Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2009 Doctoral Consortium

Americas Conference on Information Systems (AMCIS)

2009

Can 3D Virtual Worlds Address Healthcare Issues? Development, Delivery, Efficacy and Motivations to Use

Nitin Walia

University of Wisconsin - Milwaukee, npwalia@uwm.edu

Follow this and additional works at: http://aisel.aisnet.org/amcis2009_dc

Can 3D Virtual Worlds Address Healthcare Issues? Development, Delivery, Efficacy and Motivations to Use

Nitin Walia
Sheldon B. Lubar School of Business
University of Wisconsin-Milwaukee
npwalia@uwm.edu

ABSTRACT

The proposed work, which comprises of three essays, is aimed at developing and testing the efficacy of delivering healthcare services through virtual worlds (with focus on Second Life®). The first essay explores the unique aspects of system (presence) development in virtual worlds (VWs). In our study, multiple cases have been analyzed to investigate the process of systems development in SL projects and contrasted with existing information system development approaches. The second essay develops and empirically examines the efficacy of delivering healthcare services in the 3D virtual world (specifically in Second Life ®), and identify the factors (technological, process and user) that could contribute to the success or failure of such a delivery mechanism The third essay extends the proposed framework (in essay 2) by examining the role of hedonic motivations in adoption of healthcare services in the 3D VW s (specifically in Second Life ®). Contributions to education and research are discussed.

Keywords: Virtual Worlds, Second Life®, Grounded Theory, TAM, Social Presence, Telepresence, Intrinsic Motivations, Hedonic Systems

Essay 1:   *The Theory of Organic Emergence of Systems for Building in Virtual Worlds: A Study in Second Life*

INTRODUCTION

Virtual worlds have pushed the boundaries of virtual experience by creating a cyber version of the real world in which participants "live" in the virtual world through their avatars by taking part in social activities, including going to social events such as clubs, discussions, or political meetings, participating in seminars, collaborating, doing business, making objects, buying and selling, and building. One of the most advanced VWs is Second Life® (SL), which has become a prominent example of VW experience. In 2007, SL had more than 13 million registered users and a $75 million (real U.S. dollar) GDP. More than 150 large businesses, such as Sony, IBM, and Cisco, and more than 130 universities around the world have an established presence in SL. The Centers for Disease Control and Prevention is also experimenting with SL in order to reach a wider audience. Adoption of SL is also prevalent in other parts of the world. Numerous universities and companies across the globe have created a presence in SL.

RESEARCH QUESTION AND MOTIVATION

Building a presence in SL requires building the environment that includes (simulated) physical structures, avatars, and objects that represent the entity such as the company, the university campus, the entertainment center, or the clinic with the multimedia capabilities of SL. Building a presence in SL is tantamount to creating a system. Although there are numerous such systems (or presence) in existence in VWs, there is no investigation about how to create such systems. To our knowledge, there is no published research study exploring the differences, if any, between the process of systems development in VWs (specifically in SL) and that of the known system development methodologies, such as systems development life cycle or prototyping, a gap addressed in this work. Hence, the research questions in this study are: What is the process of developing a presence in VWs (with focus on SL as the exemplar)? And, what are, if any, unique aspects of developing a presence in such environments?

To answer these questions, we carried out a case study of 21 organizations that have a presence in SL. We conducted in-depth interviews of the leader/stakeholder. The method of analysis is the grounded theory. Our results show that the development process in SL has many unique features, which have led us to propose a new approach to systems development—*organic emergence of systems*. This work makes a number of contributions to research and practice. VWs constitute a new environment that is fertile ground for novel applications and creative initiatives. Identifying and

conceptualizing development process in VW provides an insight into systems development in emerging, novel, and unstable environments. It provides a glimpse into the *how, when, who* aspects of an emerging process, and the chaotic creative process that accompanies it. We learn how thought leaders and champions of creativity deal with the uncertainty of resources and results in such environments. The conceptual result of our work—*organic emergence of systems*—offers a new method for developing systems for emerging environments. This work also contributes to practice by identifying the unique aspects of such a development process and an understanding of the process of creating a presence in SL as an exemplar of VWs.

RESEARCH METHODOLOGY

The conceptualization of a new phenomenon should be informed by the process of theory building. Whetten (1989) argues that a theory has four primary building blocks: (i) what—the salient factors that should be considered, (ii) how—the relationships and patterns that connect the factors and provide a conceptual structure, (iii) why—the underlying rationale and logic for the saliency of factors and their relationships, and (iv) who, where, and when—temporal and contextual conditions that limit the generalizabiliy of the theory. "What and How describe and only Why explains" (Whetten, 1989, p. 491). Yin (2003) observes that when the intention is to investigate "how" and "why" questions, case study method is the preferred approach. This study focuses on what, how and why—what steps are involved in building a system in SL, how these steps are connected, and why the process of developing systems in SL may be different from the traditional systems development process.

Multiple definitions of case study exist in literature (Benbasat et al., 1987). Benbasat et al. (1987) states, "A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)." According to Yin (2003), "A case study is an empirical inquiry that investigates a contemporary phenomenon within real-life context, especially when the boundaries between phenomenon and context are not clearly evident." Based on the above, the case study approach is ideal when (1) "how" and "why" need to be answered, (2) ambiguity exits between a phenomenon and its context, and (3) there is need to account for uncertainty (Yin, 1999; Yin, 2002). Furthermore, a case study defines a study's design and can combine multiple methods of data collection (archives, interviews, questionnaires, and observations). According to Eisenhardt (1989), case studies can be employed to provide description, test theory, or generate theory (Gersick, 1988). The focus of this research is to study describe and generate theory. Hence, we use the case study approach for data collection and the grounded theory for analyzing the results of case studies.

Grounded theory is defined as "the discovery of theory from data" (Glaser and Strauss, 1999, pp.1), which is a "discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data" (Martin and Turner, 1986, pp. 1411). The grounded theory approach involves employing a systematic set of procedures and simultaneous processes of data collection and analysis to develop a theory about a phenomenon that is grounded in the data analysis (Strauss and Corbin, 1998). Researchers employ this approach to produce "conceptually dense" theories that consist of relationships among concepts representing "patterns of action and interaction between and among various types of social units" (Strauss and Corbin, 1998, p. 278). Grounded theory involves an iterative interplay between data collection and analysis through comparative case-oriented explanation-building and analysis in order to examine causal factors and patterns (Zahedi et al., 2006).

Ideally, there should be no theory under consideration and no hypothesis to test limiting bias in the findings. Although it is impossible to achieve this ideal of a clean theoretical slate, an appropriate middle ground suggested by Eisenhardt (1989, p. 536) "is to formulate a research problem and specify some potentially important variables, with some extant literature." Systems development life cycle (SDLC) has a similar set of fundamental phases—planning, analysis, design, and implementation—that appear in various system development approaches, irrespective of their underlying methodology (Dennis et al., 2005). Software development methodologies adopt SDLC phases in distinct manners based on order and focus they place on each SDLC phase, such as linear and pre-panned sequence in traditional waterfall model, iterative use of structured techniques and prototyping as in RAD, iterative and adaptive development as in agile methods and spiral and concurrent in other hybrid technologies (McConnell, 1996; Boehm and Turner, 2004). Thus, as a starting point of this research, we used these phases as a partial structure for conducting data collection (interviews) and data analysis. In this research, case studies were conducted by interviewing owners/stakeholders of the existing large scale University systems (presence) in SL. The interviews were semi-structured and were formulated based on the potentially important SDLC variables that could play a role in creating such systems.

In this research, case studies were conducted by analyzing the existing SL presence/systems and interviews. The interviews were semi-structured and were formulated based on the potentially important variables that could play a role in creating such

systems. Based on the requirement of the grounded theory, the literature related to the emerging theory is discussed after data analysis.

DATA COLLECTION

We collected data from 21 prominent cases in SL. Case studies were conducted through avatar-to-avatar interviews inside SL on the interviewee site. The interviewees were the major stakeholders, including owners/informers/developers of the system. Interviews lasted between 1.5 to 2 hours. An interview instrument was prepared for starting questions. However, based on the nature of the answers, the questions were altered and additional questions were asked. The medium of interviews was the SL's private chat. Table 1 report a summary of cases.

Table 1. Profile of Cases

Cases	Type	Country of Origin
11	Business (SLB)	US (8), UK(2), Italy (1)
9	Universities	US (5), and Austria, Germany , Korea, UK

DATA ANALYSIS – SUMMARY

In this proposal, because of limitation of space we henceforth provide a summary of our results. A sample consisting of twenty one (educational and business) cases with large scale initiatives in SL was used in the analysis. The method of analysis was the grounded theory. The constant comparison and categorization of results led to structuring results in multiple dimensions, including vision, stakeholders and target audience, objectives, project management, feasibility and requirements analyses, design and building, testing, and success metrics.

We found that systems development in this newly evolving field/technology has limited resemblance to the traditional approaches. The common theme in every stage was significant experimentation and iterative process. Insights and knowledge gained in each iteration are used to alter the project--in some cases, many stages up the stream. The experimentation is not limited to novices and newcomers to SL. Business with years of experience with multiple SL projects reported the same level of experimentation and discovery. Internal stakeholders change and expand, as do external customers and users. With new stakeholders come changes in vision and requirements. Projects management, funding, and scheduling are in a state of flux, changing as the system is built, tweaked, and rebuilt. Design changes and improves as the system is being built. Testing mostly consists of feedback from users of the implemented system. Metrics for system success change as new potentials are discovered. Also, very minor testing approaches were found to exist. The measurement of success was found to be quite difficult. SL systems have the fluidity of a growing organism, changing and expanding as humans involved in these projects, such as owners, builders and users alike, grow in experience and knowledge. These SL projects also reflect some of the unique human dimensions—elements of creativity, aesthetics, art, and play—features that are not emphasized in traditional information systems. Systems grow and emerge alongside the growth of their human players. Hence, the analysis has led to proposing an alternative theory and approach to systems development—*organic emergence of systems*.

LITERATURE REVIEW AND INTEGRATION PHASE

The last phase of the grounded theory involves a review of literature that integrates the emerging theory with existing knowledge and highlights its contributions to the field. For this purpose, we review theories relevant to our results as well as empirical research from diverse fields. There are a number of theories and approaches relevant to our results, including telepresence, social presence, aesthetic design and flow. A detailed discussion and integration of these relevant theories is provided in our complete study.

DISCUSSION AND CONCLUSION

Our analysis has led to proposing an alternative theory and approach to systems development—*organic emergence of systems*. This theory has its support in multiple existing theories and a variety of empirical works in various domains. It draws and integrates concepts from related work in telepresence, social presence, media richness, aesthetic design, organic computing, flow, interactivity, and systems theory. It has support from studies in salient fields, such as virtual reality, virtual experience, and video game development. The approach of organic emergence of systems proposed has significant implications for businesses that are exp loring VW opportunities and the real life businesses that are looking to use VWs to

supplement their real businesses. It provides insight into the development issues and the possible processes they can use to initiate an SL project and successfully complete it. The theory alerts them to the needed flexibility and experimentation for building knowledge and discovering unique applications. They need to understand that the need for redesign is not a failure of the original design. Rather, it is a part of the experimental process inherent in such projects. They should expect to see changes and growth in their vision, stakeholders, requirements, design, and implementation. Success is not to complete the project in the first attempt but to measure the incremental process and growth as the project evolves and the system grows.

Essay 2: Can 3D Virtual Worlds Address Healthcare Issues? Development, Delivery, and Efficacy

INTRODUCTION

During the last decade we have witnessed rapid rise in healthcare cost in conjunction with increased demand for healthcare services, making availability of affordable high quality healthcare services a challenging task. In 2007, healthcare spending in the United States reached $2.3 trillion (nearly 17% of GDP), and was projected to reach $4.2 trillion by 2016 (CHCF, 2005). An estimated 47 million Americans are uninsured, even though the United States spends more on healthcare than any other industrialized nations (The National Health Expenditure Accounts Projections Team, 2007). While it has been acknowledged that the U.S. has the best and most advanced medical technology and care quality, the comparison of outcome measures for healthcare spending does not indicate that the U.S. has necessarily higher performance in healthcare outcomes when compared to those in the G-5 countries (Business Round Table, 2009). This proposal combines the competitive advantages of the U.S—high quality medical services and leadership in IT—to create alternative methods for delivering medical services by leveraging the advantages SL provides.

Past IT related initiatives in healthcare such as telemedicine, telehealth, electronic health records, medical decision support systems, and e-prescribing have been demonstrated to reduce costs and medical errors (Mannan et al., 2006). There has been recent success in the web-based systems for filing prescriptions online and management of health plans (Yurov et al., 2007). Social collaboration technologies have allowed patients to find out about other people's health experience, share information and concerns, and build strong support communities. As emerging technologies augment the healthcare industry, serious concerns inhibit their widespread adoption and acceptability as supplementary channels for delivering healthcare. For example, concerns have been raised about the quality and credibility of information available on internet. In addition, patients can't be expected to have the knowledge and skills to evaluate health-related information. The social collaborative technologies have also been severely limited by the lack of user control, concerns about privacy, and a sense of presence similar to one experienced in real world interactions with healthcare specialists and associates. The majority of these technologies side-step the patient-physician relationship, and hence are not viewed by either healthcare providers or consumers as reliable supplements to the time-honored office visits. More importantly, there has been inadequate rigorous examination of the factors contributing to the success or failure of these technologies to become an integral part of the traditional healthcare delivery processes.

RESEARCH QUESTION AND MOTIVATION

One of the more recent Internet technologies is the development of three-dimensional virtual worlds that simulate real-life experience. Virtual worlds have pushed the boundaries of virtual experience by creating a cyber version of the real world in which participants "live" in the VW world through their avatars by taking part in activities that are part of day-to-day normal life, including buying lands, building homes and offices, going to social events (such as clubs, discussions or political meetings), participating in seminars, buying and selling products, and making products. Visiting a health clinic could also be among such activities. In other words, it is possible to deliver some selected health services through the virtual worlds that closely simulates the real-world patient-physician experience, and hence has the potential of serving as a viable supplement to the traditional healthcare delivery systems. Furthermore, the anonymity of participants in virtual world makes it possible to take innovative approaches for office visits, such as group visits of those who suffer from the same symptoms. It is, therefore, critical to rigorously examine the potential of this channel of health delivery and identify the factors that could make it a viable resource that could increase the capacity of the existing healthcare delivery systems. Thus the research questions examined in this study are: The efficacy of delivering healthcare services in the 3D virtual world. And, Identification of factors (technological, process and user) that could contribute towards (successful) adoption of such a delivery mechanism.

SUPPORTING THEORIES AND RESEARCH FRAMEWORK

For the theoretical development of this research, we rely on the presence theories to provide comprehensive framework to examine multiple aspects of VW based medical services deliver y mechanism. We also draw from online trust, privacy, and TAM literature for specific paths (Bansal et al., 2008; Qiu and Benbasat, 2005).

Presence also known as or telepresence can be defined as the perception of "being there" in an environment by means of a communication medium (Sue and Lee, 2005; Steuer, 1992), while in reality being physically present in another location. Steuer (1992, pp. 75) states "Presence refers to the natural perception of an environment and telepresence refers to the mediated perception of an environment". Telepresence can be sensed by consumers when interacting with virtual product or a virtual store. Previous studies have empirically demonstrated that a strong sense of telepresence results in stronger consumer experience, increased persuasion, higher learning and positive attitude change towards the information or product presented (Li et al. 2001). Hence the theory of telepresence and its antecedents (interactivity and media richness) support the telepresence viability of VW based medical complex.

The theory of social presence, on the other hand, focuses on the resemblance to face-to-face interactions. Social presence is defined as "the extent to which an individual psychologically perceives other people to be physically present when interacting with them" (Carlson and Davis 1998) and posits that a medium that strongly resembles a face-to-face interaction will generate higher feelings of social presence (Jahng et al., 2000). The purpose of social presence is to measure the senses of existence of other in the same environment. Social presence characteristics include perceiving a medium as social, warm, sensitive personal, and direct, based on factors like facial expressions, positioning, posture, dress, non-verbal cues (Jahng et al., 2000). Face-to-face is considered as affording the most social presence, while an email might be considered at a lower end. Thus a communication medium perceived to strongly resemble a human communication will generate higher feelings of social presence (Qui and Benbasat, 2005). The level of social presence desired from a communication media should be based on the task at hand. Thus a task that involves complex communications such as discussion and exchange of complex information requires a high level of social presence. The interactions between patients and physicians are among such complex communications. VW based medical complex with its virtual avatars and complex communication capabilities will have the level of social presence superior to existing Internet technologies. Therefore, social presence theory too supports the argument for the viability of VW medical complex as a suitable environment for patient-physician interactions.

Hence in this research, the synthesis of telepresence and social presence theories provide guidance for building VW based healthcare complex with all the possible interactive and communication capabilities that are feasible in Second Life®. This synthesis in conjunction with TAM (Perceived ease of use and Perceived usefulness), personal innovativeness, self-efficacy, and trust literature also informs the choice of technology variables that will promote and positively influence the positive experience of using VW based healthcare facility. We hypothesize a number of facilitating and inhibiting factors that may influence the experience of operating UWM Collabs medical complex (name of the facility) and consequently its viability. Control variables such as age and education will be used in the model estimation. Details of theoretical arguments for justifying facilitators and inhibitors and perceptions about the experience as well as the list of hypotheses within the model are not reported here due to the space limitation.

RESEARCH METHODOLOGY

<u>UW-Milwaukee Collabs Medical Complex</u>: As part of experiment stimulus for essay 2 and 3, a large scale university and healthcare complex, including reception, replica of School of Business, new user orientation, auditorium, physician offices, group therapy room, and built-in multimedia functionalities, was designed and built in Second Life on UW Milwaukee Collabs Island. Additionally, a unique 'The Diagnosim Medical Simulation System' a first-of-its kind architecture for simulating and "role playing" general-purpose medical process and patient flow has also been implemented on our Island.

The proposed behavioral model was tested using lab experiments with online access. All collection of data was done at a Midwest US University. A total of nearly 150 students participated in this study over a period of 3 weeks. The experiment simulates a group consultation between multiple patients and one physician. The group activity assigned was physician diagnosis based on common symptoms of the group (for example flu, cold, etc). The goal was to capture participant's experience of receiving healthcare service as a group in UWM Collabs medical complex. For the experiments, multiple avatars were created for both healthcare specialists (physicians and educators) and subjects (patients). Personalization of avatars such as clothing choice, body shape, and hair will play an important in forming judgment towards them. Emphasis were given to ensure that digital avatar's of the healthcare specialties reflects their real self (for example wearing a doctor's white coat and stethoscope).

The instrument for data collection was developed based on an extensive survey of existing scales (if there was any) and pilot testing. The IRB approval of the data collection protocol was received. The instruments and the SL environment were pilot-tested prior to data collection. A number of statistical methods will be applied testing the hypotheses and organizing qualitative feedbacks, including factor analysis, simultaneous structure equations, and regression. The reliability and validity of instruments will be examined in detail.

DISCUSSION AND CONCLUSION

This proposal is intended to implement the approach on an experimental basis with simulated interaction between patients and physicians. Data was collected to investigate the efficacy of SL-based group visits and to examine the factors that are critical to the wide-spread adoption of this approach. The preliminary data analyses indicated the presence of high interest and satisfaction in using SL-based group visits and pointed to the challenges that need to be addressed for its adoption. Two main dependent variables were investigated: satisfaction with the physician (SAT) and behavior expectation to use the system if it became available (BE). Preliminary results suggests that for individuals to use SL for getting their medical service they should be satisfied with the physician avatar's performance and the group visit should be managed effectively. In other words, as in the office-based visits, the performance of the physician in terms of medical service and management of the visit (in this case group visit) are critical for the success of SL-based visits.

Essay 3: **Can 3D Virtual Worlds Address Healthcare Issues? Role of Hedonic Motivations**

This study extends the proposed framework in essay 2 by examining the role of hedonic dimensions in adoption of healthcare services through metaverse. SL based healthcare complex, by its inherent nature and immersive environment, involves overlap between being a hedonic and utilitarian system. The central difference between hedonic and utilitarian systems is the role of intrinsic motivations and extrinsic motivations. Utilitarian system usage is primarily driven by extrinsic motivations (such as job performance, productivity, effectiveness), while for hedonic systems usage we can expect intrinsic motivations (such as enjoyment and pleasure) to be key predictor of system adoption and use (Van der Heijden, 2004; Hsu and Lu, 2007). Furthermore, extrinsic and intrinsic motivations are rarely dichotomous and both can simultaneously affect system use (for example: dating sites, blogging, video games, Internet browsing, online shopping, and virtual worlds). In this research we examine the role of hedonic benefits such as perceived enjoyment, playfulness, entertainment, pleasure and fun in adoption of healthcare services in the metaverses. The key elements for a system to be hedonic in nature are the aesthetics or visual beauty, enjoyment and fun of using the system, .i.e. fulfilling intrinsic motivations of the users.

Streams of research in psychology and architecture have substantiated the importance of aesthetics in the real world in personal appearance, as well as in aesthetics of nature, environment and, artifacts (Norman, 2004; Coates 2003). The stereotype "What is beautiful is good" has been extensively studied, and its positive impacts have been established in social psychology (Dion et al., 1972). Apple's innovative products, such as iMac, iPod, and now iPhone, have demonstrated that visual appeal is a major selling point. Information technology (IT) and human-computer interaction (HCI) fields, on the other hand, had treated aesthetics with skepticism, using such terms as "If it is pretty, it won't work" and "harm behind its beauty" (Russo and De Moraes 2003, pp. 146). The advent of Internet and web applications changed this attitude. It has been observed that that web interfaces designed as "pleasurable" were more likely to be used for making purchase choices, and user interfaces were bound to make a transition from performance-based to pleasure-fulfilling platforms (Jordan, 1998).

Recent studies have discussed the salient beauty, enjoyment, and fun in HCI and in hardware and software engineering and design (Tractinsky et al., 2000; Norman, 2004). The underlying reason for the importance of these three concepts is the demand to satisfy human needs other than those that are function-related (utilitarian), such as efficiency, effectiveness, usefulness, and ease of use (Hassenzahl, 2004). The literature on web design suggests that the aesthetics of web interface strongly influences user satisfaction, pleasure, and attitude towards e-tailers and other attributes of websites (Tractinsky et al., 2000). In metaverses in general and in SL in particular, the architectural aesthetics of structures and landscapes, perceived enjoyment and fun in interacting with system, are some of the salient attributes of the system. Hence, this research attempts to answers following questions: What key elements influence hedonic aspects of a VW system (with focus on SL as the exemplar)? And, what role does hedonic aspects of a system play in adoption of SL based healthcare facility?

The proposed work involves sets of laboratory experiments to empirically test the proposed extended model and draws from technology acceptance and motivational theory. A major contribution of this work would be to distinguish the unique role of hedonic aspects in adoption and use of metaverses for healthcare services. Such distinctions (between hedonic and utilitarian dimensions) are of utmost importance in order to develop conceptual clarity while examining the adoption of SL based healthcare facility. Furthermore, understanding the role of hedonic motivations will enable the practitioners to create a more satisfying, enjoyable and usable healthcare delivery mechanism in metaverses.

REFERENCES

1. Bansal, G. Zahedi, F. M. and Gefen, D. (2008) Efficacy of privacy assurance mechanisms in the context of disclosure of health information online. *Proc. 14th Americas Conference on Information Systems*, August 14-17, Toronto, ON, Canada.
2. Benbasat, I., Goldstein, D.K. and Mead, M. (1987) The case research strategy in studies of information systems, *MIS Quarterly*, 11, 3, 369-386.
3. Boehm, B., and Turner, R. (2004) Balancing agility and discipline: A guide for the perplexed. Boston, MA: Addison-Wesley.
4. Business Round Table, http://www.businessroundtable.org/news/ new_study_shows_health_care_costsput_us _workers_significant disadvantage_compared_global_compe, Accessed March 15, 2009.
5. Carlson, P.J. and Davis, G.B. (1998) An investigation of media selection among directors and managers: from "self: to "others" orientation, *MIS Quarterly,* 22, 3, 335-362.
6. Coates, D. (2003) Watches Tell More than Time*,* McGraw-Hill. New York.
7. Dion, K. K., Berscheid, E. and Walster, E. (1972) What is beautiful is what is good, *Journal of Personality and Social Psychology,* 24, 3, 285-290.
8. Eisenhardt, K. (1989) Building theories from case study, *Academy of Management Review,* 14, 4, 532-550.
9. Gersick, C. J. G. (1988) Time and transition in work teams. Toward a new model of group development, *Academy of Management Journal,* 31, 1, 9–41.
10. Glaser, B. and Strauss, A. (1967) The discovery of grounded theory: strategies of qualitative research, London: Wiedenfeld and Nicholson.
11. Hassenzahl, M. (2004) The interplay of beauty, goodness and usability in interactive products, *Human Computer Interaction*, 19, 4, 319-349.
12. Hsu, C. L. and Lu, H. P. (2007) Consumer behavior in online game communities: A motivational factor perspective, *Computers in Human Behavior,* 23, 3, 1642- 1659.
13. Jahng, J., Jain, H. and Ramamurthy, K. (2000) Effective design of electronic commerce environments: A proposed theory of congruence and an illustration, *IEEE Systems, Man and Cybernetics,* 30, 4, 456-471.
14. Jordan, P.W. (1998) Human factors for pleasure in product use, *Applied Ergonomics*, 29, 1, 25-33.
15. Li, H., Daugherty, T. and Biocca, F. (2001) Feeling the presence of products: consumer learning from virtual experience, *Presented at the American Marketing Association, Winter Educators Conference,* February, Scottsdale, AZ.
16. McConnell, S. (1996) Rapid Development, Redmond, WA: Microsoft Press.
17. Mannan, R., Murphy, J. and Jones, M. (2006) Is primary care ready to embrace e-health? A qualitative study of staff in a london primary trust, *Informatics in Primary Care,* 14, 121-31
18. Martin, P.Y. and Turner, B.A. (1986) Grounded theory and organizational research, *The Journal of Applied Behavioral Science*, 22, 2, 141-157.
19. Norman, D. A. (2004) Emotional design: why we love (or hate) everyday things, New York: Basic Books.
20. Qiu, L. and Benbasat, I. (2005) An investigation in the effects of text-to-speech voice and 3D avatars on the quality of live help in electronic commerce, *ACM Transactions on Computer Human Interaction,* 1-27.
21. Russo, B. and De-Moraes, A. (2003) The lack of usability in design icons: an affective case study about juicy salif, *Proc. of the 2003 International Conference on Designing Pleasurable Products and Interfaces.* June, New York, NY.
22. Strauss, A. and Corbin, J. (1998) Basics of qualitative research: techniques and procedures for developing grounded theory, Sage, London.
23. Steuer, J. (1992) Defining virtual reality: dimensions determining telepresence, *Journal of Communication,* 42, 4, 73-93.
24. Suh, K.S. and Lee, Y.E. (2005) The effects of virtual reality of consumer learning: an empirical investigation, *MIS Quarterly,* 29, 4, 674-697.
25. Tractinsky, N., Katz, A. S. and Ikar, D. (2000) What is beautiful is usable, I*nteracting With Computers,* 13, 2, 127–145.
26. Van der Heijden, H. (2004) User acceptance of hedonic Information Systems, *MIS Quarterly,* 28, 4, 694-704.
27. Vilnai-Yavetz, I. and Rafaeli, A. (2006) Aesthetics and professionalism of virtual servicescapes, *Journal of Service Research,* 8, 3, 245-259.
28. Whetten, D.A. (1989) What constitutes a theoretical contribution?, *Academy of Management Review,* 14, 4, 490-495.
29. Yin, R.K. (1994) Case study research: Design and methods, 2nd ed. Thousand Oaks, CA: Sage Publishing.
30. Yurov, K. M., Yurova, Y. V. and Potter, R.E. (2007) Strategic maneuvering in healthcare technology markets: The case of Emdeon Corporation. *International Journal of E-Business Research,* 3, 3, 1-13.