷ Linden Lab reported on 12 December 2008 that Second Life had 16,369,485 registered users of which 1,422,041 logged in over the last sixty days, 1,038,964 over the last thirty days, 696,737 over the last fourteen days, and 524,700 over the last seven days.⁷⁸ *The rest of the data presented in this section is through August 2007.*⁷⁹

By the end of August 2007 the size of Second Life encompassed 839.72 square km of which 189.41 was the mainland and 650.31 were islands⁸⁰ occupied by 9,252,781 registered users of which 6,164,951 were unique. Most users reside in the US. All users combined had a balance of L\$ 3,372,848,267,⁸¹ 23,833 sells and 206,938 buys took

⁷⁶ Note my avatar, Rocketgrrrl Tripp in the centre.

⁷⁷ On a daily and quarterly basis Linden Lab provides statistics about Second Life. See <http://secondlife.com/whatis/economy-data.php> (accessed 5/12/08). Note that data is not always complete such as values may be missing, or clear in absence of detailing followed measurement procedures.

⁷⁸ See http://secondlife.com/whatis/economy_stats.php (accessed 12/12/08).

⁷⁹ This month/year was chosen so as to overlap with the final date of my data collection period (see the Appendix). For Linden Lab's 8/2007 data, see http://static.secondlife.com/economy/stats_200709.xls

⁸⁰ Each region represents 65,536 m² and each region is simulated on a single central processing unit.

⁸¹ US\$ 1 = L\$ 250.

place, and US\$ 6,614,057 were exchanged. Users spent a total of 23,455,451 hours in Second Life. According to the hours spent in-world Second Life presents a rather gender-balanced picture, however, a completely different picture emerges when looking at female vs. male avatar counts. Based on avatar counts the largest user group is aged between 25 and 34 and this age bracket also spends the most time in-world. See Table 4-2 for a detailed overview of gender, age, and top ten countries profiling Second Life users.

Table 4-2
Second Life demographics by Linden Lab (August 2007)

Gender^a	Male	74.13% (57.92%)
	Female	25.87% (42.08%)
Age^b	<= 17	0.86% (0.71%)
	18 – 24	25.97% (17.05%)
	25 - 34	37.19% (36.15%)
	35 - 44	22.28% (27.05%)
	45+	13.21% (18.55%)
Top ten countries^c	USA	29.12% (35.27%)
	Japan	7.72% (7.51%)
	Brazil	7.69% (4.08%)
	Germany	7.68% (10.15%)
	UK	6.97% (6.52%)
	France	5.22% (5.93%)
	Italy	4.68% (3.61%)
	Spain	3.27% (3.33%)
	Netherlands	2.89% (4.44%)
	Canada	2.51% (3.69%)

Source: Linden Lab (August 2007).

^a Based on avatar count. Gender by total hours spent in-world is between brackets.

^b Based on avatar count. Age by total hours spent in-world is between brackets. Note that age of 0.5% (0.48%) is unknown.

^c Based on avatar count. Top ten countries by total hours spent in-world is between brackets.

The next section provides the rationale for developing a multi-strategy research for this study by combining quantitative and qualitative research. It introduces and discusses the basic elements and several drawbacks of the primary data sources (respectively, online surveys, semi-structured interviews, and online documents) and secondary data sources (my in-world experiences, conference attendance, and empirical data from other sources) used in this study.

4.4 Diggin' in Second Life

As a 3D platform for development user participation in Second Life, at the basic level, means logging in to inhabit land that you and/or others are toying and tinkering with. Although I have never owned land for over two years, I was fully immersed in Second Life.⁸² Most of my Second Life I spent wandering around, watched others build (a few times I was invited to play around with building which I gave a go), went to all sorts of openings, yard sales, lectures, clubs and shops. But mostly I met and talked to others who frequently invited me to join them on their land. From this perspective, an *ethnographic study* may have seemed an obvious choice to gather information yet this was not pursued. Next I address why I choose not to pursue this before moving on to outlining the multi-strategy for the research that underlies this study.

Ethnographic fieldwork can offer a descriptive account of the complexity and interconnectedness of cultural driven practices and norms of everyday life, using various tactics such as participation and observation (Bryman, 2004). In the context of the Internet, ethnography has frequently been used to yield insight into online communities and related practices (Rheingold, 1993; Taylor, 2006b; Turkle, 1995). In considering the relationship between offline and online some have come to understand the Internet as a new kind of space and culture, while others have approached the online sphere in close relation to everyday life underlying debated concerning privacy, boundaries, etc. In particular, Hine (2000) has demonstrated in her case study of a media event that the Internet can be understood as a culture in its own right and as a cultural artefact. As a culture, the unique qualities of the Internet underpinned by particular norms and practices are articulated which deserve attention separate from life offline. As a cultural artefact, the Internet is understood as socially shaped in production and use in the wider context of people's lives. Over time, however, this interplay between online and offline people and practices has been shown to increasingly articulate a multi-sited and social constructionist approach to Internet ethnography associated with the Internet as cultural object (Boyd, 2008).⁸³

⁸² Until November 2007 my avatar simply lived a digital Bedouin life until a friend of mine offered me a landing spot on the island Swissopolis.

⁸³ Most, if not all, games and/or 3D environment scholars argue that the researcher needs to be immersed in the world s/he is investigating, however, I believe that one should not have to intentionally refrain from using resources that are or do not occur in-world in order to acquire 'authentic knowledge' (Bräuchler, 2005; Hine, 2000; Steinkuehler, 2005).

It is my belief that Second Life is not isolated or self-contained in this regard. For example, Au (2008) has pointed to people falling in love or doing business in Second Life and with whom they connect in their first lives (cf. Meadows, 2008; Rymaszewski, 2007). User participation in Second Life can, therefore, be understood as an entwining of first (unmediated) and second (mediated) lives underpinning interdependencies developing between the firm and users in the context of the firm-hosted 3D platform. Therefore, doing ethnographic fieldwork seemed a good idea to investigate the organizational and related dynamics of user participation underlying product development on the firm-hosted 3D platform, but was dismissed for two important reasons.

One reason was related to Linden Lab's research policy and conducting fieldwork at the developer firm. Initial communication with the developer firm was rather slow which was partly due to the attention the firm received, not only in the media, but also from academics interested in studying the online behaviours and interactions of the individuals involved. As it has happened on more than one occasion that private communications from users were publicly published without consent, or anonymity, Linden Lab issued a research policy that required Linden Lab's consent prior to starting the project so as to protect Second Life users from potentially unwanted observations, analysis, and essays written about them. During the process of seeking Linden Lab's approval to undertake fieldwork at the company and in Second Life (which involved a six months-wait), the policy changed where one no longer needed to obtain Linden Lab's consent.⁸⁴ It took another few months before I learned that I was not permitted to conduct within-firm observations and was told that a few scholars were already involved in similar extensive exercises so Linden Lab was unable to accommodate me or provide me with the guidance it deemed appropriate.

In the meantime, I had spent a great deal of my time in Second Life and learnt that, in the context of this study, ethnographic fieldwork was not as useful as I had originally thought. Second Life is in a state of perpetual development which also means that a site of observation can be destroyed, relocated, replaced, or disappear at any given time – in addition, many sites cannot be accessed - making it more difficult to develop systematic accounts. Also, Linden Lab developers are not often on site or

⁸⁴ Instead Linden Lab urged researchers to adhere to its Community Standards, Terms of Service, and to follow its own institution's research ethics.

cannot be identified as such, complicating firm-user observations. Moreover, as this is not a study per se about what users contribute but rather about the constituents and maintenance of participation in product development, concentrating to a too great an extent on the in-world environment of Second Life would have meant neglecting, for example, open source contributions.

In this research, therefore, my participation in Second Life was mainly a means to build an understanding of the workings of the platform and in-world behaviour and other practices serving as a secondary data source (see Section 4.4.4). Continuous diligence and awareness was sought by reflecting upon my avatar's in-world activities and situatedness (Lammes, 2007). Moreover, generally, if you meet someone new in-world, your profile gets checked and so my avatar profile read "I'm an enhancer and a player but with a critical note - I question you (yes, I conduct research in SL – don't hesitate to ask me about it!)", and it also provided the URL to learn more about this study. On many occasions users would ask me about my research interests and provide me with tips and feedback. On other occasions the fact that I was conducting research was acknowledged and tacitly accepted and conversations would continue. Less than a handful of times, my avatar was bashed and told 'to get the hell out of here'. In those few instances, users had been approached by other researchers (often marketing companies) and had received a stream of instant messages asking them to take part in surveys, etc. Yet, they simply wanted to be left alone to enjoy their Second Life in peace and quiet.

In considering the data collection and analysis methods in the context of the study, I choose to combine quantitative and qualitative research. The value of this kind of multi-strategy research has been much debated. Some argue against a combination of quantitative and qualitative methods on epistemological and ontological grounds. More specifically, one of the main challenges with such an approach is the assumption that different methods can be compared unambiguously and regarded as equivalents in answering research questions (Massey, 1999). However, this research is positioned with those that acknowledge that "quantitative and qualitative research are each connected with distinctive epistemological and ontological assumptions but the connections are not viewed as fixed and ineluctable" (Bryman, 2004: 454; cf. Eisenhardt, 1989). Rather, the research methods employed in this study are understood as *complementary* which

means I can dovetail different aspects of the examination (Hammersley, 1996).⁸⁵

This study has collected and analysed an *online survey*, *semi-structured interviews*, and *online documents* to yield insight into the dynamics of participation that underlie the firm-hosted 3D Second Life platform. Each method is a unique technique geared to elicit a particular kind of data to address a certain aspect of the operationalization of the principal research question underpinning the case study. The survey was chosen as it can assist in yielding insight into the characteristics of a set of cases and variations across cases; interviews could provide a full and rounded understanding of particular attributes of a person (or, organisation) in the context of other characteristics and history; and, documents were particularly useful in highlighting (contextual) aspects of communications and interactions between participants (de Vaus, 2002; Yin, 2003).

The research process was both deductive and inductive, starting with a more macro quantitative analysis and moving to a more micro qualitative analysis and vice versa (Bryman, 2004; Flick, 2006). For example, based on quantitative insights concerning the developer firm's response to customer support gathered from the survey, the online document sources were rearranged so as to provide a more comprehensive framework of learning opportunities for the developer firm. In this way, quantitative insights were put to use to further develop the document data. Quantitative data were mainly used to reveal relevant relationships and the strength of community participation in user communication and creative development. The qualitative data were collected to understand the rationale underlying those relationships. In particular, the semi-structured interviews were a useful source of insights for the interpretation of the quantitative evidence. Thus, elements of the quantitative and qualitative data were not understood as a measure per se but rather they were considered as components of the overall assessment of user participation in the context of Second Life (Yin, 2003).

By using a survey, interviews, and documents as evidence this study sought to enhance the *validity* of the findings. In addition, hundreds of hours were spent observing and interacting with others on the firm-hosted 3D collaborative platform. As such I was exposed to a broad range of (social) experiences (Au, 2008; Meadows, 2008). Furthermore, throughout the progress of this research key informants reviewed

⁸⁵ See also <http://arts.monash.edu.au/lcl/newmedia-in-langlearn/souces-hammersleyho.pdf> (accessed 16/7/09).

drafts and provided feedback. Validity was also established through consideration of the domains to which this study's findings may be generalized, especially, the user participation literature in media research, in general, and games/3D environment studies, in particular. *Reliability* was established through the development of a case study protocol and the database during the data collection process (see Section 4.5).

The next sections present the quantitative and qualitative data that provide the basis for the empirical chapters. Data were collected between August 2006 and February 2008. Consequently, as Second Life is (at times, rapidly) progressing over time, the views and opinions expressed are pertinent to that particular moment in time.⁸⁶

4.4.1 *Web-based survey*

My interest in a firm-hosted 3D collaborative platform that is entirely Web-based as are digital development practices contributed by the developer firm and users informed my choice of selecting the online rather than the offline survey method. This method was a means to increase the likelihood of reaching a large sample of Second Life users that otherwise might have been geographically dispersed and difficult to track down.⁸⁷ The online survey method in comparison to the offline survey method has the advantage of being relatively cheap. The scale can be potentially endless, and cross-sectional and global comparisons can be facilitated. A quick turn-around is possible as people tend to respond rapidly and the data can be directly captured and stored by the analysis software. There are, however, some important drawbacks in employing online surveys. Coverage error is a risk because, despite growing Internet populations, the Internet is not evenly available in all countries (Bryman, 2004). Low response rates⁸⁸ and anonymity may be troubling sources of measurement errors. Another issue is non-response error which may be caused by factors such as the interface or other technical problems of the survey software (Bryman, 2004; Deutskens, 2006).

⁸⁶ Some changes that are not reflected in this study include for example, the redesign of the Second Life registration and initial user experience (February 2008-ongoing); the stepping down of founder and CEO Philip Rosedale to take on the role of chairman (May 2008); implementation of Havok4 and Mono (respectively, in April 2008 and August 2008); improvement of firm-user communication via the Official Second Life Blog and forums (August 2008-ongoing), and the availability of the Second Life Viewer in multiple languages (October 2008).

⁸⁷ Due to the nature of Second Life, it was assumed that Second Life users are (at least, to a basic standard) computer literate increasing the likelihood that users would not be inhibited from participating in this survey.

⁸⁸ Research has shown, however, that offline and online response rates, mean and range on Likert scale responses, are rather similar (de Valck, 2005).

4.4.1.1 Pilot survey

Prior to administering the online survey, a pilot survey was conducted in order to pre-test the questions. The goal was to learn about questions that were not understood, too uncomfortable to answer, and any unclear flow of questions and instructions (van Teijlingen and Hundley, 2001). The sample was a convenience sample. I contacted the first friend I made in Second Life, Loydin Tripp, who is well-connected in Second Life. Tripp owns the island *Lingua Franca*, he has developed the island *Swissopolis*, and he is the owner of the Second Life Island Region Sim Owners group. Our avatars met in mid-2006 at a Community Roundtable Meeting.⁸⁹ Ever since, we have kept in touch and frequently exchanged information about our Second Life experiences. We also met in person in Seattle (August 2006). Tripp reviewed the survey questions and helped with recruiting users for the pilot. He sent an announcement (containing an explanation, suggestions for feedback, confidentiality and a direct link to the online survey) to approximately seventy members on his friend and group list. I also sent the announcement to six of my Second Life acquaintances. My goal was to obtain input from fifteen users which, within the set deadline, was not a problem. Twenty respondents agreed to take the pilot survey by answering all questions and by providing suggestions for survey improvement such as concerning length, redundancy, and omissions. As a result, a few items were revised or eliminated, and a few new questions were developed. The survey was further fine-tuned in line with insights gained from the online documents (see Section 4.4.3).

The pilot survey was electronically designed using Bristol Online Survey (BOS) software that provided easy access and navigation. The respondents could answer online and their responses were stored in a data file on the BOS server. Although the main survey offered the chance of winning L\$ as an incentive for participating, the pilot survey did not offer this option. All respondents were aware of this but did not seem to mind. To ensure that those who had agreed to take part in the pilot survey were able to fill it out, the survey was online between 9 February and 12 March 2007.⁹⁰ Elimination of entries was not necessary, since all respondents completed all questions. The results of the pilot are not used in this thesis.

⁸⁹ The aim of the Community Roundtable Meeting was to improve communication and feedback with users.

⁹⁰ It was available at <https://www.survey.bris.ac.uk/lsewebsite/pilotsecondlife>.

4.4.1.2 Main survey

The conceptual framework developed in Chapter 3, and which was further explained in Section 4.2, informed the development of the parameters, guiding the main categories for which data were collected. To capture user participation in digital development practices the survey focused on the characteristics of Second Life users in the context of the features and usage of the 3D platform. Questions were asked about the level of user involvement, communication behaviour, creative practices, what users contribute to, motivation for participation, leading edgeness, membership length, time spent in-world, number of friends, and gaming profile (for the Survey on Second Life see the Appendix, pp. 247-263). These types of questions served to link mod development practices to participation, innovation and learning along six sets of measures. These are presented in an overview of the survey framework in Figure 4-1, outlining variables guiding the examination of the way users employ and relate to Second Life and, to a lesser extent, are influenced by it.

Figure 4-1

Survey framework Second Life

Second Life demographics	<ul style="list-style-type: none"> • Membership type, length • Avatar • In-world hours • Linden Dollars (LS) • Land
Second Life appeal	<ul style="list-style-type: none"> • Social, topical, technical
Friends	<ul style="list-style-type: none"> • User-user, user-firm • Group membership
Design	<ul style="list-style-type: none"> • Tools • Features • Usage
Information & communication	<ul style="list-style-type: none"> • Information provision/seeker • Comments • Opinion leader/seeker • Support • Learning
First Life demographics	<ul style="list-style-type: none"> • Gender • Age • Country of residence • Employment, income • Gaming

These constructs were operationalized with using open questions, checklist questions, ranking questions, and five-point rating scales. The survey used an unrestricted self-selected sample (non-probability sample) that was hosted on a paid-for survey software company, QuestionPro, ensuring a simple interface without foreseeable accessibility difficulties.⁹¹ The survey was live between 15 May and 15 August 2007. As it was Linden Lab's policy not to send out messages to individual users or announce surveys on their blog, this survey was announced on the Second Life forums (forums.secondlife.com), the Second Life developers and scripters mailing lists, and on my avatar profile so as to increase the scope of the sample. Users could therefore decide for themselves whether they wanted to participate in this study or not. This volunteer bias factor means that not every Second Life user had an equal chance to see the survey announcement (due, for example, non-use of forums) which may have led to a bias towards respondents with particular characteristics. Therefore, I sought to make an informed decision about the results based on my own participation in Second Life, the usage of multiple primary and secondary data sources and, where possible, comparison of the results to other available survey data from other Second Life researchers and Linden Lab, and, more generally, a few original and available studies on games/3D mod development. In this context, the results were found to be reasonably robust (Bryman, 2004; de Vaus, 2002; Yin, 2003).

Furthermore, as studies have shown that using a monetary incentive to stimulate response is effective in offline and online surveys, there was a draw that respondents could enter by providing their email address at the end of the survey (Deutskens, 2006). The incentives were paid in L\$ and could be transferred to the winning respondents via avatars in-world. The amounts were L\$ 10,000 (1x), L\$ 5,000 (2x), L\$ 3,000 (3x), L\$ 2,500 (4x), L\$ 1,000 (5x), L\$ 500 (10x), L\$ 250 (20x), and L\$ 100 (30x).

By the closing date 676 people had started the survey with a 67.31% completion rate. After examining missing data and careful cleaning 434 surveys were used for further analysis. In order to estimate the likely size of the effect in the population, the effect size was calculated using G*Power (Field, 2005). With the standard α -level of .05 and a medium effect size ($r = .3$) the sample of 434 respondents had 99.99% chance of

⁹¹ Any Internet user could potentially respond to the survey. However, based on the first question, people who answered 'no' to a question about their participation in Second Life left the survey via branching. Also, a respondent was only able to fill out the survey once which was tested via her/his IP address. No personal data or cookies were asked for, retained or stored on the respondent's computer.

detecting an effect, while the chance of detecting a small effect size ($r = .1$) was 55% (Cohen, 1992). Thus, a small effect explained 1% of the total variance and a medium effect accounted for 9% of the total variance.

What do the survey results tell us about the demographics of the respondents' first lives? The findings - similar to Linden Lab's general statistics presented earlier, contributing to the validity of the sample - indicated that more men than women participate in Second Life (58.8% vs. 35.9%). The mean age of the respondents was 34.49 with a median age of 34 and a range from 13 to 68. By far the largest groups of respondents resided in North America (58%) and Europe (32%). Nearly half of the respondents were said to work full-time and about one-third of the respondents earned an annual income less than US\$ 30,000. These findings are presented in Table 4-3.

Table 4-3
First life demographic and socioeconomic profile

Gender^a	Male	58.8%
	Female	35.9%
Age^b	<= 17	7.9%
	18 - 24	12.2%
	25 - 34	32.3%
	35 - 44	26.7%
	45+	19.8%
Continent	Africa	0.7%
	Asia	4.4%
	Europe	32%
	Oceania	4.1%
	North America	57.6%
	South America	1.2%
Professional status^c	Full-time	48.4%
	Part-time	6.2%
	Self-employed	18.9%
	Homemaker	2.3%
	Student, employed	9%
	Student, unemployed	7.6%
	Unemployed	4.8%
Annual income^d	<30,000	27%
	30,000 - 49,999	17.5%
	50,000 - 74,999	14.7%
	75,000 - 99,999	10.6%
	100k - 149,999	6%
	150k+	5.3%

Source: Survey on Second Life, $N=434$.

^a 5.3% of the respondents chose not to disclose her/his gender.

^b Age of 1.2% of the respondents is unknown.

^c 2.8% of the respondents chose not to disclose her/his professional status.

^d 18.9% of the respondents chose not to disclose her/his annual income.

A little over 10% of the respondents see Second Life as a game, while most of them do not think it is a game ($N = 434$). Some respondents made suggestions about how they understood Second Life, for example, as “a mix of game and social outlet – IRC with pictures”, “an environment where games can take place”, “beta version of Web 2.0”, “both game and development platform”, “both, it’s enjoyable like a game, but also helps me learn to script”, and “it is a communication platform with a game interface; therefore, it can be used as a game, but also can be used as a platform”. The survey did ask respondents, however, about their interest in gaming, and the results are presented in Table 4-4. The findings indicated that a moderate percentage of the respondents play games, particularly highlighting participation in MMORPGs and standalone computer games.

Table 4-4

First life gaming profile

	Everyday	1 or 2 p week	1 or 2 p month	Rarely	Never
Console/video	7.8%	14.7%	16.4%	28.3%	32.7%
Handheld	3%	8.5%	9.9%	29.7%	48.8%
Standalone	9.7%	20.5%	23%	27.6%	19.1%
MMORPG	20.3%	15%	7.8%	24.4%	32.5%
Web-based	4.6%	12.4%	20.5%	32%	30.4%
Mobile phone	2.1%	4.8%	9%	28.3%	55.8%

Source: Survey on Second Life, $N=434$.

The data also yielded insight into the Second Life profile of the respondents shown in Table 4-5. The largest group of respondents joined Second Life in 2006 (42.6%, $N = 434$). The examination of membership type revealed that 35% of the respondents were basic members and paid nothing for their participation in Second Life, followed by premium members who pay annually (30.4%). The mean of the approximate account balance per month was L\$ 67,616 with a range from L\$ 0 to L\$ 12,650,000. The average monthly sales were L\$ 74,589 with a range from L\$ 0 to L\$ 4,200,000, and the approximate monthly expenditure was L\$ 70,004 with a range from L\$ -10,000 to L\$ 5,000,000. Furthermore, in addition to having one avatar 37% of the respondents reported that they had created a second avatar. The mean of additional avatars was 4.05 with a median of 2.⁹² The respondents spent on average 25.94 hours

⁹² Half of the respondents reported not to reveal their first life identity in-world, while the other half said they do so.

per week in Second Life with a median of 20.

Table 4-5
Second Life profile

Membership type^a	Basic (no fee)	35%
	Additional basic (US\$9,95)	3%
	Premium (monthly)	15%
	Premium (quarterly)	13.4%
	Premium (annually)	30.4%
Membership length	2003	3%
	2004	9.2%
	2005	19.4%
	2006	42.6%
	2007	25.8%
Hours per week	<=8	21.7%
	9 – 15	23.3%
	16 –24	16.1%
	25 – 40	23%
	41+	15.9%

Source: Survey on Second Life, $N=434$.

^a 3.2% have a different type of membership such as 'lifetime membership'.

4.4.2 *Semi-structured interviews*

A second method used in this study to gather information was through interviews. The aim was to obtain feedback on the accuracy and validity of the survey evidence and to gain a deeper understanding of meaningful themes, practices, and relationships from the interviewees' own perspectives through the collection of qualitative firm-related information and user-related information. Technically, the interviews were semi-structured and were conducted following interview guides that were developed for the developer firm and for Second Life users. Questions for Linden Lab focused on performance and management such as role and responsibilities, the voice of/focus on the customer such as customer involvement, and the exchange of knowledge such as learning from peers and customers (see Appendix for Interview Guide Firm, pp. 264-265). Questions for users focused on their 'doings and sayings' in the firm-hosted 3D platform and their interactions with Linden Lab. For example, what were their interests in donating time and knowledge in the Second Life open source community? How did they experience meetings with Linden Lab? And, whether they felt they were 'heard' by Linden Lab? (see Appendix for Interview Guide Users, pp. 266-267). These interview questions were guided by the conceptual framework and

built on indicators highlighted in the online survey, providing insightful information to complement and consider in interpreting the quantitative evidence.

In early 2007 two interviews were conducted with Linden Lab employees as I had been corresponding with them about this research. However, a formal interview request was not sent out until October 2007. An email was directly sent to twenty nine Linden Lab employees who worked spread out over all departments at Linden Lab. Six respondents were interviewed and others were asked internally not to participate due to time constraints (see Appendix for Linden Lab Interviewees, p. 268). Around the same time as the first two interviews took place with Linden Lab employees, I conducted two interviews with Second Life users whom I had been in touch with since a Second Life conference (August 2006). The recruitment of four other interviewees was informed by random in-world encounters. Also, I recruited interviewees based on recommendations by Linden Lab employees and/or others users, and, in the context of the Second Life open source community, names of interviewees were derived from the Second Life wiki. In the case of a Linden Lab recommendation, a 'notecard' was sent in-world, and in the case of user referral, an email was sent to which all four interviewees (including a member of the Teen Grid) positively responded. In the case of the open source community, a message was sent internally via the wiki and by using Internet Relay Chat (IRC) to eight contributing mod developers of whom four agreed to be interviewed. In total fourteen interviews with Second Life users were conducted (see Appendix for Second Life User Interviewees, p. 268).

This volunteer bias factor of recruitment of interviewees is a drawback as it is likely that particular types of users may have donated their knowledge and time to this study which may be reflected in a somewhat idiosyncratic outcome of the analysis. On a similar note are the differences in data quality. Some interviewees were very open and went the extra mile such as providing me with links to specific discussions on JIRA or forums, or made introductions, whereas a few others seemed a bit wary and concerned about jeopardizing their friendly relationship with Linden Lab. With these limitations in mind, however, and my in-world participation, mixture of primary and secondary methods, and existing research guiding the analysis presented here, I am confident of my findings.

Interviews were conducted face-to-face, in-world, via Skype, phone, and AOL instant messenger (AIM). In the case of in-world and AIM interviews, transcriptions

were immediately available as they were conducted in the form of written chat, the others were transcribed. Interviews lasted between one to three hours. Prior to the interview participants were explained the research process and agreed upon allowing me to use their input in this study. Confidentiality turned out to be a non-issue (Kvale, 1996). Furthermore, several informants reviewed, commented on and checked the drafts of the empirical chapters they contributed to, thereby contributing to the validity of the study (Yin, 2003).

4.4.3 *Web-based documents*

The third method employed constituted an analysis of online Second Life-related documents. Various kinds of documents exist that can serve as data sources, such as personal documents (both in written and visual form like diaries and photographs), official documents such as reports, mass media outputs such as newspapers, and Internet document sources such as online forums and mailing lists. Documents can provide evidence of human interactions (Bryman, 2004; Frederiksen, 2006). The analysis of documents is an unobtrusive way to investigate such interactions in contrast to talk and speech. In particular, when examining processes of production and usage, documents can be a fruitful source for generating an understanding of, for example, how a certain practice in the social world is formed (Prior, 2006). It is important to determine the quality of documents by criteria such as authenticity, credibility, representativeness, and meaning (Bryman, 2004). However, the verification of these criteria for online data is less straightforward for reasons such as dealing with unknown (identity of the) authors and omitted citation sources. Therefore, continuous awareness and diligence is necessary involving checking and making informed decisions to include or reject 'flawed' documents.

In this research, Internet sources offered insight into what Linden Lab and users considered significant and insignificant on the firm-hosted 3D collaborative platform. Online Second Life-related sources were, therefore, important tools for the analysis of user-user and user-firm communication. In other words, firm-user interactions represented in documented exchanges were investigated and drew out the 'sayings and doings' of contributors to the 3D collaborative platform. Several topics and innovative practices that were discussed online were highlighted and opportunities for learning could be distilled (especially in the cases where Linden Lab had implemented

suggestions or innovations contributed by users). The overall objective of this component of data collection was to present a rich illustration of Second Life-related practices with a particular aim to highlight what Linden Lab could learn from interacting with, tracking and analysing users' discourses about the community's topics of interest (Jeppesen, 2004; de Valck, 2005).

Second Life-related resources could be retrieved from (and, in some cases, supplied to) several principal Linden Lab-hosted Web sites: lindenlab.com; secondlife.com,⁹³ secondlifegrid.net; wiki.secondlife.com; and jira.secondlife.com. The Linden Lab Web site provides information about Linden Lab, its management structure and key personnel, a Second Life 'in-the-news' section, a company press kit including white papers, and a job seekers section. The functionalities of the Second Life Web site encompass general information about Second Life, several showcases, the community environment, the blog, and support pages. The Second Life Grid provides information for organizations that are interested in an in-world presence, such as about purchasing land, statistics and demographics, and API programs. The Second Life wiki serves as an archive and means for contributors to outline detailed instructions, projects, etc. The wiki offers, for example, the open source portal, the quality assurance portal, and the Linden Scripting Language portal. JIRA is a third party tool and is a (beta) issue tracking project management tool for Second Life.⁹⁴ Its main purpose is to serve the community's open source endeavours by having users participate by submitting particular issues like bugs and feature requests.

These Web sites issue a lot of data including podcasts, instruction manuals, events announcements, discussion forums, and links to, among others, user-run virtual newspapers and fan fiction. Because this research was particularly interested in online documents that yield insight into firm-user dynamics, I chose to concentrate on the most comprehensive, interactive, public and (seemingly) widely used documents: (1) Official Second Life Blog; (2) Second Life forums; (3) Second Life mailing lists; and (4) JIRA. A selection was made omitting several forum threads and mailing lists that were deemed less, or not, relevant to this research such as 'real life meet-ups and events', 'shopping', and 'SL volunteers and education' (see Appendix for Overview Documents, p. 269). Note that all documents that could be found in the 'Second Life in the news'

⁹³ Note that teen.secondlife.com serves the 13 to 17 year old users, however, with no full access and this site, to a certain extent, being similar to secondlife.com, it has been excluded from further investigation.

⁹⁴ JIRA, developed by Atlassian, is not an acronym.

section on lindenlab.com were collected and mainly used as secondary data sources. In cases where sources are cited, a reference is made to the live URL where the document can be retrieved (see especially Chapters 5, 6, and 7).

In order to analyse these data sources an archive had to be created which constituted of single digital documents. For example, each forum thread was separated by first post and comments to allow for the investigation of information provision and seeking. Accessing and downloading all these information sources was not an option (as it is abusive of Linden Lab online properties). The most efficient manner was to create a single copy of the online information and store it in a database back end. Therefore, a threaded Web download script was created using the Ruby scripting language. This script used built in timing mechanisms to ensure that the load on the Linden Lab servers would not create too many simultaneous requests and ensuring that each message was only downloaded once for storage.

Rather than crawling the Web sites, the scripts incremented the thread identification looking for links and copied 1,457,776 messages. The script then parsed the HTML of each message and stored all the relevant metadata such as username, date/time stamp, message body, etc. into a MySQL database.⁹⁵ After the data was rechecked for accuracy another script was used to produce targeted lists with specific attributes such as forum names, user names, and date ranges. Since the database contained a near complete snapshot of all online Linden Lab data, specific fields could be matched together in post processing. These files were then transferred to a specially built database in FileMaker Pro for further coding and analysis (see Appendix for Second Life Database, p. 270). Records imported covered the period between November 2002 and December 2007.

4.4.4 Secondary data sources

As indicated in the previous section online news documents that have covered Second Life have been archived by Linden Lab. Those news documents were collected for this study and served mostly as background information or for cross-checking purposes. Data were collected between January 2002 and December 2008 and stored in the database that was developed for this research.

⁹⁵ Downloading the Official Second Life Blog used a slight variant of the forum script. The JIRA back end was downloaded as a series of XML files and parsed using this format. The mailing list was downloaded as a series of mbox files (a standard for mailing list archival) and processed for information.

Furthermore, at the beginning of Section 4.4 I addressed the role of my participation and observations by means of my avatar Rocketgrrrl Tripp in Second Life which served as a secondary data source. One important reason for this was that Linden Lab employees tended not to be much in-world⁹⁶ - with exceptions such as the occasional community manager, scheduled office hours and other in-frequent events⁹⁷ - and, therefore, Second Life itself was not the most suitable place to see and learn about users and Lindens in (inter)action. In addition, Second Life was very fragmented, consisting of many pieces of (scattered) land and islands, where not everything was accessible nor was it possible to keep track of what was going on or changes made. For example, one day you would come across a complex build and the next day the land would be cleared and abandoned. The first three months I logged in on a near daily basis for one to three hours. After this initial period I logged on once or twice a week in the early morning or late evening to cover multiple time zones and spent each session anywhere between thirty minutes up to two hours in Second Life.

I also attended several conferences and workshops. The Second Life Community Convention in San Francisco in August 2006, PICNIC'06 in Amsterdam in September 2006, a workshop New Media Knowledge in London in October 2006, DIGRA Situated Play in Tokyo in September 2007, the OECD-Canada Technology Foresight Forum on the Participative Web in Toronto in October 2007, Faculty Seminar on Virtual Reality at USC in February 2008, and the Metaverse U Conference in Second Life also in February 2008. At these conferences and seminars, I attended presentations by a variety of Linden Lab employees and Second Life users (regulars, business owners, and big name brands that set up shop in Second Life) and field notes were taken. I was also a member of two Second Life research groups, namely the 2007 Second Life Market Data Project (with several US firms including Turner Networks), and the Second Life Project Group at the Japanese firm Hakuhodo Foresight.

As this research centres on only one case study, I have sought to consult and collect survey results from other Second Life researchers and those released by Linden Lab as a means of validating my survey results. Moreover, thirteen semi-structured

⁹⁶ More specifically, some Lindens that are in-world tend not to make their presence known. For example, developers do not want to be disturbed when they are testing code so their avatar's last name would not be Linden, making it harder for users to recognize that they are dealing with a Linden Lab employee.

⁹⁷ Available documents in the form of transcripts were also collected concerning in-world firm-user meetings/gatherings, that is, office hours, town halls, and community round table meetings. These occasionally served to cross-checking findings.

interviews following the same interview guide were conducted at software developer Valve Inc. (Seattle, 2006) and a similar online survey (fitting FPS) was dispersed among gamers of Valve's Steam platform ($N = 113$). In addition, I also conducted semi-structured interviews with nine employees of the new media department of BBC Radio 1 (London, 2006) to examine the impact of new media on the organization and its usage of Second Life and other social networking sites to draw in listeners. The findings of those activities confirmed that several issues raised in this study about Second Life were not 'unworldly' and may be indicative for the wider games and 3D software industries, and perhaps the wider media sector.

4.5 Rezzing Second Life

The results of the online survey, interviews and document analysis provided the basis to analyse, or 'rez'⁹⁸ in Second Life jargon, the case study. The objective of the data analysis process was to create a link between the data and the conceptual framework. This was done by making sense of the empirical data by relating the empirical indicators to the theoretical concepts, and by checking the validity of the findings. The overall analysis used the following main tactics: descriptive and correlational, and cluster analysis and exploratory factor analysis for the quantitative data, and a thematic analysis for the qualitative data.

Some basic statistical analysis was conducted to describe and explicate the survey results. Particularly, the functionalities of the design space were presented using descriptive and correlation techniques (see Chapter 6). Cluster analysis is a technique to group individuals based on their responses to several variables, while factor analysis refers to various techniques that aim to identify groups or clusters of variables based on people's responses to those variables.⁹⁹ For this study, a hierarchical clustering method that served to identify the number of clusters was employed which was followed by a non-hierarchical K-Means clustering method. This technique was used to analyse user

⁹⁸ To *rez* means to create or make an object appear in Second Life by using the toolkit or by dragging it from the inventory (Rymaszewski, 2007).

⁹⁹ Three important uses for the factor analysis are to learn the structure of a set of variables; to develop and evaluate tests and scales; and, to reduce or simplify complex data sets (Pallant, 2005). Note that different viewpoints exist about what constitutes the various types of factor analyses. In particular, factor analysis and principal component analysis have been compared in terms of the employment of communality estimates. See for an overview Field (2005) and Kline (1994).

participation patterns and communication behaviour on the firm-hosted platform guided by four classification variables (respectively, length in-world visits, design capabilities, information retrieval and supply; see Chapter 5).

Principal Component Analysis (PCA) was selected in order to examine correlations between variables. More specifically, the analysis aimed to learn which linear components could be found in the data and what a specific variable contributed to that component (Kline, 1994). This technique assumes that the sample used reflects the population and, therefore, the conclusions are limited to the sample, making it difficult to generalize the outcome (unless multiple samples are used revealing a similar factor structure to strengthen external validity which is a point for future research (cf. Field, 2005)).¹⁰⁰ The following steps were followed to conduct the analysis using SPSS. First, the suitability of the quantitative data set was assessed by considering the sample size and ratio of subject items, using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity. Second, several factors were extracted by considering eigenvalues and the scree plot. Third, factors were rotated and interpreted so as to calculate to what degree variables loaded onto extracted factors.¹⁰¹ Fourth, the reliability of the scale was tested using Cronbach's α to check whether it reflected the construct it measured. The analysis assisted in the detection of underlying structures of information and communication practices of Second Life users (see Chapter 7).

In order to gain a deeper understanding of user participation in mod development practices it was important to examine the context of, and latent structures underlying, the explanations and interpretations of user participation in Second Life. The interview and documentary data were used to 'tell the story' of Second Life throughout the empirical Chapters 5, 6, and 7. The analysis of these data yielded many insights into "the ways that people organize and forge connections between events and the sense they make of those connections" in the context of mod development on the firm-hosted platform (Bryman, 2004: 412). This form of narrative analysis "link[s] personal experiences to organizational experiences narratives allow[ing] us to study organizational reality as constructed and transformed by its actors" (Garcia-Lorenzo, 2004: 47). In Second Life's case of perpetual development, this method was particularly

¹⁰⁰ Although a probability sample is recommended for PCA, the sample used in this study generated survey results with enough variance. Therefore I was confident to perform this type of analysis.

¹⁰¹ The term *factor* tends to be used to refer to output, strictly speaking however, the outputs for PCA are components.

helpful because it emphasizes continuity and process, highlighting the users' sense-making of their roles as participants with different stakeholders that are embedded in dynamic relationships involved in the mod phenomenon underpinning the firm-hosted 3D platform (Bryman, 2004; Reissman, 2004). As my analysis focuses on the connections among the users' accounts of their experiences, the findings tend to 'stick' to the case study, making it difficult to generalize the results (cf. Flick, 2006).

The qualitative data analysis focused on the content or meaning of *what* was said (or written) rather than on how it was conveyed. Rather than using, for example, words and paragraphs as units of analysis as is common in quantitative content analysis, this study identified common elements reported by research participants across qualitative data (cf. Haythornthwaite and Gruzd, 2007). This resulted in the organization of the qualitative data into themes and sub-themes (Fereday and Muir-Cochrane, 2006; Reissman, 2004). This was achieved by the development of categories and a coding scheme (see Appendix for Coding Scheme, pp. 271-275). Given my aim to validate and extend the conceptual framework for this study, initial sets of codes were developed based on my conceptual framework which is informed by the theories discussed in chapter 3.¹⁰² However, the framework was expanded as themes emerged during the analytical process which required a new category or sub-theme such as 'education' and 'machinima' (cf. Bryman, 2004; Kvale, 1996).

Documents and interview transcriptions were coded, checked and rechecked throughout the coding process for consistency. The analysis was facilitated by the FileMaker Pro database which functioned as a 'living document tool', grouping all the qualitative evidence into a file structure organized according to the theoretical issues guiding this research (see Chapter 3). The software assisted in developing a protocol, analysing and cross-checking themes across content, and developing counts of, for example, information providers versus commentators (see Chapter 7).¹⁰³ This organization of the data helped me to keep track of the context in which observations had been said or written which otherwise would have appeared to be fragmented (Bryman, 2004).

This analytical method was made more robust by adopting Yin's (2003) tactic towards constructing validity by using multiple data sources, establishing operational

¹⁰² These codes correspond to the themes of the survey and interview guides.

¹⁰³ Several quantitative aspects were investigated using this database (see Chapter 6).

measures, and having key informants review drafts. It also provided a basis for establishing the external validity of the results enabling me to generalize the outcomes to established theoretical domains and the reliability of the study so that the study could be repeated by reanalysing the protocol and database developed for this research. The process of making sense of the results of the data analysis involved identifying relationships between the themes and coding categories, exploring the properties of user participation in mod development and the different dimensions of learning opportunities, and uncovering underlying patterns of firm-user interactions. During the analysis and writing process, the concepts and theories emerging from the evidence were compared with, and interpreted in the light of, my initial assumptions and the results of existing research. This allowed me to check for affirmations and contradictory findings (Eisenhardt, 1989). The approaches to the quantitative and qualitative data analysis led to the new theoretical insights which are set out in Chapters 8 and 9.

4.6 Conclusion

In developing this research design, this study has sought to strengthen methodological frameworks employed in previous research by combining quantitative and qualitative elements to examine firm-user dynamics and learning opportunities that may benefit product development. First, attention was drawn to the operationalization of the research questions and working hypotheses that guides the research design in the context of the conceptual framework presented in Chapter 3. This was followed by outlining the rationale to gather quantitative and qualitative data by using Web-based surveys, semi-structured interviews, and Web-based documents, and discussing several drawbacks such as using a single case study and recruitment of interviewees. Lastly, various quantitative and qualitative analyses were highlighted that tested different aspects of the propositions guiding this research.

Chapters 5, 6, and 7 present the empirical investigation of user participation in the commercial setting of Second Life.

Chapter 5 Participation & mod development

It's a new dawn, it's a new day, it's a new life for me

- The Roar of the Greasepaint - The Smell of the Crowd¹⁰⁴

5.1 Introduction

This chapter begins the empirical journey to unravelling user participation on the firm-hosted platform. The empirical investigation is guided by the following working hypothesis that was outlined in the conceptual framework (see Chapter 3) and operationalized in the research design (see Chapter 4):

H1 Users on the firm-hosted platform 3D platform are likely to participate in mod development.

H1 guides the examination of participation patterns of the developer firm and users in Second Life by relating disparities between user participation and Second Life membership to the organization of Linden Lab, highlighting the issue concerning the professionalization of user participation in product development. The design capabilities construct informs this analysis. In particular, attention is drawn to the motivations and membership types of Second Life users in the context of commerce.

This chapter is structured as follows. Section 5.2 introduces the design capabilities as a unit of analysis. Section 5.3 draws out the development of Second Life from inception to the contemporary platform of creativity, community, and collaboration. Insight is yielded into the underlying drivers for users to join Second Life and six membership clusters based on several participation characteristics are developed. This is followed by the examination of Linden Lab and mod developers in the context of entrepreneurship in Section 5.4. The chapter ends with some concluding remarks in Section 5.5.

¹⁰⁴ Leslie Bricusse/Anthony Newley, *Feeling Good, The Roar of the Greasepaint - The Smell of the Crowd* (Merrick/Delfont/Liff, 1965).

5.2 Design capabilities

What are the qualities of user participation? What do users participate in and why do they donate time and labour? More importantly, who are those users that participate on the firm-hosted platform? The literature review presented in Chapter 3 has provided only sparse insight into these questions. User participation has tended to be approached in terms of cultural qualities - especially with a tendency to overestimate creative capacities and contributions of users and underestimate qualities of design and use -, needs, and, often, outside a commercial framework. This chapter seeks to illuminate several aspects of user participation in the context of commercial and non-commercial contributing developers on the Second Life platform which is guided by the *design capabilities* as a unit of analysis underpinning H1 (see Section 4.2). The design capabilities are idiosyncratic of particular participation patterns of mod developers and the developer firm that are (simultaneously) operating in the same designed space of Second Life, linking user participation and Second Life membership to the organization of the developer firm.

By using interview, Web-based survey and document data this chapter empirically investigates several qualities of user participation in Second Life. This is achieved by the investigation of the appeal of Second Life and analysing particular individual usage characteristics and communication behaviours of the respondents which lead to the development of six Second Life users profiles. Furthermore, the investigation of the design capabilities draws attention to ways that the organization of the Second Life platform resonates with Linden Lab's organizational characteristics and internal culture. More precisely, both Linden Lab and Second life users are guided by processes of distributed design and distributed decision-making where people create, collaborate, and most importantly, are passionate about what they do. It catapults the issue of the professionalization of mod development onto the research agenda beyond dichotomous play/labour debates (see Section 3.2.3).

The next section begins to untangle user participation in Second Life. It kicks off with an analysis of interview and online document data to yield insight into how Second Life was conceived and developed into the platform we now know today.

5.3 Your World. Your Imagination.TM

Second Life is the result of a series of course changes. In 1999 Linden Lab began working on a hardware feedback device ('haptics') that would enable users to fully immerse in virtual reality. In order to demonstrate this device (such as to potential investors) a virtual environment called 'Linden World', with task-based games was built. Linden Lab abandoned the device when it figured that Linden World had more potential, guiding the firm's choice to gear up towards a more lucrative opportunity of developing a software-based virtual environment. In retrospect, it can be said that Linden World was the first version of Second Life. The format of the 3D environment-to-be was set during a board meeting in 2001, when a number of people started building their own things such as snowmen. Those inputs marked what was going to be the most compelling aspect of Second Life: having people build and contribute their own creations in real time. So, rather than forging an objective-driven and gaming orientation as was common in other gaming and 3D software contexts, Linden Lab shifted its goals towards an user-created and community-driven platform. Jim, a software engineer at Linden Lab, points out the importance of user participation in Second Life.

So from that point onwards, the whole of Linden Lab is very aware of the debt we owe to the people who are actually making stuff. I mean seriously, the Second Life platform is, you know, a fairly adequate piece of software that allows people to make all this cool stuff, and so there was an incredible awareness from very early on in what the users and residents of Second Life know, and what they can contribute.

(Jim, 12/1/07, p. 2)¹⁰⁵

This 'epiphany' encouraged ten Linden Lab employees or so to work on transforming the Linden product into an avatar-based platform that allowed users to engage in building, and eventually, scripting activities. One year later, the alpha version of Second Life was up and running. In November 2002 Second Life entered a closed beta testing phase and was opened up to users that were interested in assisting Linden Lab with platform development. Those 'early mod developers' (or, arguably lead users; see Section 3.4.2) offered a hand in building and testing various aspects of the platform.

¹⁰⁵ The date refers to when the interview was conducted and the page number to the interview transcript. See Appendix for Interview Guide Firm, pp. 264-265, and Linden Lab Interviewees, pp. 266-267.

In those days Second Life was basically a large shared sandbox where, for example, it was possible to edit and move other people's avatars around. These user contributors were at the forefront of in-world content creation, collaboration, and community building, and caused and/or witnessed Second Life's first encounters with, among others, combats and cheats such as 'Weapon of Mass Destruction'.¹⁰⁶

On 23 June 2003 Second Life was released to the general public.¹⁰⁷ It was Linden Lab's expectation that with an increase in content, Second Life would become more interesting for different kinds of users. In other words, it was the view of Linden Lab that the initial Second Life users were so-called 'early adopters' with a rather advanced skill level, but that, when time progressed and features were added, the more average mod developers would join, followed by casual users that would participate in consumption rather than development practices. However, users did not exactly flock to Second Life. One important means to draw in users was by granting users intellectual property rights over the things they created. Another change was to replace a subscription-based model with a variable pricing model whereby users pay in proportion to the size of land they use.¹⁰⁸ These changes rang in Second Life with its own sets of social norms, laws, and markets, as we now know it (Ondrejka, 2007).

In 2004 Linden Lab steered the direction of platform development towards in-world entrepreneurship conditioned by the Linden Dollar (L\$). This resulted in an influx of users and an increase in monthly monetary exchanges between users. But it really was the year 2006 when Second Life made many media headlines which, in many cases, was marked by the entry of multiple first life businesses. Adam, journalist for Reuters, describes how Reuters came to Second Life.

This all got started when the Reuters CEO met the Linden CEO at a conference. [...] So a couple of months later they came to me and asked me first, if you have ever heard of this Second Life thing. And I said yah. But I never tried it. They said well, we want to open up a bureau there. Cover it like any other economy. And the idea seemed a bit outlandish at first but the more that I kind of looked into it, it really is a pretty good fit just because Second Life is an emerging economy just like a developing country in the real world. If it was just a video game, we wouldn't be there but because there is a real economy, because there is a real currency, because people own the concept that they create, it becomes possible for us to kind of cover this like we would a country in the real world.

(Adam, 19/01/07, p. 3)

¹⁰⁶ See <http://www.fudco.com/habitat/archives/000059.html> (accessed 9/06/08).

¹⁰⁷ See <http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2003/06/23/BU124130.DTL> (accessed 30/03/08).

¹⁰⁸ See <http://secondlife.com/land/pricing.php> (accessed 19/12/08).

By 2007 Second Life offered a home to roughly 11 million users that exchanged about US\$ 8 million per month.¹⁰⁹ This steady increase in users and money may perhaps partially explain the number of firms such as Cisco and IBM that sought to develop an in-world presence for reasons such as marketing, training, experimentation, and collaboration.¹¹⁰ Another attractive incentive may have been Linden Lab's decision to open source the Second Life Client in that same year. Linden Lab reported that, although there were no libraries or extensive manuals and the like in place at the time of writing, the firm has received an increasing stream of user-developed contributions for integration in the Second Life platform (see Sections 6.3.2 and 6.3.3).

Overall, the development of Second Life from inception to its current status has shown continuous growth. Table 5-1 summarizes this development by number of users, US\$ exchanged per month, and number of Linden Lab employees.

Table 5-1
Second Life timeline

	Number of users	US\$ per month	Number of Lindens
1999			
2000	-	-	5
2001	-	-	10
2002	145	-	20
2003	2743	-	25
2004	18,876	5,000	40
2005	123,438	500,000	60
2006	3,000,000	5,000,000	100
2007	11,000,000	8,000,000	220

Source: USC Faculty Seminar on Virtual Reality, Episode 2, Second Life, 12/2/08 by Cory Ondrejka.

With the growth of the user base and the broadening of mod development opportunities Second Life has had its fair share of controversies. Despite Linden Lab's wish to refrain from platform governance, occasionally it had to interfere and make particular operational changes to its policies such as regarding age verification,¹¹¹ sexual

¹⁰⁹ Note that the number of registered users does not equal active users (that is, according to Linden Lab's logs users that have logging in over the last 30 days) and tends to be somewhere between 500,000 and 1,000,000 users. See http://secondlife.com/whatis/economy_stats.php (accessed 19/12/08).

¹¹⁰ This information was based on conversations with Christian Renaud (Cisco) and Roo Reynolds (IBM).

¹¹¹ The age verification issue is related to Linden Lab's policy to separate adults from teenagers (<= 17) by maintaining two separate platforms. In its execution, however, this system was not watertight so now

ageplay,¹¹² and wagering¹¹³ (which, in many cases, received user protests). Despite these concerns and other daily occurring incidents,¹¹⁴ Second Life seems to offer a spatialized real-time platform where all kinds of users from all over the world can interact with others, engage in creative activities (of a commercial and non-commercial nature), and can belong to various communities at once.

This section has begun to yield insight into Second Life by providing an overview of the formation of Second Life. Based on the analysis of survey data several aspects that concern the x-factor of Second Life are examined so as to yield insight into what draws people to Second Life.

5.3.1 *Million\$ of reason\$*

Various studies have sought to examine user motivations underlying their participation in innovation, in general, and mod development, in particular (see Section 3.4.2). In the innovation and open source literatures user participation has been found to be motivated by e.g. needs and costs (Lakhani and von Hippel, 2003); career advancement (Lerner and Tirole, 2002); reputation (Raymond, 1999; West and Gallagher, 2006); firm recognition (Jeppesen and Frederiksen, 2004); and, intrinsic values related to the practice of innovating such as fun and learning (Jeppesen, 2004; Shah, 2006). In the context of a few MMORPG studies, gamers may be motivated by factors such as social interactions, escapism, learning, and achievement (Schultheiss, 2007; Yee, 2006). A study on user involvement in developing videogame cheats showed that gamers produce (and use) cheats for reasons of expertise, power, and play (Consalvo, 2007). Game modders seem to have a particular interest in enhancing or personalizing the game play, hacking, acquiring knowledge, creativity, and collaboration (Sotamaa, 2004); in addition, modders have been found to be driven by challenges encountered during the modification process and peer recognition (Behr, 2007; see Section 3.2.3). What are the motivations of Second Life users?

users can voluntarily undergo an age verification process (by providing a one-time proof of, for example, a driver's license) if they want to access mature content. However, concerns have been raised about the disclosure of personal information, cheats, etc. See <http://blog.secondlife.com/2007/12/05/age-verification-enters-grid-wide-beta/> (accessed 11/06/08).

¹¹² Sexual ageplay concerns sexualised portrayals of seemingly underage avatars which was discontinued as it was opposed to Second Life's Community Standards (and illegal in several countries). See <http://blog.secondlife.com/2007/11/13/clarification-of-policy-disallowing-ageplay/> (accessed 11/06/08).

¹¹³ See <http://blog.secondlife.com/2007/07/25/wagering-in-second-life-new-policy/> (accessed 27/10/07).

¹¹⁴ See <http://secondlife.com/support/incidentreport.php> for Linden Lab's daily incident report including types of violations and actions undertaken by Linden Lab.

A study (2007) on psychological engagement and gambling among 657 Second Life users revealed that 52.5% ($N = 345$) of the respondents use Second Life for fun or excitement purposes (Ortiz de Gortari, 2007). Furthermore, respondents expressed an interest in creating and building in-world ($N = 320$, 48.7%); the chance to meet a wide variety of people ($N = 306$, 46.6%); the permanence of the virtual environment ($N = 189$, 28.8%); relaxation ($N = 148$, 22.5%); escapism ($N = 144$, 21.9%); boredom ($N = 65$, 9.9%); and, anonymity ($N = 41$, 6.2%). Similar results were reported in a study conducted among 500 Second Life users (de Nood and Attema, 2007). Out of 18 statements, fun was reported to be the number one motivation for users to participate in Second Life ($N = 376$), followed by meeting people from across the world ($N = 356$), making friends ($N = 329$), being creative ($N = 273$), and to learn ($N = 273$).

For this study the appeal of Second Life was measured in terms of social, topical, and technical aspects (see Section 4.4.1.2). The survey questions asked about *relationships* ('I can enjoy social interactions with others' and 'I can help others with building, scripting, and texturing'), *escapism* ('I can pretend to be someone else'), *creativity* ('I like to build, script, and/or texture' and 'I can modify Second Life Open Source'), *peer recognition* ('I can build a reputation'), and *innovation potential* ('It is innovative' and 'I like that we can retain intellectual property rights').¹¹⁵ The findings are presented in the Table 5-2.

Table 5-2
Appeal of Second Life

Why does Second Life appeal to you?	Mean ($N=434$) ^a
I can enjoy social interactions with others	1.55
It is innovative	1.58
I like to build, script, and/or texture	1.74
I like that we can retain intellectual property rights	2.06
I can build a reputation	2.27
I can help others with building, scripting, and texturing	2.35
I can pretend to be someone else	2.95
I can modify Second Life Open Source	3.07

Source: Survey on Second Life, $N=434$.

^a Values range from 1-5 (Statements, 1=strongly agree; 5=strongly disagree).

¹¹⁵ See the Appendix for Survey on Second Life, pp. 247-263.

These results appear to be consistent with the other studies. The mean outcomes show that Second Life attracts users that are interested in the platform's offerings of sociability and, in particular, in-world creativity. For instance, Strife, a user interviewed for this study sums up his reasons for participation:

Interests: socializing, scripting, building.

(Strife, 4/12/07, p. 6)

Second Life can also mean an escape from first life physical disabilities, social, financial, and other constraints. Another user, Adeel who suffers from cerebral palsy and is on disability, describes why he is in Second Life:

I am very lonely in R[eal] L[ife]. When I go out to social events.. or help like after the hurricane Katrina I meet people and they have their own worlds and I am like a meteor floating in space. After helping, everyone went on their way and left me behind. And [I] went to Active Worlds. People were so "indifferent" and cold. I find SL to be more friendly. This is my main Gorean set. I would like to learn how to make money here..

(Adeel, 11/06/07, p. 8-9)

A well-known teen user explained that his interest in Second Life is driven by creative endeavours. From a very early age, Mike has developed a keen interest in pixel design. The first time he heard about Second Life, however, he did not sign up because it was then for adults only.

So all of a sudden two years later, I am looking for buildings because I like to draw things I see in pixel. And all of a sudden I saw this 3D picture of a building that a teen made and I was like I want to do that. So then got myself an account. And the first day I signed on, I was like there is other people walking around. I was like wow.

(Mike, *Teen Grid*, 14/11/07, p. 2-3)

For Garrett, another interviewee, Second Life offered the opportunity to explore alternative means to conduct his business as an interactive and interface designer. Because he had been in software development for over a decade he had developed a pragmatic (and, a somewhat cynical) approach to new technologies. Yet, his attention was drawn to the complexity of the interface and user experience of Second Life which could support (showcasing) his skills and improve his business.

The need to get the word out and at the same time an increasingly acceptance by clients to receive their work digitally and not ever physically meet, as well the growth and pervasiveness of broadband and my desire to work in an international marketplace led me to consider another method of communication.

(Garrett, 11/07/07, p. 1)

The findings presented in Table 5-2 also show that, in accordance with the prospect of content creation, intellectual property (IP) ownership is deemed a relatively appealing feature for user involvement. Scores, however, concerning escapism and advanced creativity (that is, open source), lean towards neutrality which also confirms earlier findings. The advanced creativity result may be partially explained by the timing of this survey which was conducted roughly five months after Linden Lab's announcement of open sourcing the client software and a blossoming community had not been established yet. Another reason may be related to advanced skills and know-how that users need in order to mod the client code which are not all-round capabilities that the majority users tend to have (von Hippel, 2005; Behr, 2007). If we consider the respondents' attitudes towards escapism, we can also take a closer look at whether respondents revealed their first life identity to other Second Life users. The results showed that 50.2% of the respondents ($N = 434$) do not reveal their first life identity.

The survey also asked respondents to rank six items concerning the appeal of Second Life in order of importance. The results are presented in Table 5-3. Again, social interactions followed by user creativity were considered the most important aspects for participation in Second Life. Making money and purchasing behaviour ranked after the relatively importance of visual appearance of one's avatar and/or home, and attending in-world activities. A Kendall's W Test was performed to examine the strength of agreement between respondents ($X^2(5) = 389.618$, $W = .186$, $p < .001$) (see Appendix for Appeal of Second Life: Rank, p. 276). The result was significant indicating little agreement among respondents in ranking the statements in order of importance.

Table 5-3
Appeal of Second Life: Rank

Rank in order of importance	Mean (N=420) ^a
Socializing with other members	2.40
Creating things	2.55
Visual appearance of avatar/home	3.81
Attending in-world events	3.97
Making money	3.99
Buying items for avatar/land	4.27

Source: Survey on Second Life, N=434.

^a Values range from 1-6 (Statements, 1=highest; 6=lowest).

In sum, Tables 5-2 and 5-3 have indicated that users are drawn to Second Life for mostly social and creative motivations. But who are those users that participate in Second Life?

5.3.2 *The many lives of Second Life*

Second Life is mostly praised for its *generative* features that inform the dynamic relationship between user participation as input and user innovation as output. This generative capacity is a quality that thrives on unexpected and unfiltered modifications and contributions made by all kinds of users (Zittrain, 2008). In order to learn more about those contributing users I consulted approaches of several (mostly non-empirical) studies that have concentrated on user participation in online communities (see Chapter 3). These tended to indicate orientations such as a ‘lurker/poster’ dichotomy (or, passive/active participation) (Rheingold, 1993), location of consumption practice (Cova and Cova, 2002; Li and Bernoff, 2008), and social and topical involvement (Crowston and Howison, 2005; Kozinets, 1999).

Furthermore, several studies that have focused on games/3D environments developed gamer taxonomies based on player styles in multi-user dungeons (MUDs) (Bartle, 1996); gamers’ individual traits and friendship in MUDs (Utz, 2000); gamers’ relations to the rules of the game (Salen and Zimmerman, 2004); and, possible relationships between game design and play styles (Sotamaa, 2007a). Yet, there does not seem to be one typology of ‘the’ user-as-participant nor what her/his particular participation patterns are in the context of the firm underpinning online product development. Moreover, none of these studies seem to have provided a systematic

empirically grounded investigation into the ways users may participate on the firm-hosted platform, what they may contribute, and how and with what frequency they may interact with others.

For these reasons, the empirical investigation of Second Life users presented in this study resulted in a topology of Second Life memberships that were profiled against the following *participation qualities*: participation patterns, communication behaviour, and several general user characteristics (cf. de Valck, 2005; Wiertz and de Ruyter, 2007). Based on survey data four classification variables were developed, respectively, duration of in-world visits, design capabilities (building, texturing, scripting, open sourcing), and information retrieval and supply, that served as input for the cluster analysis. More specifically, *in-world visits* (Hrs) provided insight into the average duration of weekly Second Life visits; *building* (B), *texturing* (T), *scripting* (S), *open sourcing* (V) are considered to be the main formats to contribute to mod development practices underpinning the development of the Second Life platform; *information retrieval* – i.e. read blog (Rb), forums (Rf), scripters (Rs)/developers (Rd) mailing list, open source (Ro)/linden scripting language (Rl) portal, in-world group messages (Ri) - and *information supply* – i.e. post blog (Pb), forums (Pf), scripters (Ps)/developers (Pd) mailing list, open source (Po)/linden scripting language (Pl) portal, in-world group messages (Pi) - yield insight into participation in interactions concerning Second Life.

First, a hierarchical clustering method was employed as an indicator for the number of clusters to be used in the non-hierarchical clustering method.¹¹⁶ The latter method is considered to be less myopic and better able to withstand irrelevant variables, outliers, and the distance measure deployed than hierarchical clustering methods (Field, 2000). The hierarchical cluster analysis used Ward's Method, using the squared Euclidian distance measure.¹¹⁷ Based on the outcome of the hierarchical cluster analysis and in accordance with previous research, four to eight cluster solutions and order solutions were executed during the non-hierarchical K-Means clustering (de Valck, 2005). Information concerning multicollinearity, standardized distances between final cluster centres and mean values of final cluster centres, assisting in the interpretation of the clusters can be found in the Appendix (Cluster Analysis, pp. 277-278). The six-cluster solution was preferred. In doing so, this solution should not be understood

¹¹⁶ This is a non-overlapping method that assigns an object to only one cluster.

¹¹⁷ The Ward minimum variance method of clustering joins cases by minimizing the variance within each cluster (Field, 2000).

normatively rather, it provides a wider, richer, and systematic understanding of the various elements underpinning participation qualities in the context of the firm than previous studies have accounted for. Table 5-4 presents the unstandardized mean values of the clustering variables.

Table 5-4
Second Life user profiles

	15%	26%	17%	9%	11%	22%	ANOVA ^a
	<i>Twink</i>	<i>Newb</i>	<i>Pro</i>	<i>Power</i>	<i>Facilitator</i>	<i>Experience</i>	F
				<i>rezzer</i>		<i>broker</i>	(p-value)
Hrs^b	2	2	4	4	3	3	48.996
B^c	2	3	1	1	2	1	51.034
T^c	2	4	2	1	2	2	34.805
S^c	2	4	2	2	2	4	76.698
V^c	3	4	4	3	4	5	27.182
Rb^d	2	3	2	1	1	2	43.983
Rf^d	3	3	3	2	1	2	38.567
Rs^d	3	5	4	2	4	5	132.737
Rd^d	3	5	4	2	5	5	101.924
Ro^d	3	5	4	3	4	5	67.380
Rl^d	2	4	3	2	2	5	122.101
Ri^d	2	3	1	1	1	1	33.074
Pb^e	4	5	4	3	3	4	39.104
Pf^e	4	5	4	3	2	3	80.942
Ps^e	4	5	5	3	5	5	81.804
Pd^e	5	5	5	3	5	5	81.019
Po^e	5	5	5	4	5	5	55.697
Pl^e	5	5	5	3	5	3	74.872
Pi^e	4	4	2	2	2	3	44.192

^a N=434. F-values printed in bold are significant ($p \leq .001$).

^b Hrs=Average in-world hours per week. Values range from 1-5 (1= \leq 8; 2=9-15; 3=16-24; 4=25-40; 5=41+).

^c B=Build; T=Texture; S=Script; V=Viewer open source. Values range from 1-5 (1=I do it repeatedly; 2=I have; 3=I would like to; 4=neutral; 5=I would never do it).

^d Rb=Read Official Linden Lab Blog; Rf=Read Second Life Forums; Rs=Read Scripters Mailing List; Rd=Read Developers Mailing List; Ro=Read Open Source Portal; Rl=Read LSL Portal; Ri=Read in-world group messages. Values range from 1-5 (1=everyday; 2=once/twice a week; 3=once/twice a month; 4=rarely; 5=never).

^e Pb=Post Official Linden Lab Blog; Pf=Post Second Life Forums; Ps=Post Scripters Mailing List; Pd=Post Developers Mailing List; Po=Post Open Source Portal; Pl=Post LSL Portal; Pi=Post in-world group messages. Values range from 1-5 (1=everyday; 2=once/twice a week; 3=once/twice a month; 4=rarely; 5=never).

Each cluster represents a particular Second Life user membership according to her/his participation patterns and communication behaviour on the Second Life platform.

Twink. The first cluster groups 15% of the respondents. Each week, these users spend 9 to 15 hours in Second Life. They have used tools to build, texture, and, particularly, script, and they have an interest in modding the Second Life Viewer. Furthermore, the respondents are rather passively involved in platform communications by mainly retrieving information that is provided on the blog, forums, mailing lists, wiki portal, and in-world. The blog, Linden Scripting Language (LSL) portal, and in-world group messages are read on a weekly basis, whereas the other communication means are less frequently read (only a few times per month). This group hardly ever supplies information to the Second Life community. If they do participate in information supply, it tends to be on the blog (via comments), forums, scripters mailing list, and in-world group messages.

Newb. The second cluster contains the largest group of respondents (26%). They spend weekly 9 to 15 hours in Second Life and are potentially interested in engaging in building activities. There is no pro/con attitude towards the other tools for creative endeavours. The respondents' communication behaviours indicate that they are not actively involved in the community. The forums and in-world messages are only read a few times per month and contributions are seldom made to in-world group chats.

Pro. The third cluster accounts for 17% of the respondents. These Second Life users tend to be more actively involved than users of the first two clusters. They spend between 25 to 40 hours per week in-world, where they repeatedly engage in building practices. Particularly, scripting activities have also been performed. The respondents are heavy users of the in-world messaging system. On a daily basis messages are read and a few times per week messages are supplied. The forums, however, are used only on a monthly basis where a similar amount of information is retrieved and supplied. They are not active readers of the blog, but do comment once or twice a month. The LSL portal is read a few times per month, whereas the mailing lists and the open source portal hardly ever get read. Contributions to these channels are not made.

Power rezzer. This is the smallest cluster containing 9% of the respondents. These users also spend 25 to 40 hours per week in-world. Building and texturing are

their core activities. They have engaged in scripting and would be interested in contributing to open sourcing Second Life. From their communication behaviour, it can be gathered that this group of users is an active bunch that is highly vested in Second Life. The respondents are 'power users' in their behaviour of both retrieving and supplying information. In-world messages are read on a daily basis. The forums, scripters and developers mailing lists and LSL portal a few times a week, while the blog and open source portal are read once or twice per month. Power rezzers also supply information. A few times per month they contribute to the blog, forums, mailing lists, and LSL portal.

Facilitator. The fifth cluster is the second smallest group and groups 11% of the respondents. Facilitators spend each week 16 to 24 hours in-world. Similar to the first cluster, these Second Life users have engaged in building, texturing, and scripting activities yet do not seem to have a particular dis/interest in open source. Their communication patterns are quite different however. The respondents show a strong interest in the communal aspects of the Second Life community by reading the blog, forums, and in-world messages on a daily basis. To a lesser extent, information is read on the LSL portal, scripters mailing list, and open source portal. Information is also supplied to those channels, however, on a less frequent basis; once or twice a week contributions are made to the forums and in-world messages, and a few times each month, comments are made to the blog.

Experience broker. The final cluster constitutes 22% of the respondents. Each week users spend 16 to 24 hours in Second Life. Building is their main activity, while some experience with texturing is reported. No particular dis/interest can be detected in scripting, yet no ambition seems to exist for these users to contribute to open source activities. Users of this cluster are fairly engaged in reading (mostly) in-world group messages, the blog and forums. Information is also supplied but less frequently than it is retrieved. Monthly contributions are made to in-world messages and the forums, while the respondents rarely comment on the blog.

A further examination of the cluster solutions on several additional variables was conducted as a means to enhance user membership profiles.

A crosstabulation of gender and the six clusters was performed so as to yield insight into whether a difference in gender among clusters was statistically significant.

The crosstabulation has a chi-square value of X^2 ($df = 5$ and $N = 411$) = 33.766, $p < .001$) indicating that there is a significant association between selected gender among the six user types. In the first five clusters men outnumber the women, however, there are more women among the *experience brokers*. This may indicate that women prefer a type of communication behaviour that seems especially directed towards the community, namely the blog, forums, and in-world messaging. The smallest difference (in %) according to gender is for the *newb* cluster. Assuming joining Second Life is not gender-biased, this finding may indicate that men and women have similar initial exploratory engagements (before settling on particular practices). In addition, the variables year of registration, membership type, land ownership, age, income, monthly expenditures, monthly sales, and monthly account balance were used for further profiling the six membership types.¹¹⁸ Table 5-5 presents the unstandardized mean values per variable and the ANOVA to test for significant differences between the clusters.

Table 5-5
Second Life user profiles and membership characteristics

	15%	26%	17%	9%	11%	22%		ANOVA ^a
	<i>Twink</i>	<i>Newb</i>	<i>Pro</i>	<i>Power</i>	<i>Facilitator</i>	<i>Experience</i>	<i>Sample</i>	F
				<i>rezzer</i>		<i>broker</i>	<i>mean</i>	(p-value)
Yr^c	3.81	4.26	3.59	3.58	3.59	3.79	3.79	7.361
Memb^d	3.39	2.16	3.39	3.42	3.60	3.43	3.11	9.864
Land^e	3.09	4.55	2.65	2.71	2.75	2.54	3.20	13.947
Exp^f	2.60	2.15	3.19	3.14	3.35	3.41	2.91	11.431
Accb^g	2.65	2.12	3.06	3.51	3.37	3.18	2.87	10.051
Sales^h	1.95	1.32	2.44	2.56	2.69	2.35	2.11	23.045^b
Ageⁱ	34.61	35.81	34.29	31.39	29.94	36.61	34.49	3.098

^aF-values printed in bold are significant ($p \leq .01$).

^bWelch F-values printed in bold are significant ($p < .01$).

^cYr=Year of registration. $N=434$. Values range from 1 to 5 (1=2003; 5=2007).

^dMemb=Membership. $N=434$. Values range from 1 to 6 (1=basic, free; 2=basic, \$9.95; 3=premium, monthly; 4=premium, quarterly; 5=premium, annually; 6=other).

^eLand=Land ownership. $N=434$. Values range from 1 to 7 (1=own land; 2=own island; 3=rent land; 4=former land owner; 5=former island owner; 6= own/rent; 7=other).

^fExp=Approximate expenditure per month (L\$). $N=393$. Values range from 1 to 5 (1= ≤ 200 ; 2= 201-1000; 3= 1001-3000; 4= 3001-10.000; 5= 10.001+).

^gAccb=Approximate account balance per month (L\$). $N=366$. Values range from 1 to 5 (1= ≤ 500 ; 2=501-3000; 3=3001-10.000; 4=10.001-30.000; 5=30.001+).

^hSales=Approximate sales per month (L\$). $N=373$. Values range from 1 to 4 (1= ≤ 0 ; 2=1-1000; 3=1001-20.000; 4=10.001+).

ⁱ $N=429$.

¹¹⁸Levene's test for *monthly sales/income* was $< .05$. Only Welch F for *sales* was significant and reported.

The results of the one-way between-groups ANOVA with post-hoc tests reported significant effects of the variables on the six membership clusters (see Appendix for Membership Clusters, p. 279). Respectively, year of registration ($F(5, 428) = 7.361$, $p < .001$, $\omega = 0.24$); membership ($F(5, 428) = 9.864$, $p < .001$, $\omega = 0.96$); land ownership ($F(5, 428) = 13.947$, $p < .001$, $\omega = 0.36$); age ($F(5, 423) = 3.098$, $p \leq .001$, $\omega = 0.14$); approximate expenditure per month (L\$) ($F(5, 387) = 11.431$, $p < .001$, $\omega = 0.35$); approximate account balance per month (L\$) ($F(5, 360) = 10.051$, $p < .001$, $\omega = 0.33$); and, approximate sales per month¹¹⁹ (L\$) (Welch $F(5, 139) = 23.045$, $p < .001$, $\omega = 0.4$).¹²⁰ This additional information makes the six profiles rounder and deeper.

The results of year of registration indicate that of all the clusters newbs have joined Second Life most recently. These newbs also tend to have an ‘additional basic’ account, while the respondents of the other clusters appear to have a type of premium account. The mean values of land ownership indicate that the respondents, (except cluster two that consists of former land owners) tend to rent land. The monthly average expenditure seems to be linked to those membership types where users spend the most time in Second Life, that is, pros, power rezzers, facilitators, and experience brokers. Furthermore, the account balance scores seem to be consistent with the developed profiles in that newbs have the lowest account balance, while the power rezzers have the highest which seems to support their full-on participation in mod development practices. However, power rezzers do not have the highest mean value for approximate monthly sales; rather facilitators have the highest mean value. A strong overall involvement in mod development practices (and, in this case of power rezzers, an interest in open source) therefore, does not necessarily seem to equate to, or translate into commercial activity (see Section 3.4.2).

This draws attention to the organization of interdependent relationships developing between multiple spheres of economic activity that underpin the firm-hosted 3D platform which have received insufficient attention in the literature. The aim of the following section, therefore, is to connect the organization of the developer firm to mod development. It investigates the complexities of crossover labour processes on the firm-hosted platform indicative of the professionalization and commercialization of user participation in Second Life.

¹¹⁹ For *sales* the homogeneity of variance assumption was broken, therefore the Welch F was used.

¹²⁰ Year of registration and age have a small effect. Land ownership, expenditure, account balance, and sales have a medium effect. Membership has a large effect (Field, 2005).

5.4 Digital entrepreneurship

In March 2008 Linden Lab announced its Second Life Brand Center initiative. It describes a set of Second Life trademark guidelines for ways that users are allowed to promote their contributions in terms of developments and skill sets, without implicating Linden Lab's endorsement.¹²¹ In a rather explicit way that is aimed at distinguishing Linden Lab from the creations of Second Life users, Linden Lab explains its new trademark policy as a commitment to 'protect' the Second Life brand and reputation.¹²² This policy is indicative of the many complexities of juggling user involvement and control that the firm faces when it invites users to engage and tinker with the product on a commercially developed platform. In other words, the boundaries of the developer firm are very much in flux, drawing attention to Linden Lab's organization and management of labour processes. This section yields insight into the developer firm and the developer community as entrepreneurs by highlighting work arrangements that bring to light aspects of professionalism of user participation in mod development on the firm-hosted platform.

5.4.1 *The developer firm as employer*

Linden Lab's mission statement, referred to as 'Tao of Linden', describes the principles underlying the attitude and approach towards being employed at the developer firm.¹²³ Working at Linden Lab stresses, among other things, the freedom to choose what to work on; transparency and openness; no hidden agendas and office politics; taking pleasure in work; and, to do all that with style.¹²⁴ This devotion towards employee participation in employment arrangements suggests an entrepreneurial outlook concerning work. Running and nurturing Linden Lab in this way goes back to the firm's early days when it was still a small start-up.

In those days, Linden Lab consisted of a handful developers and an office manager. Some had already worked at other companies and, based on those encounters with corporate culture, they sought to avoid particular negative experiences. One of the

¹²¹ See <http://blog.secondlife.com/2008/03/24/introducing-the-second-life-brand-center/> (accessed 27/03/08).

¹²² See <http://secondlife.com/corporate/brand/index.php> (accessed 2/03/08).

¹²³ See <http://blog.secondlife.com/2006/11/06/the-mission-of-linden-lab/> (accessed 29/03/08).

¹²⁴ Ibid.

upsides of being a small-sized company was that the hierarchy could be (relatively) flat, allowing input and decision-making from all Lindens. Internally, discussions could be held about what kind of attributes of the 'Linden culture to be' would be desirable. At the same time, they had to take into account whether these 'work ways' could be sustained over time and, for example, could be applied to a firm that would increase in size. Linden Lab came up with four goals that were to seed Linden Lab's culture:

- to maintain a flat hierarchy;
- to make Linden Lab a fun place to work;
- to refrain from ideas of ownership of (bits of) code; and
- to have no meetings, or as few meetings as possible.

In fact, since those early days, Linden Lab has prided itself in its effort to give all employees the chance to opt-in by their choice to commit to and execute outstanding job tasks. The practice of opting-in is based on volitional commitment. Linden Lab has developed a near hundred percent commitment to having employees ('Lindens') choose what to work on (cf. Hamel, 2007). Having Lindens set their own strategic direction, as envisaged by founder and former CEO Philip Rosedale, reveals a strategy whereby everyone employed at Linden Lab should think and behave like an entrepreneur. This practice of entrusting Lindens to opt-in comes with the expectation that they choose work wisely and execute it. In other words, Lindens are held responsible for carefully selecting work out of outstanding job tasks according to their own skill sets and preferences for particular tasks, and they are held accountable for successfully accomplishing a chosen task. With this practice of *distributed entrepreneurship*, it is not a surprise that Linden Lab appeared on the 2007 list as one of the most democratic workplaces in the world.¹²⁵

With over 200 Lindens employed worldwide, Linden Lab operates a distributed office structure. This means that people can work remotely, and may or may not frequent Linden Lab's headquarters in San Francisco. The largest group of 'remote Lindens' is constituted by the 'Liaisons' that are official Linden staff working client-faced by providing in-world help to Second Life users. One of the interviewees, Torley, who made the transit from early Second Life user to community management to product

¹²⁵ See <http://www.worldblu.com/scorecard/list2007.php> (accessed 17/02/08).

manager, has never set foot in Linden Lab's offices:

I've never met them in person... yet! I sure feel part of Linden Lab though, because it is a philosophy unto its own. My perspectives on existence and such have always been pretty lateral, so I'm very happy to be working at such a seemingly unorthodox company.

(Torley, 18/1/07, p. 12)

A practice that strengthens bonds between scattered Lindens like Torley, and enforces Linden Lab's commitment to openness and transparency among Lindens, is what is called 'Achievements and Objectives' (As & Os). This is a weekly email sent out by Lindens to the rest of the company, containing what they are working on and what their goals are by reporting As & Os for that particular week. It is not very likely that the majority of Lindens sift through all these weekly emails, but the interviewees consistently reported reading the ones sent out by colleagues that work on tasks that are of a direct interest or concern.

Another mechanism for Linden Lab to organize work can be evidenced in a third party tool JIRA (see Section 4.4.3). It is used to communicate, manage, and organize asynchronous tasks, projects, and documents underlying product development. Internally JIRA is mainly employed in support of active development practices, while externally (or, client-facing), it is predominantly used as a means to gather feedback from Second Life users. In other words, JIRA provides an overview of all outstanding and performed tasks, bugs, and other issues, guiding Lindens on a daily basis to enter and pick tasks underlying Linden Lab's internal operations.¹²⁶

Second Life itself is also regarded as an important tool that effectively deals with geographical and organizational constraints allowing (dispersed) Lindens to collaborate and communicate. More specifically, Linden Lab employs its own product platform to build and maintain its culture among its various (and dispersed) teams. The central role of within-firm deployment of Second Life, however, may not be obvious to a new Linden. It would not be the first time that a new hire mistakenly assumes that sharing the same office equals a physical meeting rather than logging onto Second Life (see Section 7.4.1). The platform provides open and certain closed areas for Lindens which are frequently used for, among other things, meetings, presentations, and job interviews.

¹²⁶ Every week Lindens cast their vote on unresolved issues they deem worthwhile which results in a ranking system that guides the (de)prioritization of particular issues (see Chapter 7 for JIRA discussion).

For example, Brett, a Web content editor at Linden Lab, was hired after his in-world interview:

I actually literally went out and bought like an avatar suit. You know, because you want to make a good impression and I didn't know if that was necessary or not but I figured, you know, I'll lean towards the conservative just to be on the safe side. And so I did that and I had the actual in-world interview. This was before voice. [...] So it was all text chat. The in-world experience interview was with two people that I now work with pretty much on a daily basis.

(Brett, 13/11/07, p. 7)

So Linden Lab not only develops Second Life but also inhabits its product or design space for various firm-related tasks. In this view, Lindens often (albeit, at times, in different vicinities) rub shoulders with mod developers. In the previous section attention was drawn to profiles of Second Life users, but what kind of people work at Linden Lab? Smart, Creative, Energetic, and Passionate (SCEP) people are the qualities that Linden Lab looks for when hiring people.

The reality right now is that for the most part it is pretty decentralized. I mean the idea is that you as a contributor, any individual worker there, bring whatever talents or skill sets that they hired you for to the table and you seek out. You know it's very transparent.

(Brett, 13/11/07, p. 13)

Almost everything here is your own initiative, the timid need not apply lol.

(Blue, 22/10/07, p. 7)

It is not unheard of that applicants are interviewed eight to ten times. Moreover, similar to other developer firms, engineers have to undergo a 'programming test' focusing on algorithmically complex problems as part of the hiring process (cf. van der Graaf, 2008). The point of these tests is not so much about having applicants come up with the right solutions, but rather Linden Lab seeks people that find such complexities 'irresistible' and are capable to justify choices made and program languages chosen. Job seekers applying for various permanent and temporary positions can stem from the Second Life community and elsewhere. For example, one of the Second Life community interviewees was commissioned by Linden Lab to work on the setup of Orientation Island.

It's a job on the side, very much or rather a hobby that pays. I can't downgrade the research or teaching work I do because I'm getting \$ from Second Life. That's all based on time spent, it's not something that's possible to really leave off or do part-time. I know quite a few of the Linden Lab people. I have been to their Second Life Views thing etc. and I think the Orientation Island team just don't have the manpower, so I think Torley suggested me to them.

(Seifert, 6/12/07, p. 5)

Despite many applications, Linden Lab finds it hard to attract people with the right combination of qualifications, that is, with exceptional skills and/or a really good resume and who fits the Linden profile. Not only does Linden Lab compete with other firms like Google, but also with the Second Life community at large. For example, there are over 3,500 businesses that have set up shop in Second Life, the execution of which, in various capacities, may depend on skills possessed by other users (cf. Ondrejka, 2007). This has resulted in all kinds of Second Life-related jobs, varying from contracting to full-time positions that may, by some users, be considered more attractive or suitable than working for Linden Lab.

5.4.2 *The developer community as employer*

From the six membership types that were discussed in Section 5.3.2, Second Life can be said to offer a plethora of creation opportunities where users with different levels of skills and know-how can participate.¹²⁷ Regardless of incentive and skill to participate in mod development, users (as individuals and as collectives) can make their mods and/or skills available (for free or a fee) for others to copy, rework, use in Second Life. Such practices suggest opportunities for entrepreneurship and highlight the ways employment can be organized among mod developers on the firm-hosted platform.

Second Life, in many cases, offers a site where users rez, or show each other objects and development. This act of showcasing can be understood as a communicative (and aesthetic) experience and is pivotal for in-world interactions. Rezzing is akin to a handshake in the first world. Showing work to others means sharing an understanding of the roads that were travelled to arrive at the current path. Mike (Teen Grid) recalled a situation where he was on some land watching newcomers at work. Soon he learned that they were trying out for 'Skoolaborate' which was an Australian initiative that used Second Life as a means to engage students in collaborative learning experiences. Mike sent in his buildings and got the job.

¹²⁷ The way Second Life as design space is organized is discussed in the Chapter 6.

He almost thought I was an adult. He didn't understand. Yah. Pretty nice. [...] I am getting paid like two grand. [...] They really want me to help them out, get started off in Second Life because I am like the little guru kid. They kind of want to help me out getting a business started.

(Mike, *Teen Grid*, 14/11/07, p. 4-5)

Mike hopes to establish a limited liability company that works with first life companies interested in moving their business to Second Life.¹²⁸ One example of an already established company is The Electric Sheep Company (TESC). Its founder, Sibley who was interviewed for this study, had an interest in building a communication platform where social interactions could blend with ecommerce. Second Life seemed a good match. He hired someone in 2005 to set up the company and in 2006 committed himself full-time. Within one year TESC had twenty-five employees who were mainly preoccupied with offering in-world professional services for clients such as advertising and public relations agencies.¹²⁹ The company's relationship with Linden Lab is highly regarded, not so much in terms of supporting what companies TESC launches in Second Life may so benefiting Linden Lab, but rather in terms of pushing the boundaries of the platform.

We talk to [Linden Lab] several times a week. [...] How much work would it be to do this? When is this feature coming out? And then just generally being in touch with what is going on. We try to steer away from this but there occasionally are projects where we go and are jointly with the client in some cases, specifically asking Linden Lab to roll out a particular feature a little bit sooner so we can use it if it is really critical for a particular project. [...] If it is a feature that is not at all on their road map, then they in theory might do it for pay but in practice they won't because they are totally busy. But usually it is something they wanted to do. It is a matter of just moving it up to be done sooner.

(Sibley, 13/10/06, p. 12)

Other interviewees reported not to have benefited from such a form of 'favouritism'. An explanation may be related to the size of the project (that is, money), or, more likely, to the tremendous growth the platform experienced alongside the recognition of professional standards of running a business like Linden Lab. In particular, when technical aspects fail and Linden Lab does not prioritize the issue, this dependency of mod developers on the developer firm becomes very apparent. For example, Garrett explained that his client-facing and paid-for project 'Swissopolis' was

¹²⁸ See also http://online.wsj.com/public/resources/documents/info-VIRTUAL_0803.html (accessed 14/06/08).

¹²⁹ Note that TESC had about 100 employees by the end of 2007, but as a result of a restructuring had to let go of 22 employees. See <http://blogs.electricsheepcompany.com/giff/?p=497> (accessed 12/05/08).

extremely delayed because he found no immediate response and/or action by Linden Lab regarding several technical issues such as developing the largest terra form ever attempted in-world, namely the Matterhorn at Second Life scale. It was built as part of a highly trafficked set of islands with embedded premium first life brands rather than concentrating on a single brand. It would have been a first if the project had received a more adequate response from Linden Lab which would have prevented rising costs (and delay in income) that directly impacted the labour process. For example, there was no longer enough money to hire skilled builders and scripters for an extensive period of time which would have promised a quicker turn-around in delivering the project. In the mean time, Linden Lab launched Bay City which was built with the same strategy in mind, and now has become a rather strong competitor.

Employers that wish to attract hires for various paid and unpaid jobs, varying from employment arrangements of a more temporary nature to full-time positions, also tend to fish in the Second Life user pond. In so doing, they compete with Linden Lab and many small and large-sized, first and Second Life-based entrepreneurs in search of talented mod developers. Generally, job openings and service offerings tend to be announced in a dedicated section on the Second Life forum, in paid-for advertisements in-world, or by referral such as via in-world groups and friends. Tedd, an open source developer from Norway, joined Second Life to check out its technology and dabble in some business opportunities. He was not interested, however, in learning yet another programming language instead he was interested in the idea of building a Second Life server and via an email list came across a group of like-minded individuals.

I really started to feel the need of programming again because two weeks without programming must be a record or something [...] So I joined them basically just on the IRC channel asking what they needed help with. [...] And they said that they needed scripting. I had some experience with writing some script engines before so I started on that. [...] And I think within a week or something then they had given me membership in the core group or something because the amount of code that I was delivering was too much to put into the project, so that is the acceptance limit or threshold to accept new members [...].

(Tedd, 12/02/08, p. 10-11)

This open source initiative became known as OpenSimulator Project (or, 'OpenSim'), operating on the Second Life server-side with the aim to make Second Life

interoperable with other 3D environments.¹³⁰ OpenSim does not accept financial donations (nor pay its contributors), rather it serves as an entity where people can donate, for example, licensing rights so that developers have extended licensing rights for using some tools, making it commercially friendly underlying entrepreneurship (see Sections 6.4 and 7.4.3.1).

Similar to Linden Lab's interest in potential hires, mod employers seek to select the right person for the job not purely based on skills and experience, but also on her/his personality. As employers tend to deal with remote workers they have never met and who, in many cases, are only known by their Second Life name, personality is an important attribute. Garrett explains:

What I have come the conclusion of, with all these people, the same conclusion they all come to is that what we're really looking for now is the temperament, the personality. That we can build on. Because if you don't got that, it doesn't matter if you have the skills. You can't be trusted, or you're not disciplined, you're not responsible.

(Garrett, 5/12/07, p. 91)

Furthermore, mod developers do not only use Second Life as their object of work and/or the environment they work in, but the platform also serves as their preferred means of communication with their peers; especially, chat, instant message, and more recently, voice assist them in the organization of work.¹³¹ Second Life also supports the infrastructure of commercial endeavours allowing users to transfer money via the internal micro payment system. Because of its speed and low cost it is often preferred over Paypal or international bank wire transfers. Another tool provided and employed by Linden Lab is JIRA. The mod developers community uses the client-side of JIRA as a means to report bugs and, to a lesser extent, request features. While it notifies Linden Lab of submitted issues, JIRA also helps the wider mod developers community in communicating other contributors' interests and issues which may inform mod developers to support entered issues by casting their vote. The type of call and eloquence of discussions may not only make a stronger case to Linden Lab indicating what actions to prioritize but may also lead to opportunities for mod developers to collaborate (see Section 7.4.3).

¹³⁰ See <http://blog.secondlife.com/2008/07/08/ibm-linden-lab-interoperability-announcement/> (accessed 11/07/08).

¹³¹ Interviewees also reported using external communication means such as Skype for video and voice conferencing, and IRC seems to be the main channel for open source developers.

This section has drawn attention to work arrangements at Linden Lab and within the mod development domain. Linden Lab's internal organization can be said to reflect the firm's dedication to user participation in product development. Both Lindens and Second Life users operate 'entrepreneur-like', work the same space, use, in many cases, similar tools, and in their activities are part of a collaborative effort to make the firm-hosted 3D platform a better and more enticing place that is adjustable to each person's liking.

5.5 Conclusion

This chapter has examined the creative capacities of users and their contributions to product development in the commercial setting of developer firm Linden Lab. The analysis was designed to enhance our understanding of user participation on the firm-hosted platform. By drawing out the design capabilities as the unit of empirical scrutiny Second Life membership was related to the within-firm organization of Linden Lab with the aim to highlight particular qualities of user participation.

Linden Lab was introduced as a developer firm that has embraced and fully integrated user participation in its overarching strategy, highlighting a 'break' with a more traditional perspective on the vertical organization of within-firm development activities. The analysis showed, however, that Linden Lab's initial interest was a technological orientation which changed direction over time. By 2002 Linden Lab had set on the alpha version of the user-centred 3D environment Second Life, thereby showing early signs of user creation, community building, and collaboration. Crucial in the development process to popularizing Second Life, was *Linden Lab's abandonment of the practice to own the IP of user-generated content and to replace a subscription-based model by a variable pricing model*. In a little under ten years Linden Lab saw its product and company grow from a small to a medium-sized software service platform that, on a daily basis, handles roughly half a million users.

By the examination of work arrangements at Linden Lab and within the mod development domain this study has sought to move beyond the (narrow) focus on the culture of mod development per se associated with user participation in the context of firm. The findings begin to unravel the complexity of user participation on the firm-

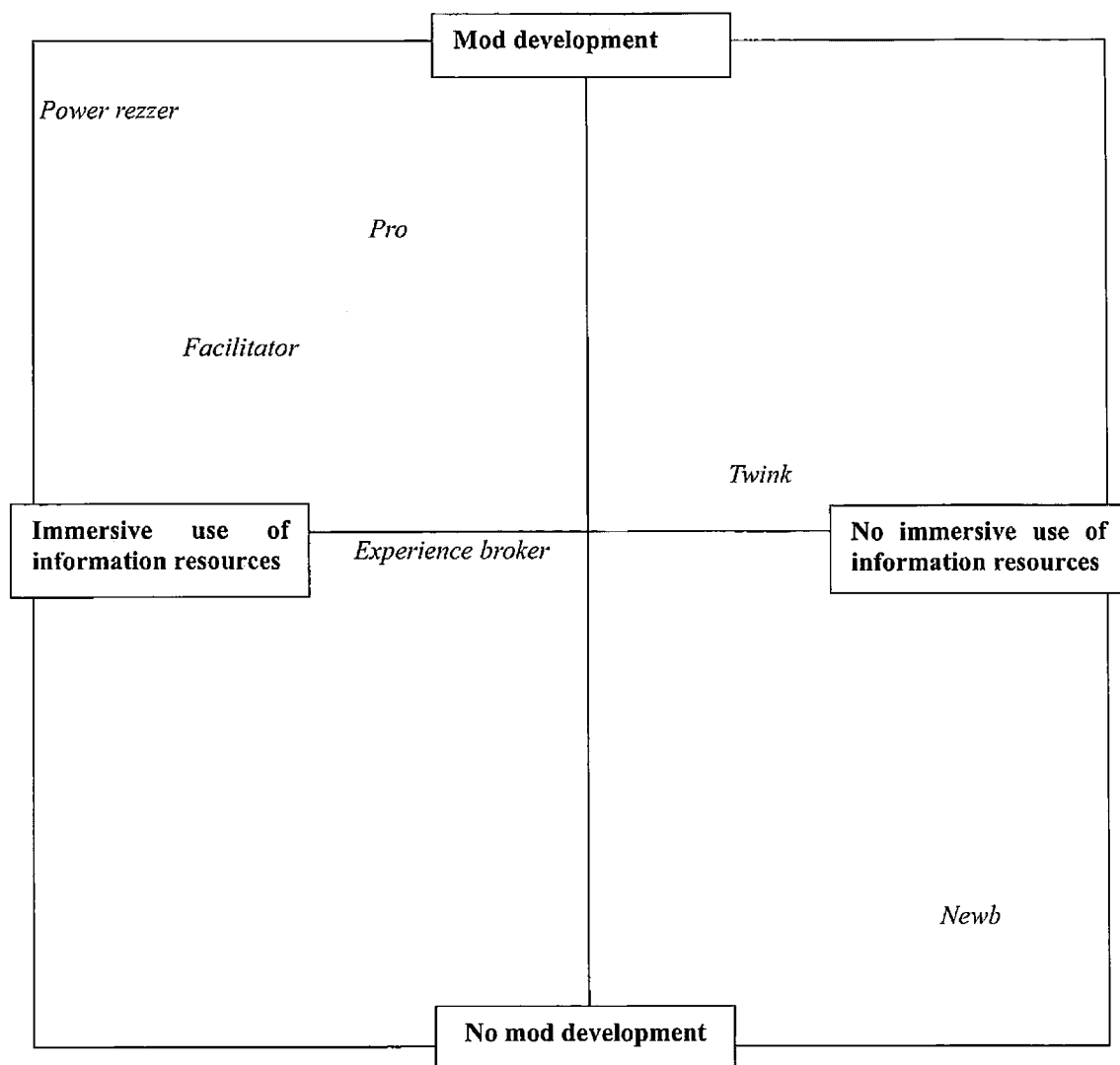
hosted platform, catering to both the developer firm and mod developers. Both the developer firm and mod developers tend to look for new talent in Second Life and deem someone's skills important but the results suggest personality, even more so, as is an entrepreneurial (and accountable) approach to work. Both the developer firm and mod developers are developers and users of the tools and technologies, and seem to benefit from the platform and community for commercial and non-commercial reasons.

So, whereas some evidence does point to a strong likelihood that users may develop an *entrepreneurial* approach towards their own participation in Second Life underpinning the rapidly growing in-world economy, the findings indicated that most users are less motivated by monetary rewards relative to other drivers to join Second Life. In accordance with earlier research findings, the analysis showed that the main reasons attracting users to Second Life were three-fold: *social interactions, creativity, and the innovation potential*.

In order to yield insight into the prevalence of users drawn to this 3D platform, and particular capabilities that characterize these users, a two-step cluster analysis was conducted. The analysis resulted in six membership profiles that were based on individual participation patterns, communication behaviour, and several additional variables, that is, year of registration, membership type, land ownership, age, income, monthly expenditures, monthly sales, and monthly account balance. They are presented in Figure 5-1. The development of six user profiles suggests that nuances exist among users. *Although this outcome should not be taken normatively, it does provide a systematic, broader and richer understanding of the various qualities that underpin participation in the context of product development practices (than, for example, a more dichotomous approach discerning between participating and non-participating users)*. Based on those findings, the theoretical perspective guided by H1 is partially disconfirmed and further developed.¹³²

¹³² Chapters 6 and 7 present empirical findings that complement and further develop this line of investigation set out in this chapter.

Figure 5-1
User participation profiles of Second Life users



The findings presented in this chapter reveal a strong interdependence between the developer firm and mod developers. As a result, the (distributed) organizational design and the practice of user participation are viewed as two complementary sources underlying product development. In other words, a dynamic tension between emergent and designed properties among the developer firm and mod developers is emphasized. This dynamic between top-down and bottom-up expressions of product development, between institutional design and emergent practices, makes the issue of *professionalism of user participation* explicit. In fact, what is at stake is not so much the investigation of user participation in mod development practices in terms of play/labour (see Section 3.2.3), but rather a type of *outsourcing 2.0* where the developer firm relies on its user

base for product development. Furthermore, this may, at the same time, indicate a *participation tipping point*, highlighting the prospect that users themselves can become entrepreneurs, while drawing attention to the developer firm (that still provides and/or hosts the platform) but becomes a ‘reversed participant’ or client of mod developments.

Within this setting, it is pivotal to understand what the firm-provided design space is in terms of the parameters and conditions that underlie the organizational and technical elements of the platform through which the firm develops and organizes user participation, varying from basic content creation to complex open source coding. The next chapter therefore provides an empirical analysis of Second Life as a design space by investigating three key areas of mod development, highlighting dynamic relations between mod developers and the developer firm’s employment of the design space.

Chapter 6 Participation, innovation & mod development

You are the trick, I am the treat. You are the circus, I am the freak

- Lovage¹³³

6.1 Introduction

This chapter complements the previous chapter which presented the empirical analysis of the design capabilities by taking the design space as the unit of analysis in relation to the following working hypothesis (see Section 4.2):

H2 The user's experience level in using first and third party toolkits is positively related to mod development.

H2 informs the investigation of functionalities of the design space in the context of user participation in digital development practices. Three areas of mod development are discerned that shed light on the organization of the (mostly) technical characteristics that enable and facilitate user participation on the micro, meso, and macro levels of the design space that is provided by Linden Lab. Particular interactions with the design space by means of the toolkit, however, are not only leveraged differently. Linden Lab has also a particular perspective on the endeavours of mod developers in terms of conveyance and management which is empirically investigated by linking the design space to the aspect of transferability of mod development. In particular, attention is drawn to the types of legal contracts employed between the developer firm and users.

The structure of this chapter is as follows. Section 6.2 introduces the framework for the analysis of the design space. In Section 6.3 a mixture of qualitative and quantitative data is combined to link the workings of Second Life to three areas of user participation in mod development. More specifically, the micro level design space focuses on in-world creative contributions, the meso level design space addresses interface modding of the open sourced Second Life Viewer software, and the macro level design space yields insight into mod developer groups interested in open sourcing the platform's underlying technology. Section 6.4 connects the three areas of

¹³³ Lovage, Book of the Month, *Music to Make Love to Your Old Lady By* (Tommy Boy, 2001).

development to the ways mods can be transferred, integrated, and used on the Second Life platform. Section 6.5 draws together the main points of the analysis and discusses their wider implications.

6.2 Design space

Whereas the user participation literature has done really well making the cultural status of user participation in production practices vis-à-vis the industry explicit with particular attention to the uncertain status of user participation in terms of play/work boundaries, these lines of investigation do not present a full picture of user participation (see Chapter 3). By considering user participation as a practice that is situated with the industry, in general, and the developer firm's logic, in particular, it is desirable to examine the role of user participation in the context of the design and use underpinning the firm-hosted 3D platform. Within this setting, this chapter uses qualitative data and some quantifiable evidence to report on the ways user participation has been organized by the developer firm. More specifically, it features certain unique Second Life characteristics on the level of platform development and usage, as such, influencing design capabilities and (maintaining) certain aesthetic conventions. In doing so, it complements the discussion in the previous chapter of the conjunction of Linden Lab's organizational structure and the design capabilities.

In this chapter the *design space* is taken as the unit of analysis that shapes (and affects) the labour process of platform development across its boundaries.¹³⁴ This design space is the glue of dynamic migrations that occur between the developer firm and mod developers. These migrations draw attention to the functionalities of the design space (in particular, the toolkit) provided by Linden Lab and the issue of active 'tethering' of the creative and interpretative endeavours of users. More specifically, the empirical results complement previous research by addressing aspects of the ways in which the design space leverages particular (design) tasks and the ways in which it can be adopted and tinkered with in order to make it work with a range of tasks. Three distinct areas of mod development on the micro, meso, and macro levels are presented. Furthermore, the nature of mod development is such that on an ongoing basis content and code are added,

¹³⁴ In this thesis, the design space for mod development is not viewed as technologically deterministic; rather it is a process of reciprocal interaction between the space and/or tools to tinker with and contributing developers in NeoP (see Section 2.2).

removed, and changed by both mod developers and the developer firm which raises the issue of transferability of these changes to other contributors. The combination of these aspects yields insight into the implementation of trajectories of user participation and creativity in Second Life.

6.3 The making of Second Life

This section empirically investigates Second Life as a design space.¹³⁵ It aims to yield insight into the software tools, consisting of a mixture of proprietary, free, and open source software that Linden Lab has provided to enable and facilitate user participation on its commercial mod platform. Various functional elements of this design space are examined with particular attention to the kinds of tools that assist users with different design capabilities (associated with different kinds of user-developed contributions) to use the platform according to their own wishes. The empirical analysis lays the groundwork to investigate the practices that connect user participation to opportunities for the firm to learn, and which may benefit the further development of Second Life (see Chapter 7).

This section is organized ‘from the inside out’. First, the *micro level design space* which is the in-world environment of the Second Life platform, is discussed. This is followed by the ‘intermediate’ or *meso level design space* which connects the user to the Second Life platform, referred to as the Second Life Viewer. On the *macro level* the so-called ‘underworld’ of the Second Life platform is discussed which draws particular attention to open source initiatives.

6.3.1 Inside Second Life

On a daily basis, hundreds of gigabytes of data are created and added to Second Life, tens of millions of scripts are constantly running in-world and, in an average month in 2007, there was an exchange of about US\$ 8 million between the in-world economy and the ‘first’ (physical) world, approximately US\$ 40 million GDP (cf.

¹³⁵ Strictly speaking, Linden Lab maintains two platforms. Since January 2006 there is the so-called ‘Main Grid’ which is for people aged 18 and over, and ‘Teen Grid’ which houses those users between the ages of 13 and 17. The analysis presented here concentrates on the ‘collaborative palette’ of the Main Grid as a design space. Some empirical evidence, however, was collected among Teen Grid users which in cases where it was included in the findings is explicitly stated.

Ondrejka, 2007). More specifically, about 256,000 Second Life users contributed to writing code that runs 24/7 in more than 2 million simulated objects (Purbrick and Lenctzer, 2007); there are roughly 100 million database queries each day, 50 terabytes of user-created data and 26 million peer to peer transactions.¹³⁶ Consequently, contributing to Second Life means, at the very minimum, to acquire some insight into the inner workings of the 3D interface.

About half of the Second Life population has been reported to experiment with the built-in tools and to invest time to learn how to work with the Second Life toolkit (Ondrejka, 2007). Warkirby, a user interviewed for this study, describes his experience of getting acquainted with several functionalities of Second Life:

I've since gone into content creation pretty much full time. This mainly started in the last six months or so, before that I was exploring and learning. [...] I had a little experience with game mods before Second Life, but it was generally my first time at a lot of things. [...] I've learned most of what I know since coming to Second Life. I spent five months studying scripting on and off here.

(Warkirby, 3/12/07, p. 3)

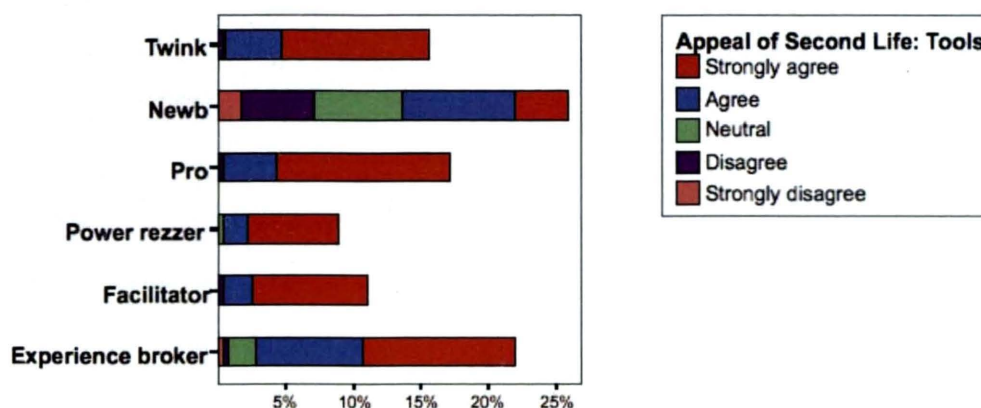
It takes about four hours to familiarize oneself with the basic controls of one's Second Life avatar such as walking and flying. With a user retention of roughly 10% the majority of users does not get through this learning curve yet the ones that do tend to stay.¹³⁷ This may be due to some of Linden Lab's (early) choices of formats and methods which may not have been standard or platform agnostic such as the development of its own programming language, Linden Scripting Language (LSL). It is therefore possible that participation in Second Life requires a *flexibility curve* that differentiates between learning the tools the 'system way' or wanting the tools to do certain things in your own way. In this context, my survey on Second Life asked respondents about the attractiveness of Second Life based on the main functionalities of the Viewer's built-in toolkit, guiding users to engage in building, scripting, and texturing practices in-world (see Section 4.4.1.2). The findings indicate that more than half of the respondents found the toolkit an appealing factor to participate in Second Life ($M = 1.74$, $SD = .994$, $N = 434$; $r_s = -.162$, $p < .01$). This goes particularly for the

¹³⁶ Presentation 'Continual Opening of Second Life' by Rob Lanphier and Aaron Brashears at O'Reilly Open Source Convention, Portland, 27 July 2007. See <http://www.slideshare.net/oscon2007/os-lanphier-brashears> (accessed 28/12/08).

¹³⁷ Presentation 'Virtual Worlds, Real Lives' by Philip Rosedale at PICNIC'06, Amsterdam, 28 September 2006.

Second Life membership profiles twinks, pros, and experience brokers which is depicted in Figure 6-1.

Figure 6-1
Distribution of Second Life respondents according to their interest to build, script, and/or texture



Source: Survey on Second Life, N=434

But what do Second Life users actually have at their disposal to work with to enhance the platform? The internal tools palette and some examples of in-world content creation that I refer to as *micro level mod development* are discussed next.

6.3.1.1 Micro level design space

Quite frankly, one of the challenges with Second Life, as a technology platform, is because we are driven by user-generated content, the kinds of experiences that people create, the kinds of interactions that people can create with the system, are largely governed by the flexibility and the performance characteristics of our scripting engine. People have gotten very good at living within the boundaries of the Linden Scripting Language.¹³⁸

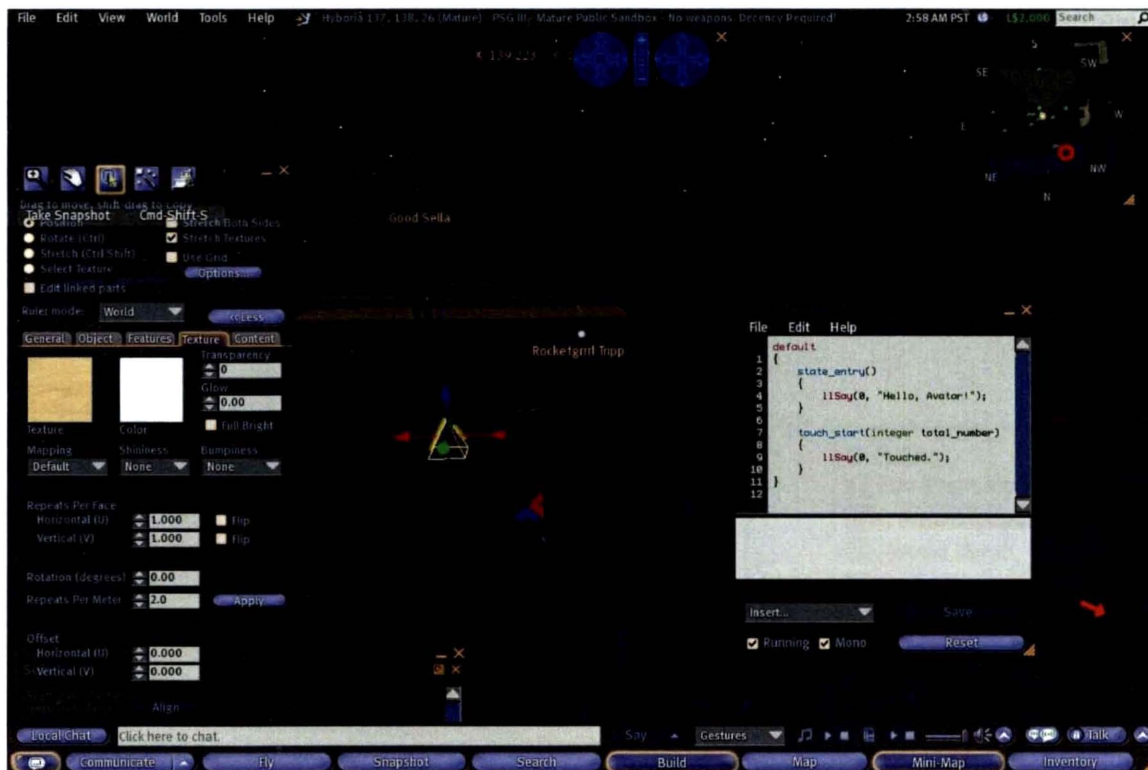
In-world access to the built-in toolkit assists users to explore the possibilities of the design space and to have a go at modding on their own or collaborate with others in mod practices. *This first party toolkit enables users to build, script, and texture and can be found on the taskbar under 'Tools'*. The 3D modelling tool allows users to produce houses, mountains, and so forth that can be shared, moved, copied, and sold. It also

¹³⁸ 'Inside the Lab' podcast with Joe Miller, Linden Lab's VP Platform & Technology Development (24/01/08). See http://static-secondlife-com.s3.amazonaws.com/press/jmiller_transcript_20080108.doc.

permits users to generate and apply textures to created objects and the LSL can be used to manage and control behaviour of in-world objects. More specifically, Second Life's design space is developed in such a manner that it allows for 'atomistic creation' (cf. Au, 2008; Rymaszewski, 2007).

Screenshot 6-1

Second Life basic tool palette for building, texturing, and scripting



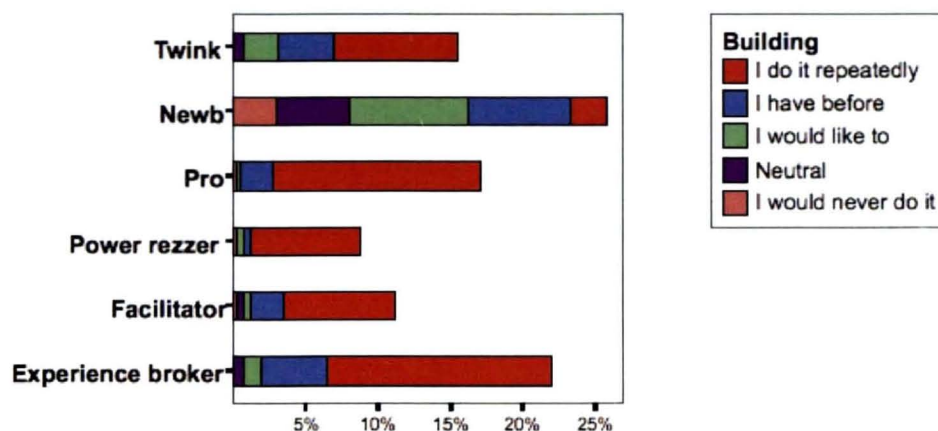
The toolset provides a few basic geometric primitives (referred to as 'prims'¹³⁹) that can be used and combined for 3D modelling purposes. In this regard, this *build* function is similar to other commercial third party editing tools such as Blender and Maya, however, with eight prims it is less flexible in the range of reconfigurations it allows (cf. Rymaszewski, 2007). The build function enables and facilitates mod developments, ranging from simple to complex physical properties and corresponding behaviours. For example, if you were to build a boom box you could do the following: first, select and combine two prims 'box' and 'cylinder' from the built-in toolkit. These prims can be modified in scale, colour, and texture, etc. A sample of Internet radio can

¹³⁹ There are eight prims that can be used for building purposes: box, cylinder, prism, sphere, torus, tube, ring, and sculpted prisms. These can be modified in terms of size, cut, and transparency, etc.

be added. And, with the right script (which is a particular piece of source code attached to an object providing and executing behaviour), you could make your boom box dance through space. In addition, you could make copies of the boom box freely available or for purchase so that others can also use your object, and when the boom box has served its purpose you could store it in your inventory or you could completely remove it from the platform.

The survey asked respondents about their involvement in in-world building practices. The findings indicated that 56% of users frequently participate in building activities ($M = 1.82$, $SD = 1.126$, $N = 434$; $r_s = -.346$, $p < .01$). Membership clusters are profiled according to their interest in building which is presented in Figure 6-2.

Figure 6-2
Distribution of Second Life toolkit usage for building

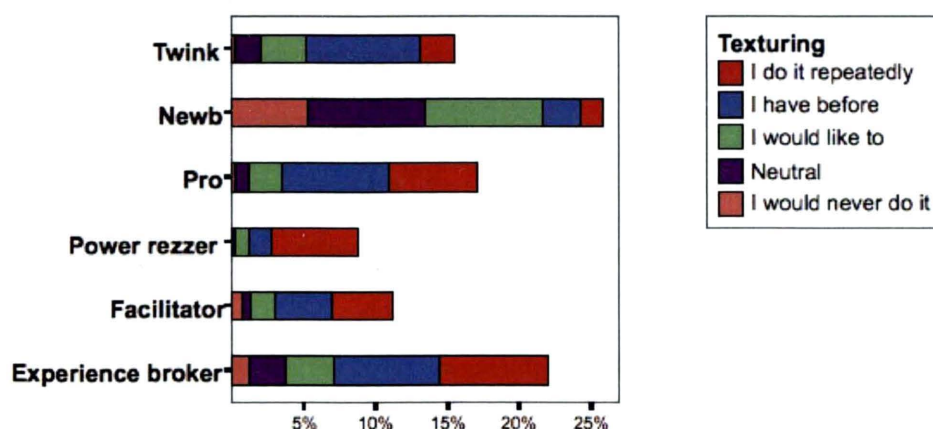


Source: Survey on Second Life, N=434

In-world generated builds can be *textured*, however, these textures cannot be made inside Second Life with the exception of several prefab textures which are provided by Linden Lab and can be found in the user's in-world inventory. There are numerous commercial (and free) third party tools such as Gimp and Texture Makes that can be used to create imagery externally and which can then be imported into Second Life as a simple image and applied to a single surface. In general, textures can, for example, be seen on the side of objects like paint, or they can be made transparent ('alpha mapping'), and there tends to be very little use of the dark and light of the image

to create 3D texture shadows ('texture bumping'). Roughly one-third of the respondents were found to create and import textures ($M = 2.43$, $SD = 1.244$, $N = 434$; $r_s = -.277$, $p < .01$).¹⁴⁰ Figure 6-3 shows that especially pros, power rezzers, and experience brokers have an interest in texturing practices.

Figure 6-3
Distribution of Second Life toolkit usage for texturing



Source: Survey on Second Life, N=434

Scripting, using LSL, is the internal event-driven, C/Java-style language used to create and control interactivity, run animations, operate gesture poses, and so on. The built-in toolkit enables scripts to be written so that they can be placed inside primitive objects.¹⁴¹ As there are aspects of LSL such as 'HTTP request' that communicate to external Web sources, the survey made a distinction between 'script internal' and 'script external', however, for the purpose of this analysis a new variable was created that combined the two scripting variables.¹⁴² Fewer than 20% of the respondents - especially twinks and pros presented in Figure 6-4 - reported to participate in scripting activities which is indicative of scripting being a more advanced practice, requiring different

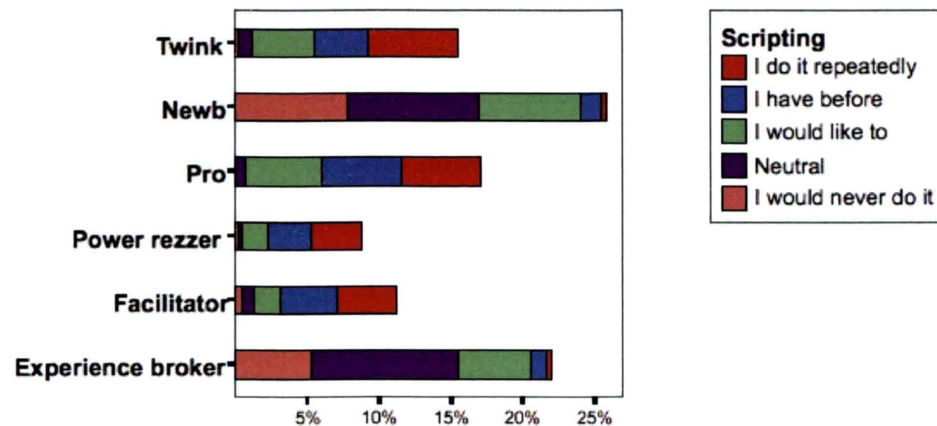
¹⁴⁰ For the empirical investigation of the texture functionality, a new variable was created. This newly created variable combines 'texture build' and 'texture design'. The term 'texture build' referred to the construction of a complex texture from multiple integrated textures, while 'texture design' referred to the process of planning or the circumstances of a texture's use.

¹⁴¹ Note that avatars can only wear scripted objects.

¹⁴² Internal scripting refers to particular in-world scripting activities with no connection to external sources, while external scripting refers to scripts that are either in LSL sending messages out or receiving messages from within or, more likely, scripting or coding that is outside Second Life in a Web site or other Web-based application.

skills than for building and/or texturing practices ($M = 2.91$, $SD = 1.325$, $N = 434$; $r_s = .150$, $p < .01$).

Figure 6-4
Distribution of Second Life toolkit usage for scripting



Source: Survey on Second Life, N=434

In principle, every user that joins Second Life has the capacity to participate in building, texturing, and scripting the 3D environment, as it is not a prerequisite to own or rent land. In practice, this means mod development is very much a location-based ability. For example, sandboxes provided by Linden Lab are designated public spaces where anyone can go to explore, experiment, and indulge in tinkering practices. There are some restrictions, however, such as objects may not be sold or advertised and a few times per day, sandboxes are cleared out. Having access to land therefore, is preferred for more dedicated (and permanent) modding plans. In particular, land ownership permits all sorts of enhancements of the space and, if desired, other users can be invited to participate in modifying land. Different types of land ownership, however, come with variations in toolkit functionality. More specifically, the simulator (also referred to as ‘sim’ or region’) owner has access to all land tools in contrast to the estate manager of a simulator and the ‘land owner within a simulator’. The latter has no access to region tools, while the estate manager cannot use terraforming tools (required for loading a raw image file)¹⁴³ nor can s/he use server functions such as for rebooting the sim. So, the estate management tools can be fully used by the sim owner and, to some degree, by the

¹⁴³ *Terraforming tools* are land tools that allow the user to raise, lower, flatten, and/or smooth the terrain.

estate manager.¹⁴⁴

There are numerous other in-world design attributes associated with the built-in toolkit that shape (and restrict) the range of user outputs of mod development practices.¹⁴⁵ For example, a teenage participant illustrates such a nuisance.

Like I have to, I will take a picture of two prims together so it looks like one on Photoshop. I mean, that is really good that I can do that but it would be nice if I could actually show the prim getting shaded by the actual Second Life engine. I mean, there is just so many things like that.

(Mike, *Teen Grid*, 14/11/07, p. 14)

Several other (mostly technical) limitations define the workspace that underlies opportunities for mod development, among which the following are most important. Primitive objects cannot be greater than 10 meters, a complex object cannot link more than 255 prims, a 'link set' cannot exceed 40 meters in any direction, and any kind of vehicle is not allowed to exceed 31 prims. More importantly, sims (regardless of their location on the mainland or island) are always 256 by 256 meters on a side and 65,536 square meters in total. Standard sims cannot have more than 15,000 prims in which to build or handle more than 40 avatars simultaneously.¹⁴⁶ The mainland and islands are always surrounded by water ('ocean') that is 20 meters in depth. Building in a range of 138 to 248 meters in altitude is subject to frequent cloud formations disrupting visibility. And, lastly, both the centre of an object and land are not allowed to exceed 768 meters in elevation.

The built-in toolkit then conditions the creation space for internal mod development. The next section draws attention to the *intermediate* or *meso level mod development* of the design space, highlighting the Second Life Viewer.

6.3.2 *Accessing Second Life*

Everyone with access to a relatively new computer equipped with a graphics card and a fast connection can download and install Second Life for free. The client software is needed to connect to the servers on which Second Life runs.¹⁴⁷ This software

¹⁴⁴ These tools, however, are more about management and control than about creation, and include functions such as region (e.g. block flying); debugging (e.g. collision); ground textures (e.g. importing images); terrain (e.g. uploading a raw image file); estate (e.g. add and remove estate managers); and, covenant (e.g. define rule sets).

¹⁴⁵ Note that in-world one day lasts three hours and the night is only one hour.

¹⁴⁶ Typically, one server supports two or more sims.

¹⁴⁷ Most of this research was conducted by using version 1.19.1.4.

application is referred to as the *Second Life Viewer* (or, 'Client') and is, in its execution, similar to other real-time 3D rendering engines like the Quake 3 game engine (id Software) or a Web-based client like FireFox (Mozilla Corporation) (see Section 2.4.3.2). The Viewer is written in C++ and runs on Windows, Macintosh, or Linux operating systems. *The role of the Viewer is to retrieve, or render, in-world content on the user's computer screen enabling and facilitating the interaction between the user and the platform.* Subsequently, the Viewer comes with features that enable users to participate in Second Life including user-to-user interactions (such as via chat, notecards, voice, payments), movement controls (such as walk, fly, teleport); search functionality (such as groups, land sales, world map); community resources (such as abuse, live help, bug reporting, volunteers); and in-world economics (such as buy and sell assets, L\$). Moreover, the Viewer fully incorporates the main tools available to all Second Life users that were discussed in the previous section and particular design features such as the appearance mode for avatar customization and terraforming tools for land management.

A correlation analysis was performed to analyse the strength and direction of a constructed scale, consisting of the most important built-in Viewer features (combining the three main creation tools and supporting features¹⁴⁸) that were surveyed among Second Life respondents (11 items, $N = 434$). The reliability of the scale reported a good internal consistency with a Cronbach's α coefficient of .765 (see Appendix for Reliability of Built-in Viewer, p. 280).¹⁴⁹ The relationship between the design features of Second Life (as measured by kind) and usage (as measured by the usage frequency scale) was investigated using the Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure that there was no violation of the assumptions of normality, linearity and homoscedasticity. There were strong, positive correlations between texturing and building, $r = .691$, $N = 434$, $p < .01$, and textures and animations, $r = .517$, $N = 434$, $p < .01$ which may be explained by the types of practices that in-world tend to go hand in hand. The same can be said for the moderate positive

¹⁴⁸ This scale combines items taken from question 21 (building, texturing, internal and external scripting) and 23 (other features). Internal/external scripting were combined and refers to scripting in general (as other scripting languages can be used), while LSL refers to a specific scripting language.

¹⁴⁹ Above .7 the scale can be considered reliable (Pallant, 2005). Furthermore, Corrected Item Total Correlation gave an indication of the degree to which each item correlated with the total score (if less than .3 it measured something else). Only scripting reported a low score, i.e. .212 though removing this score would not have had a large impact on the overall scale.

correlations that were detected between the variables.

Table 6-1
Correlations between measures of design features and usage frequencies^a

Measures	Bui	Tex	Scr	Lsl	Scp	Xml	Ani	Txt	App	Terr	Upl
Bui											
Tex	.691**										
Scr	.367**	.324**									
Lsl	.237**	.130**	.328**								
Scp	.110*	.164**	.142**	.421**							
Xml	.022	.046	.110*	.348**	.491**						
Ani	.081	.018	-.072	.324**	.253**	.317**					
Txt	.304**	.301**	.075	.337**	.288**	.210**	.517**				
App	.062	.080	-.063	.210**	.178**	.236**	.397**	.395**			
Terr	.068	.087	.020	.250**	.288**	.225**	.317**	.352**	.480**		
Upl	.140**	.092	-.048	.308**	.218**	.223**	.422**	.338**	.406**	.419**	

N=434. Bui=Building; Tex=Texturing; Scr=Scripting; LSL=Linden Scripting Language; Scp=Sculptable Primitives; XML=XML Functionality; Ani=Animations; Txt=Textures; App=Appearance editor; Terr=Terraforming Tools; Upl=Uploading and File Format.

^aThe correlation coefficient used is Pearson Product-Moment.

** Significant at the 0.01 level (2-tailed).

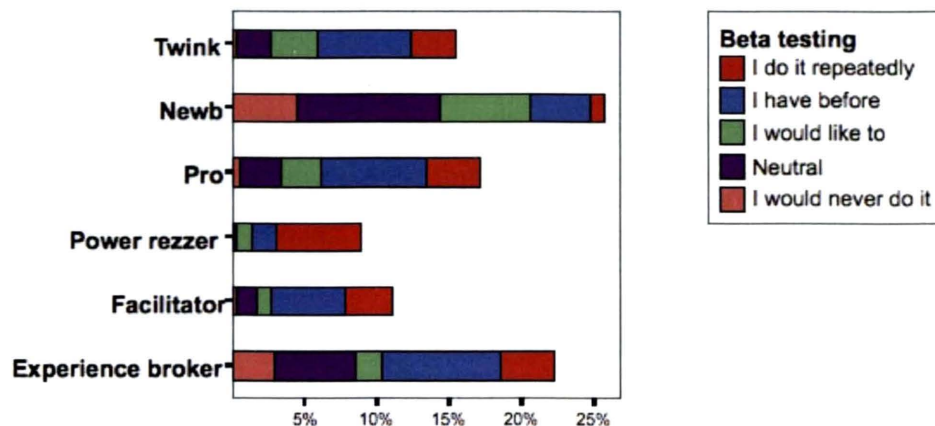
* Significant at the 0.05 level (2-tailed).

In addition to the Second Life Viewer, Linden Lab also provides three test Viewers that are indicative of Linden Lab's software release stages.¹⁵⁰ The *Release Candidate Viewer* is an optional Viewer that includes the latest bug fixes and sometimes also new features that are geared towards a general release. This provides users with an opportunity to learn, explore, and test new features and provides Linden Lab with feedback. *First Look Viewers* are test versions of the Second Life Viewer. At time of writing, 'Dazzle' could be used to connect to the Main Grid where it could be previewed and tested in the everyday environment. *Beta Viewers* do not connect to the Main Grid, but to the Beta Grid. The Beta Grid is a test bed that is open to the general public. All changes made last only for the duration of the session. All these test software features have similar features as the Second Life Viewer. However, Beta Viewers have fewer constraints regarding the execution of, for example, client and server menus

¹⁵⁰ Version 1.8 marked Linden Lab's departure from having major point releases (every few months) to more feature-rich releases over a shorter time span.

where a ‘admin’ request is permitted in contrast to the commonly-used Viewer. The Second Life survey also asked respondents about their participation in beta testing. Some 20.5% ($N = 429$) reported to engage in beta testing activities on a repeated basis ($M = 2.65$, $SD = 1.255$, $N = 429$; $r_s = -.128$, $p < .01$). Figure 6-5 depicts the distribution of responses according to membership profile from which we can gather that, perhaps unsurprisingly considering their advanced status, the power rezzer is most interested in beta testing.

Figure 6-5
Distribution of Second Life respondents participating in beta tests



Source: Survey on Second Life, N=429

In the beginning of January 2007 Linden Lab added another level to its user participation strategy by releasing the Viewer source code to the public, so, “not only can you make things within the world, you can help create future generations of the tool used to interact in-world – the Viewer” (Torley, product manager at Linden Lab, 18/1/07, p. 31). This intermediate or meso modding allowed the more advanced Second Life user to tinker the Viewer itself and this is addressed next.

6.3.2.1 Meso level design space

Releasing the source now is our next invitation to the world to help build this global space for communication, business, and entertainment. We are eager to work with the community and businesses to further our vision of our space.¹⁵¹

¹⁵¹ See <http://blog.secondlife.com/2007/01/08/embracing-the-inevitable/> (accessed 31/03/08).

Linden Lab has been exploring ways to open up the platform even further, indicating the firm's move towards morphing Second Life into a *3D Web environment* where users are simultaneously present and connected. Linden Lab saw open source development as a means to support its plans, affording and sustaining a continuous rapid enhancement of the platform and, hence, for providing even better user experiences. Strictly speaking, Linden Lab recognized that manpower, or the lack thereof, created a bottleneck for further enhancement. Rather than following a linear way of hiring new Lindens, Linden Lab aimed to expand in a non-linear or boundary-crossing way by inviting mod developers interested in contributing to open source Second Life. Another push came from the community itself where a group of enthusiasts was working on reverse engineering Second Life, project 'libsecondlife'. The group built an application that sat between the Viewer and the simulator. As a result, the Viewer would talk to the application that would talk to the Second Life servers. Based on the information gathered, the protocol was reverse engineered and mod developers started developing new applications such as CopyBot.¹⁵² Jim explains Linden Lab's choice to open source the Second Life Viewer:

In some ways open sourcing was inevitable because they were reverse engineering it anyway, and it got to the point where they were building alternative clients to Second Life anyway. And so rather than have a situation where there are two Viewer applications, the open source one and the Linden Lab one, it's far better for everybody that there is an open source version of the Linden Lab code and that people can use that to build alternative clients and then Linden Lab can accept patches to the mainline clients from that alternative version. [...] It's kind of going to happen anyway and also doing it this way means that everybody can potentially benefit from it.

(Jim, 12/01/07, p. 5)

With the release of the Viewer source code several paths were developed. The official Viewer was ported and packaged to work with different Linux distributions (with help from volunteer testers that accelerated the process from alpha to beta status). For the atmospheric renderer 'WindLight', originally a proprietary product of which the source code was released in June 2007, Linden Lab received many contributions from mod developers which resulted in a relatively fast track to First Look status.¹⁵³ Most contributions, however, are generated in the domain of *alternate Viewers*. Many are

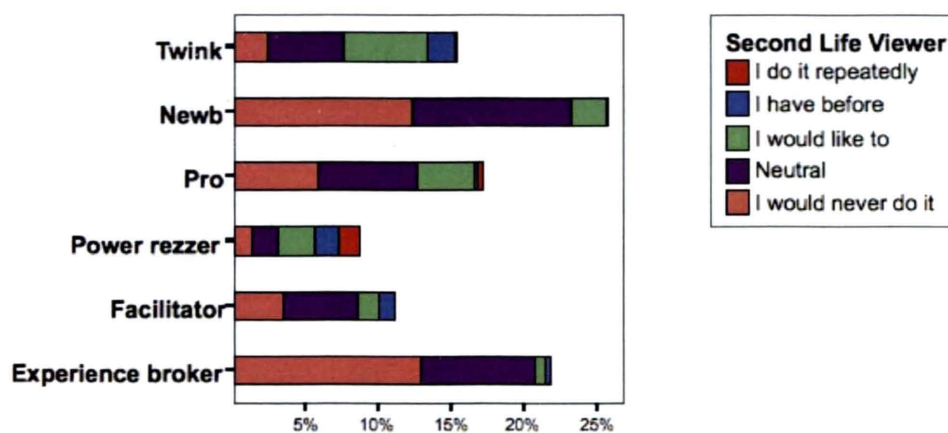
¹⁵² *CopyBot* was a program that let users copy objects without permission of their creators. See <http://secondlife.reuters.com/stories/2006/11/14/outcry-as-copybot-threatens-copyright-protection/> (accessed 3/04/08).

¹⁵³ See <http://blog.secondlife.com/2007/06/14/windlight-update/> (accessed 3/-4/08) and <http://blog.secondlife.com/2008/02/12/new-windlight-viewer-79674/> (accessed 3/04/08).

solution-based and of immediate utility in that new features may be added, existing ones may be improved, bug fixes may be implemented, and, in some cases, roll back changes may be made (cf. von Hippel, 2005). Figure 6-6 shows that only a very small percentage of Second Life respondents, in particular, the power rezzers, reported to tinker with the Viewer, while a large portion has no interest at all in those kind of practices ($M = 1.88$, $SD = 1.071$, $N = 434$; $r_s = .191$, $p < .01$).

Figure 6-6

Distribution of Second Life toolkit usage for modding the Second Life Viewer



Source: Survey on Second Life, N=434

Both individuals and Second Life-related companies continue to participate in modding this Viewer. For example, the user-modded ‘Nicholaz Edition’ (nicholazberesford.blogspot.com), developed by a German software developer, aimed to address, plug, and test memory and resource leaks of the Second Life builds and apply those preliminary bug fix patches in releases of the Nicholaz Edition.¹⁵⁴ The *OnRez Viewer* is an illustration of a commercially licensed Viewer. It was developed by The Electric Sheep Company (TESC) and released around the TV show CSI: New York.¹⁵⁵ Some key features were the easy-to-use interface and improved information flow across the

¹⁵⁴ An important motivation is that these bugs consume more computer memory than is necessary. Other examples include the ‘Able Edition’ (ablewhitman.org/viewer/), the ‘Dale Glass Edition’ (sl.daleglass.net/), Katherine Berry’s (Teen Grid) ‘AjaxLife’ (www.ajaxlife.net/), and the stereoscopic Viewer developed by the University of Michigan. All user-modded alternate Viewers are publicly available.

¹⁵⁵ Making code accessible also lowers the threshold for third party companies that are interested in commercial licensing opportunities.

platform and the Internet. During the interview for this study, TESC's founder pointed to the plans it had in this direction:

We have some ideas that now we are pursuing internally, still confidentially, toward making Second Life easier to use, more mass market appropriate. So some of the layers of the technology that we think are necessary for [Second Life] to potentially grow into the 3D Web.

(Sibley, 13/10/06, p. 6)

On the periphery of the 3D collaborative platform mod developers tinker with Second Life's underlying technology which I refer to as *macro level mod development* and which is discussed next.

6.3.3 *The underworld*

During 2007, Linden Lab by and large concentrated on upgrading and upscaling aspects of the underlying technology or 'underworld' of Second Life which interacts with the Viewer as there were concerns about scalability, performance, and usability.¹⁵⁶ In particular, Linden Lab worked on re-engineering back end systems to transform its APIs into modular and secure Web services; upgraded to the Havok 4.6 engine;¹⁵⁷ and implemented Mono to improve the performance of LSL scripts (and, later also other programming languages). By working through these issues, among others, Linden Lab aims to move towards becoming the market leader in the 3D Internet space. Open sourcing the servers is an important aspect of this process that is intended to signify the move from one grid to multiple grids, that is, from a closed to an open system. Yet the stability project seems to hold up Linden Lab's open source process as Q, a senior engineer at Linden Lab, explains:

There's the rub. Right now, we're drastically changing our processes to improve internal stability. A side-effect of that has reduced our ability to accept those kinds of patches. We have enough trouble internally right now. BUT... it's an explicit goal of mine this quarter to help us get to the point of being better able to do that. I'm actually planning to try to do one of my projects outside the firewall so that people can participate and so that I can understand the pain, and hopefully start to address it.

(Q, 7/11/07, p. 8)

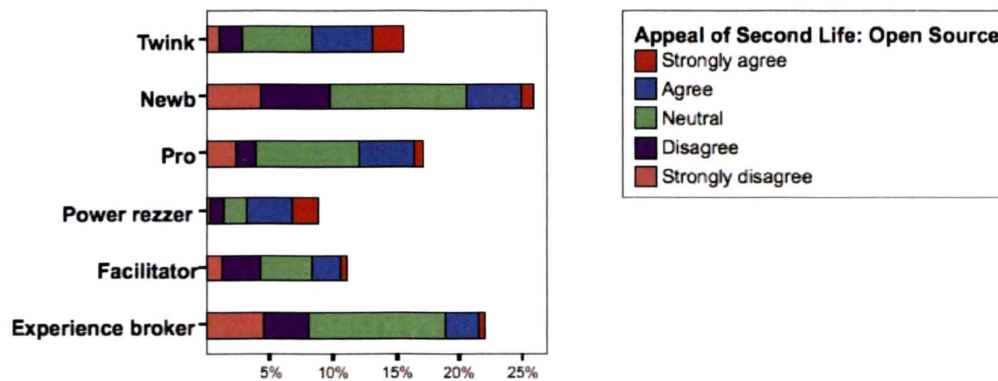
¹⁵⁶ The Viewer connects with the (Debian) servers (running GNU/Linux, Apache, Squid and MySQL) that follow particular protocols to simulate the Second Life environment. See http://wiki.secondlife.com/wiki/Server_architecture (7/09/08).

¹⁵⁷ The Havok engine is a commercial product which complicates opening up the simulator's source code. However, Linden Lab is seeking to build "an abstraction layer between the simulator engine and the physics engine, so that at some point it may be possible to use other physics engines with the simulator." See http://wiki.secondlife.com/wiki/Physics_engine (accessed 4/04/08).

Another reason for a slow open source progress may be found in the platform's monolithic design and trust issues between components that will need to be solved in order to prevent undesirable practices among users once all of Second Life is open source. Furthermore, at the time of writing, there was no external writable repository. Despite these important shortcomings, Linden Lab's developers' mailing list (SLDev) reported 719 subscribers and 64 developers contributing patches that were rolled in.¹⁵⁸ The survey conducted for this study also asked respondents about their interest in open source. Figure 6-7 shows that although each cluster acknowledges some interest, the open source element of Second Life is not the most important draw for people to join Second Life. Furthermore, only 2% of the respondents said to contribute to open source activities surrounding the platform on a repeated basis ($M = 4.04$, $SD = .982$, $N = 434$; $r_s = .225$, $p < .01$). Considering the advanced skills and know-how level needed to contribute, this small percentage of respondents is consistent with the findings of existing studies in the context of user-centred innovation studies (see Section 3.4.2).

Figure 6-7

Distribution of Second Life respondents to their interest in Second Life open source



Source: Survey on Second Life, N=434

Note that at the time of data collection and writing only client-side code was officially released. This did not restrain several mod developers from working on the underworld of Second Life, nonetheless. At present, mod development on the micro

¹⁵⁸ See <http://www.newsforge.org/feature/128941> (accessed 21/03/08).

level occurs much more often than the incidental projects occurring on macro level design space of the Second Life infrastructure. However, there are several open source initiatives that - to some extent – interact with Linden Lab. Next, two such initiatives operating on the macro level or periphery of the 3D platform, and which are the most advanced forms of user participation, are discussed.

6.3.3.1 Macro level design space

If you are a company in a network effects market that has a complicated product that costs real money to offer as a service, you should open source all of it from the beginning. Not because you do it for the good of humanity, although I believe that is true in our case. But because you will win. You will win as the top competitor in the market.¹⁵⁹

Linden Lab interviewees claimed to benefit from the active involvement of open source developers which seems to fit the presentation of Linden Lab and Second Life as a bottom-up and distributed entrepreneurial system. To this end, Lindens participate in various third party projects like Mercurial, donate internal source code such as Eventlet and, in September 2007, Linden Lab initiated the *Architecture Working Group* (AWG) to collaboratively work on scalability and interoperability aspects of the 3D platform. The aim was to define an open protocol that can be standardized. In other words, it allows developers to implement components informing interactions and write their own servers.

AWG is a mixture of Lindens and mod developers. The group organizes about four annual meetings and a ‘tech-talk’ twice a week at director of Linden Lab’s Icehouse Studio, Zero Linden’s in-world office. The group uses the SLDev mailing list, IRC, and a wiki to document its mission by providing an agenda and transcripts, design documents, and other resources. The meetings are mainly used for discussing and organizing work, while documentation is developed in the user space and wiki before being released in the main (locked) pages (after within-group consultation and assessment). Furthermore, AWG houses some smaller groups such as Viewpoint Advocacy Groups that tackle specific ideas and issues on a smaller scale and an unofficial user-mod group AW Groupies, consisting of nine core members, also participate in AWG. The operation of AWG has not been entirely positive as indicated

¹⁵⁹ Presentation ‘Open Source Second Life’ by Philip Rosedale at O’Reilly Open Source Convention, Portland, 27 July 2007. See http://conferences.oreillynet.com/cs/os2007/view/e_sess/14656 (accessed 31/03/08).

by several user-side interviewees.

- 2. AWG is a bit bogged down at [the moment] IMO. Seems we are discussing the same things ^^; I think part of the problem is that some people just don't have the technical background for it. It is a very nerdy topic.

(Strife, 4/12/07, p. 19)

The thing is if [Zero] is the only one working on that stuff then that might be a problem too. So, he now changed positions somehow. [...] So he might have more time for it now but still it's – I mean there should be more people there. [...] And, I mean in the end, it should be one mailing list for everything and not one internal and one external. [...] I don't see that problem in the end because if we really do that stuff with the old protocol, then at some point, we might not need Linden Lab anymore [...].

(Christian, 5/12/07, p. 36)

Another initiative, founded by the user MW in January 2007, was the project *OpenSimulator* (or, 'OpenSim') that focused on interoperability (see Section 5.4.2). The group consisted of about fifteen core developers and about forty additional developers, testers, and other contributors. Many were motivated to contribute to OpenSim as a means to become independent of Linden Lab for reasons that particularly concerned social and technical aspects. More specifically, the developers collaborated to create a common 3D platform (or, 'Virtual Worlds Server') that could be used to develop 3D environments. In practice, this meant that OpenSim allowed the server to connect to any Viewer and vice versa, similar to a browser like FireFox that can connect to the Apache server. Second Life was implemented as its first compatibility project. One contributor hails the project's popularity:

More and more people are joining. This thing is just so amazingly popular that it's incredible. I would never have guessed that about any software project, actually. It seems like people and companies are really interested in spending time on this, so we actually have a lot of companies who are dedicating resources for giving us programming.

(Tedd, 12/2/08, p. 11)

For example, IBM made one full-time programmer available and 3Di, the Japanese developer firm of the virtual world platform Jin-sei, provided three programmers who contributed to OpenSim. As a result, most of the code has been donated but, for mostly commercial reasons, participating programmers from developer firms tend to keep back some of the code. OpenSim has received mixed reviews from Linden Lab ranging from disinterest, to bad-mouthing, to respect and lively discussions.

Overall, the empirical investigation has shown that all sorts of contributions can be made to enhance the firm-hosted platform varying from in-world building, to beta testing, to modding the Viewer, to building a server or even an engine from scratch. The three levels of design space functionalities and related opportunities for mod development associated with particular design capabilities discussed above draw attention to the boundaries of Linden Lab. In particular, the ways Linden Lab has sought to manage different creative and interpretative in/outputs of mod developers. This aspect is discussed with respect to the issue of transferability next.

6.4 Servicing Second Life

In Chapter 5 it was observed that time and other investments users make in mod development can have extensive social and economic connections to the first world. In particular, the many approaches users have taken to engage in creating experiences, mod development practices and, in several cases, generating first world benefits and/or profits were discussed. Although the results of the survey conducted for this study indicated that making money was not a strong motivation for respondents to participate in Second Life, the internal economy does appear to affect users in some small to very powerful ways.¹⁶⁰

Strictly speaking, money per se is not needed to have a Second Life yet even the most basic experience is likely to include the exchange of (a minimum of) L\$ such as purchasing in-world assets like clothes from others or paying a small fee to bring in external assets such as images, sounds, and animations in-world. The supply of those assets tends to be produced by Second Life users rather than by Linden Lab. Some mod developers choose to provide their creations (and skills) gratis, while others do charge a fee to earn an income on the back of mod development. How are the commercial endeavours of mod developers regarded by Linden Lab? The built-in functionalities provide leverage for the micro, meso, and macro levels of the design space, but how are they conveyed and managed with particular attention to IP rights?

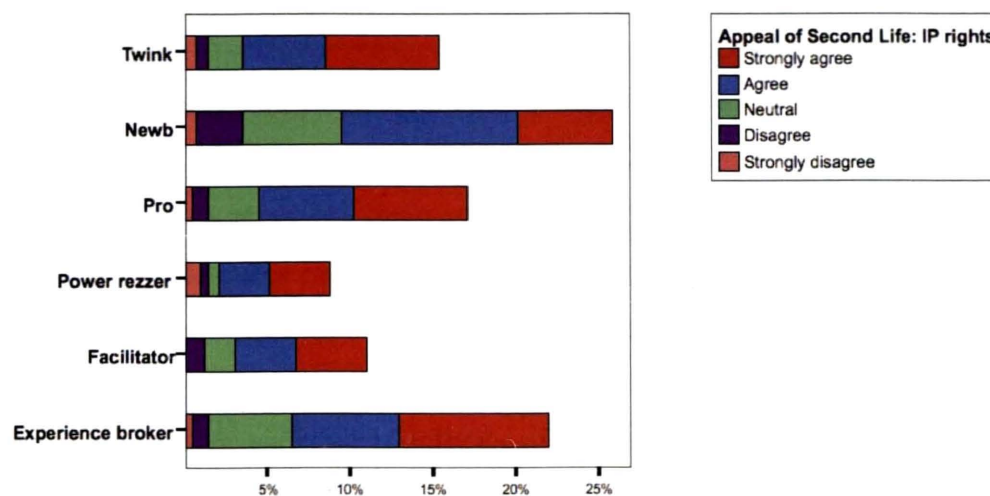
Linden Lab defines its own role as a provider of a multi-user online service offered through the Linden Software encompassing the Second Life servers, Viewer,

¹⁶⁰ An independent t-test was conducted to investigate in-world micro-payments by comparing financial scores in an average month for males and females. There were no significant differences between men and women in approximate expenditure, sales, and account balance in L\$ per month.

APIs, and Web sites. Linden Lab monetizes its software as a service (SaaS) by providing the software platform for free, while charging according to particular usage patterns which underlies the firm's aim to shy away from micro-managing in-world interactions between users (see Section 5.3.1). Approaching Second Life as a product (and the L\$ as part of the package) was consistent with Linden Lab's prominent step in 2003 to give users ownership over their contributions. The survey reported that, respectively, 36.64% and 34.56% of the Second Life respondents strongly/agreed with the statement that holding ownership through IP rights over one's developments was a factor in participating in Second Life ($M = 2.06$, $SD = 1.058$, $N = 434$). Figure 6-8 shows that power rezzers score relatively high on 'strongly disagree' in comparison to other clusters which may be explained by their relative 'outer-platform' interests that are underpinned by different legal contracts as I will explain below.

Figure 6-8

Distribution of Second Life respondents according to their interest to retain IP rights



In the context of IP rights, the transferability of mod development is played out differently on the micro, meso, and macro levels. *Micro level management* influences in-world user endeavours that are interpreted and legally bound by Linden Lab's Terms of Service (ToS). Without approving the ToS agreement no access to Linden Lab's

services is granted. The ToS describes the services and content of Second Life, user conduct, and terms of ownership. The user is given a “nonexclusive, limited, revocable” license to use the software according to the ToS.¹⁶¹ Participating in mod development (by means of creation or uploading) “does not make you a Linden Lab employee” and Linden Lab does not offer any compensation.¹⁶²

Ownership means that users retain the IP rights to their creations. Yet, as soon as the creations have made it onto the Linden Software, Linden Lab is permitted “a royalty-free, worldwide, fully paid-up, perpetual, irrevocable, non-exclusive right and license to use and reproduce” the content throughout its service and for other publicity purposes.¹⁶³ Linden Lab reserves the right to delete content without any obligation or liability to the user and it can use generated content for “debugging, testing, and/or providing support services” as it sees fit.¹⁶⁴ Furthermore, it is stated that the user has no data ownership, meaning that, “intellectual property rights do not confer any rights of access to the Service or any rights to data stored by or on behalf of Linden Lab.”¹⁶⁵ In return, for the duration of the account, a license is granted to use environmental content and textures for development purposes. Users also have to comply to Linden Lab’s Trademark Policy as a means to differentiate user contributions from Linden Lab’s endorsements.¹⁶⁶

On the micro level, governance mechanisms have been put in place, ruling over Second Life users that violate another mod developer’s copyright. There are various ways, for example, to copy someone else’s work and all are considered a breach of Section 4.2 of the ToS. Copying does not necessarily equal theft, however. Rather, in many on- and offline cases norms have come into existence concerning fair use. An examination of the evolution of community attitudes toward copyright and fair use has shown that historically, media consumers have considered small scale sharing of, for example, music with friends and family as a fair use of the content they purchase. However, simultaneously consumers were found to harbour strong norms against large scale copying and/or selling of media (Gasser and Ernst, 2006). These norms of sharing have expanded when new technologies were introduced, allowing users to engage in the

¹⁶¹ See under §3.1. See: <http://secondlife.com/corporate.php> (accessed 8/05/08).

¹⁶² Ibid.

¹⁶³ See under §3.2. See: <http://secondlife.com/corporate.php> (accessed 12/05/08).

¹⁶⁴ See under §3.2. See: <http://secondlife.com/corporate.php> (accessed 1/05/08).

¹⁶⁵ See under §3.3. See: <http://secondlife.com/corporate.php> (accessed 8/05/08).

¹⁶⁶ See <http://secondlife.com/corporate/brand/index.php> (accessed 15/05/08).

seemingly victimless, communal behaviour of sharing their media with others on a large scale.¹⁶⁷ This may also hold for Second Life. As such, several features have been put in place such as the possibility to use Creative Common licenses and ban lists. Linden Lab states, however, that it is not them but the users who are enforcers of copyright.

The communities within Second Life should have the tools and the freedoms to decide how and when they deal with potentially infringing content. Many will decide on less restrictive regimes in order to maximize innovation and creativity. Others will choose more restrictive options and ban visitors who do not respect them. Consumers, creators, and all residents need to have the final say about which approaches work best for them. Please recognize that using the Terms of Service is not a permanent solution.¹⁶⁸

Furthermore, a mod developer can also choose to respond to an alleged copyright infringement by means of the first world legal system, that is, in accordance with the US Digital Millennium Copyright Act (DMCA). This means that upon receipt of a valid DCMA notification Linden Lab as service provider can take down the copyrighted material. The owner is notified so that s/he can file a counter-notification which may lead to Linden Lab restoring the content.¹⁶⁹

Meso level management organizes the boundaries between Linden Lab and mod developers concerning interface modding of the Second Life Viewer. Contributions are made under the GNU General Public License version 2 (GPLv2) with an additional Free/Libre/Open Source Software (FLOSS) exception.¹⁷⁰ GPLv2 allows mod developers to copy, distribute, and modify the Viewer software under the condition that the newly derived result is bound by the same GPL. As such, Linden Lab can impose some restrictions. It is possible that in order to develop some derivative mods based on the Viewer software GPL-incompatible libraries may be used. Therefore, a FLOSS exception has been added that applies to some Viewer software files. This means that Linden Lab has the right to approve of (non-GPL) licensed software that relates to or works with the Viewer software. It is allowed, however, to “create or distribute a work which is a work based on the Program for the Viewer Software and any other work licensed under the GPL” and, therefore, the FLOSS exception must be removed.¹⁷¹ Upon submission of any type of contribution the Second Life Viewer Agreement has to

¹⁶⁷ This was branded by the media industries as ‘theft’.

¹⁶⁸ See <http://blog.secondlife.com/2006/11/14/use-of-copybot-and-similar-tools-a-tos-violation/> (accessed 18/06/08).

¹⁶⁹ See <http://secondlife.com/corporate/dmca.php> (accessed 18/06/08).

¹⁷⁰ See http://secondlifegrid.net/programs/open_source/licensing (accessed 8/05/08). The artwork is licensed under the Creative Commons Attribution-Share Alike 3.0 License.

¹⁷¹ See http://secondlifegrid.net/programs/open_source/licensing/flossexception (accessed 8/05/08).

be signed. This document offers joint ownership with Linden Lab. More specifically, Linden Lab can “register a copyright in Your Contribution” and “exercise all rights as a copyright owner of Your Contribution.”¹⁷² Thus, Linden Lab can (commercially) re-license a mod developer’s contribution. In case a mod developer is interested in modding the Viewer software for commercial purposes, s/he cannot use this license. Instead, Linden Lab provides a commercial Viewer license that does allow the Viewer to be modded and used proprietarily.¹⁷³

Strictly speaking, there is no licensing (yet) for *macro level modding* as the Linden servers have not been formally open sourced. However, as was mentioned earlier, there are several developer groups that contribute to open sourcing the Second Life underworld. OpenSim, for example, makes use of a Berkeley Software Distribution (BSD) license. As the BSD license is more permissive than the GPL,

people that work on OpenSim are not supposed to be working on the Viewer. We’re not even supposed to look at it. Really. Because if we look at it, and we know too much about it, there is a fear that we might accidentally steal some of the code and be accused of that [...]. So there’s a concern about keeping that separate. Which means, since we’re not building the Viewer, we want to remain compatible with Linden Lab.

(Dan, 26/11/2007, p: 38-39)

Against this backdrop, Linden Lab’s commitment to its aim to become the embodiment of the future of the Internet remains to be seen. The firm’s reliance on user input in product development may be a core capability, but the road leading towards a fully open and decentralized platform by the incorporation of standardized open devices, systems, protocols, and servers seems long and winding. Based on the analysis of the functionalities of the design space, the current state of user participation on the firm-hosted platform suggests that Second Life operates mainly under Linden Lab’s direction and efforts made to open up seem to have instead had a rather closing down implication.

¹⁷² See http://secondlifegrid.net/programs/open_source/submission - “Contributor Agreement” (accessed 21/05/08).

¹⁷³ See <http://secondlifegrid.net/programs/licensing/viewerlicensing/form> (accessed 18/06/08).

6.5 Conclusion

In this chapter attention has been drawn to the design space of the firm-hosted 3D platform so as to contribute a systematically developed and dynamic approach to build an understanding of the firm-hosted 3D site where user participation is central to the design and the development and maintenance of the product across firm boundaries. The analysis of the design functionalities yielded three loci of user-driven design which were particularly discussed in terms of leverage, accessibility, and transferability.

First, the *micro level design space* was introduced. The empirical analysis of micro mod development concentrated on the built-in toolkit that enables and facilitates building, texturing, and scripting practices. Based on the outcome of the survey analysis most respondents engaged in building activities, followed by texturing and, lastly, by scripting. Mod developers are engaged in *performative mod development* because this in-world development practice is an instance of showcasing that tends to occur there and then, often for others to see.

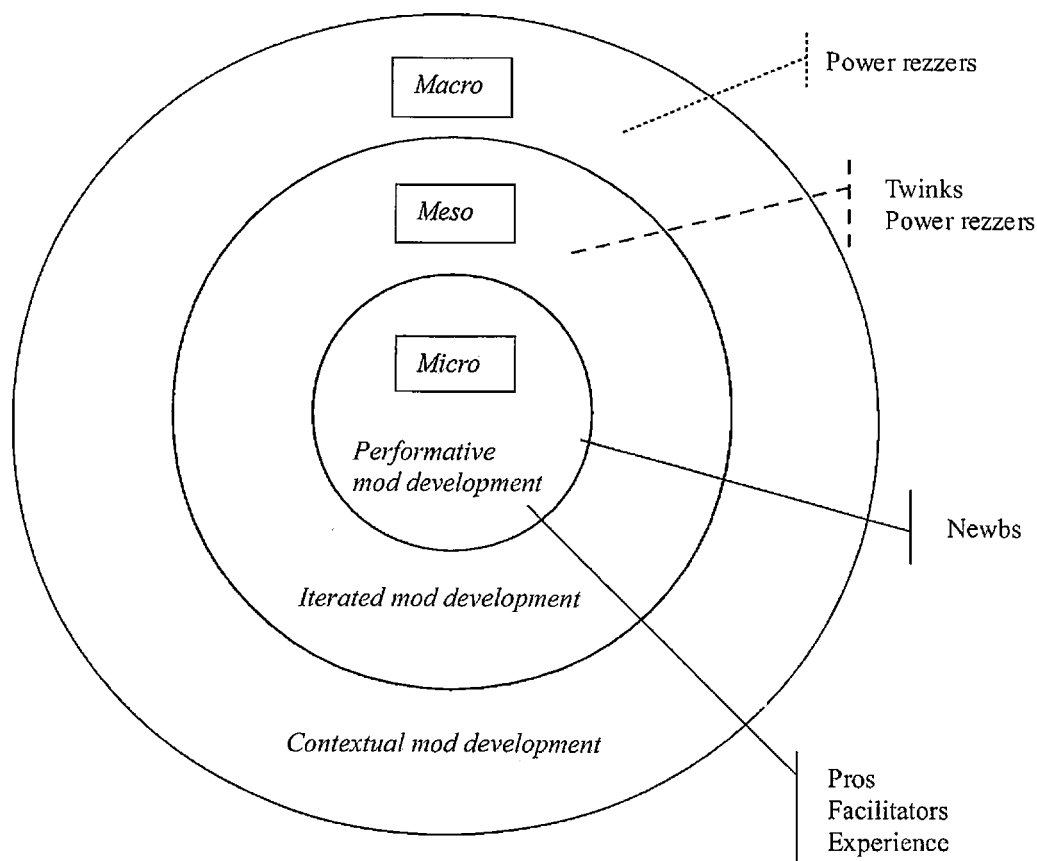
Second, the *meso level design space* yielded insight into the usefulness of several additional features that service mod development such as terraforming. More importantly, meso mod development addressed a first-level advancement of user participation in mod development, namely, what I refer to as *iterated mod development* of the Second Life Viewer which is the client-side of the Second Life platform. Part of the rationale behind the firm's open source strategy was explained by the firm's need to be able to compete in a 'network effects' market. Another reason was a combination of factors related to a within-firm shortage of resources and external reverse-engineering initiatives.

Third, the analysis yielded the *macro level design space* which focused on the platform's underlying technologies and the issue of open sourcing the Linden Software's back end servers. In this context, Linden Lab launched the AWG which is a collective of Lindens and mod developers that joined forces to work on a common goal suggesting a convergence of design norms between the developer firm and mod developers. Furthermore, despite the fact that Linden Lab has not released this part of the source code, several external developer groups have engaged in what I refer to as *contextual mod development* which is a second-level advancement of user participation in mod development. Those initiatives such as OpenSim have tended to work on

reverse-engineering Second Life and developing external servers to connect to the Second Life grid. As a result, this type of mod development can be said to have overcome or transgressed the limitations of the firm-hosted design space.

How do these findings relate to those concerning the design capabilities presented in Chapter 5? Six Second Life memberships based on participation patterns were set out. Based on those findings, the *pros*, *facilitators*, and *experience brokers* invest in micro mod development, the *newbs* move on the periphery of the micro level design space and, in particular, the *twinks* and *power rezzers* engage in open source practices of meso and macro mod development. Contributions in the domain of alternate Viewers and the underworld tend to be solution-based and more need-related which may point to a more advanced user participant (cf. 'lead mod developer') who is likely to emerge from especially the power rezzer category. A synthesized structure of the design capabilities against the design space is presented in Figure 6-9.

Figure 6-9
Synthesis of design capabilities and design space



The firm-hosted 3D collaborative platform is thus purposefully modular in design (compare also the software release stages of Release Candidate, First Look, and Beta Viewers) allowing the enhancing or furthering parts of the product development process across firm boundaries with no (or minimum) disruption of the overall services. The analysis of the conveyance and management of this modular design space drew attention to several legal contracts underpinning legally established design limits. Whereas the micro level design space is managed by a ToS agreement and the meso level design space is bound by the GPLv2 with an additional FLOSS exception, the findings show that, in practice, there seems to be only a small difference between the micro and meso areas of mod development.

On the micro level, mod developers own what they create and make money with it, yet it is developed within the confines of the design space and toolsets and bound by the specifications of the ToS. Overall, there is no 'transferring' to other platforms and only a limited option to 'bring in' various desired features and assets.¹⁷⁴ Furthermore, mod developers on the meso level, in contrast to commercial Viewer licensees, are not allowed to derive direct monetary value from their contributions. Therefore, meso developed mods are, in principle, non-market productions and mainly depend on Linden Lab's proprietary code. Moreover, mod developers seem to find themselves in the peculiar situation of being in the business of creating proprietary experiences (bound by Linden Lab's software) that can be commercial and non-commercial proprietary extensions of the firm-hosted 3D product. For example, explicitly, users can develop in-world digital developments that can be exchanged for money and a commercial Viewer license can be retrieved for business purposes but, implicitly, a freely available user-modded Viewer may result in an overall better Second Life experience and direct more traffic towards the platform. In the case of macro mod development, contracts are dependent on the group licenses that come with available libraries and other software. Some of these developments may be used for commercial purposes, others may not.

User participation on the Second Life platform then means dealing with *firm-constructed design limits that are, to a degree, of a technical and artificial nature and are purposeful and coincidental, yielding the term 'contingently generative' to describe Second Life*. Thus, controlling parts of the design such as code, yet not the creation

¹⁷⁴ There are some third party software packages that are compatible with Second Life, such as animation editors like BVH and Poser.

activities, implicitly influences the organization of product development between the developer firm and mod developers. The developer firm has constructed the design space in accordance with certain forms of usage that are influenced by trade-offs made throughout the development process. Therein lies the space that mod developers have at their disposal to work in, negotiate with, and remake as an integral part of Linden Lab's overarching strategy. The approach is likely to reduce the costs of development in contrast to the wider games and 3D software industry that thrives on the development of interactive 3D content. In the face of the rapidly increasing costs of game development, in particular, due to investments in the technology, a combination of inviting users to tinker with parts of the product and the provision of commercial licensing opportunities, is a clever business model. The advantage of providing a multi-levelled design space as a platform for a different range of user participation practices is that it favours the creative capacities of users over having them concentrating on the mechanics, and, in this context, confirms H2 that was outlined at the beginning of this chapter.

On the basis of the analysis so far, however, a more critical engagement with the conceptualization of user participation seems desirable, in particular, with regard to the variable degrees to which mods appear to be easily transferable (in-world transferability among users and/or the firm seems the most straightforward). More specifically, the design functionalities on the level of the design space seems to indicate a type of (temporary) role-based coordination of different levels of mod development that furthers various aspects of product development, yet which may have implications for e.g. the extent of participatory opportunities and the exchange of knowledge between projects. The next chapter further assesses the role of users on the firm-hosted platform by empirically investigating the ways dynamic relationships between users and the developer firm are developed and organized with the aim to highlight learning opportunities for the developer firm.

Chapter 7 Participation, innovation, learning & mod development

I want to be as big as a mountain, I want to fly as high as the sun

- Stone Temple Pilots¹⁷⁵

7.1 Introduction

This chapter provides the last component of the empirical investigation of user participation on the firm-hosted platform. It focuses on knowledge contributions made by users and Lindens alike, highlighting aspects of learning (within and) across firm boundaries. The third working hypothesis guides the empirical analysis set out in this chapter (see Section 4.2):

H3 User involvement in knowledge contributions on the firm-hosted 3D collaborative platform is likely to strengthen crossover learning opportunities between the developer firm and users.

By linking the design capabilities and design space to knowledge contribution practices, H3 guides the investigation of the ways firm-user learning might occur that underpin product development practices on the firm-hosted 3D platform. Particular attention is directed to informational inputs in the context of product development that may stem from within and external sources of the developer firm which highlight the ways (shared) practices and platform use may generate opportunities for individual and collective development to occur. This strategy of consulting with the user base positions the Second Life platform as a site where ideas about discovering, developing, and refining modifications are provided by both the developer firm and mod developers. In this view, the investigation seeks to illuminate the extent of cross-pollination among different users and the developer firm. In doing so, aspects of mastery are investigated which signal particular knowledge loci that may be connected to various learning prospects. In this relational approach mod development is understood as a learning dynamic and in this capacity serves as the unit of analysis in this chapter.

The structure of this chapter is as follows. Section 7.2 introduces the relational

¹⁷⁵ Stone Temple Pilots, *Where the River Goes*, *Core* (Atlantic Records, 1992).

dimension of mod development associated with firm-user learning. In Section 7.3 a principal component analysis is presented that sheds light on the underlying dimensions of mod development as a learning dynamic. Attention is drawn to the means of information retrieval and supply by Second Life users. This is followed by Section 7.4 which provides an analysis of learning practices among the developer firm and mod developers on the firm-hosted platform. In particular, mastery and leadership practices are highlighted. Furthermore, learning is connected to the aspect of 'production' underlying user participation, because throughout this research, it has been suggested that 'production' continues well after the release of the platform by user contributions made to the design space, emphasizing several interactions among contributors across firm boundaries. Concluding remarks are presented in Section 7.5, drawing attention to the centripetal effect of complex learning among mod developers and the firm.

7.2 Learning by design

In this study attention has been drawn to the rapidly expanding number of firms that have noticed 'your' creative endeavours in various online capacities (see Chapter 1 for an initial discussion). Increasingly, firms can be seen to invite and host online user communities on their platforms which are considered to providing an unprecedented capability as resources of information underpinning, for example, feedback and problem solving mechanisms (see Chapter 3). Research findings, however, have insufficiently addressed the role of those firms in the context of user participation that seem to mark a shift from 'firms as producers' to 'firms as platform (or, service) providers'. Instead, studies have often focused on the practices themselves and, in many cases, on not-for-profit or 'commons'-oriented platforms such as various open source communities.

This chapter links the design capabilities and the design space to communicative purposes so as to yield insight into user participation in relation to the firm's capacity to benefit or learn. This perspective informs the examination of mod development as a *learning dynamic* and draws attention to the interdependent dynamics formed and maintained among different types of users and the developer firm. From this perspective, knowledge sharing on the firm-hosted platform is regarded as a social process where social relationships are formed, new knowledge is nurtured, and user creativity is stimulated, guided by the firm-hosted platform as a repository of

knowledge, mobilizing learning as a dynamic between the developer firm and user base (see Section 3.3). This means that Second Life membership may influence users and the developer firm as participants and, subsequently, as learners. More specifically, the empirical findings on the design capabilities that differentiated between platform users based on participation patterns and communication behaviour, may be indicative of differences among users in terms of leadership. Leadership may be considered in terms of apprenticeship to acquire knowledge and skill sets and may highlight learning practices (cf. 'meritocracy in F/OS' in Berdou, 2007).

Therefore, the analysis presented in this chapter, based on qualitative and quantitative research findings, aims to reveal the organization of levels of interaction among mod developers and the developer firm taking place on the micro, meso, and macro design space, and the implications for firm-user learning opportunities. In doing so, mod development as a learning dynamic serves as the unit of analysis. Insight is yielded into the potentiality of crossover learning as a catalyst of product development that may particularly benefit the developer firm, drawing attention to the fundamental challenge for the developer firm to integrate and learn from users' shared insights and contributed mods.

Before concentrating on the examination of several elements of the learning relationships developing between the developer firm and users, the next section provides some basic information concerning the use of the information and communication means on the Second Life platform.

7.3 Mod development as a learning dynamic

This section presents the findings of a principle factor analysis (PCA). This analysis was conducted to detect relationships within the data set generated by the survey in order to yield insight into the underlying structure of information and communication practices among Second Life users (see Section 4.5). Given the empirical analyses of the design capabilities and the design space presented in the previous two chapters, the aim is here to identify the key factors that can assist in conceptualizing user participation in development practices as a learning dynamic on the firm-hosted platform. This is achieved by the examination of elements through which users establish and renew relations with each other (regardless of the camps to

which the developer firm or mod developers belong).

PCA works by revealing existing linear components in the data set and the way specific variables contribute to that component (Field, 2005). The survey on Second Life was used as input for the PCA. Questions with a five-point rating scale were asked about the appeal of Second Life; usage and usefulness of various firm-provided tools and features of the platform; participation in information and communication activities; orientation towards others ('other-directedness'); and several of Linden Lab's services (see Appendix for Survey on Second Life, pp. 247-263). Examples of these items included, respectively: 'I can enjoy social interactions with others'; 'Do you mod the Viewer source code?'; 'How useful is the Linden Scripting Language for you?'; 'Do you post Second Life-related information on sites like YouTube, Flickr, and Del.icio.us?'; 'How often do you read the Official Linden Blog?'; 'How often do you post or comment on the SLDevelopers mailing list?'; 'How often do companies ask you to develop their presence in-world?'; and, 'How would you rate Linden Lab's response to feature and development requests?'

First, 65 items were checked for their suitability by screening for high correlations ($R < .9$) and significance values over .05 ($N = 421$). This led to the removal of one item ('pretend to be someone else'). The Kaiser-Meyer-Olkin value was .850 and Bartlett's Test of Sphericity was highly significant ($p < .001$), both indicating a good sampling adequacy. The PCA revealed 15 components with eigenvalues exceeding 1. The first component explained 17.4% of the total variance and all components combined, explained 64.3% of the total variance. A closer inspection of the scree plot and running the Monte Carlo parallel analysis indicated that the first 8 eigenvalues for the randomly generated data matrix scored below the observed eigenvalues from the reduced matrix of the Second Life data (see Appendix for Total Variance Explained and Monte Carlo Parallel Analysis, pp. 281-282). As a result, it was decided to retain eight components. Together they accounted for 50.68% of the total variance. A Varimax rotation was used to help in interpreting the components. Table 7-1 presents the eight factors, their explained variance and the outcome of the reliability analysis based on the loadings ($>.3$) of the items on the factors (see the Appendix for Component Matrices with loadings ($>.1$), pp. 283-285).¹⁷⁶

¹⁷⁶ An Oblimin rotation was conducted as well so as to ensure there were no correlations between factors. This was confirmed by the pattern matrix.

Table 7-1
Overview factors, explained variance, and reliability

Factor	% of Variance	Cronbach's α
Meta	17.41	.880
Scripting	8.98	.901
In-world orientation	6.82	.895
Building & texturing	4.77	.850
Organizational character	3.54	.835
Features (& tools)	3.39	.843
Other-directedness	3.19	.858
Perceived innovative character	2.58	.849

The first factor, *meta*, refers to advanced and specific links of communication and adoption behaviour. It contains those questions that loaded highly on open source practices, the retrieval and supply of information about open source, developers and scripters mailing lists, LSL, hacking activities, and interest generation from companies. Meta measures high-end usage of the platform that may be related to the macro and meso level of mod development. The second label *scripting* falls immediately below. It measures moderate to advanced capabilities and usage of the design space that may be associated with scripting practices. The items that loaded highly were the retrieval of information about open source, LSL, and the scripters mailing list, participation in scripting activities (such as vehicles and physics, and in-world games), beta tests, and JIRA.

In-world orientation combines items that are directed towards micro level mod development. In particular, aspects of information and communication were related to questions that asked about posting and commenting to the blog, in-world group messages, and the forums. Furthermore, elements of in-world improvement are user-to-user and user-to-firm-oriented by helping others, validated opinions, bug submissions, JIRA, and beta tests. The questions that loaded onto the factor *building & texturing* measure in-world usage of build and texture activities indicating micro-level mod development. It combined the items related to 'enjoy participating in said practices' that may have included, among others, producing artwork, clothes and fashion.

Organizational character measures the construct referring to the services provided by Linden Lab. Respectively, the developer firm's responses to customer

service, technical issues, community feedback, abuse, features and development requests, and purchase and billing information. The sixth factor measures the *features* that support in-world mod development such as animations, appearance editor, inventory, and uploading and file format. The factor *other-directedness* measures the orientation of users towards others. Questions that loaded strongly on this factor were related to helping others (other users and companies alike), opinion leadership, and engaging in communicative activities concerning Second Life on external platforms. The last factor reveals the underlying structure of items that measure Second Life's *perceived innovative character*. It combined the items of retaining IP rights, hacking, open source modifications, and the features sculptable primitives and XML.

These factors provide a framework to examine different aspects of user participation in mod development practices. By simplifying the data based on the respondents' responses, the underlying structure revealed that especially the factors meta, scripting, in-world orientation, and other-directedness, measure communicative elements.¹⁷⁷ The first construct embraces communication means that I consider to be dealing with the more advanced topics of mod development. The second scores considerably lower on the retrieval of information than the meta factor, while knowledge contributions are, in comparison to meta, virtually absent. The in-world orientation component measures the retrieval and supply of information of the blog, forums, and in-world group messaging. Other-directedness contains items involving the supply of Second Life-related information via external Web sites etc. Against this framework a closer examination of the respondents' communication behaviour can be interpreted.

The survey on Second Life asked respondents about the frequency of retrieving and supplying information to the communication channels provided by Linden Lab; respectively, the Official Second Life Blog, Second Life forums, scripters mailing list, SLDev mailing list, open source portal (or, wiki), LSL portal (or, wiki), and in-world group messages.¹⁷⁸ From Table 7-2 it can be gathered that the overall communication means of in-world messaging, the blog, and forums are frequented most often.

¹⁷⁷ The other factors can be said to mainly concentrate on the underlying structures of the design capabilities, the design space, and organizational culture that were discussed in Chapters 5 and 6.

¹⁷⁸ Note that only Lindens can post on the Official Second Life Blog, while users can only comment.

Table 7-2
Distribution of retrieval and supply of information

How often do you...?	Mean Retrieval (N= 434) ^a	Mean Supply (N= 434) ^a
Official Linden Lab Blog	1.96	4.12
Second Life Forums	2.53	3.65
Scripters mailing list	4.10	4.68
SLDev mailing list	4.13	4.71
Open Source portal	4.22	4.74
LSL portal	3.48	4.70
In-world group messages	1.66	2.94

Source: Survey on Second Life, N=434.

^a Values range from 1-5 (Statements, 1=ever day; 2=1-2 per week; 3=1-2 per month; 4=rarely; 5=never).

Furthermore, based on the respondents ($N = 434$) that did supply information, 37.1% reported to typically reply more to posts than to initiate posts. This is followed by 29.5% of the respondents who said they retrieve and supply a similar amount of messages. Only 8.5% post more than they retrieve information, while 4.4% only reply to other people's posts and 1.2% only retrieve information without supplying it (see Appendix for Retrieval/Supply Frequency, p. 286). This is further investigated in the next section concerning firm-user learning.

Respondents were also asked to rank their preferred means of communication to find out how to do certain things in Second Life. The results are presented in Table 7-3. A Kendall's W Test showed that there was moderate agreement among respondents to rank the items ($X^2(6) = 495.007$, $W = .239$, $p < .001$). Interestingly, external sites hosted by other Second Life users ranked quite well, that is, before the firm-provided knowledge base and even support. Further examination shows that more than half of the respondents (57.8%, $N = 429$) reported that they have engaged in activities that concern and promote Second Life externally such as on user-run blogs and Web sites. In addition, nearly 40% ($N = 428$) reported to have posted Second Life-related information on Web sites like YouTube and Flickr. It is therefore likely that many of those sites offer useful and qualitative resources.

Table 7-3
Information quest 1: Rank

Rank in order of importance	Mean (N= 345) ^a
Official Linden Lab Blog (& archives)	3.03
Second Life Forums (& archives)	3.05
Member-owned external URLs	3.55
Knowledge Base	3.62
LSL Portal	3.77
Open Source Portal	5.37
Contact support (email, phone)	5.61

Source: Survey on Second Life, N=345.

^a Values range from 1-7 (Statements, 1=highest; 7=lowest).

What are the implications of this information and communication framework underlying user participation for firm-user learning? The next section empirically investigates several elements of the learning dynamics involving Second Life.

7.4 Learning Second Life

This section yields insight into the dynamics forming between mod developers and the developer firm. It draws attention to various aspects of the organization and implications of crossover practices for firm-user learning. In particular, apprenticeship and knowledge sharing practices are addressed (see Chapter 3). First, a perspective is offered that presents the internal enculturation practices within Linden Lab. This is followed by the presentation of the mechanisms at work that guide mod developers into the ‘doings and sayings’ of the modification culture. The final section focuses on the dynamics of firm learning underlying user participation in mod development practices.

7.4.1 *Mastering Second Life: the developer firm's perspective*

In Chapter 5 several aspects of the organization of the developer firm were examined. One important finding highlighted Linden Lab's rather extensive distributed decision-making policy where employees are hired for exhibiting an entrepreneurial attitude. Pivotal in this regard is that Lindens can choose what (not) to work on. This means that a Linden's success or failure is very much connected to not only executing tasks well, but also communicating them well to others so that they understand the

value of those tasks (hence, the role of the Linden). Lindens are encouraged to work on what interests them. If that means they cannot do it on their own, they should find a team or, if they potentially need someone with more experience in an area, they are encouraged to find someone who wants to teach them. This is, however, not to say that Linden Lab is completely devoid of a type of seniority system. More specifically, Lindens can take on extra responsibilities such as mentoring new Lindens to guide them into the 'Linden way' and chart their careers. Brett recalls his first week at Linden Lab:

There's a steep learning curve for people that first come into the company because there's just a lot of specific tool sets, and communication techniques, and things that they prefer that you use to, kind of, get calibrated to the Linden way. [...] I was set up at a desk with a computer. There are two buildings actually right across the street from each other [...] So I made the mistake of assuming that [my first meeting] was a physical meeting because people said "Oh there's a meeting at 3" or whatever time it was. And so I literally scattered and ran across the street to the other building to meet with the Marketing Executive [...] and they look at me like I was crazy. [...] "You can have a meeting in-world."

(Brett, 13/11/07, p. 13-14)

For a newcomer in any company it may be unclear what the preferred means of communication are, yet starting in a company where the choice of work is yours is, according to the Linden interviewees, for many, somewhat 'mind-boggling'. The role of the mentor therefore is to guide new Lindens into this process of 'choosing wisely' by having them choose things that can be reasonably achieved and by guiding them in how to manage their work (and, they play also a role in salary reviews). The mentor is particularly important during the first few months "when you're like figuring out what the hell's going on in this crazy hippyified company" (Jim, 12/1/07, p. 10). Mentorship, however, is available for the duration of employment at Linden Lab which is explained by Q, while Torley underscores the possibilities to move forward internally.

Everyone is expected to choose a mentor and have regular meetings. Mentorships can change over time as your needs change. My mentor is a program manager, because I wanted someone not in development. Well... that part I've been doing for a while, and I'm one of the more senior devs around. But everyone needs to hear about how they're doing managing their work, their social interactions, etc.

(Q, 7/11/07, p. 3)

She guides me in my personal and professional development. I show her regular reports of my work and she advises me in areas of improvement, things I should be looking for next.

(Torley, 18/01/07, p. 6-7)

Torley pointed here to his transition from his initial position as liaison to community manager and to product manager at Linden Lab. Another illustration of a process that guides internal labour practices is the studio system.¹⁷⁹ The studio is development-oriented and headed by a studio director. The most important task of the studio director is to oversee and manage multiple projects, not people. Lindens are not attached to a particular studio and, therefore, the director fulfils a kind of guidance and awareness role concerning resource management. This is a rather big challenge as many Lindens have an opinion about what is ‘most important’ in order to move Second Life forward. Steve describes his role:

I currently have three active projects in my studio, each with two to four developers and a few other resources shared among the projects (two program managers, a designer, and of course myself). I ensure that the projects have enough resources and approve which projects have resources available to be worked on within my studio. Then I help to make sure that those projects succeed. [...] So part of my job is to help make the “hard decisions” when deciding between projects.

(Steve, 7/11/07, p. 2)

A studio is not attributed a single work area per se yet, depending on the studio director, each studio tends to have certain specialisms. For example, Studio Blacklight concentrates on high priority bugs and issues that affect the service. In addition, in order to acclimatize and familiarize oneself with Second Life and the tasks ahead, a new developer generally spends her or his first few weeks in Studio Blacklight. Since this studio’s main focus is solving bugs rather than being project-oriented it tends to be, for newcomers, an insightful way to become accustomed to the inner workings of Linden Lab. After a while, some new developers may become inspired by other parts of the Second Life product and move on to another studio.

If you want to have a successful career at Linden Lab, it is important to master the various communication channels such as Second Life (used for meetings, presentations, etc.) and IRC (used for communicating emergencies, etc.) which are interwoven with Linden Lab’s internal organization of labour (see Section 5.4.1). Particularly, JIRA was said to be pivotal in this regard as it manages tasks and projects concerning platform development. More specifically, Lindens use JIRA on a daily basis to submit and retrieve tasks, bugs, and so forth. It is also a mechanism to prioritize work

¹⁷⁹ As Linden Lab moved rapidly from a small-scale to a mid-size company it had to adopt a more formal structure to keep track of the division of labour.

as once a week issues that are considered worth doing are ranked by votes cast by Lindens. In the words of Jim:

If you were being completely mechanical about it, one way of working you could choose to do, would be whenever you finish a piece of work, go to JIRA, find the thing with the highest number of votes, so this is the thing that most people in the company think is worth doing, pick it up and do it. And there are some people who kind of work like that. And there are other people who work in particular areas and have a more personal appreciation of what needs to be done and will work on that, and there's a kind of guideline that if you propose a task and it doesn't get any votes, then you should think twice about doing it or ask somebody else about doing it.

(Jim, 12/1/07, p. 6)

JIRA shows what options are available and underscores that tasks and goals are interdependent. As Torley put it, "I choose my own work – out of a pile that's selected for me in the first place by others, Lindens and Residents!" (18/1/07, p. 31). Furthermore, projects usually stretch over several months or more which delicately constrains Lindens from 'pingponging' between various task which could potentially stagnate or even harm product development. JIRA is also used to assess a Linden's performance on and mastery of the job. Each quarter every Linden has a review day where accomplishments are gathered from JIRA based on 'As & Os', and the JIRA-modified 'Love Machine'.¹⁸⁰

JIRA provides general metrics such as what tasks have been accomplished and yields a post-analysis of how things were executed, while the Love Machine is a more qualitative means of assessment. On a daily basis Lindens give and receive 'love' from their colleagues. In practice this means that when, for example, someone is stuck writing code, s/he can ask for help. In return, a Linden sends out a 'love note' to thank the person who has helped out. The Love Machine is therefore providing insight into which Lindens are helping which other Lindens which accumulates as a quantifiable value. At the end of each quarter every Linden gets a pink envelope with money in it, as every 'love note' received translates into US\$ 1.

Not only is a Linden evaluated based on tasks performed and the extent of peer-interactions, the review is also viewed by a number of co-workers and their comments accompany the review as well.¹⁸¹ In another attempt to achieve transparency, both 'love'

¹⁸⁰ A Linden picks ten tasks and writes an explanation why those were relevant.

¹⁸¹ The CEO received the same treatment during each quarterly review. As this data was gathered prior to Philip Rosedale's stepping down on 14 March 2008, it is unsure whether the new CEO Mark Kingdon has adopted Rosedale's CEO review.

scores and reviews are published internally on a wiki for everyone to read. Linden Lab has also been experimenting with a bonus distributor. During a profitable quarter each Linden is given a few 'points' and can decide how s/he wishes to distribute those points among her/his colleagues. This strategy is consistent with Linden Lab's philosophy of remaining as flat an organization as possible by putting compensation distribution into the hands of all Lindens and, therefore, nurturing a culture where employees appear to be empowered to make decisions rather than a concentrated bunch of Linden executives.

All these organizational means are suggestive of Linden Lab's distributed structure that is associated with transparency rather than with traditional management styles, and which are believed by the Lindens interviewed for this study, to encourage company-wide learning and to underlie creative problem solving.

[There are] some very smart people and me being mostly non-technical I learn A LOT from the techies. People here are always happy to share knowledge.... our internal wiki and blogs really encourage it too.

(Blue, 22/10/07, p. 9)

7.4.2 *Mastering Second Life: a mod developer's perspective*

First time users of Second Life are introduced and mentored by a built-in functionality that automatically directs newcomers to Orientation Island (see Section 4.3.1). It is here where they are introduced and guided through the basic controls and functions of, especially, the avatar. However,

if you have no gaming history you are going to have a much steeper learning curve. Mostly, in regards to controlling your avatar's body and attempting to speak through chat or IM. [...]. You can be made fun of the way you dress or act or what you do not know, especially that. To be labelled a 'newb' or 'noob' is the ultimate put down label.

(Garrett, 5/12/07, p. 4)

From Orientation Island the newcomer is transferred to a Welcome Area and left to her or his own devices. There are, however, many resources available that can be tapped into that can assist and enhance the experiences of new Second Life users. Examples of such firm-provided resources include in-world workshops and courses, libraries, knowledge base, wiki portals, videos, blog, and forums. There are also user contributions that mix with Linden-produced ones. For example, one interviewee

volunteered to write most of the LSL content for the Second Life wiki and also moderated several of the Second Life forums. In addition, there are various support channels that correspond to specific account types associated with Second Life membership. For example, a premium account holder can access live chat, while fee-based enterprise level support is serviced 24/7 by a so-called concierge team. There are also many user- and third party-provided means of support similar to the firm-hosted ones including blogs, forums, wikis, newspapers, instruction guides, videos and podcasts, books, and sandboxes.

Not only can resources be consulted; generally other users are friendly and are likely to help out. A teen user narrates how he was mentored into the Teen Grid and now helps others and an adult user describes how he sees his mentoring role:

You interact with people and you show them what you have done. And you set off little goals to design things. So it's partially self and people interacting. [...] She's like one of the best designers on Teen Grid. [...] She kind of helped me out. She taught me how to use the grid. And once I learned grid that is when everything started happening for me really. [...] I like to give people information and a ways to get them started. I give them enough information so they can go on their path. [...] I have actually trained a girl that I saw her work when she started and I just saw potential. So I just taught her some things that would lead her to progressing. And then I helped her out along the way. And now she is building really good.

(Mike, *Teen Grid*, 14/11/07, p. 7, 19-20)

I do scripting mentoring which means I may tell you how to solve your problem, but I won't solve it for you.

(Strife, 4/12/07, p. 9)

Consulting with fellow Second Life users seems often to be preferred over Linden Lab's, to various extents, poorly designed documents and support channels, indicating a situation of interdependence between Linden Lab and its user base. In this context, the survey developed for this study asked respondents to rank their preferred means of communication to find out how to do particular things in Second Life. The results are presented in Table 7-4. A Kendall's W Test showed that there was moderate agreement among respondents ranking the items ($\chi^2(4) = 482.435$, $W = .306$, $p < .001$).

Table 7-4
Information quest 2: Rank

Rank in order of importance	Mean (N= 394) ^a
Ask someone you know in-world via IM	1.68
Ask group in-world	2.84
Visit an in-world library	2.99
Ask anyone in-world within visual range via chat	3.45
Ask a Linden in-world	4.04

Source: Survey on Second Life, N=394.

^a Values range from 1-5 (Statements, 1=highest; 5=lowest).

Most users work on the micro-level design space which translates to users that work inside their own project.¹⁸² As a result, most of the development, at least in this sample of users, takes place real-time in-world and, subsequently, it is not unheard of that developers can count on working in front of an audience; hence its designation as *performative mod development* (see Chapter 6). Skilled developers can rapidly make shapes appear in space, turn, twist, and join them, and change their colour and textures, while moving from abstract to concrete objects and structures. Such performances are, in many cases, sites for apprenticeship. Sandboxes can fulfil a similar role as one user interviewee explains:

I mean [I learned] some stuff in the forums which I was reading, of course, but mostly it was trying around and meeting people in the sandbox and talking to them and learning maybe a little bit from them or just looking how other people do it and trying to replicate that and then build on this so, learning by doing.

(Christian, 5/12/07, p. 3)

Sandboxes are public spaces where users can indulge in creative endeavours, discuss their work, and meet new people. However, sandboxes are of a temporal character as they are cleared out daily. So if users are interested in pursuing work in-world, buying or renting land becomes necessary (see Section 6.3.1.1). Acquiring land involves familiarizing oneself with various aspects of this mechanism such as tier, number of prims needed, and location. It is not uncommon for users to ‘learn by doing’ and sell off their first land quite rapidly for a more suitable piece that fits their needs better. Neighbours are an important factor in this regard. Neighbours with contrasting

¹⁸² Some mod development can be done outside Second Life such as skin/clothes development and gesture/avatar animation design, but structures or full simulators need to be done in-world.

goals (think, a gambling palace next to a spiritual and quiet zone) can cause severe distress and lead to, for example, security issues and performance lag. Good neighbours with different levels of mastery by skill-set and knowledge, however, may revel in offering each other advice and assistance, every now and then, resulting in group initiatives such as Ex Arte Communis.¹⁸³

Some users are more interested in the technology and the way these applications are used and move towards a 3D Web environment, such as mod developers who participate in open source initiatives. This is mod development occurring on the meso level of Second Life, that is, user-modded Viewers (see Section 6.3.2). Many developers make their code freely available for others to use and mod. In addition, progress and findings are often written down in blog format. Although others can contribute and provide feedback, Viewer modifications tend to be an individual effort (unlike Viewers that are commercially licensed).

Macro mod development, however, is very much a collaborative practice. In practice, mod developers that worked on OpenSim were said not to spend much time using the Second Life platform. Rather they collaborate using IRC, mailing lists, and software repositories, thereby differentiating among channels for helping others, for development, and for the core group. Logs and word searches assist in keeping track of certain interests. The software repository functions as the repository for the source code and as a bug tracker where bugs or feature requests can be entered and which, in turn, are assigned to someone (or can be chosen to be worked on). When developers add something new or make changes, they add some comments and an overview of what has been done. This is distributed via IRC and the mailing lists so as to ensure all participants are up to date.

This sort of then brings up a lot of discussion around what just happened and stuff like that, and people, a lot of people on the channel upgrade their servers immediately to try the new features or to test it or stuff like that so we get feedback right away so we can fix the feature if it doesn't work or if something breaks.

(Tedd, 12/02/08, p. 24)

Yet not all mod developers are granted access to write code to the repository. Newcomers may be granted those privileges when they have proven themselves over

¹⁸³ This is a cooperative group of creatives and builders, founded by Garrett who was interviewed for this study.

time in terms of reliability, technology usage (such as IRC) and delivering good work. Holding the position of core developer for that matter is not guaranteed either. When a core member starts investing less time and energy in contributing work, s/he will be replaced:

There is a person right now who's probably more in touch with what's going on in physics than I am because I've been gone for 3 weeks, pretty much. And if I want to come back in, now I have to come back in, to some degree I have to prove myself again. Come back in, fix some of his bugs, and help put some features in that weren't there. And then they'll be, "OK, he hasn't lost it," you know, "He still knows what he's talking about."

(Dan, 26/11/07, p. 42)

Authority appears to be determined substantially by meritocracy.¹⁸⁴ Some developers are likely to be more specialist, while others are more generalist. In addition, there are also tasks that are more of a supportive nature than writing the actual code such as cleaning up the library repository and maintaining the Web site. These may be executed by the developers but are more likely to be performed by non-programmers as part of the development group (cf. Berdou, 2007). Overall, the mastering of macro mod development of Second Life appears to involve a rather stringent and distributed review process where skills and contributions are constantly confirmed and reconfirmed so as not to compromise the overall project.

7.4.3 *Learning from user participation*

After the 2007 Second Life Community Convention, Philip Rosedale received 'love' for trying to engage in meaningful conversations with all of the 800 attendants over the course of three days. He included this bit of 'love' in his quarterly review and accompanied it with a note expressing how important it is for Linden Lab to listen to Second Life users. Not all Lindens, however, are likely to possess the same level of awareness, or exposure, and engagement with the user base which, arguably, is directly connected to the area of work they engage in internally. For example, the community team, consisting of about a dozen Lindens, has a key client-side facing with roles such as community affairs (such as abuse), and user communication, while areas such as programming deal to a far lesser extent directly with users which Steve underscores:

¹⁸⁴ See Berdou (2007) for insightful analysis of 'the programme of meritocracy' in F/OS which, as she has found, is never fulfilled due to reasons of abuse, technocracy, and structural biases associated with preferential access.

When we work on feature development, we are much more involved with communicating with the residents. At the moment I am more focused on stability and performance where the motivation is pretty straightforward - reduce the crash rate and make SL perform better :)

(Steve, 7/11/07, p. 3)

However, as many Lindens were users prior to making the transit to working for Linden Lab, many have maintained their private accounts to continue their Second Life in that capacity.

Personally I spend quite a lot of time on Second Life, maybe a couple of hours a week, not as a Linden [...]. I think it's valuable to my work but I think it's separate from my work, you know I don't spend my time in Second Life trying to find out where Second Life needs to be improved, but some of the things I do in Second Life make me aware of the things in Second Life that you can change so I think, you know, spending time in Second Life is valuable whether or not you're actually trying to use it as part of your work or not.

(Jim, 12/01/07, p. 12)

Regardless of a Linden's individual interaction with users, Linden interviewees uniformly acknowledge the status of Second Life as a development platform that depends on *user creativity*, *social interactions* and *entrepreneurship*. The platform has attracted many smart and skilled users that make useful and helpful contributions that, in many cases, can be beneficial to all. In this view, as it is easy to become overwhelmed by the amount of user-provided information (particularly when every user seems to point to a different set of features that are important to her/him). Several Lindens have a day job to filter the most critical input for internal use. In particular, they dedicate a lot of time interacting with users so as to learn what things work well, what the biggest issues are, etc. These findings are prioritized and internally communicated.

In order to be better able to listen to its user base, Linden Lab has put some tools and methods in place to facilitate and organize this process for those users interested in sharing their ideas and providing feedback. The remainder of this section yields insight into the ways those interactions between Linden Lab and mod developers function as learning opportunities underlying mod development.

7.4.3.1 Blogs, forums, mailings lists, and JIRA

There are multiple ways for the developer firm and users to interact and share information. Much of the communication tends to occur on a near day-to-day basis such

as via the blog, office hours, JIRA, mailing lists, wiki, and forums, while first life focus groups and design discussions are organized on weekly and quarterly bases. For this study the empirical investigation concentrates mainly on the blog, forums, mailing lists, and JIRA (see Section 4.4.3).

The *Official Second Life Blog* is considered to be Linden Lab's main communication channel.¹⁸⁵ The Linden interviewees reported to read the blog and the comments, particularly the ones that pertain to what they are working on or when they originated the post. Occasionally, they said they contribute posts and comments themselves. For this study total blog activity was measured between October 2004 and February 2008. It showed that 98 Lindens contributed 1,517 posts, 65 Lindens wrote 1,592 comments, and 21,059 users made 95,252 comments. Further analysis showed that one of the Linden interviewees, Torley, was the main contributor to the blog with 162 posts followed by four colleagues who contributed between 80 and 87 posts. Although the top blogger also received the most comments from the community, the analysis also showed that several less frequent Linden posters received more comments than a few contributors who had a higher volume of posting (see Appendix for Blog, p. 287).

The analysis also showed that Lindens do engage with commenters on the blog by commenting on comments. The findings show that the top poster is also the top commenter. Furthermore, Sidewinder Linden turned out not to be a very active poster but scored just below the top poster/commenter on the number of comments supplied. These comments are very much related to clarification and quality concerns that can be viewed as a learning dynamic indicative of firm-user interactions. For example, Sidewinder tends to provide the community with technical status updates such as the usage of the Havok4-based Second Life simulator in the Beta Viewer and various in-world 'early adopter regions'. In a 147 comment-long thread they discuss some troubles that occurred in areas that worked well prior to the update. The following discussion illustrates that both Linden Lab and mod developers (jointly) attempted to solve the problem:

¹⁸⁵ Linden Lab received a storm of criticism when it shut down part of the user forums and started blogging. Users complained about the inability to initiate issues, the danger to miss out and search for supplied information. See <http://blog.secondlife.com/2006/08/10/forums-take-a-new-turn/> (accessed 05/01/09).

and customer service teams.¹⁸⁶ An important reason for this is related to the volume of forum threads and to a large noise-to-signal ratio that makes it rather time-consuming to pick out meaningful and valuable user comments. The Linden interviewees tend to visit the forums in those cases when a colleague has pointed them to a particular topic that s/he should participate in. Their participation is driven by trying to be helpful and informative:

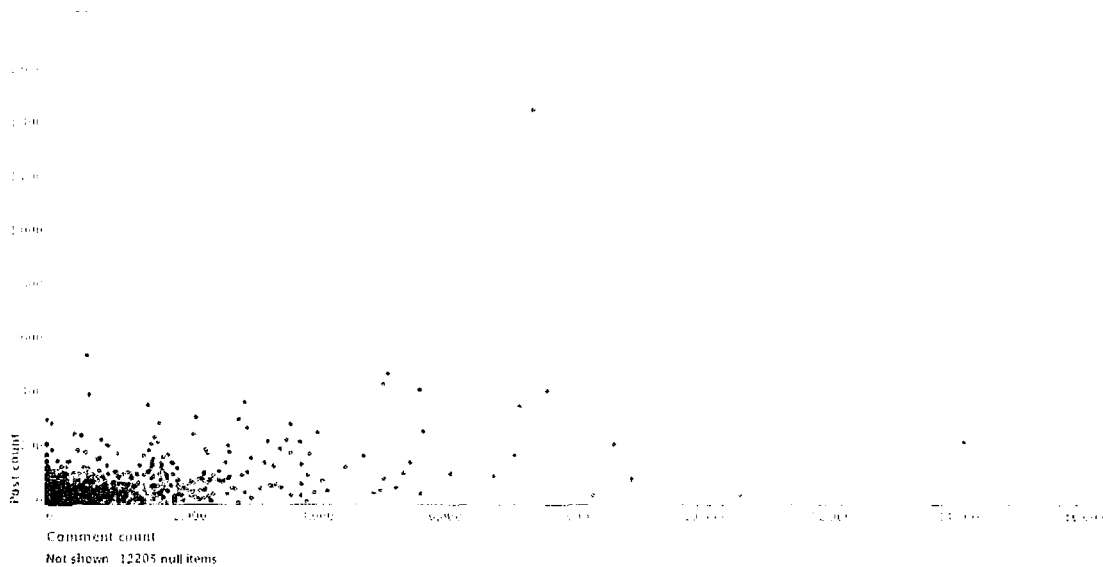
In the past I would participate in forum discussions, not so much now but still sometimes. Mostly because I'm working too hard. But sometimes I pipe in on some issue on which I have opinions or plans.

(Andrew, 7/11/07, p. 13)

A closer look at the forums showed that 149,957 posts and 1,307,814 comments were made between November 2002 and February 2008. A further breakdown showed that 94 Lindens and 24,755 users contributed posts, while 140 Lindens and 30,106 users supplied comments. For this study threads were divided by first post and comments. This was a means to investigate apprenticeship relations, mobilizing leadership, by highlighting information retrieval and supply (see Section 4.2). More specifically, apprenticeship by means of opinion leadership was connected to being knowledgeable about a topic and information sharing (de Valck, 2005; Frederiksen, 2006). From this viewpoint, leadership is thought to positively affect mod development by offering learning opportunities in firm-user interactions (Morrison, Roberts, and Midgley, 2004). Figure 7-2 yields insight into communication behaviour in the Second Life forums. Each dot represents an individual by the total number of initiated posts by the total number of contributed comments. On the far right, Torley Linden out-commented the user base with 14,332 comments (and 230 thread starts), while SuezanneC Baskerville is the top poster among users with 1,471 posts (and 7,644 comments). Note that most forum contributions concentrate between roughly 150 posts and 1,500 comments. Furthermore, forum participants tend to comment more than they start threads and, by and large, outnumber Linden participants.

¹⁸⁶ Note that in August 2008 Linden Lab announced that it is revamping its communication tools and developing its blog and forums towards improving extended conversations with Second Life users. See <http://blog.secondlife.com/2008/08/27/linden-lab-blog-changes-to-give-residents-more-choices/> (accessed 28/12/08).

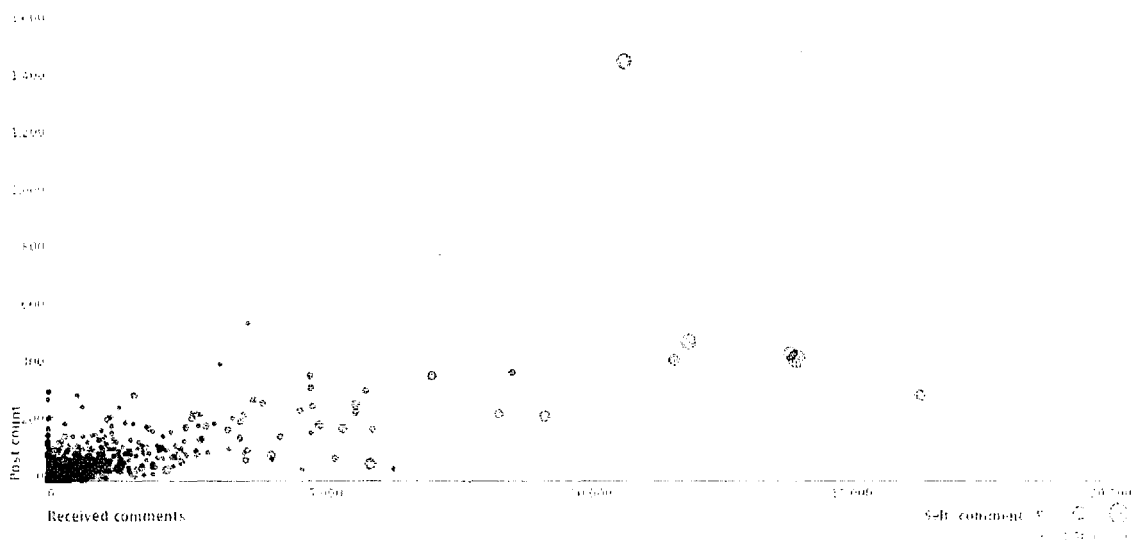
Figure 7-2
Second Life forums: posters vs. commenters



^a See <http://manyeyes.alphaworks.ibm.com/manyeyes/visualizations/sl-forums-comment-starters> for live visualization and counts.

Figure 7-3 presents the analysis of forum participants according to the total number of posts made, total comments that were received, and the number of self-comments that were made on those initiated posts. It shows that only a handful of contributors received a large volume of comments, and those users also scored high on self-commenting activities. In this regard, Lindens scored relatively low.

Figure 7-3
Second Life forums: posters by received comments and self-comment behaviour

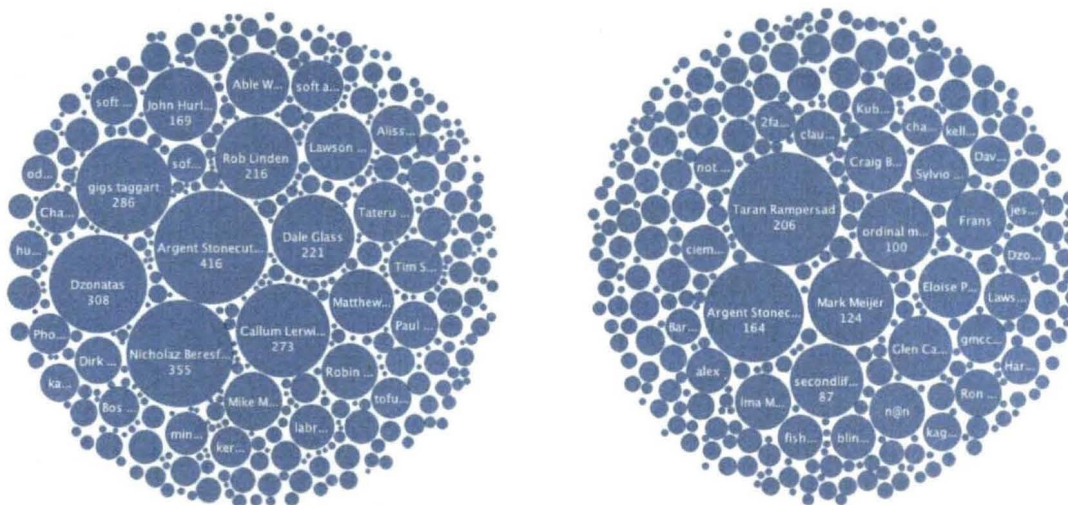


^a See <http://manyeyes.alphaworks.ibm.com/manyeyes/visualizations/sl-forums-thread-starters> for live visualization and counts.

The *Second Life mailing lists* cater to specific interest groups.¹⁸⁷ The everyday volume of the developers (SLDev) and scripters lists is experienced as being too high for some of the Linden interviewees to sift through. As a consequence, these emails are filtered into a particular folder for later reading or for deletion. Figure 7-4 shows the key contributors to the developers and scripters mailing lists.¹⁸⁸ Several Lindens who are interested in open source and other technical topics are quite active on the SLDev list (mostly in the periphery). Both Lindens and users can be seen as information seekers and suppliers contributing to rather specialist discussions. In the context of those technical discussions, Lindens also organize in-world open source meetings and hold office hours (ranging from Q&A to round-robin format) which aim to extend these conversations and bounce off (new) ideas to learn and sooth particular objections that users may have. According to the Linden interviewees, however, users do not tend to have burning questions; instead they like to hang out and ask curious questions.

Figure 7-4

Mailing lists: SLDev^a and secondlifescrpters^b



^a See <http://manyeyes.alphaworks.ibm.com/manyeyes/visualizations/sldev> for live visualization and counts.

^b See <http://manyeyes.alphaworks.ibm.com/manyeyes/visualizations/slscripters> for live visualization and counts.

¹⁸⁷ See <https://lists.secondlife.com/cgi-in/mailman/listinfo> (accessed 28/06/08).

¹⁸⁸ The *SLDev mailing list* reported 410 subscribers contributing around 6,000 posts between January 2007 and February 2008. The *secondlifescrpters mailing list* counted 370 users that accounted for approximately 3,000 posts between October 2005 and February 2008.

As I have explained earlier, *JIRA* is used as a tool to help organizing tasks internally. There is also a public version that is used to collect and organize user input (and which is connected to the internal JIRA). Lindens regularly interact with users by posting comments and posing questions regarding all kinds of issues. More specifically, it is the main method that Lindens use to quickly root out issues entered by users such as bugs and feature requests, and to determine how these should be actioned, such as what Lindens should be informed, whether users should be notified, and an estimated timeframe for a resolution. Yet, some critical voices complain about JIRA's user friendliness and the slow pace of assigning and/or resolving issues:

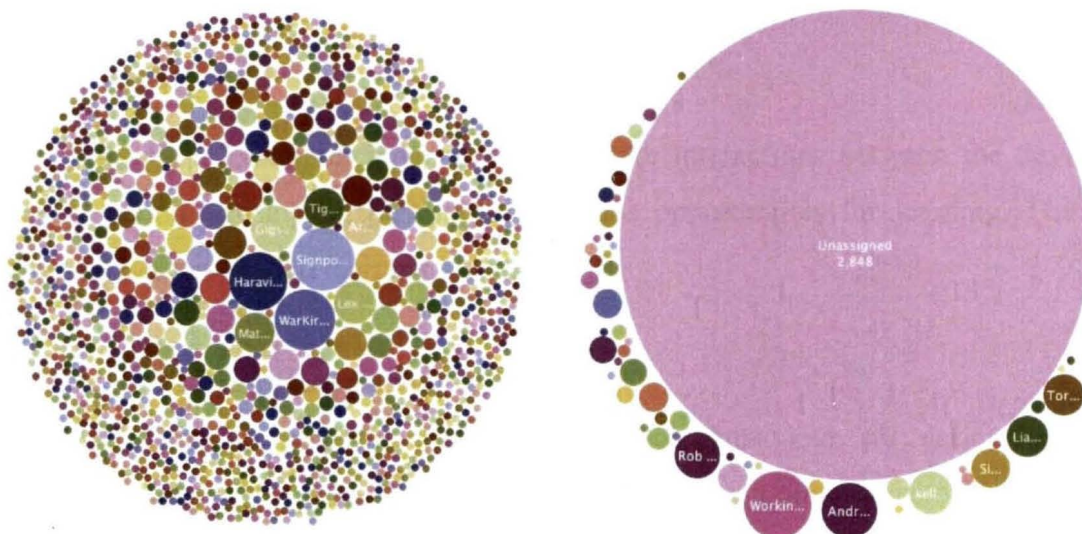
The thing is, people think we don't listen, but some stuff just takes time. [...] But there's really no percentage in us saying we're working on it. We have tons of people actually working on it. [...] It's an insanely complicated problem, and we have to make sure we make it better, not worse. [...] The frustrating part is that there's no useful way to express that to the residents. People want their problems fixed, and they want it now. I understand that. We all do.

(Q, 9/11/07, p. 7-8)

The analysis of the public JIRA showed that 1,516 users and 51 Lindens entered 3,227 issues between January 2007 and February 2008. Most entries have remained unassigned (regardless of the number of votes an entry may have received). Although most assignees are Lindens, there were six mod developers that were assigned nine reports.

Figure 7-5

JIRA reporters and assignees



^a See <http://manyeyes.alphaworks.ibm.com/manyeyes/visualizations/jira> for live visualization and counts.

Weekly *triage meetings* further the prioritization of outstanding issues. These meetings are open to all users yet tend to be (virtually) attended by about 15 to 20 more advanced mod developers and usually not more than a handful Lindens. The agenda can be set by Lindens and/or users to discuss (recent) issues, such as Release Candidate bugs, that get prioritized during these collective meetings for integration in Linden Lab's internal JIRA. Criteria include the overall impact on general usage, number of JIRA votes, and the quality of (user-)provided documented information. The motivation for users to participate in triage meetings was aptly summarized by Warkirby, "to learn, to shape the future of SL, and to make things better in general" (03/12/07, p. 4).

Not all firm-user learning opportunities happen online. Linden Lab also runs the *SLViews program* which invites users to the San Francisco office where they spend a few days discussing specific topics such as griefing prevention, new scripting features, Windlight, and several policy changes. There are usually 10 to 16 participants (including a teenager) that may come from all over the world. Under a non-disclosure agreement participants tend to be presented with unannounced plans to which they can voice their opinions. For example, one group consisted of client-hackers and super-scripters who spent an afternoon with the firm's former CTO and open source director discussing open sourcing. One participant recalls:

The one I was invited to was very techie heavy, the new physics engine, graphics, etc. [...] The SLViews thing was to some extent about figuring out priorities for what LL should work on. Currently they're just trying to get [Havok4] up and running but there are ideas for what to do next once it is running. So its good to ask residents about what technology is being used for what things people would really like to be able to do and so on. These are issues that many Lindens don't really have first hand experience with because they're developing the platform rather than using it.

(Seifert, 6/12/07, p. 4-5)

All these communicative means facilitate interactions between the developer firm and mod developers, highlighting various opportunities for learning. The next section describes several learning examples.

7.4.3.2 *Illustrations of learning opportunities*

Participation patterns and communication behaviour, to various degrees, organize people to *share knowledge* and *expertise* creating opportunities for learning to

take place.¹⁸⁹ Dan, a participant in OpenSim, describes what he has learned:

[..] I'll explain something about physics, they'll explain something about network protocols that I didn't know that I need to know. [...] I'm learning C Sharp, which I never wrote in before [...]. And I actually have learned things about the technology I wouldn't know if I hadn't worked on it, just how complicated some of these issues are, the networking issues, the physics issues. You know, I have a really good vision now for what's the scope of a project like this. Why it's difficult. Why [...] it doesn't get written in a couple months by a kid on the weekends, right? And that helps me think a little bit about sort of the business side of it.

(Dan, 26/11/07, p. 40-41)

Users come up with ideas, suggestions, and solutions that are often need-related. An illustration are LSL workarounds, for example, there are quirks associated with functions used to interact with Second Life such as moving a prim from one location to another. A particular script (llSetPos) is needed, but it only allows movement within 10 meters which is inconvenient for larger distances because the function needs to be repeatedly used. Therefore, some scripters came up with workarounds that were the result of trial and error and discussions with peers using, especially, the scripters mailing list and forums. In particular, interviewee Strife is well-known among scripters and Lindens for his developmental and writing contributions to the LSL portal. He won the 2007 Linden Lab innovation award for Best Community Organizer.¹⁹⁰

I think my opinions are received well. I have influence as long as I don't overuse it. My moderationship gives me some sway but I have the most swing in the LSL community. I've designed the spec for several LSL functions. I defined how all string and list functions should handle negative indexes (except for llInsertString). I wrote the test cases for llEscapeURL and llUnescapeURL (not that I'm happy with the implementation of those two functions).

(Strife, 3/12/07, p. 13)

In turn, Linden Lab may learn from such solution-based workarounds. Not only in terms of the actual solution, but such contributions also inform the firm about what really frustrates users about scripting, what can be improved and possible means supporting this improvement.

Occasionally, micro, meso, and macro mods may transgress the conditions set by the developer firm. Hence, a process of *negotiating design norms* may be initiated. For example, the 'libsecondlife' project discovered an exploit¹⁹¹ in Second Life where the

¹⁸⁹ Learning may resonate with explicit aspects such as giving tips to fix problems to more implicit aspects such as learning to become more outgoing.

¹⁹⁰ See <http://blog.secondlife.com/2007/08/25/innovation-award-winners-announced/> (accessed 29/06/08).

¹⁹¹ An *exploit* refers to an unintended software bug that users can use to their own advantage.

object size was set to 10 meters on the client-side yet the server refrained from checking the size of the object with the client. As a result, big prims (or, ‘megaprims’) were generated that could be used for, among other things, construction, decoration, and griefing purposes. Linden Lab fixed this but there were already many megaprims used (and copied) in-world. As these are quite hard to remove without breaking content, they can still be found in-world but are unsupported by Linden Lab (on a side note: several Lindens have used megaprims to build their office on the mainland!). Now, with the implementation of the new physics engine Havok4 megaprims started causing some troubles for, in particular, optimizing physics simulations in-world. As a result, Linden Lab consulted with the user base via SLViews, the blog, and forums to discuss the future (or workarounds) of megaprims. In over 700 messages users offered their opinions about wanting to keep or get rid of megaprims and engaged in discussions, sharing solutions on how to effectively deal with existing nuisances.¹⁹² Also, Andrew, who was responsible for the implementation of Havok4, discussed megaprims during several of his office hours so as to “learn from the residents” (7/11/07, p. 15). Although there was no official resolution in place at the time of writing, there is a “megaprim liberation” plan that continues to allow megaprims in-world, albeit, adhering to certain rules.¹⁹³

Lindens have also shown an interest in open source initiatives on the macro level design space (see Section 6.3.3.1). One of the interviewees who contributes his scripting expertise to OpenSim was approached by Linden Lab to make sure their scripting was in tune.

We spoke 3, 4 months ago or something briefly about the direction that I’m heading in with my script engine, and they had not released anything then. Now they released a few weeks ago a better test version of their new scripting engine, and he contacted me again so that we could get our scripts to be compatible.

(Tedd, 12/02/08, p. 18)

Although the Second Life server is not formally open sourced, Linden Lab has developed a strong interest in such third party initiatives to see what it can learn, especially in the case that open sourcing is not a guaranteed success (like Netscape was

¹⁹² See <http://forums.secondlife.com/showthread.php?t=216541&page=1&pp=15> (accessed 3/07/08).

¹⁹³ See <http://vteamblog.com/2007/12/21/havok-4-mentor-q-a-session-with-andrew-linden/> (accessed 29/06/08).

not).¹⁹⁴ Moreover, the Linden interviewees regarded learning about what users are working on as a means to assist Linden Lab to strategize and prioritize work internally. In the case of open sourcing the Second Life Viewer, Linden Lab hoped to prevent mod developers from working on conflicting standards and, more importantly, to have them support platform development by outsourcing part of the work to users. In particular, open source guides users to develop many (low-level) features, at least temporarily, allowing Linden Lab to mainly concentrate on scalability issues and the like (see Section 6.3.3).

There seems to be a strong awareness at Linden Lab that a lot can be learned from various Second Life users that use different channels. Many of the active mod developers are well-known to the firm and are credited for their contributions. Yet, the downside seems to be Linden Lab's lack of human resources to react and respond to the information it receives from user innovations:

At the moment the SL client is open source and a bunch of non-linden-lab developers are playing with it, fixing bugs. Unfortunately we haven't been able to throw enough internal resources at processing the incoming patches. There are a few Linden Lab developers who do try to import the suggested patches, but I think we're understaffed in that area. As a result, the SLDev members have trouble getting big projects done on the codebase. I think we could keep 2 or 3 developers busy full time just helping the SLDev people help us.

(Andrew, 7/11/07, p. 16-17)

In this view, Linden Lab functions as a bottleneck, while Lindens can be said to be 'working in a fishbowl'. The functionalities of the design space and more general tools such as the former Feature Voting Tool that was replaced by JIRA and open source initiatives suggest Linden Lab's intentions to be open and transparent, yet, simultaneously, seems to make clear the issue of Linden Lab's (in)ability to learn from its users in contrast to the user's ability to teach Linden Lab. As a result, by lacking the human resources to follow up on its good intentions, some bad feelings were engendered within the Second Life community. In other words, expectations between Linden Lab and the user base did not always seem to converge. Both the developer firm and mod developers needed to give and take so as to build a robust and functional 3D product, making Second Life a case that illustrates 'learning while doing' across firm boundaries.

¹⁹⁴ Failure may be related to aspects of information quality such as documentation about what and how changes can be made, ways of moving patches from the open source to the standard version, etc.

There have been a couple of cases when I've needed to know exactly what is going on in the background code. Now that the client is open source I can check it out myself [...]. Generally though, if it's something pretty obscure, a given Linden isn't likely to know that much more about it than the content creator residents.

(Seifert, 6/12/07, p. 8)

I don't exactly feel like there are people in charge at Linden Lab. It's more like there's sort of a cacophony of ideas, and a general direction. [...] So you can often find someone at Linden Labs, I mean, I talked to somebody at Linden Labs about physics, and it was just like, you know, it was like talking to somebody at my own company. It's like, "Yeah, you know, this was hard. Yeah, it's pretty difficult."

(Dan, 26/11/07, p. 32)

Linden Lab, therefore, may have promised more learning from the Second Life community than it could actually assimilate.

7.5 Conclusion

This chapter has focused on user participation on the firm-hosted platform by highlighting aspects of learning (within and) across firm boundaries. In this view, Second Life not only functions as product and outcome of mod development but also as a site at which the developer firm can be seen to learn underpinned by interdependent dynamics of the organization of people, knowledge, and resources across firm boundaries. The analysis has indicated that Linden Lab is not a developer firm that seeks to live in an ivory tower which can be evidenced in the firm's strong awareness of its dependency on the user base as consumers and as mod developers.

Linden Lab has recognized the pivotal role of user input and has sought ways to harvest the full potential of user-based resources by putting various mechanisms in place that inform and organize knowledge contributions associated with mod development on the firm-hosted platform. First, the analysis based on survey findings drew out several general aspects of knowledge contributions made by Second Life users. Several key factors were identified that assisted in approaching mod development as a learning dynamic, respectively, meta, scripting, in-world orientation, building & texturing, organizational character, features (& tools), other-directedness, and perceived innovative character. The empirical analysis of information and communication patterns showed that the blog, forums, and in-world messaging were the most frequently used means to retrieve information. The mailing lists scored moderately, while open source-

related knowledge contributions did not play a main role.

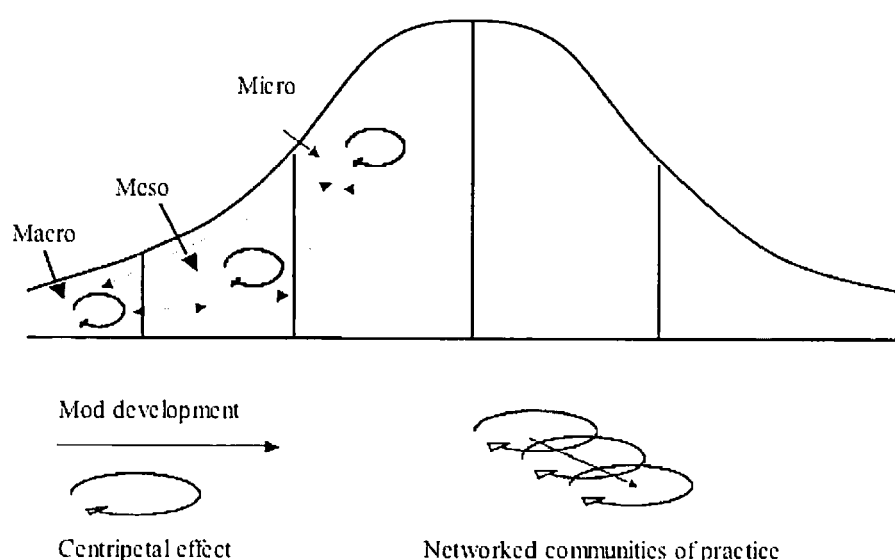
How do these results relate to the earlier findings concerning the design capabilities and design space presented in Chapters 5 and 6? The findings presented in Section 7.3 can be connected with the six Second Life membership types. Power rezzers and functionalists indicated an interest in engaging in open source practices. Their communication behaviour showed that power rezzers maintain a strong involvement in retrieving and supplying information to the various channels, while functionalists expressed an active engagement in mainly information retrieval. Based on their mod development interaction patterns these two memberships are capable of developing *iterated innovations* on the meso level and, possibly, *contextual innovation* on the macro levels of mod development. The pro, facilitator, and experience broker memberships engage in *performative innovation*, while the newb operates in the margins of the micro level design space. And, whereas the newb hardly connects to the community, the other clusters do engage in various communicative activities. The pro is a frequent user of in-world messaging and, to a lesser extent, forums, while the experience broker has some interest in information retrieval of in-world group messages, the blog and forums. The facilitator strongly invests in retrieving rather than supplying information on the blog, forums, and in-world messages.

In the context of these findings, several documents were more closely examined with the aim of highlighting interactions between the developer firm and users underlying opportunities for learning relationships to form. The findings indicated that knowledge contributions tended to be made via the blog, forums, JIRA, mailing lists, and SLViews. There is, therefore, no single representative communication venue and, more importantly, each seems to attract its own particular subset of the Second Life community. This seems to be consistent with the results presented in Chapters 5 and 6, where different Second Life memberships were shown to operate on the micro, meso, and macro levels of mod development. Some users may operate on more or all three levels, however, based on the findings presented in the previous chapters, it seems that users tend to work within a particular setting of the NCoP; each with their own levels of mastery and leadership. More importantly, meso and macro mod development appears to be connected to the SLDev and scripters mailing lists and JIRA, while micro mod development seems to be mainly associated with the forums.

As a consequence of the ‘cutting up’ of communication means and high volume,

the theoretical perspective guided by H3 appears to suggest a weakening of learning opportunities and therefore, H3 can be disconfirmed. Moreover, the findings also extend the findings relating particularly to H1 (see Section 5.5) by indicating that mod development in Second Life is constituted by multiple centres of activity. Figure 7-6 presents the learning dynamic associated with user participation in Second Life.

Figure 7-6
Mod development on the firm-hosted platform



This schematic of the architecture of user participation on the firm-hosted platform shows that most users operate on the micro level design space, while the smallest group consists of the most advanced mod developers. Based on this study's analysis focusing on mod development as a learning dynamic, users seem to master and work around their particular interest of mod development creating a *centripetal effect*. This seems to complicate the way sustainable relationships are formed and maintained between Linden Lab and mod developers on the Second Life platform that underlie complex learning practices across (firm) boundaries. Furthermore, Linden Lab's system of distributed learning between mod developers and the developer firm has tended to generate many knowledge contributions that the firm seems incapable of effectively dealing with and, subsequently, risks becoming *knowledge that is derivative*. This refers particularly to Linden Lab that uses and reuses various information sources such as the internal and external JIRA and triage meetings for bug fixes which may result in a

decrease in the quality of information and effectiveness of user contributions. More specifically, the findings also suggested that there seems to be a point at which too many learning opportunities for Linden Lab may result in a 'bottleneck' which may result in stagnating development and user dissatisfaction and, arguably, increasingly motivate users to 'do it themselves' (see '*participation tipping point*' in Section 5.5).

These problems do not necessarily stem from Linden Lab's practices. Rather they may be derived from users' preferences and practices that as a collective may work to damage Linden Lab's goals concerning distributed product development and entrepreneurship. This *inverted U-shape of mod development* draws attention to the blind spots that are related to the dynamics of commercial and non-commercial production modalities underpinned by a professionalization of mod development, further suggesting that H3 cannot be confirmed. *By providing a firm-hosted product space and tools (that are less than intuitive) to practice mod development, firm learning depends on its organization of user participation which, arguably, contributes to designating mod development as an evolutionary rather than a revolutionary process.* It is unclear, however, what the trade-off will be between business models and firm learning when mod development is fully put in the hands of the user base.

Chapter 8 Mod development on the firm-hosted 3D platform

Divine idylle

- Vanessa Paradis¹⁹⁵

8.1 Introduction

This chapter presents the analytical results of this study. It considers the empirical findings in the light of the conceptual framework and discusses the theoretical implications of this investigation. User participation on the firm-hosted Second Life platform provided the empirical focus for this research. The lines of analytical investigation involving user participation in mod development practices presented in Chapters 5, 6, and 7 contribute to an understanding of a redefinition of a particular configuration of overlapping production modalities of the developer firm and users. Several terms such as ‘modification effect market’ are developed to identify this type of firm-user relationship in the context of the 3D software industry.

The structure of this chapter is as follows. In Section 8.2 the principal research findings are recapitulated and discussed in terms of the theoretical implications, with particular attention to the user participation literature which was the main theoretical framework used in this study. Section 8.3 concludes the chapter by reviewing the key empirical findings and theoretical contributions presented in this research.

¹⁹⁵ Vanessa Paradis, Divine Idylle, *Divinidylle* (Barclay, 2007).

8.2 User participation revisited

This study has been informed by the overarching theoretical interest in user participation in Web-based 3D development practices in the commercial setting of the 3D software industry with the aim to highlight the ways the developer firm arranges a sharing of the product workspace with its user base, underpinning product development across firm boundaries. To date, however, the user participation literature in the media research field has tended to focus on the firm-hosted platform as a site of participatory culture. It has pointed to seemingly transcending boundaries between development and usage associated with production and consumption practices, without fully explaining the mechanisms of and implications for firms that have sought to strategize user participation on the Internet. In particular, this literature has tended to give insufficient attention to the apparent link between user participation and technological advancement, overestimating the creative capacities of users and underestimating technological capabilities. It has focussed on the qualities and roles of users-as-participants and the firm-as-platform/service-provider underpinning the development and maintenance of this particular configuration between the developer firm and users (see Chapter 3). In this context, this research was informed by insights developing in the communities of practice tradition and user-centred innovation literature. The aim was to investigate the roles of knowledge and toolkits associated with the growing significance of user participation in the emerging knowledge-based economy.

In the next sections, the principal theoretical implications of the analysis presented in Chapters 5, 6, and 7 are discussed.

8.2.1 *Qualities of user participation*

Little attention has been given in the user participation literature to the qualities involved in different participatory modalities. Frequently, the differences between the more active and passive users have been assumed away, while the adoption of various technical and social designs in the context of the Internet seems to ‘magically’ lead to a critical mass of participation (Burgess, 2007; Li and Bernoff, 2008; Tapscott and Williams, 2006). In particular, this literature seems to be limited in addressing the qualities of user participation in terms of user characteristics and motivations in the context of commerce. The user-centred innovation perspective, however, has

contributed insights into these aspects, particularly drawing upon the notion of lead usership (von Hippel, 1986, 2005; cf. Morrison, Roberts, and Midgley, 2004). However, this line of investigation is somewhat limiting when the aim is to offer a rounded, more nuanced, and realistic understanding of user participation in the light of the different creative capacities of users and variations in their contributions to product development on a Web-based firm-hosted 3D platform (see Chapter 3). An important reason for investigating Second Life members, therefore, was to build upon these existing studies that have provided parts of the user participation puzzle but have yet to offer a robust framework to empirically examine user participation and creativity in this particular context.

In order to understand the kind of users who join and participate in Second Life particular attention was given to the examination of users. My analysis showed that user participation in digital development practices seem to be motivated by social interactions, creativity, and the innovation potential rather than the monetary aspect, supporting existing studies which have suggested that users tend to participate in basic to advanced mod development practices when individual use benefits exceed their perceived costs (Behr, 2007; von Hippel, 2005). Furthermore, based on the analysis of participation patterns, communication behaviour, and several additional characteristics, six membership profiles were developed, respectively, power rezzer, facilitator, twink, pro, experience broker, and newb (see Section 5.3.2). These membership profiles indicate gradations of user participation in mod development activities, highlighting differences in creative capacities and the contributions users make to product development guided by the firm-provided design platform. Rather than understanding this solution normatively, *this outcome contributes a multimodal perspective on user participation, offering a richer and systematic understanding of the various elements that underpin participation qualities in the context of the firm* than previous user participation studies, and, to a lesser extent, the user-centred innovation literature, have accounted for.¹⁹⁶

Previous research has suggested that particular technical organizations, often associated with toolkits, can enable user participation in product development by motivating users to learn, produce, and share minor to advanced contributions that can

¹⁹⁶ In order to fully relate and interpret this study's findings in the context of the lead user construct more research is desirable, particularly, in terms of the variables used in this study compared to von Hippel's (see Section 3.4).

be cheaper, quicker, more efficient, and of a higher volume compared to less user-friendly conditions (Franke and Piller, 2004; Jeppesen, 2005; Thomke and von Hippel, 2002; von Hippel, 2005). Therefore, this study further considered user participation in terms of the particular design and use of the 3D platform in relation to its enabling and facilitating of the development, coordination, and integration of product development across firm boundaries.

The analysis examined the ways the firm systematically seeks to outsource certain tasks to users by investigating particular functionalities of the design space underpinned by toolkits so as to provide a range of capabilities for different users. On the first-order of user participation, or micro level, the built-in toolkit was found to allow users to generate builds, scripts, and textures. This yielded the term *performative innovation*. Meso mod development entailed client-side (interface) modifications which are referred to as *iterated innovation*. Several external development initiatives provided *contextual innovation* by modding the server-side of the macro level design space. In terms of the relative size of these three domains, micro mod development encompasses the majority of mod developers and the smallest group of mod developers contributes the contextual innovations (see Section 6.5). In addition, from the findings it appears that the relative size of each area of mod development is not necessarily in line with the size of the contributions or their importance to the firm. So, for example, only a small group of individuals may be capable of and interested in contributing to open sourcing Second Life which may have a large impact on certain features potentially influencing the entire community. This seems to confirm certain claims made in the context of user participation on the Internet (Burgess, 2007; Horowitz, 2006; Jenkins, 2006; Nielsen, 2006; Li and Bernoff, 2008; van Dijck and Nieborg, forthcoming).

In this view, product development across firm boundaries, bound by several production modalities underpinned by a synthesis of user participation and user creativity, has drawn attention to the development and organization of the firm-hosted 3D platform in terms of 'modularity' and 'generativity' (see Section 3.4.1). Both concepts are related to a sharing of the task of production, particularly, between the developer firm and its user base. The analysis demonstrated that the design space is purposefully modular and generative in its design, allowing users with different skills and interests to participate in product development activities. Yet, the possibilities for user participation in product development are not infinite (cf. Langlois and Garzarelli,

2006; Zittrain, 2008). This study highlighted certain drawbacks, or limitations, of user participation on the firm-hosted 3D platform in terms of technical, artificial and legal norms that guide the ways mods may be produced, transferred, integrated, used, and compensated on the platform and across product boundaries underpinned by a mixture of proprietary, free, and open source software (see Section 6.4).

In the investigation of the qualities of user participation in the commercial setting of the firm, this study has contributed *a more coherent understanding of user participation encapsulating status, architecture, organization of creative capacities and contributions to product development by linking the design capabilities to the design space*, rather than focusing on different aspects of participatory mechanisms (Benkler, 2006; Jenkins, 2006; Tapscott and Williams, 2006; von Hippel, 2005). Moreover, this study has yielded the term '*contingently generative*' to contribute to understanding of user participation on the firm-hosted platform as *a constellation of open and closed systems* that affect the development and organization of product development across firm boundaries.

8.2.2 *User participation in the context of commerce*

Whereas research has focused on user participation on the Internet evidenced in grass roots communities (in many cases, understood as alternative or countercultures operating in the margins of commerce; cf. Benkler, 2006; Jenkins, 1992, 2006) and brand communities (in many cases understood as not-for-profit-oriented social networks operating in commerce; cf. Tapscott and Williams, 2006), user participation has tended to be understood as an expression of a DIY culture that can provide mutual benefits for firms and users (cf. Bruns, 2007; von Hippel, 2005). In this regard, several concepts outlined in Chapter 3 such as 'produsage' (Bruns, 2007) and 'wikinomics' (Tapscott and Williams, 2006) have tended to emphasize a merging of firm/business interests, technological platforms, and users. In other words, taking into consideration the fact that some streams of thought have conceptualized user participation in terms of creative (or, cultural) emancipation while others have examined user participation in a business setting by focusing on profitability, user participation itself has tended to be associated with the notion of 'free', associated with social modalities such as collaboration and sharing. Thus, in many cases, users have invested skills, knowledge, and time in digital development practices associated with a 'participatory turn' (see Chapter 1) such as

self-produced short films, game cheat tutorials, page templates, and fan fiction, without a particularly strong financial impetus.¹⁹⁷ Against the backdrop of ever cheaper, faster, and user-friendlier digital technologies this kind of Web-based user creativity has become more prevalent and businesses seem to have caught on.

This so-called Web 2.0 model draws attention to the relationship between user participation and capitalism (van Dijck and Nieborg, forthcoming; Turner, 2006). In other words, users in the commercial setting of the firm, to some extent, increasingly seem to have the capability to produce digital content, aggregate services, act as intermediaries, and offer innovative consumption channels all together, customised to individual need and/or liking, highlighting a particular industrial logic on the Internet. This research was designed to yield insight into the various positions and interests of several players involved in a Web 2.0 business model by dismantling the development and organization of firm-user interactions across the firm boundaries of a particular 3D software platform. Within this context the findings draw attention to the underlying premise of Web 2.0 business and production models that seems to be at odds with some conceptions of 'homo economicus'.

In the dominant discourse of economic behaviour, firm and market dynamics are often explained in terms of transaction costs. This perspective suggests that under particular circumstances people use a market when the benefits minus transaction costs exceed those managed within the organisational environment. In other words, transaction costs are associated with predicting – to the extent that decisions can be quantified - when particular economic tasks will be executed by the firm or the market, that is, the issue of 'make or buy' (Williamson and Winter, 1993). However, the organization of production in many Internet communities, such as open source and fan communities, does not seem to depend on markets or managerial hierarchies and there is no direct or future monetary return.

In this view, the literature review presented in Chapter 3 has drawn attention to seminal works developed by Henry Jenkins and Yochai Benkler. In particular, Jenkins (2006) has pointed to a reconfiguration associated with user participation underlying business operations in the media industries which he conceptualizes using the notions of 'participatory culture' and 'convergence culture' to refer to an intermediate zone of top-

¹⁹⁷ See Section 5.2.2 for an overview of user motivations underlying user participation such as personal satisfaction.

down and grassroots activities, and the unpredictable influences of media power and consumer power. Benkler (2006) provided a conceptual framework that understands user participation in the light of the ‘networked information economy’ underpinning the idea that the Internet enables and facilitates increased opportunities for user participation which generates a better likelihood of enhancing information quality and diversity in the information environment associated with freedom and autonomy. In his view, the networked information economy works to enhance the efficacy of non-market production suggesting an alternative model to organize ‘commons-based peer production’. This term refers to a framework of collaboration where “inputs and outputs are shared, freely or conditionally, in an institutional form that leaves them equally available for” everyone to use as they wish outside the proprietary commercial system (Benkler, 2006: 62).

Thus, whereas Jenkins seems to acknowledge and hail user participation in the context of commerce, Benkler understands user participation outside a commercial framework – as an alternative to firm and market-based models – by depicting user creativity as a mode of (peer) production that is based on a kind of individual action characterized by self-selection and decentralization, facilitating social sharing and exchange which are argued to underlie the networked information economy. In both streams of thought user participation has been understood in terms of productive behaviour that, to various degrees, is connected to social modalities such as collaboration and sharing which have tended to be associated with the notion of free resources or services, at least as far as users (or, consumers) are concerned.

How do these perspectives on user participation relate to the phenomenon of mod development on the firm-hosted platform investigated in this study? The organization of production across firm boundaries was scrutinized by examining work arrangements as a means to untangle user participation associated with ‘free’ in the context of economic production with the developer firm. This has led to various studies focusing on the very act of contribution by approaching user participation in terms of labour and play (see Section 3.2.3). Within the domain of games/3D environments the term ‘play’ has commonly been regarded as separable from everyday life, as something safe, fun, and special (or ‘magical’) (cf. Kerr, 2006; Taylor, 2006b). Yet, with the increasing focus on user participation as production in the firm-hosted setting, research has tended to dub user creativity associated with ‘free’, as unwaged or ‘free labour’ (cf.

alternative mode of production involving social sharing and information exchange, Benkler, 2006). This serves as a means to draw attention to the implications of production forces that seem to move away from the 'factory to society', stressing that firms increasingly depend on those voluntary user activities (Terranova, 2000). This 'precarious playbour' of, in particular, mod development has often been perceived as a leisure activity (Kücklich, 2005). Such an amateur or hobbyist status has tended to situate user creativity practices outside the professional domain and commerce (cf. Postigo, 2003; Sotamaa, 2007).

Yet, the findings presented in this study have shown that user participation on the firm-hosted platform seems to be grounded on the principles of productive behaviour and sociality demonstrating a complex interdependent dynamic encompassing both commercial and non-commercial interests between the developer firm and the user base. *The firm-hosted 3D platform as a site of participatory culture can be viewed as (non-) transaction locales that blend social and economic elements of production associated with product development across firm boundaries.* More specifically, Linden Lab's internal organization was characterized as a distributed design and distributed decision-making culture which was associated with a rather high degree of openness, transparency, and entrepreneurship (see Section 5.4.1). Achieving employment at Linden Lab therefore gave rise to a particular combination of requirements that, to a certain extent, often can be seen in the user developer community. An important reason for this was that Second Life, in encompassing multiple roles such as the workspace and toolkit, served both the developer firm and mod community, suggesting that a certain amount of know-how, know-what, and passion were present.

In this view, the findings of this study have demonstrated that user participation on the firm-hosted platform can be characterized by *digital entrepreneurship*. Not only in terms of development and organization of product development across firm boundaries pointing to an increased professionalization of user participation, but also in terms of developers who may be interested in monetizing their contributions (a 'participation tipping point'). Taken together, this points to multiple centres of activity, compensation, and competition occurring on the firm-hosted platform. Therefore, I suggest that understanding user participation in mod development practices in terms of labour and play does not do justice to the complexity of the reciprocal dynamics among

contributing developers.

Rather, by relating the constructs of design capabilities to the design space and to learning, this study shows that user participation is evoked in a context of a networked organization of players, technologies, and knowledge instantiated by particular modes of (overlapping) cultural, social, technological, and economic production. As a result, not only corporate structures, but a multiplicity of non-transaction locales, has been shown to underlie the business operations of the developer firm. These organize, motivate, and inform product development across firm boundaries. This may render an industrial outlook on a reconfigured logic between the developer firm and users somewhat limiting. Based on the findings, this study proposes to appraise user participation in mod development practices on the firm-hosted 3D platform in the context of the ‘social network market’, a term which was introduced in Section 3.2.2 (Hartley, 2008; Potts, Cunningham, Hartley, and Ormerod, 2008).

The concept of ‘social network market’ combines non-market dynamics associated with social networks with commerce (or, market). However, this concept seems to emphasize the aspect of sociality rather than that of (commercial and non-commercial) production. More specifically, notwithstanding that aspects of sociability, innovation and creativity were found to be important drivers for users to join Second Life (see Section 5.3.1), the findings consistently point to the Second Life product, depending on user participation in mod development practices, as being in the ‘production business’ of software and resources as services across firm boundaries associated with the ‘growth of knowledge’. User participation on the firm-hosted platform can therefore be identified as a specific segment of the social network market in the context of the 3D software industry or, in other words, as a *modification effect market* emphasizing that any contributions made tend to have an impact to various degrees on other users of the Second Life product across firm boundaries.

8.2.3 *Benefits of user participation*

In the investigation of user participation on the online firm-hosted platform the user participation literature has given relatively little attention to the role of the developer firm which can be said to move away from content production to providing platforms/services for user participation. Moreover, users as participants have been shown to shape and maintain a firm-hosted platform underpinning product development

efforts from which the developer firm is expected to benefit. Following a knowledge-based view of the firm, users are conceived of as external resources of knowledge and skills providing the firm with certain inputs from which it may benefit (Brown and Duguid, 2000; Foray, 2004; Nonaka, 1991; Wenger, 1998).

In this view, informational inputs can come from within and outside the boundaries of the developer firm. These knowledge contributions may provide the firm with inputs which may advance and fine-tune opportunities for (mod) development and benefit the product, and hence, draw attention to learning relationships developing across firm boundaries. Insights from communities of practice theory have complemented the main conceptual framework to investigate such learning relationships via apprenticeship mechanisms in communities (see Section 3.3.1). Lave and Wenger's (1991) seminal work on learning models describes a process of 'legitimate peripheral participation' indicating an insider-outsider, or master-apprentice learning dynamic. In other words, this learning model developed an understanding of ways of enculturating newcomers to a community, whereby the relationship between long-standing members and new members yields insight into the processes involved through which newcomers can learn from the older members. In this view, an apprentice tends to participate in some kind of peripheral practice from which, upon increased mastership, s/he can move on to become an established and fully participating member.

In order to yield insight into learning relationships occurring between the developer firm and users, this study examined user participation in relation to the learning opportunities developing between the developer firm and users underlying product development (Allen, 1977; Brown and Duguid, 2001; Foray, 2004; Frederiksen, 2006; Nonaka, 1991). In this study, learning is investigated in the context of apprenticeship mechanisms, where learning, rather than being purely transfer-based, is understood as a social process shaped and maintained within networked communities of practice. Users as external resources can be seen to form an essential part of a 'constellation of NCoP' surrounding mod development on the Second Life platform, highlighting different dynamics and interdependencies occurring among contributing developers (see Section 3.3.1; cf. Brown and Duguid, 2001; Wenger, 1998).

By linking knowledge contribution practices to design capabilities and the design space, interesting insights were developed concerning the relationship between firm-user interactions and learning opportunities and learning modalities (see Section

7.4.3). The analysis considered learning in the light of within-firm and mod developer enculturation practices. The findings highlighted the roles of mentorship, the studio system, and the mastery of various communication systems as important ways to embed newcomers in Linden Lab's internal labour process and also assist employees in career advancement opportunities (see Section 7.4.1).

The analysis of several firm-hosted communication tools and methods indicated that user participation in the commercial setting of the firm seems to underpin *multiple learning opportunities* between the developer firm and user base. Furthermore, the empirical evidence of the various knowledge loci analysed for this study - particularly, the blog, forums, mailing list, and JIRA - points to differences in the appropriation of knowledge loci in micro, meso, and macro development domains, indicating a *centripetal learning effect* rather than a more linear effect as in the model developed in LPP learning theory (cf. the role of peripherality in F/OS communities in Berdou, 2007; see Section 3.3.1). These findings suggest that *learning opportunities across firm boundaries can occur in all three domains of user participation* yet each potential learning dynamic between the developer firm and user base seems to remain within that particular locus for participation (see Section 7.5). Subsequently, although the findings did not produce a sufficiently robust insight into the aspects of mod development as a learning dynamic underlying product development, they do suggest that opportunities for crossover learning across micro, meso, and macro mod development domains, or 'cross-pollination' relationships, seem to be bound by certain thresholds such as the skill set that may impact on how firm-user, in general, and user-user, learning relationships, in particular, will occur.

Based on the discussions above of the principal theoretical implications in the context of the user participation literature, this research contributes an understanding of the firm-hosted 3D platform as a site of participatory culture by the following indicative themes - ranked in order of robustness - that underpin user participation as a significant aspect of the knowledge-based economy associated with the creative industries (see Chapter 3).

Differences in user experience levels are strongly connected to the user's (shared) participation in the development of the firm-hosted platform, i.e. user participation can be characterized by multimodality.

- By combining user participation patterns, communication behaviour, and general user characteristics this research has provided a systematic and empirically grounded investigation of the ways users may participate, the types of contributions they may make, and what kinds and how frequently interactions may occur on the firm-hosted platform.
- By including a broader range of membership profiles in my analysis, the empirical findings demonstrate a more nuanced and complete understanding of typologies of virtual community memberships by connecting different users to a diverse range of experience levels fulfilling distinct roles in sets of relationships forming between the developer firm and users, involving the modification culture underlying product development on the firm-hosted platform. This view complements the user participation literature associated with games/3D environment research, and to a lesser extent, user-centred innovation studies.

Micro, meso, and macro level mod development is a constellation of centralized and distributed, commercial and non-commercial practices, i.e. user participation can be characterized as contingently generative.

- The organization of product development across firm boundaries in terms of the functionalities of the firm-hosted design space highlights a delicate balance of user participation on the firm-hosted platform. A kind of a 'user participation loophole' seems to exist that points to a constellation of various degrees of open and closed systems that make up and underlie the operations of the firm-hosted platform that may impact on mod development practices, in general, and entrepreneurial endeavours, in particular (such as in terms of transferability and compensation).
- Consequently, this study tends to condition the claims suggested in previous studies that seem to give Web-based user participation the benefit of the doubt in terms of openness, empowerment, and subversiveness. Rather this study has systematically shown that a commercial approach to user participation in firm-hosted development practices is open, yet also has a closed meaning. By this I

mean that the developer firm incites user participation but, by controlling parts of the design, implicitly encapsulates mod development as proprietary extensions of the firm-hosted product that may be particularly beneficial for the firm. As a result, a constellation, that is simultaneously centralized and dispersed, commercial and non-commercial, of product development practices exists that is (entirely) attributable to user participation on the firm-hosted platform. Contributing developers have this constellation space at their disposal to work in, negotiate with, and reconfigure as an essential part of the developer firm's business model.

Mod development on the firm-hosted platform is a multiplicity of entrepreneurship, i.e. user participation can be characterized as modification effect market.

- User participation on the firm-hosted platform can be characterized by mutual dependency between the developer firm and users which make explicit the arguments developed in the user participation literature that user-generated contributions create a particular logic between the firm and the user base, pointing to an increasing importance of interdependent production practices. In particular, intersecting labour processes across firm boundaries show a consistent relationship between the organization of within-firm resources and external resources, suggesting the likelihood for multiple centres of mod development-related activity, competition, and compensation to occur associated with entrepreneurship, where the developer firm and mod developers, throughout the course of community life, rub shoulders in different formations.
- From the perspective of the developer firm relatively low investments are made in the development of the platform as nearly all content is user-generated rather than produced in-house, highlighting the firm's overarching business model that can be characterized by a particular kind of outsourcing (or, outsourcing 2.0) (cf. compare capital-intensive game engine development in Dovey and Kennedy, 2006).¹⁹⁸ Furthermore, permeable boundaries between the developer firm and mod developers (jointly) operating in practice-oriented networks draw attention to the reduction of (production) costs, non-linear expansion, and competitive

¹⁹⁸ However, costs such as those concerning customer support may rise as a result (cf. Jeppesen, 2004; Moore and Sward, 2007).

advantage, indicating a strong entrepreneurial approach towards the organization of labour processes that may not only benefit the firm but also contributing users. Those users that are steeped in mod development practices draw attention to an entrepreneurial approach to mod development, highlighting opportunities for competition and compensation with the developer firm, in particular, and the community at large. This is what I have termed a participation tipping point where the developer firm increasingly becomes a client of mod developments, or a 'reversed participant'.

- In this view, user participation is demonstrated as a rather well-developed business model in a commercial setting of the 3D software industry. User participation occurs in multiple formations constituted by commercial and non-commercial developers. These are role-based and temporary because of the perpetual state of development characterizing the 3D platform. As a result, a dynamic relationship between designed and emergent practices is continuously shaped, negotiated, confirmed, and reconfirmed among commercial and non-commercial contributing developers.

Knowledge loci exist that contribute multiple learning relationships to occur between the developer firm and users, i.e. user participation can be characterized by crossover learning opportunities.

- This study confirms the argument presented in previous studies that the developer firm can learn from its user base in terms of apprenticeship mechanisms and information and communication practices underpinned by knowledge and expertise sharing, and the development, negotiating, and remaking of design norms influencing the three domains of product development.
- The presence of several firm-provided communication venues points towards crossover learning opportunities between the developer firm and the user base that work as catalysts of product development and which may, subsequently, benefit the developer firm and the wider mod community. More specifically, each domain of product development seems to be associated with particular communication channels, while each knowledge locus seems to represent a particular subset, with minimal overlap, of contributing mod developers which

points to multiple learning opportunities across firm boundaries to occur. Furthermore, knowledge loci seem to be differently appropriated into the three domains of user participation, highlighting a centripetal effect underlying learning dynamics across firm boundaries. Hence, rather than a more linear learning model associated with LPP, learning tends to remain within a particular mod development domain, suggesting a nuanced impact of cross-pollination learning opportunities across the micro, meso, and macro domain boundaries. As a result, this outcome might point to differences in the firm-user learning and user-user learning dynamic as the firm taps into all domains of user participation while users are likely to stay put in one domain.¹⁹⁹

- This model of distributed learning, however, suggests that the relationship between firm learning has an inverse-U shape with the type and number of knowledge contributions made underlying learning opportunities. Initially, crossover learning opportunities between the firm and users seem to help further product development yet too much input seems to hinder firm learning (and arguably, stagnate mod development) as the firm's capacity to effectively deal with learning opportunities seems to fall short (and, arguably, can be said to fail to learn). The firm promised more learning than it could actually provide which potentially harms a transparent, effective, and trust-inducing interdependent relationship that underlies product development across firm boundaries.

This section has outlined the principal theoretical implications with respect to the user participation literature by revisiting the main findings of this study. The research has aimed to offer an enhanced theoretical perspective on user participation in mod development practices on the firm-hosted platform underpinning product development across firm boundaries. Based on the findings the initial conceptual framework developed for this study and outlined in Chapter 3, was not fully capable of explaining all the insights resulting from the empirical analysis of the data. For that reason, several new concepts were introduced to elaborate on some key areas within the conceptual framework. In order to understand the firm-hosted 3D platform as a site of participatory culture associated with user participation, the main conceptual

¹⁹⁹ Further research is needed to account for the impact of the centripetal effect for the firm-user learning relationship and user-user learning dynamic.

contributions offered by this study as a result are the notions multimodality, contingently generative, modification effect market, and crossover learning opportunities. These are developed to further conceptualize the uncovering of firm-user dynamics that underlie product development in the context of the commercial setting of the 3D software industry.

8.3 Conclusion

This chapter has woven together the empirical findings and discussed their theoretical implications in the context of the user participation literature that is associated specifically with traditions in media theory. By drawing upon the key aspects of the conceptual framework for this study, the research findings were presented to provide insight into the firm-hosted 3D platform as a participatory site underpinned by particular firm-user dynamics in the context of product development. The investigation of user participation in the commercial setting of the developer firm has emphasized those relations that underlie within-firm and external resources, identifying, making up, and leveraging multi-levelled aspects of what can be called a *firm-hosted modification culture*. The main points of the principal research findings have been summarized.

The findings have developed a *richer and deeper understanding of user participation on the firm-hosted platform*, highlighting variations among creative capacities and contributions made to product development, guided by a firm-provided design space whereby several functionalities provide a range of capabilities, allowing for different user in- and outputs. In this view, this study has contributed a *multimodal rather than a unimodal perspective* on user participation in mod development practices in the commercial setting of the developer firm. Furthermore, the analysis of the structure and organization of user participation in terms of labour processes across permeable firm boundaries indicated an *entrepreneurial approach to product development* underpinned by opportunities for competition and compensation to occur among all contributing developers. As this study examined user participation on the firm-hosted platform in a context of a networked organization of different players, technologies, and knowledge, the term *modification effect market* was introduced to identify this particular configuration between the developer firm and the user base in the 3D software context.

The analysis has shown that product development is underpinned by *centralized and dispersed, commercial and non-commercial-related practices*, specific to user participation on the firm-hosted platform. In this context, attention was drawn to the role of several technical, artificial and legal aspects that enable, facilitate, and condition user participation and user creativity in relation to the extent of mod development opportunities associated with the Second Life product. The findings indicate that user participation in firm-hosted mod development practices is limited in terms of *production, transferability, integration, usage, and compensation* within and across product boundaries. A delicate balance of user participation in the commercial setting of the firm becomes apparent that is contingently generative, highlighting *an open approach to commercial mod development underpinned by a closed meaning* that affects the development and organization of product development across firm boundaries.

The interest of this study in detecting a learning dynamic between the developer firm and users associated with product development, highlighted the developer firm's model of *distributed learning*, not only within the firm, but also with regard to firm-user learning relationships. The findings showed that various knowledge loci exist from which the firm may benefit. In addition, each communication locus seemed to represent a particular subset with minimal overlap between mod developers supplying and retrieving information. This suggests that *multiple learning opportunities across firm boundaries* are likely to unfold associated with user participation in product development. Furthermore, the analysis of knowledge loci highlighted a *centripetal learning effect rather than a more linear model* suggesting that potential learning dynamics seem to remain within the confined locus for mod development which is likely to influence learning dynamics across firm boundaries. However, the findings also pointed to an important drawback for the firm in the light of having access to multiple knowledge loci for establishing learning opportunities. When the firm is incapable of effectively dealing with potential learning moments, the firm risks failing to learn. This may *possibly endanger a transparent, effective, and trust-inducing interdependent relationship between the developer firm and users* that underlies user participation in firm-hosted mod development practices and it ultimately may even stagnate product development.

The overarching contribution of this study rests in providing an understanding of

a redefined configuration of the relationship between firms associated with economic production and users associated with free and/or social production involving product development, or a *consolidated life cycle*, depicted by user participation in product development practices on the firm-hosted Second Life platform.

Chapter 9 Conclusion

Direct me

- Otis Redding²⁰⁰

9.1 Introduction

Throughout my life I have sought to construct, deconstruct, and reconstruct my understanding of the world. As a child I was eager for the world to be LEGO so I could take it apart, understand it, and put it back together. During my adolescent years I built, destroyed, and rebuilt my world view by travelling the world and trying to find my place in it. In my adult life I have connected, disconnected, and reconnected with people from all corners of the globe to make the world visible. When Second Life appeared on my horizon a new kind of platform presented itself where worlds were being born. Yet, rather than experiencing a ‘Eureka!’ moment I thought Second Life was quite funny - à la Isaac Asimov – especially when I discovered that I had to learn, unlearn, and relearn tools and skills to create, destruct, and recreate the product. This did not stop me from logging back in. I was struck by the sociality of this Web-like environment, combining 3D graphics and the laws of physics to inform seemingly endless possibilities for user participation. I was in awe of what people were developing such as ideas, builds, business opportunities, services, and new uses of the programming language, perpetually making, breaking, and remaking the Second Life product. Before I could plant my digital feet firmly on the ground I wanted to touch the sky so I spent most of my Second Life visiting, leaving, and returning to issues concerning user participation and creativity underlying this firm-provided platform.

This chapter offers an overview of where the journey of this study began and ended, with particular attention to the principal findings and contributions, limitations, and avenues for further research. It is structured as follows. In Section 9.2 the main theoretical, methodological, and empirical findings are summarized following the structure of the operationalization of the principal research question. Section 9.3 reflects on the limitations and generalizability of this study. This is followed by a consideration of directions for future research in Section 9.4. This study is concluded in Section 9.5.

²⁰⁰ Otis Redding, *Direct Me*, *Love Man* (Atco, 1969).

9.2 Rolling restart

A rolling restart, or recapitulation, of where the journey of this study began leads us back to my interest in user ingenuity and firm-engagement practices on the Internet associated with a 'participatory turn' in a Web 2.0 context. From a theoretical viewpoint my interest was piqued by the user participation literature developing within the media studies field. This study was designed to yield insight into the development and organization of interactions between the developer firm and users, highlighting the creative capacities of users and their contributions to product development on a firm-hosted 3D platform. This research has aimed to enhance our understanding of a distinctive firm learning process that underlies the organization of product development across firm boundaries. The focus of the study was subsequently framed to identify and analyse the dynamics of contributing developers as participants, creators, and learners in the context of firm-hosted modification practices associated with product development.

The study was guided by the examination of user participation that was instantiated in mod development, a practice that has been increasingly encouraged and facilitated by various developer firms in the games and 3D software industries (see Chapter 2). Second Life was selected as a case of participatory culture with particular attention to using, toying and tinkering with the product software, (communications) platform, toolkit, and workspace by the developer firm and users. In examining strategies of the developer firm that tap into the user base, a complex set of interdependent development and organizational dynamics was found that were formed and nurtured among contributing developers across firm boundaries, revealing a particular configuration of overlapping production modalities between the developer firm and users from which the firm can be seen to benefit. In this section, these findings are recapitulated to highlight the principal theoretical, methodological, and empirical contributions of the study.

For the investigation of this rapidly growing phenomenon of user participation in a commercial Web-based setting the following principal research question was formulated:

Q How is user participation constituted and maintained on the firm-hosted 3D platform, and with what implications for product development across firm boundaries?

This question was operationalized using three constructs, guided by three working hypotheses, indicating the conceptual boundaries of the study (see Section 3.5). Each empirical chapter wove a construct together with one proposition indicating a likelihood of the relationship described in each case. Chapter 5 introduced the first-level empirical analysis of the *design capabilities* construct guided by the hypothesis that users who accept the invitation to engage in firm-hosted digital development practices are likely to contribute to mod development practices (H1). In the investigation of the design capabilities the following was highlighted:

- The development of Second Life as a user-generated, collaborative, community-driven, and entrepreneurial firm-hosted 3D platform.
- The role of motivational, participatory, and behavioural patterns to define user design capabilities.
- Digital entrepreneurship associated with the organization of the developer community and the developer firm.

Table 9-1 provides an overview of the operationalization and principal findings relating to the design capabilities construct.

Table 9-1
Summary of the design capabilities

Design capabilities	
<i>Working hypothesis</i>	
H1	Users on the firm-hosted platform 3D platform are likely to participate in mod development. DISCONFIRMED.
<i>Main methodology</i>	
<ul style="list-style-type: none"> • Online survey, 434 respondents, cluster analysis • Interviews, 21 interviewees 	

Operationalization	Findings/Answers
How does community membership characterize users as mod developers?	<ul style="list-style-type: none"> • Sociality, creativity, and innovation are the key drivers for users to participate • Based on differences in participation patterns and communication behaviour 6 categories of membership are distinguished: power rezzer (9%), facilitator (11%), twink (15%), pro (17%), experience broker (22%), newb (26%) • Diminishing knowledge contributions and mod development towards periphery
How does the organization of production relate to labour processes across firm boundaries?	<ul style="list-style-type: none"> • Second Life is simultaneously the software, product, communication platform, toolkit, and workspace for Linden Lab and mod developers underpinning • Within-firm organization characterized by distributed design and distributed decision-making, i.e. entrepreneurial approach to the organization of work associated with accountability • Getting hired mainly depends on the right mixture of personality, entrepreneurial attitude, and skill-set • Plenty of opportunities for commercial and non-commercial entrepreneurship in mod community • Product development is characterized by interdependencies across firm boundaries associated with multiple centres of activity, compensation, and competition

The *design space* construct served as second-level unit of analysis in Chapter 6. The empirical analysis drew on the examination of the likelihood that the user's experience level employing first and third party toolkits is positively related to mod development (H2). The examination process of the design space was as follows:

- First and third party toolkits related leverage for user-driven design to mod development on the firm-hosted platform.
- Micro level, meso level, and macro level mod development were distinguished as the functional areas of the firm-hosted design space and provided access to labour processes across firm boundaries.
- Transferability of mod development was linked to legal contracts used between mod developers and the developer firm.

A summary of the operationalization and main findings with respect to the design space construct is presented in Table 9-2.

Table 9-2
Summary of the design space

Design space	
<i>Working hypothesis</i>	
H2	The user's experience level in using first and third party toolkits is positively related to mod development. CONFIRMED.
<i>Main methodology</i>	
<ul style="list-style-type: none"> • Online survey, 434 respondents, descriptives • Interviews, 21 interviewees 	
Operationalization	Findings/Answers
What are the functionalities of the design space?	<ul style="list-style-type: none"> • Toolkits can provide an effective joint product development process, accessing labour across firm boundaries (e.g. cheap, speediness) • Toolkits offer a range of capabilities shaping the conditions users face: (1) micro level design space, i.e. builds, scripts, textures; (2) meso level design space, i.e. client-side/interface open source; and, (3) macro level design space, i.e. server-side/open source • Variations in user experience levels can be explained by differences in participatory modalities (and apprenticeship) among various users
How is mod development perceived by the developer firm? And what are the implications for transferability?	<ul style="list-style-type: none"> • Product development is a constellation of centralized and distributed, commercial and non-commercial practices (no micro-management of user-to-user transactions) • Constraints influencing product development are mostly of a technical, artificial, and legal nature; esp. micro level management (ToS); meso level management (GPLv2 +FLOSS); and macro level management (BSD) • Prospects of transferability and compensation are limited • Without a commercial license (meso) mod development is a form of non-market production • Mod development produces proprietary experiences that can be non/commercial proprietary extensions of the 3D product

Chapter 7 yielded insight into user participation in digital development practices as a learning dynamic underpinned by knowledge contributions across firm boundaries. The extent of learning was empirically approached by examining the likelihood that knowledge contributions made on the firm-hosted 3D platform are likely to strengthen opportunities for crossover learning relationships between the developer firm and users (H3). Guided by the *learning by design* construct this analysis examined aspects of learning by considering the following:

- Mod development as a learning dynamic underpinned by the relational dimension of interdependent characteristics of the organization of people, knowledge, and resources across firm boundaries.
- Learning practices of the developer firm and mod developers in the context of apprenticeship with particular attention to mastery and leadership driving mod development.
- The extent of crossover learning as a catalyst of product development impacting on the developer firm and mod developers.

Table 9-3 offers an overview of the operationalization and main findings concerning the learning by design construct.

Table 9-3
Summary of learning by design

Learning by design	
<i>Working hypothesis</i>	
H3	User involvement in knowledge contributions on the firm-hosted 3D collaborative platform is likely to strengthen crossover learning opportunities between the developer firm and users. DISCONFIRMED.
<i>Main methodology</i>	
<ul style="list-style-type: none"> • Online survey, 434 respondents, PCA • Interviews, 21 interviewees • Blog, forums, mailing lists, JIRA, thematic analysis 	
Operationalization	Findings/Answers
What are the mechanisms underlying crossover learning opportunities?	<ul style="list-style-type: none"> • Mentorship, studio system, communication channels such as Second Life, IRC, and JIRA are essential for the organization, operation, and execution of work

	<p>associated with company culture</p> <ul style="list-style-type: none"> • Based on As & Os, Love Machine, and JIRA the performance of each employee is measured leading to transparency, encouraging firm-wide learning and creative problem solving • Domains of mod development can be associated with particular enculturation practices: e.g. Orientation Island and sandboxes (micro), firm-provided resources and third party-generated resources (micro/meso/macro), and software repositories (meso/macro). • The distribution of knowledge contributions highlights a relational dimension among contributors guided by the interaction rate of information retrieval and supply; low-end channels such as blog, and forums are most frequently used, while high-end or specialized channels such SLDev mailing lists and OS portal, are used less often
<p>What are the implications for firm learning?</p>	<ul style="list-style-type: none"> • The blog is the main channel to share information within the community but one-directional; due to volume and their generalist tendency, forums are infrequently used for crossover learning opportunities; mailing lists provide specialist information yet the high volume hinders optimal use; JIRA is extended to the public yet the reported-solved issue ratio is troublingly low • Firm learning has an inverse-U relationship with the type and number of knowledge contributions made underlying learning associated with a shortage of resources within the firm • Knowledge loci are differently appropriated into the domains of mod development creating a centripetal learning effect

What do these findings tell us about the firm-hosted 3D platform as a site of user participation in the context of the conceptual framework used for this study? The findings contribute to an understanding of a particular configuration of production that influences the processes of product development across firm boundaries, especially associated with the games and 3D software industries. Specifically, this study has sought to complement insights developing in the media studies field concerning user participation on the Internet, particularly, associated with the notions of participatory

and convergence culture. In developing this research, however, this conceptual framework was complemented by several insights developed in the communities of practice theoretical tradition and in user-centred innovation studies so as to come to a more robust approach to examine and understand the organization and related dynamics of user participation that can be identified as underlying product development on the firm-hosted 3D platform. These streams of thought helped to extend the main conceptual framework by contextualizing user participation in terms of knowledge production and platform design/use, allowing me to address certain blind spots and implicit claims that underpin the user participation perspective regarding these issues.

The architecture of user participation on the firm-hosted platform suggests a complex intersection of designed and emergent mod development practices attracting contributors with different interests, skills, and knowledge levels associated with the three domains of mod development. The presence of and access to various tools, support systems, and learning opportunities enable and assist different users in modding the firm-hosted platform in various capacities. Yet the sky is virtually boxed in or, as the analysis has demonstrated, there are limitations to having a Second Life. Some of these are related to certain user preferences and practices that may be contrary to Linden Lab's overarching strategy, while others may point towards constraints of a more technical nature.

The analysis has demonstrated that Second Life is mostly a work-in-progress where goals, appearance, and usage guide a change-inducing result for the (configuration of) business. Such a dynamic of 'give and take' among constellations of contributing developers demonstrates an interdependent relationship that suggests a consolidated life cycle underlying product development that is simultaneously structured and emergent, top-down and bottom-up, centralized and dispersed, commercial and non-commercial. In this view, this study suggests that user participation on the firm-hosted platform can best be characterized, in order of robustness, by the concepts of multimodality, contingently generativity, modification effect market, and crossover learning opportunities. In this context, the business of user participation seems to be more evolutionary than that it is revolutionary in the context of the Web 2.0 phenomenon, yet with the challenging task for the developer firm to coordinate, integrate, and learn from its user base in order to nurture a self-sustaining product culture.

9.3 Hurdles

Undertaking any research project is a long and winding road. Throughout the research process hurdles are encountered and decisions are made. This section reflects upon several of those choices and in so doing offers some suggestions for the starting points for future research.

One limitation of the research design is that it is based on a single case study which conditions the extent to which the results can be generalized. My choice of Second Life to serve as the site for evidence of the 'participatory turn' in user participation in digital development practices was based on a set of six criteria with particular attention given to Second Life's heavy reliance on user participation, the abundance of variations in (user) contributions, and the shared workspace for the firm and users (see Section 4.3). These features were strengths but also resulted in the selection of a case study that appeared to be the most advanced illustration of firm-hosted user participation at the time this research was undertaken. The reason for this was the scale of effort needed to get to the bottom of the issue of user participation in the context of one firm-hosted site. Information was gathered at game developer Valve Inc. (interviews and surveys) and BBC Radio 1 (interviews) and this informed my analysis of the empirical evidence in this study. These data sets could be used in the future to draft a comparative perspective so as to yield a more robust and general perspective on the phenomenon of user participation (see Section 4.4.4).

Although this is a unique case, it nevertheless provides many potential avenues to explore which may apply in other settings that bear some similarity to the present case. For example, there are various representations of firm-user interactions on the Internet such as social networking sites, portal sites, and online gaming sites, each revealing particular interactions between the goals of the firm and the interests of users. A future research design allowing for a comparative perspective across selected cases could yield insight into the variety of participatory structures that may be aligned with differences in purpose, interest, site structure, and (inter-)action. Future research could focus on the kinds of input that users can give, the structure of inputs, external rule sets, and the community-based norms informing the loci where the development and organization of firm-user interactions underlying product development are likely to assert themselves.

Furthermore, a comparative research design would provide a stronger basis for generalization than the present study, especially with respect to the determinants and implications of the extent of homogeneity within and across different Web-based user bases for user participation and the way these influence user creativity on firm-hosted platforms underpinning the characterization of the firm-hosted online platform as a site of user participation developed in this study. For example, several studies focusing on Web 2.0 issues and user creativity more generally, have suggested that especially younger age groups (roughly <25) are prevalent as user participants and that, generally, a strong gender-bias according to digital platform seems to exist. However, in this study, the user base is characterized by a near gender-balanced group of users (in terms of hours) of whom the majority is aged between 25 and 34 (ESA, 2008; OECD, 2007). These and other variables (such as those of the lead user construct) could also be investigated more extensively in conceptualizing user participation and their implications in the context of commercial activity.

Another decision that affected this study relates to my own participation in Second Life (see Section 4.4). Although I spent quite a lot of time in Second Life, I have little experience with micro and meso mod development and none with macro mod development. The time it would have taken for me to learn the specifics of programming was too demanding. As a result, my understanding of user participation and production modalities of Second Life is predominantly based on information gathered from many conversations, observations, and my analysis of the available documentation. In retrospect, more active participation in development practices and greater access to Linden Lab itself might have contributed to a deeper understanding of user creativity and firm-user interactions. For example, I would have been able to say more about the resources available and needed to participate in different development domains, gained greater access to and a richer understanding of levels of collaboration between mod developers and Linden Lab, and a better understanding of the specific steps involved that underlie product development across the various design spaces.

More direct contacts with Linden Lab would have yielded greater insight into everyday issues such as the disposition of its assets, the use of scripting workarounds, employment of human resources, and concerns about performance. This would have enabled me to gain a deeper understanding of the inner workings and how these issues might interfere with aspects of learning and the strategic development of an open 3D

Internet in the context of user participation associated with knowledge management. However, this approach was not adopted because of accessibility and disclosure issues. It is likely, however, that in the future firms may become more sympathetic when user participation outgrows its still somewhat experimental state.

A weakness of the present study is related to its static character. Second Life is characterized by a perpetual state of development and, hence, is very dynamic. So, although this study used a multi-method strategy for collecting and analysing qualitative and quantitative data which has many advantages, the data, and especially the survey method, offered a snapshot at a single point in time. This cannot fully capture the dynamic characteristics of user creativity or the lows and highs experienced during modding processes. Semi-structured interviews and the collection of online documents helped to provide a more rounded perspective, but these were also undertaken over a specific time period.

In addition, the recruitment of survey respondents and interviewees resulted in a volunteer-bias. Due to a lack of access to Linden Lab's user database the survey was announced at several specific online locations with the risk of attracting respondents with a particularly distinctive set of characteristics. Likewise, the recruitment of interviewees was mainly guided by random encounters, referrals, and the high visibility of some of the interviewees in certain developer communities (see Section 4.4.2). It is possible therefore that some aspects of user participation in Second Life were over- or under-appreciated. However, this study has sought – when possible - to compare, (especially the survey) results with other available data sets such as Linden Lab's and a few other academic studies so as to make informed decisions about the validity of the findings which was further supported by my own experience and knowledge of the platform.²⁰¹ Nonetheless, in future research this could be addressed by increasing and stratifying the sample size for both the survey and interview methods and, if possible, using a voluntary-based (systematic) recruitment method by notifying all users, or better, announcing the research on the login screen. Another means could be recruiting respondents by using particular Second Life panels that have emerged, consisting of people that have made known that they can be contacted for research purposes.

My investigation focused on the development and organization of firm-user

²⁰¹ In the context of the sample, this study viewed Second Life as not fully self-contained implying that unmediated practices inform mediated ones, and, therefore, did not distinguish between so-called first life/second life identities of the respondents in answering the questions (see Section 4.4).

interactions but did not take into account changes in composition over time. One key finding of this study was that particular firm-user learning opportunities occur on micro, meso, and macro levels of mod development but which also seemed to remain within a confined locus.²⁰² If this study had pursued a longitudinal perspective it would have allowed the investigation of the development of user transitions within and across the three domains of mod development providing a deeper understanding of a constellation of firm-user interactions and learning dimensions. Analytical techniques such as social network analysis and examining a broader range of participation patterns (such as particular client- and server-side data such as accumulated assets and L\$ transactions) and knowledge loci (in particular, chat and group logs, and transcripts of office hours and meetings) could assist in this investigation of ‘cross-pollination’ relationships across domains and the implications for firm-user and user-user learning relationships in the context of user participation in product development.

This study focused on user participation by zooming in on evidence of user creativity underlying firm-user dynamics. Yet, as indicated in Chapter 5, sociality was revealed as an important reason for people to join Second Life. This was not researched extensively because it was beyond the scope of this study. The investigation of aspects of sociality (and culture) would be another project in itself and, as an important driver of Second Life, could benefit from extensive research and perhaps contribute to a further conceptualization of user participation on the firm-hosted platform. In addition, the findings have pointed to the significance of economic production, especially in the context of entrepreneurship underpinned by evidence of apprenticeship and professionalism. These findings make the claims systematically explicit which are developed, especially, in the user participation literature concerning a shift in the power relations between media firms and users. Yet, as this study’s central focus was not about power, this would make an interesting future thread for informing, for example, ongoing research in labour economics on the division of labour within software developer communities, more generally, and in studies concerning issues of power (and the efficacy of digital governance, in general, and IP issues, in particular) that may be indicative of new forms of power relationships.

²⁰² This study did collect document data over a longer period (see Chapter 4). Based on a basic comparative analysis of users across these communication channels, only a small number of names appeared to overlap at the top for heavy users. Further research would allow not only for a more in-depth analysis of transitions of users between production modalities, but also across loci which could strengthen crossover learning opportunities (and, provide a more robust insight in support of confirming H3).

9.4 Feature suggestions

With courses followed and crossroads taken this study has opened up several directions for further research. In this section a few future scenarios are discussed highlighting different theoretical lenses on the dynamics between firms and users on the online firm-hosted platform. By offering insight into a number of theoretical perspectives that are not the central focus in the present study, some useful avenues for further interpretation of the empirical findings could be explored.

A 'science of networks' approach draws attention to network topologies such as social networking sites occurring on the Internet in terms of the rules, patterns, and collective behaviours that underlie them (Barabási and Albert, 1999; Watts and Dodds, 2007; Watts and Strogatz, 1998). Developing this perspective would encourage a discussion of the research findings in the light of the distribution of connections among the developer firm and mod developers on the firm-hosted platform. In their study of networked phenomena, Barabási and Albert (1999) found that many complex network topologies can be characterized by a scale-free power law. In other words, the distribution of links between vertices (nodes) suggests a small likelihood that a vertex will have many connections to many others and a large likelihood that most vertices will have few or no connections. Although there are different views on how networks evolve there is persistent evidence that they follow power laws (Adamic and Huberman, 2000; Barabási, 2002; Kossinets and Watts, 2006).

What might this power law distribution of links in a network mean for the investigation of interdependent relationships among contributing developers in Second Life? The body of network topology research that builds on this finding has provided insight into several properties of network topologies that draw attention to participatory formats. For example, connections tend to be made based on commonly shared interests, an idea which is quite similar to the NCoP perspective which guided this study. Also, networks have been found to exhibit small-worlds effects. Fuelled by Milgram's (1967) study on the distance or social links between any two people ('interconnectivity') and Granovetter's (1973) work on connected clusters and weak ties, Watts and Strogatz (1998) detected a 'small-world network'. This implies that any link (e.g. person) to any other point in a network can be reached through a relatively limited number of links.

In the future, adopting this approach to the case examined in this study could enable the development of a model of how to order emerging interactions among the developer firm and users, where some relationships would be much more visible than others. This approach might produce an understanding of the firm-hosted platform as a small-world network and offer a framework to examine user participation as a “conduit for the propagation of information or the exertion of influence, and an individual’s place in the overall pattern of relations determines what information that person has access to or, correspondingly, whom he or she is in a position to influence” (Watts, 2003: 48). Attention could be drawn to ‘influentials’, relating personal influence and opinion leadership to technology adoption in the topology of the NCoP (Van den Bulte and Joshi, 2007; Watts and Dodds, 2007). As this approach focuses on links rather than the qualitative aspects of firm-user dynamics, it could offer a good fit with the conceptual framework developed in the present study by offering a detailed quantitative and qualitative approach to investigate the shape and organization of interdependent relationships occurring on the firm-hosted platform.

Marketing research presents another framework that could be used to further interpret the empirical findings. One line of contemporary research concentrates on online marketing strategies that adapt and turn cultural formats such as films and games into transient images in order to create ever-changing consumer experiences (Pine and Gilmore, 1999; Schmitt and Simonson, 1997; Vedrashko, et al. 2006). The term ‘advertainment’ has been developed to refer to “the integration of advertising messages in respectively online games and films and [are] increasingly being used as an integral part of Internet marketing and advertising strategies to promote goods and services to potential consumers” (Buckner, Fang, and Qiao, 2002: 1). For example, the US Army developed the online game America’s Army: Operations (AA:O) as part of a larger marketing campaign to address concerns about missed recruiting goals.²⁰³ The game has built a relationship between gamers (whose profiles largely match those of the army’s recruiting targets) and the US Army by transferring the emotion of the game to the Army brand that is powering it and creating an engaging experience that has positively influenced recruitment (van der Graaf, 2004). Such strategies of ‘experiences’ and ‘aesthetics’ marketing make user participation an explicit component of a commercial setting (cf. Prahalad and Ramaswamy, 2004).

²⁰³ See <http://www.americasarmy.com> (accessed 29/08/2008).

In this context, the role of Internet communities has been examined. In the marketing literature a customer-centric understanding of consumption communities has been developed, emphasizing social ties and experiences among customers that evolve around a brand (Fournier, 1998; McAlexander, Schouten, and Koenig, 2002). A marketing perspective would enable the study of Second Life and similar developments as (interpretative) brand communities (Kozinets, 1999; Muniz and O'Guinn, 2001). Attention could be drawn to the developer firm as creator and manager of the overall Second Life brand in terms of type of brand and brand strategy as customers, by design, are afforded a prominent role in the brand community (Tybout and Carpenter, 2001). Specifically, the focus of the investigation would shift to an emphasis on business-oriented participation to yield insight into questions related to brand attitude, purchasing intention, measurement of returns, and avatar-based marketing (cf. Hemp, 2006; Kim, Lyons, and Cunningham, 2007; Li, Daugherty, and Biocca, 2002).

Furthermore, with over 3,000 businesses in Second Life, varying from well-known corporations such as IBM to the first in-world generated brand Tringo, a marketing perspective would offer the basis for the examination of, for example, in-world branding modalities associated with particular consumption activities, the exchange of product information, and consumption experiences that evolve around a brand (McWilliam, 2000). The marketing approach therefore could offer valuable insights regarding firm-user relationships in the context of commerce. Yet, with an emphasis on user participation as brand experience based on mere customer engagement and interaction with the brand, this approach seems to oversimplify the role of user participation practices in the wider context of the inner workings of the firm-hosted platform. Therefore, future research would benefit from a consolidation of some elements of my conceptual framework and marketing research.

The research findings could also be reexamined in the light of studies of organizational change in the management studies field which focus on models of employment relationships (Baron and Hannan, 2001; Bilton, 2007). Contemporary employment relations seem to be characterized by a rise in individualism, the pervasiveness of change in technologies, and the blurring of boundaries of work such as location and life (Guest, 2004; Hamel, 2007). Furthermore, similar to many terms used to describe user participation, increasingly, ways of organizing work are encapsulated by terms such as 'self-organizing', 'democratic', and 'swarming'. Malone (2004) uses

decentralization to conceptualize employees' participation in decision-making practices that affect them. In this view, rather than a command and control approach, management seeks a 'coordinate and cultivate' perspective that is said to be associated with benefits such as increased motivation, creativity, flexibility, freedom, and individualization. More specifically, the development of new ways of mobilizing and attracting talent, capturing the wisdom of employees, and organizing capital allocation, are captured by the notion of management innovation (Hamel, 2007).

A study of the kind undertaken here could be informed in the future by findings that draw attention to the internal organization of Linden Lab. Such an investigation would interpret the findings in the light of a 'coordination and cultivation' approach. The implications of the organization of the work environment at the developer firm might point to issues such as the obsolescence of authoritarian relationships and physical proximity (Bijl, 2007; Malone, 2004), external leadership of self-organizing teams (Morgeson, 2005), work/life balance (Moen, Kelly and Huang, 2008; Sturges and Guest, 2004), the sources of competitive advantage, capitalizing on individualized workers as 'markets of one' (cf. Clippinger, 2007), and the importance of creativity as a constitutive element of the workplace and employment relations (cf. Bilton, 2007; Rank, Pace, and Frese, 2004).

The strength of the organizational and management domain is to understand how employees act within the organization in accordance with the organizational format and goals related to the effectiveness of the organization. Although it appears that this perspective is not fully equipped yet as to take account of the impact on work and work relations when employees are dealing with a high level of user participation beyond mere consumption, in combination with the conceptual framework in this study. This could be a productive framework in the future to accommodate emerging firm-user configurations in the context of employment relationships.

9.5 Conclusion

It has been nearly three years since my avatar Rocketgrrrl Tripp set foot in Second Life. With bad hair and prefab clothes she offered me a whole new way to travel the 3D space. Little could I think or say of what to expect of these explorations. I encountered many friendly human-, beast-, and undetermined-shaped avatars and was

inspired, amused, and bewildered by many divergent conversations. Mostly I was flabbergasted by numerous users engaging in many kinds of creation covering miles and miles of digital lands, a sensation that only grew stronger when I learned that user participation also extended to the exteriors of the Second Life product. Key insights concerning user participation on the firm-hosted platform accumulated throughout my Second Life undertaking have in this chapter been summarized, their limitations highlighted, and their significance evaluated in the context of directions for future research avenues.

With the investigation of Second Life as site that has come to be associated with a larger trend concerned with a 'participatory turn' reflected in the claimed democratization of the Internet, this study has enhanced our understanding of user participation in the commercial setting of 3D software development. More specifically, this study has focused on improving our understanding of the way interactions between the developer firm and users are developed and organized across permeable firm boundaries in the context of product development on the 3D platform. The examination of the creative capacities of users and their contributions to product development on the firm-hosted platform has offered a basis to assess several claims that have tended to be intuitive and implied, rather than manifest, that have been attached to the idea of the 'participatory Web'.

The results of this study suggest that user participation is evoked in a context of a networked organization of players, technologies, and knowledges represented by various modes of especially (overlapping) social, technological, and economic production. In particular, knowledge-intensive and information-rich digital development practices embedded in user participation associated with certain participatory infrastructure modalities indicate learning relationships between the firm and user base that underlie the business operations of the developer firm in informing and organizing product development. By yielding insight into the ways participation and practices are structured and organized across firm boundaries, these findings provide a deeper understanding of the blending together of social dynamics and commerce as a significant aspect of the emerging knowledge-based economy. By gaining systematic insight into user participation in a commercial context, this study has built future roads to follow in the further examination of this particular configuration with eager feet.

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Additional data are available upon request

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Survey on Second Life

Hello:

You are invited to participate in an academic study on Second Life. We are interested in the innovation-related practices of Second Life members so we can study the composition and structure of the Second Life community and the extent to which members receive resources and support from Linden Lab and other members. The questions focus on information sources such as the Official Linden Blog and the forums, and Second Life features and tools so we can study the ways in which Linden Lab invites and supports Second Life residents to create in-world content and to further develop the Second Life platform through (close) contact with Second Life members.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. The survey takes approximately 20 minutes.

For your chance of winning one of the following amounts in Linden\$ - L\$ 10.000 (1x), L\$ 5.000 (2x), L\$ 3.000 (3x), L\$ 2.500 (4x), L\$ 1.000 (5x), L\$ 500 (10x), L\$ 250 (20x), and L\$ 100 (30x), you can fill out your email address at the end of survey. We will never use this information publicly. If you have questions at any time about the survey or the procedures, you may contact **Rocketgrrrl Tripp** aka **Shenja van der Graaf** (London School of Economics) at a.c.vandergraaf@lse.ac.uk.

Data Protection Statement. All data collected in this survey will be held anonymously and securely. No personal data is asked for or retained. Cookies, personal data stored by your Web browser, are not used in this survey.

Thank you very much for your time and support. Please indicate whether you are a member of Second Life to proceed.

1. Are you registered with Second Life? Please tick the appropriate box.

- Yes
- No

SECOND LIFE DEMOGRAPHICS

- 2. When did you become a Second Life member? Please choose (approximate) month and year from the drop box.**

Month

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Year

- 2003
- 2004
- 2005
- 2006
- 2007

- 3. What is your membership type?**

- I am a basic member (and pay nothing)
- I am a 'additional basic' (and pay \$9.95)
- I am a premium member and pay monthly
- I am a premium member and pay quarterly
- I am a premium member and pay annually
- Other

- 4. What kind of avatar is your main avatar?**

- Default avatar
- Your own created avatar
- Purchased avatar

5. **Other than your main avatar, how many alternate avatars do you have? Use 0 if you have only one avatar.**

6. **How many hours per week do you on average spend in Second Life? Enter a number in the box.**

7. **When are you generally logged into Second Life? Choose all that apply.**

Time

- Between 9 AM and 1 PM
- Between 1 PM and 5 PM
- Between 5 PM and 9 PM
- Between 9 PM and 1 AM
- Between 1 AM and 5 AM
- Between 5 AM and 9 AM

Day

- During the week
- During the weekend

8. **The following three questions ask you about in-world economics (in L\$). Please enter a number in the box. (Optional).**

What is your approximate expenditure per month (L\$)

What are your approximate sales per month (L\$)

What is your approximate account balance per month (L\$)

LAND**9. This question asks you about land ownership. Do you...?**

- I own land
- I own an island
- I rent land
- I am a former land owner
- I am a former island owner
- I do not own / rent land
- Other

10. What do you own? Choose all that apply.

- I own less than a sim on the mainland
- I own more land than a sim but not a whole sim
- I own a complete sim on the mainland
- I am an island owner
- I own multiple, scattered islands
- I own multiple islands as a small continent
- Other

11. I own land as... Choose all that apply.

- I own land as individual
- I own land as part of a group
- I own land as individual and as part of a group
- Other

12. What is the location of your land? Choose all that apply.

- Mainland north continent
- Mainland south continent
- Mainland new northeast continent
- Dreamland or other non Linden third party
- Island

13. How is your land used? Choose all that apply.

- I use land as non-profit
- I use land for myself
- I purchase land and resell it unimproved
- I purchase land and resell it improved
- I purchase land and rent it unimproved
- I purchase land and rent it improved
- I rent land from another member and then rent it to others
- Other

APPEAL**14. Why does Second Life appeal to you?**

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I can enjoy social interactions with others					
I can pretend to be someone else					
It is innovative					
I like to build, scripting and/or texture					
I like that we can retain intellectual property rights					
I can help others with building, scripting and texturing					
I can build a reputation					
I can modify Second Life Open Source					

15. How important are the following statements to you? Please rank in order of importance (1 – Highest, 6 – Lowest). If you consider all equal or if you don't do any of the following, you may skip this question.

	Rank (1 – Highest, 6 – Lowest)
Making money	
Creating things	
Socializing with other members	
Buying items for my avatar or land	
Attending in-world events such as live music	
The visual appearance of my avatar or home	

FRIENDS

- 16. The following questions ask you about your friends and group list. Please enter a number in the box. Use 0 if you have none.**

How many friends do you approximately have in your friends list?

How many of the people in your friends list work at Linden Lab?

How many groups do you have in your group list?

- 17. How often are you group owner? Please choose one answer from the drop box.**

- I am usually the group owner
- I am sometimes the group owner
- I am almost never the group owner
- I am never the group owner

- 18. How often are you group officer? Please choose one answer from the drop box.**

- I am usually the group officer
- I am sometimes the group officer
- I am almost never the group officer
- I am never the group officer

- 19. How often are you group member? Please choose one answer from the drop box.**

- I am usually the group member
- I am sometimes the group member
- I am almost never the group member
- I am never the group member

20. What kind of groups do you belong to? Choose all that apply.

- Related to land ownership
- Similar social interests
- Club, casino or other commercial outlet
- Special and limited access
- Technical know how scripting or open source
- Technical know how building or other design
- Discussion or similar philosophical interests
- As a family or tribe community relationship
- As a company or work group
- NA

DESIGN**21. Do you...?**

	I do it repeatedly	I have	Neutral	I would like to	I would never do it
Animate and gesture					
Texture build					
Texture design					
Make clothing and fashion					
Script internal					
Script external					
Build					
Make vehicles and physics					
Make machinima					
Mod the Viewer source code					
Use the Public Issue Tracker					
Make in-world games					
Create artwork					
Use a hack or other program to harm others					

22. How useful are the following provided tools and features for you? Please rank in order of preference (1 – Highest, 8 – Lowest). If you consider all equal or if you don't do any of the following, you may skip this question.

	Rank (1 – Highest, 8 – Lowest)
Movie recording	
Camera controls	
Snapshots	
Movement controls	
Music controls	
Statistics bar	
World-map	
Search interface	

23. How useful are the following provided tools and features for you?

	Very useful	Sufficient	Neutral	Insufficient	Useless
Second Life desktop client					
Inventory					
Linden Script Language					
Sculptable primitives					
XML functionality					
Animations					
Textures					
Appearance editor					
Terraforming tools					
Uploading and file format					
Teleporting					
Public Issue Tracker					

24. If you could add or change the way Second Life is designed, what would you do? (Optional).

INFORMATION AND COMMUNICATION**25. Do you...?**

	I do it repeatedly	I have	Neutral	I would like to	I would never do it
Write about Second Life on your website/blog/etc.					
Participate in beta tests regarding Second Life					
Post Second Life-related information on sites like YouTube, Flickr, Del.icio.us					
Submit bugs and features to JIRA					
Develop Second Life open source					
Report abuse					

- 26. If you are looking for information about how to do things in Second Life, where do you get this kind of information? Please rank in order of preference (1 – Highest, 5 – Lowest). If you consider all equal or id you don't do any of the following, you may skip this question.**

	Rank (1 – Highest, 5 – Lowest)
You ask someone you know in-world via IM	
You ask anyone in-world who is within your visual range via chat	
You ask a group in-world	
You ask any Linden Lab employee in-world	
You go to a library in-world such as Ivory Tower	

27. Please rank in order of preference (1 – Highest, 7 – Lowest). If you consider all equal or if you don't do any of the following, you may skip this question.

	Rank (1 – Highest, 7 – Lowest)
Official Linden Blog (and archives)	
Forums on the Second Life website (and archives)	
Knowledge Base	
LSL Portal (scripting help)	
Open Source Portal	
Email or call Support	
A member-owned website/blog/wiki	

28. How often do you read...?

	Every day	Once/twice a week	Once/twice a month	Rarely	Never
Official Linden Blog					
Forums on the Second Life website					
Scripters mailing list					
SL Developers mailing list					
Open Source Portal					
LSL Portal					
In-world group messages					

29. How often do you post or comment...?

	Every day	Once/twice a week	Once/twice a month	Rarely	Never
Official Linden Blog					
Forums on the Second Life website					
Scripters mailing list					
SL Developers mailing list					
Open Source Portal					
LSL Portal					
In-world group messages					

30. If you post messages, do you...? Please choose one answer from the drop box.

- Generally post more questions than answering them
- Generally reply more to messages than posting them
- Post and reply to a similar amount of messages
- Always post questions, and never answers others
- Always answer questions, and never pose questions
- NA

31. What do you consider important in order to judge the usefulness of other people's contributions to the discussions? (aside from its content). Please rank in order of preference (1 – Highest, 5 – Lowest). If you consider all equal or if you don't do any of the following, you may skip this question.

	Rank (1 – Highest, 5 – Lowest)
Familiarity with the name of the contributor	
Frequent online contact with the contributor	
The contributor posts a lot	
The contributor has provided personal information in his/her profile	
The contributor is a Linden Lab employee	

32. Distribute 100 points among the following statements regarding your Second Life skills (100 – Highest, 1 – Lowest).

	Distribution 100 points (100 – Highest, 1 – Lowest)
I learn skills from other Second Life members to make a wider variety of content	
Second Life members can learn from how I do things in Second Life	
Linden Lab can learn from the way I do things in Second Life	
I learn a lot from interacting with Linden Lab employees	

33. How often do...?

	100%	75%	50%	25%	0%
Members often ask me to help them in Second Life					
The Lindens on my friends list give faster assistance					
Members value my opinion about Second Life					
Companies ask me to develop their presence in-world					
I announce new developments in the community					

34. How would you rate Linden Lab's response to ...?

	Very good	Sufficient	Neutral	Insufficient	Poor
Customer service					
Feedback from the community					
Purchase and billing information					
Technical issues					
Abuse					
Feature and development requests					

35. What are the best things about Linden Lab? (Optional).

36. What are the worst things about Linden Lab? (Optional).

FIRST LIFE DEMOGRAPHICS

37. What is your gender?

- Male
- Female
- NA

38. Do you reveal your first life identity in Second Life?

- Yes
- No
- NA

39. What is your age? Please enter a number in the box.

40. What is your country of residence? Please choose one answer from the drop box.

- Afghanistan
- ...
- Zimbabwe

41. The following questions ask you about your employment.

What is your employment status?

- Full-time employed
- Part-time employed
- Self-employed / business owner
- Homemaker
- Student, working
- Student, not working
- Unemployed
- NA

What is your employment sector?

- Academic/education
- Arts
- Accountancy, finance, business services
- Broadcast, film
- Engineering
- Fashion
- Games, interactive media
- Government

- Health
- Hospitality
- IT, information systems
- Legal services
- Marketing
- Publishing
- Retail
- Other

What is your annual income (US\$)?

- Below \$30,000
- Between \$30,000-\$49,999
- Between \$50,000-\$74,999
- Between \$75,000-\$99,000
- Between \$100,000-\$149,999
- Above \$150,000
- NA

42. Do you play...?

	Every day	Once/twice a week	Once/twice a month	Rarely	Never
Console / video games					
Handheld games					
Standalone computer games					
MMORPGs					
Mini games on the internet					
Mini games on the mobile phone					

43. Do you think Second Life is a game?

- Yes
- No
- Other

THANK YOU!

Comments or suggestions? *(Optional)*.

For a chance to win L\$ to thank you for your participation, fill out your email address below. *(Optional)*.

E-mail

Thank you for your interest! You are now being directed to Second Life >>>

Interview Guide Firm

Introduction

- Introduction of the research project
- Explain confidentiality
- Discussion will be recorded – is that ok?
- Introduction interviewee: name, gender, position, number of years at firm, background sketch

Performance & management

Role, structure and responsibilities of team

1. What is your role and the roles and responsibilities of those in your team?
2. Sketch organizational chart summarizing which other organizational units your team works with
3. Are there informal networks or interest groups? Are you in touch with particular people inside and outside the firm that may not be part of your team? What do you discuss? What are your sources of information about X or other related interests?
4. How is the performance of your team evaluated? And by whom?

Product innovation & quality (barriers and success factors for strategy X)

1. What are the main management challenges (or barriers) you face?
2. Name two things that you really wished you knew would be important when you started out
3. What approaches do you use to manage change associated with user-generated content? Implementing new functionalities?
4. Describe X (SL), technology employed, new features, quality, costs

Process & strategy standardization

1. Setting performance criteria for service / product (project)
2. Talk me through planning process, highlighting (difficult) issues which occur at each stage
3. Who is involved?
4. How are objectives set? By what are they informed?
5. What types of objectives are set?
6. How well do you think the process works? How could it be improved?
7. How would you describe your level of influence in determining strategic direction in the organization?
8. How is your team regarded by other parts of the business, what do you think is their perception of the importance of strategy X and your contribution is?
9. To what extent is strategy X integrated with other strategy? How does this integration occur?
10. How would you describe the style and culture of the organization in terms of how it develops strategy and how readily it responds to change in the marketplace such as new competitor offerings or new opportunities for using technology or particular kinds of consumer behaviour?

Customer focus

Process – customer focus

1. Employment of structured processes to identify customer needs

System – voice of customer

1. Align competing service / product requirements by focusing on ‘voice of customer’
2. Cultivate staff to provide this kind of service
3. Involve customers early in the service / product development process / moving in the direction of customer needs
4. What defined boundaries have you set that allow for consumer interaction? How do you interact with consumers? On what levels? Can you take me through all the steps (and examples)

Customer involvement

1. Involvement of customers in decisions/what stages about service / product development
2. Are you present? What do you monitor (and sanction)?
3. What are the collective choice mechanisms at work? How are new features added? How is that decided? How are ideas generated?
4. What can be appropriated? How and why? What rules are provided with?
5. Are there any conflict resolution mechanisms in place? How are they employed?

External linkage for learning

1. How do you learn from consumers? What do you learn?
2. How is interaction externally validated and recognized? Translated into internal actions or strategy?

Knowledge exchange

Organization

1. Training, cross-functional teaming
2. Rewarding project teams / groups
3. What do you offer consumers? (e.g. scholarships, training, volunteering)

Tools - shared technology

1. Software for project management
2. Software for process mapping

Documentation

1. Improving/measuring documentation of processes

Knowledge integration

1. View knowledge as a paramount competitive advantage
2. Transfer lessons from external sources (relation to willingness of customers to pay for ‘novelty’)

Debriefing (e.g. recording) & Thank you!

- Introduction of the research project
- Explain confidentiality
- Discussion will be recorded – is that ok?
- Introduction interviewee: name, gender, age, nationality, ethnicity, education, number of years at SL, ownership of computer/mac, consoles (& accessories) background sketch.

Second Life

1. Describe SL, technology employed, features / upgraded features, quality, cost of service / product development and delivery
2. How long have you been a resident of SL? (paid / non-paid)
3. Are you interested in keeping yourself informed about SL? If so, in what? (e.g. events)
4. Where do you get information about (things going on in) SL?
5. What do you do in SL?
6. What do you think of companies buying/selling, marketing events, etc?
7. What have you bought/sold?
8. Do you consider yourself a SL entrepreneur? If so, explain
9. What SL events have you attended? Organized/contributed to?
10. How many friends do you have on your friends list?
11. Can you remember where & when you met them?
12. Are there informal networks or interest groups? Are you in touch with particular people inside and outside SL that may not be part of SL? What do you discuss?
13. What do you learn from other SL residents or other sources? Explain

Interacting with firm

1. Talk me through the moment you start up SL until you exit SL highlighting (difficult) things which occur at each stage
2. Who is involved?
3. Do you have particular objectives? If so, how are they set? By what are they informed?
4. What types of objectives are set?
5. How would you describe your level of influence in SL?
6. How is your avatar regarded by others – both Linden Lab representatives -, what do you think is their perception of the importance of your contribution to SL?
7. How would you describe the style and culture of Linden Lab in terms of how it develops strategy and how readily it responds to change in the marketplace such as new competitor offerings or new opportunities for using technology or particular kinds of consumer behaviour?
8. What are the main challenges (or barriers) you face?
9. Do you interact with the Linden Lab? Why? How?

- needs and translating into SL adjustments?
13. What do you think of Linden Lab's way of incorporating systematic reviews for development & improvement of SL? How do they do it?
 14. Do you feel you have a 'voice' (e.g. development process, in direction of customer needs)? If so, how, explain
 - Involvement of customers in decisions
 - Interaction externally validated and recognized? Translated into internal actions or strategy?
 - What are the collective choice mechanisms for suggestions/feedback etc)?
 - What can be appropriated? How and why? What rules are provided with?
 - How are conflicts resolved?
 15. Is there cultivation of SL residents that provide service / product SL-wide thinking as well as specialized knowledge (e.g. jobs, grants, SL education volunteers)? Tell me more
 16. What do you think Linden Lab can learn from SL residents? Any examples perhaps? Particular names involved?
 17. Do you learn from Linden Lab? What do you learn?
 18. Any words of SL wisdom?

Debriefing (e.g. recording) & **Thank you!**

Linden Lab Interviewees

Linden Lab	Position	Tool	Date
Jim Purbrick (Babbage) ²⁰⁴	Software engineer (e.g. Mono)	Face-to-face	12/1/07
Torley Wong (Torley)	Community/product manager	AOL IM	18/1/07
(Blue)	Teen grid community manager ²⁰⁵	In-world	22/10/07
Andrew Meadows (Andrew)	Software engineer (e.g. Havok4)	In-world	7/11/07
Steve Bennetts (Steve)	Software engineer, Studio director 'Shiny'	In-world	7/11/07
Kent Quirck (Q)	Software engineer	In-world	9/11/07
Brett Atwood (Brett)	Web content editor	Skype	13/11/07
Cory Ondrejka (Cory)	CTO ²⁰⁶	In-world	15/11/07

Second Life User Interviewees

Second Life User	Position/Affiliation	Tool	Date
Sibley Verbeck	CEO Electric Sheep Company	Skype	13/10/06
Adam Pasick	Journalist, Reuters	Phone	19/1/07
Adeel Cave	Unemployed	In-world	11/06/07
Mike Denny	Second Life Teen Grid	Skype	14/11/07
Luca Vidi	CEO Swissopolis	Skype	18/11/07
Dan Miller	Squiggle.com, OpenSim ²⁰⁷	Skype	28/11/07
Stefan Andersson	Co-founder Tribal Media, OpenSim	Skype	28/11/07
Warkirby Magojiro	MagoTek industries, Ferox sandbox	In-world	3/12/07
Strife Onizuka	Scripter, Linden Lab innovation award 2007	In-world	4/12/07
Joel Greenberg	VP Marketing Electric Sheep Company ²⁰⁸	Skype	5/12/07
Christian Scholz (Tao Takashi)	Co-owner COM. Lounge, AWG	Skype	5/12/07
Seifert Surface	University of Texas, Dep. Of Mathematics	In-world	6/12/07
Garrett Cobarr	Media Lingua Group	Skype	3/1/08
Tedd Hansen	Owner NimbusTech AS, OpenSim	Skype	12/2/08

²⁰⁴ Second Life name is between brackets.

²⁰⁵ On 10 December 2008 Blue stopped managing the Teen Grid as this position was dubbed outdated and eliminated.

²⁰⁶ On 19 December 2007 Cory Ondrejka resigned.

Overview Documents

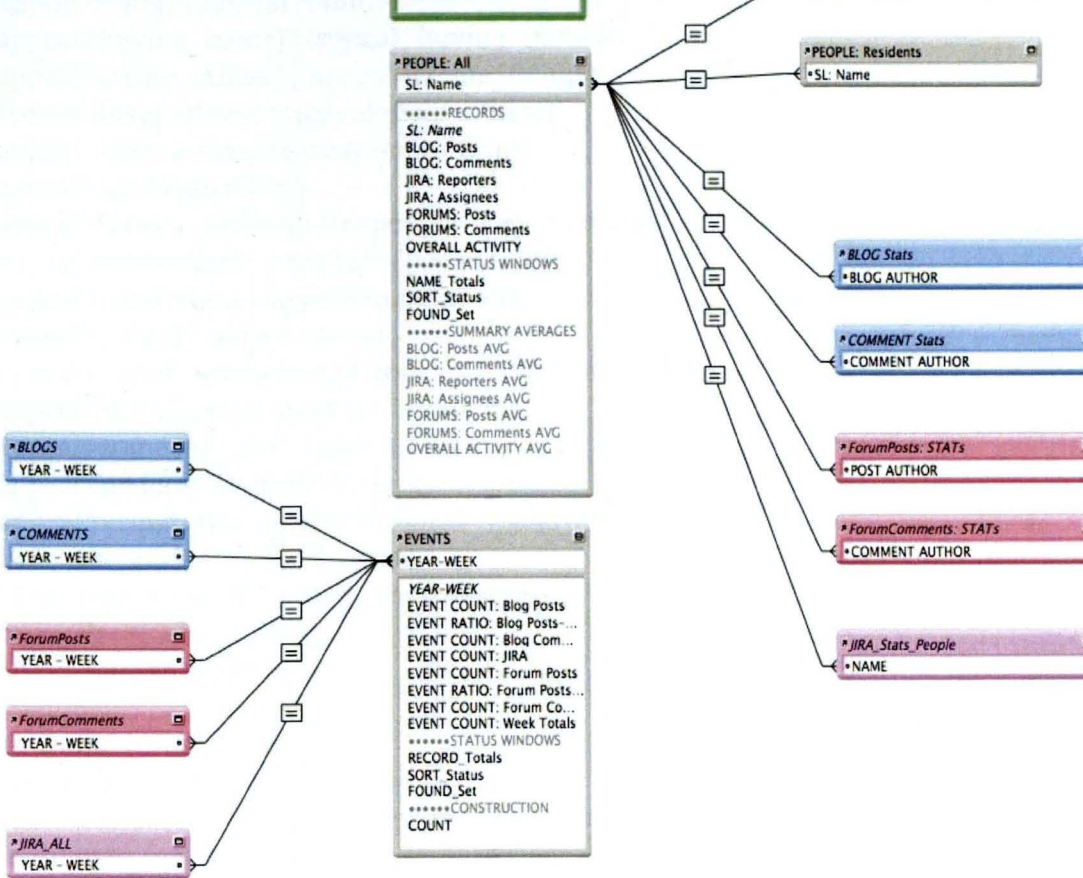
Document Type	Selection	Period	URL
<i>Official Second Life Blog</i>		4/10/04 – 01/02/08	blog.secondlife.com
<i>Second Life Forums</i>	Resident answers	19/11/02 – 01/02/08	forums.secondlife.com
	Animation tips		
	Building tips		
	Texturing tips		
	Scripting library		
	Scripting tips		
	Employment/ help wanted		
	First Look Viewer		
	Beta Test Grid		
	Current version feedback		
	Town hall feedback		
	Feature suggestions		
	Technical issues		
	Linux client alpha tests		
	Lindens asking for feature feedback (archive)		
Linden answers (archive)			
<i>Mailing lists</i>	SLDevelopers	08/01/07 – 01/02/08	lists.secondlife.com
	SLScripters	18/10/05 – 01/02/08	lists.secondlife.com
<i>JIRA</i>	Second Life Viewer	08/01/07 – 01/02/08	jira.secondlife.com
	Second Life Service		
	Second Life Website		
	Second Life Misc Issues		
	Eventlet		
	Mullib		
	Certified HTTP		

Secondary documentary sources

- ◆ Transcripts of the office hours of Andrew Linden (02/10/07 – 01/02/08), Zero Linden (13/02/07 – 01/02/08), and Which Linden (03/01/07 – 01/02/08) made available on wiki.secondlife.com
- ◆ Transcripts of Open Source Meetings (12/07/07 – 01/02/08) and Architecture Working Group (28/09/07 – 31/12/07) that are also made available on wiki.secondlife.com

²⁰⁷ Retired core developer of OpenSim.

²⁰⁸ On 17 December 2007 Joel Greenberg left Electric Sheep.



Coding Scheme

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{infocomm>ask_group_inworld} {/infocomm>ask_group_inworld}
{infocomm>ask_library_inworld} {/infocomm>ask_library_inworld}
{infocomm>ask_linden_inworld} {/infocomm>ask_linden_inworld}
{infocomm>ask_via_im} {/infocomm>ask_via_im}
{infocomm>ask_within_range} {/infocomm>ask_within_range}
{infocomm>beta_tests} {/infocomm>beta_tests}
{infocomm>contributor_frequency} {/infocomm>contributor_frequency}
{infocomm>contributor_linden} {/infocomm>contributor_linden}
{infocomm>contributor_personal_info} {/infocomm>contributor_personal_info}
{infocomm>dev_open_source} {/infocomm>dev_open_source}
{infocomm>email_call_support} {/infocomm>email_call_support}
{infocomm>familiarity_name_contributor} {/infocomm>familiarity_name_contributor}
{infocomm>frequency_posting} {/infocomm>frequency_posting}
{infocomm>frequency_reading} {/infocomm>frequency_reading}
{infocomm>frequent_online_contact} {/infocomm>frequent_online_contact}
{infocomm>knowledge_base} {/infocomm>knowledge_base}
{infocomm>lsl_portal} {/infocomm>lsl_portal}
{infocomm>member_url} {/infocomm>member_url}
{infocomm>official_linden_blog} {/infocomm>official_linden_blog}
{infocomm>open_source_portal} {/infocomm>open_source_portal}
{infocomm>post_read} {/infocomm>post_read}
{infocomm>report_abuse} {/infocomm>report_abuse}
{infocomm>second_life_forums} {/infocomm>second_life_forums}
{infocomm>submit_jira} {/infocomm>submit_jira}
{infocomm>write_url_external} {/infocomm>write_url_external}
{infocomm>you_tube} {/infocomm>you_tube}
{interviews} {/interviews}
{knowledge>competitive_advantage} {/knowledge>competitive_advantage}
{knowledge>information_across_boundaries}
{/knowledge>information_across_boundaries}
{knowledge>information_input_customer} {/knowledge>information_input_customer}
{land} {/land}

```

```

{learning>abuse} {/learning>abuse}
{learning>announce_dev} {/learning>announce_dev}
{learning>asked_by_firms} {/learning>asked_by_firms}
{learning>best_lindenlab} {/learning>best_lindenlab}
{learning>community_feedback} {/learning>community_feedback}
{learning>customer_service} {/learning>customer_service}
{learning>external_into_internal_strategy} {/learning>external_into_internal_strategy}
{learning>feature_dev_requests} {/learning>feature_dev_requests}
{learning>from_customer} {/learning>from_customer}
{learning>linden_from_me} {/learning>linden_from_me}
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{learning>skills_other_members} {/learning>skills_other_members}
{learning>tech_issues} {/learning>tech_issues}
{learning>worst_lindenlab} {/learning>worst_lindenlab}
{marketing} {/marketing}
{movies_machinima} {/movies_machinima}
{partnership>3rd_parties} {/partnership>3rd_parties}
{partnership>learning} {/partnership>learning}
{partnership>licensing} {/partnership>licensing}
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{process>corporate_culture} {/process>corporate_culture}
{process>corporate_culture>hype} {/process>corporate_culture>hype}
{process>corporate_culture>studios} {/process>corporate_culture>studios}
{process>corporate_culture>tao} {/process>corporate_culture>tao}
{process>internal_communication} {/process>internal_communication}
{process>jira_internal} {/process>jira_internal}
{process>level_of_influence} {/process>level_of_influence}
{process>love_machine} {/process>love_machine}
{process>perception_your_importance} {/process>perception_your_importance}
{process>performance>havok4} {/process>performance>havok4}
{process>performance>opensource} {/process>performance>opensource}
{process>performance>work_load} {/process>performance>work_load}
{process>performance_criteria} {/process>performance_criteria}
{process>planning_process} {/process>planning_process}
{process>process_improvement} {/process>process_improvement}
{process>recognition_competition} {/process>recognition_competition}
{process>set_objectives} {/process>set_objectives}
{process>strategy_integration} {/process>strategy_integration}
{process>team_regarded_internal} {/process>team_regarded_internal}
{process>types_of_objectives} {/process>types_of_objectives}
{product_innovation>adoption_strategy} {/product_innovation>adoption_strategy}
{product_innovation>change_ugc} {/product_innovation>change_ugc}
{product_innovation>internal_use_sl} {/product_innovation>internal_use_sl}
{product_innovation>management_challenges}
{/product_innovation>management_challenges}

```

```

{product_innovation>things_of_importance}wish you would have known when starting
out{/product_innovation>things_of_importance}
{sl>technology} {/sl>technology}
{team>background} {/team>background}
{team>choice_of_work} {/team>choice_of_work}
{team>early_linden_lab} {/team>early_linden_lab}
{team>external_contact} {/team>external_contact}
{team>hierarchy} {/team>hierarchy}
{team>hierarchy>labour} {/team>hierarchy>labour}
{team>informal_networks} {/team>informal_networks}
{team>job_description} {/team>job_description}
{team>learning_from_peers} {/team>learning_from_peers}
{team>performance_measurement} {/team>performance_measurement}
{team>role}role and the roles and responsibilities of those in your team{/team>role}
{team>role>hiring} {/team>role>hiring}
{team>training} {/team>training}
{team>website} {/team>website}
{urls} {/urls}
    
```

Screenshot

Example code tags SL forum post

The screenshot shows a forum post on the 'Second Life Analysis: Forum Posts' board. The post is titled 'A difficult challenge: Rez, then Rez back' and was posted by Karyna Jie on 10/30/2007 at 07:31:00. The post content discusses a script challenge involving rez objects and switching between them. The comment thread includes responses from Jesse Barnett and Karyna Jie, with Jesse Barnett providing a solution to the problem.

Forum Post Content:

DESCRIPTION TAG
A difficult challenge: Rez, then Rez back

FORUM THREAD TITLE: 220084 Scripting Tips 23

FORUM POST AUTHOR: Karyna Jie **POST DATE:** 10/30/2007 07:31:00

DESCRIPTION TAG
 A difficult challenge: Rez, then Rez back Hi guys, I'm in a bit of a kerfuffle here... *sigh* I made a simple rez script that would rez an object, then kill the rezzer. OK, fine... not a problem... but the problem is... I need to be able to rez the original rezzer from that new object, basically being able to switch back and forth between the two... I tried putting the script in each object, then the objects in each other... but this will only allow it to rez as many times as I have 'layers' of objects. ie. 1-2-1-2-1-2... 2 was empty, so nothing. I considered using switching alphas, but object 2 is a vehicle, so it may cause problems. I considered trying to rez by UUID... but as far as I'm aware - that's not possible (is it?) Basically the script flow should go like this, able to switch between the two objects with a spoken command: ----- OBJECT 1 ----- On_rez, get owner. Listen to owner. On command (from owner), rez OBJECT 2. Kill self. ----- OBJECT 2 ----- On_rez, get owner. Act as vehicle, anyone permitted to drive On command (from owner) rez OBJECT 1. Kill self. Help!! What can I do!! I need to get this script finished by 4pm Tuesday (SLT)... and it's really frustrating me.

FORUM THREAD INITIAL POST TEXT

FORUM COMMENTS:

- Jesse Barnett** (10/31/2007 03:17:00): I don't kill the original object, after three objects or so, it would start giving a 49 or so codes to the new object. Killing the object that gave codes on Obj 1, that strategy will have to be...
- Jesse Barnett** (10/31/2007 03:28:00): OK I don't really understand the purpose of #GiveInventory in this instance. You have 2 objects: A Blue Sphere and a Red Sphere. Why not just have the Red Sphere in the inventory of the Blue Sphere and the Blue Sphere in the inventory of the Red Sphere. That way, when you rez the Blue Sphere, you'll...
- Karyna Jie** (10/31/2007 04:05:00): Well, if you read the first post, I need it to switch between the two. So it rez's the alternate sphere and gives copies of each to it before deleting itself. Then clicking on sphere B replaces sphere B with sphere A. B and A change Blue and Red respectively. The script, originally, had an 'if' that the result...
- Jesse Barnett** (10/31/2007 04:16:00): Counter: Originally Posted by Karyna Jie: Well, if you read the first post, I need it to switch between the two. So it rez's the alternate sphere and gives copies of each to it before deleting itself. Then clicking on sphere B replaces sphere B with sphere A. B and A change Blue and Red respectively. The script...
- Karyna Jie** (10/31/2007 05:54:00): "heats" Maybe the last trip on switching, but I want to...

FORUM THREAD COMMENTS:

FORUM POST STATS: 129923 SORT STATUS: UNSORTED FOUND SET: Found Set - 18

FORUM COMMENT STATS: 23 COMMENTS

FORUM NAME: SL

FORUM TAGS: LSL, Rez, #GiveInventory

FORUM ACTIONS: OPEN FIND, EXECUTE FIND, SHOW ALL RECORDS, CANCEL FIND

FORUM FILTERS: POST DATE, LABEL TAG, FORUM NAME, POST DATE, POST AUTHOR, COMMENT TOTAL

Appeal of Second Life: Rank

Kendall's W Test

Ranks

	Mean Rank
Making money	3.99
Creating things	2.55
Socializing with other members	2.40
Buying items for avatar or land	4.27
Attending in-world events	3.97
Visual appearance of avatar or home	3.81

Test Statistics

N	420
Kendall's W ^a	.186
Chi-Square	389.618
df	5
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Note. This Kendall's W Test is exemplary for other similar tests performed in this study.

Cluster Analysis

Overall, the matrix showed sufficient collinearity between variables but not where two or more variables were very closely linearly related (above .7; Field, 2005). No underlying structure of groups of variables that would distort the cluster solution in a major way, was expected (Field, 2005; Pallant, 2005).

	Hrs	B	T	S	V	Rb	Rf	Rs	Rd	Ro	Rl	Ri	Pb	Pf	Ps	Pd	Po	Pl	Pi
Hrs ^b	1																		
B ^c	-.370 **	1																	
T ^c	-.361 **	.691 **	1																
S ^c	-.380 **	.367 **	.324 **	1															
V ^c	-.229 **	.271 **	.327 **	.464 **	1														
Rb ^d	-.357 **	.351 **	.377 **	.272 **	.348 **	1													
Rf ^d	-.305 **	.307 **	.324 **	.347 **	.233 **	.426 **	1												
Rs ^d	-.237 **	.373 **	.239 **	.363 **	.371 **	.196 **	.167 **	1											
Rd ^d	.120 *	.306 *	.202 **	.309 **	.405 **	.318 **	.143 **	.723 **	1										
Ro ^d	-.396 *	.127 **	.311 **	.335 **	.497 **	.262 **	.355 **	.585 **	.625 **	1									
Rl ^d	-.283 **	.273 **	.338 **	.621 **	.321 **	.327 **	.165 **	.498 **	.408 **	.534 **	1								
Ri ^d	-.360 **	.307 **	.394 **	.310 *	-.221 **	.477 **	.321 **	.317 *	.307 *	0.07 **	.326 **	1							
Pb ^e	-.256 **	.238 **	.347 **	.157 **	.293 **	.383 **	.255 **	.150 **	.390 **	.342 **	.197 **	.306 **	1						
Pf ^e	-.166 **	.288 **	.302 **	.301 *	.268 **	.354 **	.641 **	.076 **	.177 **	.215 *	.346 **	.334 **	.473 **	1					
Ps ^e	-.034 *	.318 *	.295 **	.254 **	.346 **	.158 **	.121 *	.640 **	.517 **	.455 **	.318 **	.289 **	.354 **	.329 **	1				
Pd ^e	-.304 *	.096 *	.297 **	.233 **	.361 **	.357 **	.090 **	.469 **	.581 **	.475 **	.3261 **	.263 **	.349 **	.395 **	.696 **	1			
Po ^e	-.067 **	.076 **	.365 **	.383 **	.355 **	.150 **	.326 **	.406 **	.469 **	.574 **	.274 **	.230 **	.427 **	.439 **	.520 **	.686 **	1		
Pl ^e	-.290 **	.101 *	.150 **	.365 **	.357 **	.342 **	.079 **	.426 **	.444 **	.469 **	.393 **	.048 **	.377 **	.429 **	.656 **	.629 **	.697 **	1	
Pi ^e	-.346 **	.331 **	.273 **	.187 **	.309 *	.320 **	.325 **	.133 **	.321 *	.310 *	.160 **	.541 **	.348 **	.386 **	.215 **	.391 **	.267 **	.378 **	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

^b Hrs=Average in-world hours per week.

^c B=Build; T=Texture; S=Script; V=Viewer open source.

^d Rb=Read Official Linden Lab Blog; Rf=Read Second Life Forums; Rs=Read Scripters Mailing List; Rd=Read Developers Mailing List; Ro=Read Open Source Portal; Rl=Read LSL Portal; Ri=Read in-world group messages.

^e Pb=Post Official Linden Lab Blog; Pf=Post Second Life Forums; Ps=Post Scripters Mailing List; Pd=Post Developers Mailing List; Po=Post Open Source Portal; Pl=Post LSL Portal; Pi=Post in-world group messages.

Distances between final cluster centers^a

	C_1	C_2	C_3	C_4	C_5	C_6
C_1	-					
C_2	4.819	-				
C_3	3.460	5.202	-			
C_4	4.801	8.519	5.369	-		
C_5	4.397	5.972	3.128	5.435	-	
C_6	5.008	4.017	3.331	7.180	3.603	-

^a Euclidean distance is used

Final cluster centres

	C_1	C_2	C_3	C_4	C_5	C_6	ANOVA ^a
	<i>n</i> =67 15%	<i>n</i> =112 26%	<i>n</i> =74 17%	<i>n</i> =38 9%	<i>n</i> =48 11%	<i>n</i> =95 22%	F (p-value)
Hrs^b	2	2	4	4	3	3	48.996
B^c	2	3	1	1	2	1	51.034
T^c	2	4	2	1	2	2	34.805
S^c	2	4	2	2	2	4	76.698
V^c	3	4	4	3	4	5	27.182
Rb^d	2	3	2	1	1	2	43.983
Rf^d	3	3	3	2	1	2	38.567
Rs^d	3	5	4	2	4	5	132.737
Rd^d	3	5	4	2	5	5	101.924
Ro^d	3	5	4	3	4	5	67.380
Rl^d	2	4	3	2	2	5	122.101
Ri^d	2	3	1	1	1	1	33.074
Pb^e	4	5	4	3	3	4	39.104
Pf^e	4	5	4	3	2	3	80.942
Ps^e	4	5	5	3	5	5	81.804
Pd^e	5	5	5	3	5	5	81.019
Po^e	5	5	5	4	5	5	55.697
Pl^e	5	5	5	3	5	3	74.872
Pi^e	4	4	2	2	2	3	44.192

^a F-values printed in bold are significant ($p < .001$)

^b Hrs=Average in-world hours per week. Values range from 1-5 (1= \leq 8; 2=9-15; 3=16-24; 4=25-40; 5=41+)

^c B=Build; T=Texture; S=Script; V=Viewer open source. Values range from 1-5 (1=I do it repeatedly; 2=I have; 3=I would like to; 4=neutral; 5=I would never do it)

^d Rb=Read Official Linden Lab Blog; Rf=Read Second Life Forums; Rs=Read Scripters Mailing List; Rd=Read Developers Mailing List; Ro=Read Open Source Portal; Rl=Read LSL Portal; Ri=Read in-world group messages. Values range from 1-5 (1=everyday; 2=once/twice a week; 3=once/twice a month; 4=rarely; 5=never)

^e Pb=Post Official Linden Lab Blog; Pf=Post Second Life Forums; Ps=Post Scripters Mailing List; Pd=Post Developers Mailing List; Po=Post Open Source Portal; Pl=Post LSL Portal; Pi=Post in-world group messages. Values range from 1-5 (1=everyday; 2=once/twice a week; 3=once/twice a month; 4=rarely; 5=never)

Note. Average z-scores and ANOVA results are also available upon request.

Membership Clusters

Year of registration

Descriptives

Year of registration											
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum			
					Lower Bound	Upper Bound					
1	67	3.81	1.118	.137	3.53	4.08	1	5			
2	112	4.26	.898	.085	4.09	4.43	1	5			
3	74	3.59	.992	.115	3.36	3.82	1	5			
4	38	3.58	1.200	.195	3.18	3.97	1	5			
5	48	3.54	.922	.133	3.27	3.81	1	5			
6	95	3.59	.928	.095	3.40	3.78	1	5			
Total	434	3.79	1.024	.049	3.69	3.89	1	5			

Test of Homogeneity of Variances

Year of registration

Levene Statistic	df1	df2	Sig.
1.570	5	428	.167

ANOVA

Year of registration

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	35.944	5	7.189	7.361	.000
Within Groups	417.976	428	.977		
Total	453.919	433			

One-way between-groups ANOVA with post-hoc test

Year of registration: $F(5, 428) = 7.361, p < .001, \omega^2 = 0.06$. Despite reaching statistical significance, the actual difference in mean scores between clusters was quite small. Post-hoc comparisons using the Tukey HSD test reported that the mean score for cluster 2 ($M = 4.26, SD = .898$) was significantly different from all the other clusters, respectively cluster 1 ($M = 3.81, SD = 1.118$) cluster 3 ($M = 3.59, SD = .992$), cluster 4 ($M = 3.58, SD = 1.200$), cluster 5 ($M = 3.54, SD = .922$), and cluster 6 ($M = 3.59, SD = .928$).

Note. This membership cluster is exemplary for other similar tests performed in this study.

Reliability of Built-in Viewer

Item Statistics

	Mean	Std. Deviation	N
Build	1.8180	1.12562	434
Texturing	2.4309	1.24432	434
Scripting	2.9171	1.32572	434
Linden Script Language	2.3018	1.12237	434
Sculptable primitives	2.5876	1.16450	434
XML functionality	2.9032	.97300	434
Animations	2.2442	1.07255	434
Textures	1.8710	.95726	434
Appearance editor	2.0760	1.09005	434
Terraforming tools	2.6129	1.15633	434
Uploading and file format	2.2880	1.15036	434

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Build	24.2327	39.324	.390	.750
Texturing	23.6198	39.105	.350	.756
Scripting	23.1336	40.758	.212	.776
Linden Script Language	23.7488	37.579	.528	.733
Sculptable primitives	23.4631	38.249	.451	.742
XML functionality	23.1475	40.283	.395	.750
Animations	23.8065	39.025	.442	.744
Textures	24.1797	38.439	.569	.731
Appearance editor	23.9747	39.286	.412	.747
Terraforming tools	23.4378	38.436	.442	.744
Uploading and file format	23.7627	38.500	.440	.744

Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.144	17.412	17.412	11.144	17.412	17.412	4.950	7.735	7.735
2	5.746	8.978	26.390	5.746	8.978	26.390	4.432	6.925	14.659
3	4.364	6.819	33.210	4.364	6.819	33.210	4.246	6.635	21.294
4	3.054	4.772	37.981	3.054	4.772	37.981	4.135	6.462	27.756
5	2.265	3.540	41.521	2.265	3.540	41.521	3.792	5.925	33.680
6	2.171	3.391	44.912	2.171	3.391	44.912	2.758	4.309	37.990
7	2.041	3.190	48.102	2.041	3.190	48.102	2.430	3.797	41.787
8	1.651	2.579	50.681	1.651	2.579	50.681	2.386	3.729	45.516
9	1.500	2.344	53.025	1.500	2.344	53.025	2.051	3.205	48.721
10	1.390	2.171	55.197	1.390	2.171	55.197	2.032	3.175	51.895
11	1.309	2.046	57.243	1.309	2.046	57.243	1.903	2.973	54.868
12	1.207	1.887	59.129	1.207	1.887	59.129	1.866	2.916	57.784
13	1.152	1.800	60.929	1.152	1.800	60.929	1.671	2.611	60.395
14	1.112	1.738	62.667	1.112	1.738	62.667	1.312	2.050	62.445
15	1.050	1.640	64.307	1.050	1.640	64.307	1.192	1.862	64.307
16	.994	1.553	65.860						
17	.967	1.512	67.372						
18	.954	1.491	68.862						
19	.910	1.423	70.285						
20	.853	1.333	71.618						
21	.811	1.268	72.886						
22	.801	1.252	74.138						
23	.754	1.179	75.316						
24	.710	1.110	76.426						
25	.701	1.095	77.521						
26	.681	1.064	78.586						
27	.638	.997	79.583						
28	.616	.962	80.545						
29	.588	.918	81.463						
30	.575	.898	82.361						
31	.566	.884	83.246						
32	.561	.877	84.122						
33	.534	.834	84.956						
34	.522	.815	85.772						
35	.511	.798	86.570						
36	.497	.776	87.345						
37	.472	.738	88.084						
38	.449	.702	88.786						
39	.444	.693	89.479						
40	.435	.680	90.159						
41	.426	.665	90.824						
42	.416	.651	91.474						
43	.400	.624	92.099						
44	.383	.599	92.697						
45	.370	.578	93.275						
46	.357	.557	93.832						
47	.344	.537	94.370						
48	.317	.496	94.865						
49	.312	.488	95.354						
50	.303	.474	95.827						
51	.280	.438	96.265						
52	.274	.428	96.693						
53	.262	.409	97.102						
54	.240	.375	97.477						
55	.235	.368	97.845						
56	.220	.344	98.189						
57	.200	.313	98.502						
58	.196	.306	98.808						
59	.189	.296	99.104						
60	.157	.245	99.349						
61	.130	.203	99.552						
62	.114	.178	99.729						
63	.095	.148	99.877						
64	.079	.123	100.000						

Extraction Method: Principal Component Analysis.

Monte Carlo Parallel Analysis

Eigen (E) #	Random E	Standard Dev
1	1.8672	.0400
2	1.7984	.0321
3	1.7434	.0283
4	1.6937	.0271
5	1.6533	.0267
6	1.6120	.0232
7	1.5726	.0227
8	1.5392	.0185
9	1.5085	.0177
10	1.4776	.0181
11	1.4487	.0168
12	1.4178	.0171
13	1.3891	.0164
14	1.3621	.0155
15	1.3382	.0146
16	1.3111	.0145
17	1.2871	.0157
18	1.2622	.0134
19	1.2387	.0133
20	1.2157	.0127
21	1.1918	.0131
22	1.1692	.0129
23	1.1480	.0135
24	1.1274	.0142
25	1.1065	.0130
26	1.0864	.0121
27	1.0657	.0138
28	1.0442	.0118
29	1.0254	.0124
30	1.0069	.0114
31	0.9874	.0119
32	0.9686	.0124
33	0.9514	.0104
34	0.9334	.0108
35	0.9158	.0121
36	0.8982	.0123
37	0.8794	.0123
38	0.8627	.0121
39	0.8429	.0115
40	0.8267	.0125
41	0.8097	.0121
42	0.7909	.0111
43	0.7763	.0105
44	0.7596	.0107
45	0.7425	.0108
46	0.7247	.0096
47	0.7087	.0102
48	0.6919	.0099
49	0.6752	.0109
50	0.6597	.0094
51	0.6437	.0105
52	0.6284	.0109
53	0.6107	.0113
54	0.5965	.0110
55	0.5799	.0124
56	0.5648	.0112
57	0.5461	.0110
58	0.5306	.0118
59	0.5142	.0114
60	0.4952	.0110
61	0.4761	.0107
62	0.4573	.0101
63	0.4390	.0116
64	0.4174	.0121
65	0.3868	.0162

Note. Number of variables: 65; number of subjects: 421; number of replications: 100.

Component Matrices

Component Matrix^a

	Component							
	1	2	3	4	5	6	7	8
Read open source portal	.620		-.374		-.158	-.152		.181
Read scripters mailing list	.619	.142	-.239	-.102	-.135		-.161	.104
Read LSL portal	.611		-.170	-.324		-.158	.107	-.192
Read developers mailing list	.604		-.377		.166			.248
Post scripters mailing list	.604	.129	-.402	.245	-.305		-.240	
Like to build, script, and/or texture	.602	-.223	.310	-.326			-.122	
Script internal	.594	-.157		-.538			.104	-.304
Post LSL portal	.594	.143	-.430	.272	-.251		-.130	
Post developers mailing list	.591		-.441	.313	-.293		-.189	
Script external	.584	-.139	-.174	-.478			.184	-.252
Post open source portal	.570		-.450	.338	-.317		-.145	
Texture build	.570	-.336	.362	-.102	-.142	.294	-.302	
Participation in beta tests	.562	-.222			.200		.161	
Develop Second Life open source	.557	.161	-.325	-.268			.229	.164
Viewer source code	.546	.103	-.366	-.238			.235	
Texture design	.543	-.361	.354	-.146	-.217	.335	-.280	
Vehicles and physics	.525	-.150		-.334		.282	.197	-.234
Build	.512	-.315	.438	-.180		.139	-.244	-.131
In-world games	.511		-.172	-.189		.129	.155	-.197
Help others with building, scripting and texturing	.508		.189	-.181			-.264	
Machinima	.492			-.131		.386	.281	
Read Official Linden Lab Blog	.469	-.212	.190		.173	-.426		
Post Official Linden Lab Blog	.466	-.227		.364		-.281		
Asked to help others	.463	-.265	.156	.272	.183			-.178
JIRA (Public bug tracker)	.460	-.197			.250	-.241		
Submit bugs and features to JIRA	.460	-.188			.177	-.260		
Companies ask to develop in-world presence	.448		-.215	.314		.365	.150	
Post in-world group messages	.423	-.308	.167	.251	.234	-.151		
Modify Second Life Open Source	.417	.172	-.224	-.177		-.106		.338
Opinion about Second Life is valued by other members	.401	-.195	.148	.387	.283	.143		-.126
Report abuse	.377	-.268	.232	.133	.181	-.192		
Linden Script Language	.362	.355	.285	-.245	-.140	-.129	.268	-.168
Post Second Life info on YouTube, Flickr, etc	.350			.204	.339	.276	.305	.242
Artwork	.347	-.278	.340		-.114	.324	-.220	.158
Read Second Life forums	.336	-.208	.178	.142		-.328		-.133
Build a reputation	.322		.123	.197	.162			.223
Animate and gesture	.275		.181			.120		
Response to customer service	.211	.699			.259	.109	-.232	-.142
Response to feedback from the community	.189	.669			.237	.158	-.231	-.149
Response to technical issues	.208	.838			.238		-.316	-.121
Response to abuse	.176	.580			.291	.114	-.287	
Response to feature and development requests	.281	.579			.324		-.221	
Teleporting		.567	.218					
Public Issue Tracker	.194	.563			.161	-.159		
Response to purchase and billing information	.190	.537			.216		-.267	
Inventory		.456	.389	.157	-.174		.194	-.134
Sculptable primitives	.334	.374	.168	-.180	-.107		.189	.313
XML functionality	.272	.373			-.143		.247	.276
Terraforming tools	.263	.339	.287	.214	-.195	.108	.286	
Second Life desktop client	.303	.323	.250			-.247	.128	-.108
Textures	.331	.216	.534	.115	-.283			
Animations	.119	.416	.449	.139	-.272		.190	
Appearance editor	.142	.347	.414	.133	-.332		.185	
Uploading and file format	.173	.349	.405	.176	-.197		.213	-.127
Read in-world group messages	.337	-.274	.349	.172	.157	-.220		.120
Clothing and fashion	.289	-.185	.344		-.228	.276	-.169	
Hack to harm others	.224		-.294	.292	-.161	.279	.122	-.267
Enjoy social interactions with others	.200	.119	.281	.171	.182	-.124		.146
Announcing new developments in community	.390	-.115	-.115	.397	.158	.283	.278	
Lindens on friend list give faster assistance	.278	.105	-.243	.376	.102	.220	.125	-.123
Post Second Life forums	.354	-.277	.108	.372		-.291		-.222
Write about Second Life on blog, website, etc	.378			.145	.389	.169	.182	.229
Retain IP rights	.252		.188					.444
Innovative	.255	-.177	.206		.147	-.160		.334

Extraction Method: Principal Component Analysis.

^a. 8 components extracted.

Rotated Component Matrix^a

	Component							
	1	2	3	4	5	6	7	8
Post open source portal	.851		.128				.163	
Post developers mailing list	.845		.117				.164	
Post scripters mailing list	.831	.115	.150		.143			
Post LSL portal	.791	.152	.129		.137		.162	
Read developers mailing list	.648	.270		.100				.305
Read open source portal	.617	.373	.114					.288
Read scripters mailing list	.586	.333	.109	.143	.189			.212
Script internal		.816	.233	.230				
Script external	.143	.808	.154	.139				
Read LSL portal	.298	.660	.204					
Vehicles and physics		.645		.317			.237	
Viewer source code	.355	.571					.182	.258
Develop Second Life open source	.327	.562			.104		.149	.371
In-world games	.177	.531		.111			.249	
Read Official Linden Lab Blog		.204	.658	.123			-.117	.119
Post in-world group messages			.599	.192			.200	
Post Second Life forums	.216		.582		-.170	.138	.100	-.210
Read in-world group messages			.576	.247				.165
Post Official Linden Lab Blog	.386		.563				.112	
Report abuse			.545	.154			.124	
Read Second Life forums	.106		.538					
Asked to help others		.108	.516	.198			.332	-.122
Submit bugs and features to JIRA	.139	.249	.494					.116
JIRA (Public bug tracker)		.312	.486					.159
Participation in beta tests	.115	.358	.423	.127			.276	.145
Enjoy social interactions with others			.294		.116	.236	.135	.236
Build a reputation	.104		.289	.138	.128		.207	.258
Texture design	.108	.162	.157	.853				
Texture build	.102	.151	.237	.823				
Build		.242	.325	.719				
Artwork			.131	.663			.178	
Clothing and fashion				.613		.125		
Like to build, script, and/or texture		.417	.285	.597				.112
Help others with building, scripting and texturing	.132	.230	.244	.486	.157			.115
Animate and gesture		.105		.307				.120
Response to customer service					.796	.167		
Response to technical issues					.774	.157		
Response to feedback from the community	.125		-.128		.763	.135		
Response to abuse					.733			
Response to feature and development requests		.107			.729	.112		.141
Response to purchase and billing information					.655	.137		
Public Issue Tracker		.106		-.157	.496	.295		.191
Animations						.703		
Appearance editor				.136		.668		
Inventory					.182	.668		
Uploading and file format					.113	.645		
Textures			.221	.299		.629		
Terraforming tools						.604	.237	
Linden Script Language		.422			.156	.556		
Teleporting					.371	.474		
Second Life desktop client		.154	.250		.212	.451		
Announcing new developments in community	.179		.178				.665	
Post Second Life info on YouTube, Flickr, etc			.154				.625	.292
Companies ask to develop in-world presence	.324			.140			.614	
Opinion about Second Life is valued by other members			.439	.164			.506	-.101
Write about Second Life on blog, website, etc			.261	.100			.501	.307
Lindens on friend list give faster assistance	.285				.145		.496	-.135
Machinima		.443		.245			.459	.117
Hack to harm others	.361		-.101				.388	-.328
Retain IP rights				.251				.484
Sculptable primitives		.203			.135	.394		.467
Modify Second Life Open Source	.328	.272			.126			.463
Innovative			.202		.178	.134		.450
XML functionality	.143	.166				.401		.405

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
^a. Rotation converged in 9 iterations.

Component Score Covariance Matrix

Component	1	2	3	4	5	6	7	8
1	1.000	.000	.000	.000	.000	.000	.000	.000
2	.000	1.000	.000	.000	.000	.000	.000	.000
3	.000	.000	1.000	.000	.000	.000	.000	.000
4	.000	.000	.000	1.000	.000	.000	.000	.000
5	.000	.000	.000	.000	1.000	.000	.000	.000
6	.000	.000	.000	.000	.000	1.000	.000	.000
7	.000	.000	.000	.000	.000	.000	1.000	.000
8	.000	.000	.000	.000	.000	.000	.000	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

Note. More data concerning PCA is available upon request.

Retrieval/Supply Frequency

Frequency posting inf

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Generally post more questions than answering	37	8.5	8.5	8.5
Generally reply more than posting	161	37.1	37.1	45.6
Post and reply to similar amount of messages	128	29.5	29.5	75.1
Always post questions never answer	5	1.2	1.2	76.3
Always answer questions, never pose questions	19	4.4	4.4	80.6
"Not Applicable"	84	19.4	19.4	100.0
Total	434	100.0	100.0	

Blog

Screenshot

Database Official Second Life Blog

Second Life Analysis: Linden Blogs - Author Statistics

Blog Count - Descending		LINDEN BLOGS		BLOG COMMENTS		BLOG COMMENT STATS			
98	ALL - Blog Authors - 98	SL				FIRST	PREV	NEXT	LAST
BLOG AUTHOR	BLOG COUNT	COMMENT TOTAL	COMMENT RATIO	ACTIVE FACTOR	LINDEN COMMENT				
Torrey Linden	162	8509	52.52	8,509.00	402				
Joshua Linden	87	12649	145.39	12,649.00	140				
Jeska Linden	84	6724	80.05	6,724.00	131				
Robin Linden	82	8285	101.04	8,285.00	52				
Teepie Linden	80	747	9.34	747.00	6				
Babbage Linden	64	1200	18.75	1,200.00					
Cory Linden	47	1623	34.53	1,623.00					
Jack Linden	47	3428	72.94	3,428.00	14				
Jesse Linden	41	4976	121.37	4,976.00	6				
Kate Linden	38	592	15.58	592.00	2				
Cyn Linden	36	861	23.52	861.00	1				
Ben Linden	33	239	7.24	239.00	6				
Blue Linden	33	5293	160.39	5,293.00	6				
Steve Linden	33	4811	145.79	4,811.00	29				
Chadrick Linden	32	1352	42.25	1,352.00	57				
Jean Linden	32	1951	60.97	1,951.00	1				
Sidewinder Linden	28	1791	63.96	1,791.00	335				
Matthew Linden	25	0	0.00	0.00	1				
Maurice Linden	25	1039	41.56	1,039.00	6				
Philip Linden	24	1460	60.83	1,460.00	4				
DESCEND	DESCEND	DESCEND	DESCEND	DESCEND	DESCEND				
ASCEND	ASCEND	ASCEND	ASCEND	ASCEND	ASCEND				
	15	988	63.43	988.20	25				

100% Browse