A video game enabled collaborative virtual shopping environment.

Penton, Tristan

A Video Game Enabled Collaborative Virtual Shopping Environment

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Abstract

The technology used to create social presence through computer-mediated communication in multi-player video games can also be used to synthesise a "traditional" virtual shopping environment by introducing social communication, complete user-control, and product interaction. Such an environment would serve to re-empower the user and instil the confidence necessary for shoppers to carry out their online transactions. This thesis investigates such matters, with the aim of showing that multiplayer video games may well be the drivers for a radically new approach to e-commerce, which has the potential to evolve independently of the World Wide Web.

The benefits to web based e-commerce are numerous and widely acknowledged. Unfortunately, the process of making commerce electronic simultaneously created several drawbacks that inevitably resulted from stepping out of the physical world and into a digital alternative. These have included a loss of consumer control over independent movement, severely reduced product interaction, and potential social isolation. A video game enabled collaborative virtual shopping environment (VGECVSE) could, however, offer a fresh approach that is needed to counter these limitations. If successfully implemented a VGECVSE has the potential to make participants believe they are sharing space with others who are, in reality, all at different physical sites (social telepresence). It could also introduce a more "open road" 3D environment where users are in complete control of their actions. Finally, it could enable consumers to share the same virtual space as the product, thereby enabling numerous interaction possibilities between product and consumer.

This thesis discusses how the games industry has already taken significant steps towards the creation of a VGECVSE, most noticeably the convergence of the games industry with telecommunications, e-commerce and various digital entertainment products (see Chapter 4, Section 4.4). It is the opinion of this thesis that these steps together with the drive of consumer demand, financial incentives, competition and the desire to express oneself will ultimately lead to an all encompassing VGECVSE.

Such an environment will act as a gateway between the worlds of bytes and atoms connecting users to an unprecedented world of digital entertainment, social communication and e-commerce. A virtual space that can expand, develop and evolve well beyond the conventional limitations that restrict the physical world.

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Abbreviations and Acronyms

Abbreviations and Acronyms	*Definition*
2D	Two-Dimensional
3D	Three-Dimensional
AI	Artificial Intelligence
B2B	Business-to-Business
B2C	Business-to-Consumer
BD-ROM	Blu-ray Disc Read-Only Memory
C2B	Consumer-to-Business
C2C	Consumer-to-Consumer
CD-ROM	Compact Disc Read-Only Memory
CGI	Computer-Generated Imagery
CMC	Computer-Mediated Communication
CSCW	Computer-Supported Cooperative Work
CVE	Collaborative Virtual Environments
CVSE	Collaborative Virtual Shopping Environment
DVD	Digital Versatile Disc
DVD-ROM	Digital Versatile Disc Read-Only Memory
EC	Electronic Commerce
EDI	Electronic Data Interchange
EFT	Electronic Funds Transfer
FPS	First Person Shooter
GD-ROM	Giga Disk Read-Only Memory
GPS	Global Positioning System
GUI	Graphical User Interface
HD	High Definition
HDMI	High-Definition Multimedia Interface
HTML	Hyper-Text Markup Language
HTTP	Hyper-Text Transfer Protocol
ICT	Information and Communication Technology
IP	Internet Protocol
IPTV	Internet Protocol Television
IS	Information Systems
ISP	Internet Service Provider
IT	Information Technology
KBS	Kilobytes per Second
LAN	Local Area Network
MMORPG	Massively Multiplayer Online Role Playing Game
MUD	Multi-User Dungeon

MP3	MPEG Audio Layer 3
N64	Nintendo 64
NES	Nintendo Entertainment System
NVC	Non-Verbal Communication
PC	Personal Computer
PDA	Personal Digital Assistant
PEU	Perceived Ease of Use
PS2	Playstation 2
PS3	Playstation 3
PSP	Playstation Portable
PU	Perceived Usefulness
RAM	Random Access Memory
ROM	Read-Only Memory
RPG	Role Playing Game
USB	Universal Serial Bus
SNES	Super Nintendo Entertainment System
TAM	Technology Acceptance Model
TV	Television
VGE	Video Game Enabled
VGECVSE	Video Game Enabled Collaborative Virtual Shopping Environment
VE	Virtual Environment
VR	Virtual Reality
W3C	The World Wide Web Consortium

Chapter 1

Introduction

Over the last 20 years, each generation of video game console has been exponentially more powerful in terms of processor capabilities than the previous generation (see Chapter 4, Figure 4.3). The trend has enabled more sophisticated graphical techniques to develop, which have been used to generate increasingly realistic and believable worlds. This development has continued to such an extent that video games are beginning to compete with films both visually and financially, but their real importance only starts to become clear when looking at what is likely to be the future, a vision which forms the core of this thesis.

The next generation of video console is destined to infiltrate the epicentre of our living space. The evidence for that stems from the fact that they have already diversified into entertainment hubs: channels through which all digital media flow, whether games, films, music, still pictures, audio or text. As if that was not enough, these digital entertainment hubs can also act as a gateway to a worldwide community, connecting living rooms around the world through the Internet. Such connectivity facilitates online gaming, headset communication, digital download and payment for an increasing number of products. How long will it be before video game environments simulate shopping environments and present the user with a radically new approach to social interaction and commerce? This eventuality is already possible with the technology available today. The importance of introducing this kind of social element into electronic commerce is immense, so too is the financial wealth available to those who control such an

environment. This could be the reason why Microsoft changed their position regarding electronic entertainment and began investing so heavily into creating their own games console, intent on becoming the market leader.

The popularity of video games has been increasing steadily since their inception in the 1970s, and they are now on the verge of surpassing films in terms of popularity (see Chapter 4, Section 4.6). The financial revenues they generate have forced development companies to invest in the best programmers in order to maintain an edge over their competitors. Both hardware and software developers are fully aware that they simply cannot afford to be left behind (Torres, 2005): they have no choice but to continually innovate. It is this competition for supremacy by both games developers and console manufacturers that has driven the industry's technical advancements. In order to stay ahead, those involved in the creative side of the games industry are continuously striving to engage their audience in new and exciting ways.

In contrast, the World Wide Web – another growing computer-based phenomenon which relies heavily on human-computer interaction – is not progressing quite as rapidly. Hindered (at least initially and to some extent this still applies) by low connection speeds, the Web has evolved far more gradually in terms of its appearance, functionality and how it engages the end users. Too few developments appear to be made in the area of the general technical and social limitations with the aim of enhancing its functionality and usability. Why is this? Is it because all the pioneering programmers skilled in this field, and the people capable of overcoming these problems, have generally been snapped up by the games industry? Perhaps.

Nevertheless, the comparative inability of the Web to innovate, and therefore to a significant extent to improve the usability for the users, represents an opportunity. As Leiner et al. (1997) have said, "The Internet was not developed for one application but as a general infrastructure on which new applications could be conceived" (p.104). It is therefore not only possible for e-commerce to evolve

outside of the Web, but for the strong driving forces in the games industry to use the Internet to take e-commerce into the third dimension and address the current limitations.

> *Jaron Lanier, the father of "virtual reality" offered a major thesis: that e-commerce's future is in video games, since interactivity gives consumers psychological control. "There is a big disconnect between the industry and the format people want it in, in 20 years, somebody will have figured out how to make a video game front for commerce that's more appealing" This will give consumers what they want: "control of their communication".*
>
> (Nudd et al., 2000, p.74)

This thesis aims to show that with the same technology used to create social presence through computer-mediated communication in multi-player video games, a traditional shopping experience can be synthesised by transporting the shopper into a virtual shopping environment where social and product interaction can occur. The interaction between shoppers could be both verbal and non-verbal, something which could completely revolutionise the e-commerce industry. By exploiting user interaction, games consoles could surpass what is currently offered by the Web and recreate the social enjoyment of shopping together with all of the electronic advantages. From a business perspective, research has long shown that social presence facilitates persuasion (Fogg & Tseng, 1999) and sales in e-commerce (Moon, 1998).

> *Designing e-commerce applications that simulate the feeling of being in a real market will definitely give more confidence to users in carrying out their transactions. Similar to 3D video games, the e-commerce applications will enhance the customers' shopping experience by allowing them to walk around the streets of the market, visit shops, read adds, and chat with vendors.*
>
> (Maamar, 2003, p.255)

The games industry is, then, more than capable of capitalising on Web-based commerce's relative inability to innovate, but the assumption that such a move by the games industry would replace the Web is unrealistic. New channels seldom destroy the old, but instead offer an alternative. More than likely, the two will exist as separate entities which are interconnected and cross compatible, giving the consumer a 2D and 3D option. However, such a development could help the Web overcome some of its current limitations. In other words, the development could create what one might call a synergy of improvement.

It is the intention of this study to bring together supporting research in the areas of collaborative virtual environments, avatars, computer-mediated communication, non-verbal communication, social presence and telepresence to prove, at least to some extent, that the future of e-commerce lies within the games industry.

In summary, the aims and objectives of this thesis are as follows:

To conduct a comprehensive review of the literature on social interaction and communication so that the remainder of the thesis can be viewed within that context (Chapter 2). To outline the approaches and methods that will be used in this study in order to investigate the phenomena of a VGECVSE (Chapter 3). To provide an accurate background synopsis of both the games industry and e-commerce so that the reader can understand the important events, commonly accepted concepts, driving forces and limiting factors within both industries (Chapter 4 & 5). To outline the social interaction that occurs between those who play video games, explaining how social presence is communicated through various modes of communication, and highlighting the significance of games in this respect (Chapter 6). To provide an insight into a possible future convergence between video game technology, telecommunications and electronic commerce through the utilisation of collaborative virtual environments (CVEs) and avatars (Chapter 7). Finally, to summarise the findings of this thesis, and comment on the limitations of the study as well as suggesting possible areas for future research. (Chapter 8).

Chapter 2

A Review of the Literature

2.1 Introduction

The aim of this chapter is to provide an overview of the field of research concerned with social interaction and communication. The objective is not to provide a detailed discussion of this subject area, but instead to provide an overview of it so that the remainder of the thesis can be viewed within the appropriate context.

The chapter is divided into four main sections: *Presence, The Importance of Play, Non-Verbal Communication, and Collaborative Virtual Environments* (CVEs). The first section examines the concept of presence in its varying forms including the difference between social presence and telepresence. The second section briefly highlights the importance of traditional and virtual play for learning, escapism, and forming new social groups. This is followed by the significance of non-verbal communication in human interaction and the difference between non-verbal cues and social context cues. The fourth section discusses the notion of collaborative virtual environments as virtual spaces shared by participants across a computer network. This is followed by a brief summary of the chapter.

2.2 Presence

The notion and importance of presence and its impact on human interaction through various forms of mediated communication has become widely accepted by researchers the world over. The problems of how to define, measure, and create different forms of presence has presented both challenging and practical problems in communication theory, virtual environment design and in psychological measurement (Biocca et al., 2001, p.2). This section attempts to clarify the various definitions and types of presence, and in particular, determine which definitions are relevant to this thesis.

2.2.1 Physical Presence and Social Presence

The term "presence" (also referred to as "physical presence") is defined by Steuer (1992) as "the sense of being in an environment" (p.5). He immediately expands on this definition:

> *Presence can be thought of as the experience of one's physical environment; it refers not to one's surroundings as they exist in the physical world, but to the perception of those surroundings as mediated by both automatic and controlled mental processes.*
>
> (Steuer, 1992; quoting Gibson, 1979)

However, because humans are social beings, the most common purpose of physical presence is to increase the sense of social presence (Biocca et al., 2001, p.2). Social Presence was first applied in communication literature by Short, Williams and Christie in 1976, when they studied face-to-face, audio, and closed-circuit television encounters in order to assess the strengths and weaknesses of various communication systems. They applied the concept of social presence and defined it as the "degree of salience of the other person in the interaction and consequent salience of the interpersonal relationships" (p.65); that is, the extent to which a person is perceived as a real person through computer-mediated communication (CMC). In addition, they also discovered that CMC is extremely low on social presence because it lacks the non-verbal features of face-to-face

communication. They went on to hypothesise that different communication media vary in the amount of social presence they communicate. The capacity of the medium to transmit information about facial expression, direction of looking, posture, dress and non-verbal cues, all contribute to the level of social presence experienced through a communications medium (Gunawardena, 1995).

Two concepts associated with social presence are: Argyle and Dean's (1965) concept of "intimacy" and Weiner and Mehrabian's (1968) concept of "immediacy" (Short et al., 1976). These are both concepts of social psychology established during face-to-face interactions and can be applied to social presence. Argyle and Dean used the concept of intimacy in the interpretation of interpersonal interactions: both verbal and non-verbal behaviours are maintained between interactors. Intimacy is a function of eye contact, physical proximity, topic of conversation, etc., and changes in one will produce compensatory changes in the others (Short et al., 1976). For example, reduced eye contact by a listener could result in a change of conversation topic by the speaker. As Tu (2002) has said, "The interaction is unpleasant if behaviour cannot be altered to allow an optimal degree of intimacy" (p.3). Immediacy is a measure of psychological distance that communicators choose to place between themselves and their recipients (Short et al., 1976); immediacy behaviours, such as nodding and smiling "enhance closeness to and non-verbal interaction with another" (Weiner & Mehrabian, 1968, p.213). The concepts of social presence, intimacy and immediacy are interrelated: immediacy behaviours are used to create and maintain intimacy and also enhance social presence (Gunawardena, 1995). However, "online immediacy becomes difficult to deliver because computer-mediated communication lacks social non-verbal cues" (Tu, 2002, p.3). Therefore, the lack of non-verbal communication (NVC) in CMC has a negative effect on immediacy, which in turn restricts intimacy and social presence.

Perhaps the most all-encompassing definition with respect to social presence and mediated environments has been put forward by Lombard et al. (2000), who define presence as "the perceptual illusion of non-mediation", where perceptual

refers to the "continuous (real-time) responses of the human sensory, cognitive, and affective processing systems to objects and entities in a person's environment" (p.77), while the illusion of non-mediation refers to a situation when "a person fails to perceive or acknowledge the existence of a medium in his or her communication environment and responds as he or she would if the medium were not there" (p.77). In other words, users act as if they are present in the communicated environment. Biocca et al. (2001) put forward two further definitions in an attempt to clarify the concept of presence. They suggest that presence is frequently presented as consisting of two interrelated phenomena: *social presence* and *telepresence* (see Heeter, 1992; Biocca & Levy, 1995; Biocca, 1997). Telepresence is the sense of "being there" and involves mental models of mediated spaces that create the illusion. Social presence is the sense of "being together with another" and involves mental models of other intelligences that help us simulate "other minds". Biocca et al. (2001) also suggest that social presence mediated by telecommunication technology might be more accurately described as mediated social presence or social telepresence (this will be examined further in section 2.2.2). However, to follow tradition in this area (Short et al., 1976; Heeter, 1992; Biocca et al., 2001) this thesis will use the phrase "social presence" also to mean interactions in mediated environments, even though it applies equally to non-mediated interactions (Soussignan & Schaal, 1996; Huguet et al., 1999).

2.2.2 Telepresence and Social Telepresence

The growth of the telecommunication infrastructure over the last one hundred years has forced many relationships and interactions between individuals to become mediated by telecommunication technologies.

> *The Internet is a social place. Because of growth in our telecommunicating infrastructure, many relationships and more and more interactions with others are mediated by the telecommunication system.*
>
> (Biocca et al., 2001, p.2)

The general public increasingly communicates, works and plays with others via telephones, email, instant messages, chat rooms, video game consoles and teleconferencing systems. Advancements in communication technologies are destined to intermittently redefine how we as human beings converse and interact over physical distance through multimedia manipulation. Already evident is how video conferencing has reduced the need for business travel (Tandberg, 2007, p.16), inspired by emission reducing initiatives and the associated cost-savings, a new virtual means of conducting business has already emerged (Pamlin et al., 2006). In a future of virtual communities and computer-mediated communication, intricate relationships are likely to form between individuals who may never meet in the physical world. Presence is at the heart of humans' desire to use media to move beyond the limits of body and the sensory channels (Biocca et al., 1995). As a result, the concept of presence has become central to theorising about advanced human-computer interaction and telecommunication.

When perception is mediated by a communication technology, one is forced simultaneously to perceive two separate environments: the physical environment in which one is actually present, and the environment presented via the medium (telepresence) (Steuer, 1992), and it is necessary to distinguish between the two. Physical presence is a subset of presence concerned with conceptual and perceptual reactions to the perceived physical environment (Heeter, 1992). Telepresence is the extent to which one feels present in the mediated environment rather than in the immediate physical environment (Steuer, 1992). The term "telepresence" was devised by Minsky (1980) for remote manipulation of physical objects in reference to teleoperation systems. For further clarification, physical presence can also be defined as the perception of being located in the same physical space in which a certain event occurs, process takes place, or person stands (Heeter, 1992; Sheridan, 1992; Steuer, 1992; Slater et al., 1994). Telepresence, on the other hand, can be defined as the experience of presence in an environment by means of a communication medium. It is the extent to which one feels present in the mediated environment rather than in the immediate

physical environment. In other words, "presence" refers to the natural perception of an environment, and "telepresence" to the mediated perception of an environment (Steuer, 1992).

Already it is clear that the concept of presence is by no means straightforward, and there is great potential for overlap, misuse and confusion. It is this intrinsic nature of presence that makes it so difficult to define, measure and create. Sheridan (1992) emphasises this problem: presence is a subjective sensation or mental manifestation that is not easily amenable to objective physiological definition and measurement. Mühlbach et al. (1995) define telepresence in video communications as "the degree to which participants of a telemeeting get the impression of sharing space with interlocutors who are at a remote physical site" (p.301). This clearly includes an element of social presence and would be more accurately referred to as social telepresence, thus highlighting yet again how definitions invariably overlap.

Overall, this thesis is primarily concerned with the concept of presence in terms of social presence, telepresence and social telepresence, and the following definitions have been selected in an attempt to clear up any confusion (please see Figure 2.1 for a diagrammatical representation of the different subsets of presence).

- *Presence* - "the sense of being in an environment" (Steuer, 1992, p.78).
- *Physical Presence* - the perception of being located in the same physical space in which a certain event occurs, process takes place, or person stands (Heeter, 1992; Sheridan, 1992; Steuer, 1992; Slater et al., 1994).
- *Telepresence* - the extent to which one feels present in the mediated environment, rather than in the immediate physical environment (Steuer, 1992, p.78).
- *Social Presence* - the sense of "being together with another" (Heeter, 1992; Biocca & Levy, 1995; Biocca, 1997).

- *Social Telepresence* - "the degree to which participants get the impression of sharing space with interlocutors who are at a remote physical site" (Mühlbach et al., 1995).

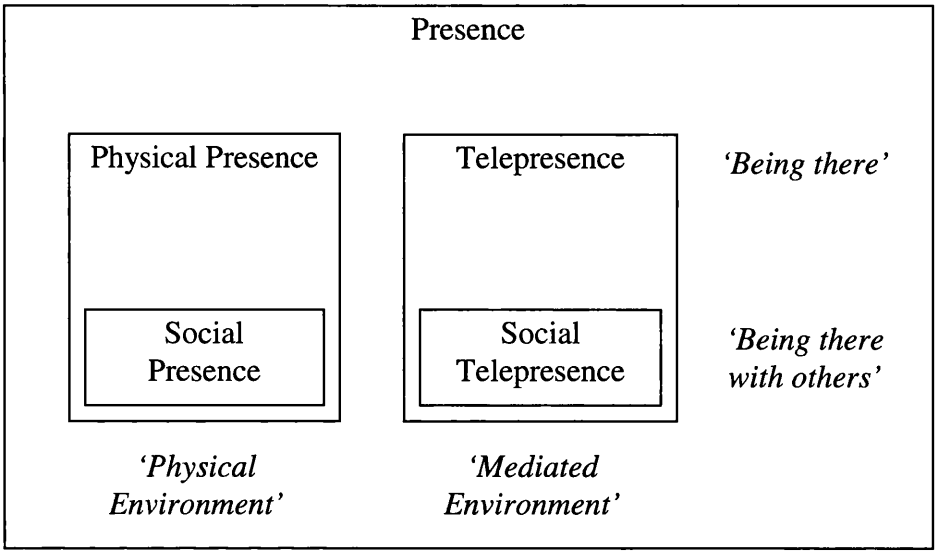

Figure 2.1: Subsets of Presence

Although Figure 2.1 differentiates between social presence and social telepresence according to whether the environment is physical or virtual (mediated), it should be noted that, in order to stay in line with convention, in this thesis the term "social presence" will be used synonymously with both the physical and mediated environments. In other words, this thesis is primarily concerned with both social telepresence and social presence as the terms have become less accurately referred to in the majority of the literature.

2.3 The Importance of Play

The significance of play for both children and adults has been deliberated over for many years, and numerous theories have been but forward for the biological reason behind it. Play has been described as a discharge of superabundant energy, a satisfaction of some imitative instinct, a need for relaxation and an innate urge to dominate or compete. Other explanation include an outlet for harmful

impulses, a fiction to keep up the feeling of personal value and a training of the young for the serious work of later life (Huizinga, 1938; quoting Zondervan, 1928; Buytendijk, 1932). This section highlights the importance of traditional and virtual play in learning, escapism and in forming new social groups.

2.3.1 Traditional Play

Existing theories of play have identified many ways in which play may advance the emotional, social and cognitive development of an individual. According to the psychoanalytic theories, play reduces anxiety by giving children a sense of control over their world and an acceptable way to express forbidden impulses (Verenikina et al., 2003; quoting Erikson, 1963; Freud, 1968; Freud 1969). Whereas sociocultural theories suggest that play creates a mental representation of social roles and the rules of society by separating meaning from objects and actions and using actions and objects in symbolic ways (Verenikina et al., 2003; quoting Vygotsky, 1977; Vygotsky, 1978). Shifting the focus from social and emotional aspects of play to cognition, Piaget (1962), stated that play consolidates learning that has already taken place while allowing for the possibility of new learning in a relaxed atmosphere. This is supported by brain studies research which indicates that young children require the kind of stimulation provided through play to foster effective cognitive processing (Kotulak, 1996; Winkley, 1999).

Huizinga (1938) describes play as:

> *[...] a free activity standing quite consciously outside "ordinary" life as being "not serious", but at the same time absorbing the player intensely and utterly. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social grouping.*
>
> (p.13)

The most important characteristics from this definition are "its spatial separation from everyday life" (p.21) and the encouragement of "social grouping".

Huizinga (1938) observes that playing games is one of the most common ways to form new groups and groups formed from playing games tend to become more stable. He found that the play community generally tends to become permanent even after the game is over, with the feeling of sharing something important, mutually withdrawing from the rest of the world, adhering to the same rules and experiencing similar emotions (p.12).

Hara Estroff Marano (1999) argues that "play lifts stress from us. It refreshes us and recharges us. It restores our optimism. It changes our perspective, stimulating creativity. It renews our ability to accomplish the work of the world" (p.36). Similar to Patrick's (1916) recreation or relaxation of energy theory which suggests that play may in fact be the highest expression of our humanity, both imitating and advancing the evolutionary process. According to Marano (1999), play appears to allow our brains to exercise their flexibility, to maintain and even perhaps renew the neural connections that embody our human potential to adapt, to meet any possible set of environmental conditions. This is confirmed to some degree in more recent research by Greatrex (2002) "play appears to be a central organizer that allows complex systems to emerge from simpler ones ... every act of perception modifies the experiential learning processes of the brain".

It would appear, then, that play is extremely important in the lives of human beings, as it gives cognitive thought a rest from the worries experienced in everyday life, thereby promoting mental health and happiness. This idea is supported by Robins (1996) who describes television as a "Window on the World," but also maintaining that it is more about a drive to play or a distraction than about a drive to know. Robins goes on to argue that television is an intoxication of the senses which functions to block out "competing stimuli of a more threatening kind" brought about by the modern existence of war, death and violence.

Most of us think of adult play as respite or indulgence, but having fun is no trivial pursuit. In fact, according to Marano, it is crucial to our mental creativity, health and happiness. It allows for emotional discharge in a way that carries with it little or no risk (Terr, 1999). Play is a state of mind as well as an activity, and, as Terr contends, all the mental benefits of play are achieved without realisation, and therein lies its value: the mental activity is never the direct goal (Terr, 1999).

2.3.2 Virtual Play

In modern society it could be argued that the digital generation is using video games as their chosen method of play or medium of escapism, since video games are highly immersive and contain elements of fantasy, competition and exploration unlike anything else. At this point, it is worth remembering that for a long time video games were considered a complete waste of time, "games are not educational, only goal oriented: Mario rescues the Princess, and Pac Man gobbles the dots ... they are not necessarily goals that are consciously admired or pursued by any particular group in the culture" (Provenzo, 1991, p.33). Video games were widely regarded as an entertaining activity devoid of any educational value. This changed however as over the years the video games industry grew and the games developed. In 1997, Sutton-Smith noted that when adults play video games, their memory is better, they are cognitively more capable and they are generally happier. Eventually, games were no longer simply problems or puzzles: but micro-worlds, and in such environments students develop a much firmer sense of how specific social processes and practices are interwoven, and how different bodies of knowledge relate to each other (Squire & Jenkins, 2003). Simpson (2005) argues that children today spend more time outside the classroom exploring, questioning and problem solving than they do learning in school. It would appear that a student's ability to participate in complex social practices, learn new knowledge and skills, and perform well in novel, changing situations is gradually being recognised as valuable learning.

Malone (1982) suggested three characteristics that affect the pleasure obtained from playing video games: challenge (competition), fantasy, and curiosity (the

reaction to unexpected game events). Vorderer (2001) recommends the psychology of play as a useful explanatory framework for research on media entertainment, in particular video games. He further suggests that psychological considerations on the functions of play for human development may enrich Malone´s conceptualisation of the fantasy dimension (Sutton-Smith, 1997).

Huizinga (1938) explained why competition is so important:

> *From the life of childhood right up to the highest achievements of civilization one of the strongest incentives to perfection, both individual and social, is the desire to be praised and honoured for one's excellence.*
>
> (p.63)

> *In order to excel one must prove one's excellence; in order to merit recognition, merit must be made manifest. Competition serves to give proof of superiority.*
>
> (p.63)

This would suggest that through interactivity it is the competitive elements that make video games so enjoyable: "the games' interactivity allows for a continuous stream of challenging and competitive situations" (Vorderer, 2003). Greenfield (1984) explained the appeal of video games by, amongst other things, their visual dynamism, personal involvement or control, discernable goal, audio effects and speed (p.90-91). In addition, exploration of the unknown is a drive that some would argue makes humans very different from animals and a trait that enables mankind to continually strive to push past the limit of their understanding. This "drive to know" can be seen from an early age: "Exploratory behaviour is enjoyable, as it is similar to the playful actions children perform to try out what they can do and cannot do with an object" (Vorderer, 2003). However, Vorderer goes on to suggest that it is the competitive elements that are considered the most important determinant of the enjoyment. Although exploration maybe entertaining, it is the suspenseful coping with challenges, such as tasks and threats, that generate the basis of the entertainment experience. An example of

these essentials is the world-renowned *Tomb Raider* series, which epitomises the blend of such qualities by combining exploration with the completion of tasks and the elimination of threats.

The notion of challenging oneself to achieve something of value is intrinsically enjoyable, but "for an activity to be challenging, it needs to have a goal whose outcome is uncertain" (Malone, 1982). With video games the enjoyment is in not knowing what will happen next, together with the chance of failure, which makes success all the more enjoyable. As with sport, sharing experiences with friends, competing against others with the aim of achieving a goal, either in a team or as an individual, are what makes video games so enjoyable and addictive.

However, it must also be noted, that whilst there are distinct advantages to the use of video games for play. It should also be noted that from the very start of the video game industry, society has feared for the negative impact this new medium might have on young people. Such a concern is, of course, not unique to the world of video games, and indeed can be observed throughout history as far back as Plato, who was concerned that the technique of writing would be harmful to a child's education (Smith, 2002). Partly as a result of fears of this kind, there has been a considerable amount of research done on the negative effects of video games (Anderson & Dill, 2000; Anderson & Bushman, 2001; Sherry, 2001; Anderson, 2004). Yet despite the work undertaken, very little consensus has been achieved on the extent to which the effect, if it exists, has been negative or positive. It is generally accepted that games in general provide a structured environment for quickly learning complex behaviours (Raybourn & Waern, 2004). Whether this extends to video games is a moot point.

2.4 Non-Verbal Communication

Human communication consists of both verbal and non-verbal communication. Verbal communication "includes all the verbal aspects of communication, such as words and phrases" (Kujanpää & Manninen, 2003, p.221). These are combined

and projected as speech which, if understood, conveys meaning to others. Non-verbal communication can only be defined accurately by distinguishing it from verbal communication in a negative way. Once verbal communication has been defined, everything else which is considered to have a communicative value can be called non-verbal communication. Therefore non-verbal communication can be defined as the whole set of means by which human beings communicate except for the human linguistic system and its derivatives (writings, sign language, etc.) (Imbert et al., 1999). Alternatively, it can be defined as non-word human responses, that is, gestures through which messages can be transmitted (Ruesch & Kees, 1956; Luthans, 1989). As this second definition demonstrates, any attempt at a positive definition falls short, since the word "gestures'" in this definition does not adequately represent the numerous and varied NVC channels available. At least, however, one can justifiably say that the purpose of non-verbal communication is to "augment spoken messages, by helping people express their feelings or thoughts through the use of their bodies, their facial expressions, their tones of voice and so on" (Guye-Vuilleme et al., 1998, p.105), and that:

> *NVC is involved in most human contact. It may reveal the true nature of emotions, provide hints on personality and work as a channel to send and receive information. NVC emerges in a variety of ways, some of which may not even be consciously thought of.*
>
> (Argyle, 1988)

Mehrabian (1967; 1981) believed that as much as 93 percent of communication between people is determined by non-verbal cues such as tone of voice and body language. Additional research in the communication field suggests that over 80 percent of a message is communicated non-verbally (Grant & Hennings, 1971; Knapp, 1971). Whereas psychological studies concluded that more than 65 percent of the information exchanged during face-to-face interaction was expressed through non-verbal communication (Argyle, 1988). Finally, Petrie et al., (1998) suggest that 75–80 percent of classroom instruction techniques should be non-verbal. Whatever the exact figure, it is widely recognised that in

traditional face-to-face interactions, besides what is actually verbalised, people exchange a considerable amount of non-verbal information.

Manninen and Kujanpää (2002) broke down NVC into there separate forms highlighting the assortment of various elements that make up NVC (p.222). As can be seen from Figure 2.2, there are many aspects of NVC that can be used to improve multilayered communication.

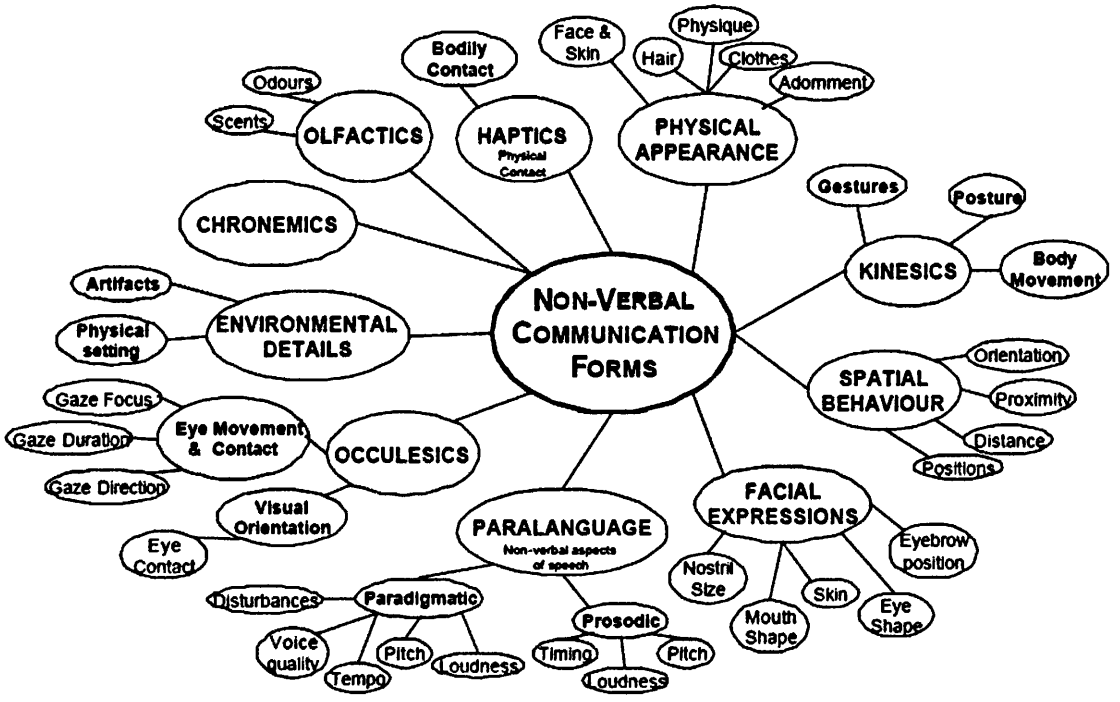

Figure 2.2: Different Forms of Non-Verbal Communication (Manninen and Kujanpää, 2002, p.222)

"Non-verbal communication", "non-verbal cues" and "non-verbal communication cues" are different terms that can be used synonymously and encapsulate all non-verbal human messages. Non-verbal cues are defined as communicative messages that are non-linguistic, analogic, and processed primarily by the dominant cerebral hemisphere (Andersen et al., 1979). Social cues or social context cues, are however different, and refer to the situational variables necessary to define the nature of a social encounter, which are used to determine the content of conversation and behaviour of participants.

Some researchers claim that face-to-face communication provides richer information than electronic communication, in part because computer mediation generally lacks social context cues or social information about the members of the group (Daft & Lengel, 1986). The research of Sproull and Keisler (1986) indicated that the lack of cues to define the nature of a social situation led to uninhibited communication such as hostile and intense language, greater self-absorption and a resistance to defer speaking turns to higher-status participants. This is supported by Collins (1992) who found that "the level of uninhibited verbal behaviour indulged in by those communicating via computer-mediated communication is a function of the absence of social context cues". However, there is an argument that, in some circumstances a user might not be misreading a social situation but simply choosing not to adhere to social norms. As a direct result of the CMC being distributed, any inappropriate behaviour is not punished in the same way it would be in a face-to-face interaction (i.e. there is no deterrent or consequence to anti-social behaviour). Therefore, a crucial factor when designing CVEs in the future should be the identity and accountability of the user. As discovered by Hew et al. (2004) when conducting industry research:

> *In order for online videogames to be convivial places for social interaction – we need to design for more socially translucent computer-mediated communication by attending to issues of awareness, visibility and accountability of users.*
>
> (Hew et al., 2004, p.56)

Sproull and Kiesler (1986) claimed that a reduction of social context cues deters interpersonal impressions and "without non-verbal tools, a sender cannot easily alter the mood of the message, communicate a sense of individuality, or exercise dominance or charisma... Communicators feel a greater sense of anonymity and detect less individuality in others" (Kreijns, 2003; quoting Sproull & Kiesler, 1986, p.48). Consequently, social relationships are not likely to emerge and the creation of a common social space is hampered. Furthermore, if individuating impressions cannot be developed, the resulting communication behaviour may

negatively influence communication activities (Kreijns, 2003). Researchers generally agree that the fewer channels that are available to communicate cues, the less social presence communicators will experience resulting in the experiencing of CMC as impersonal (Walther et al., 1994, p.7). Therefore the additional social and non-verbal cues found in richer media (media that utilise more modes of communication) would increase the extent to which messages can be accurately communicated and understood (Weisband & Atwater, 1999).

2.5 Collaborative Virtual Environments

Studies of cooperative work in real-world environments have highlighted the important role of physical space as a resource for negotiating social interaction, promoting peripheral awareness, and sharing artefacts (Bentley et al., 1992). This has prompted the belief that if these characteristics can be successfully recreated inside a virtual space, then distributed collaboration can occur through networked computers. It is from computer-supported cooperative work (CSCW) and virtual reality (VR) that the concept of the collaborative virtual environment (CVE) has emerged, and it is an example of a virtual-reality system where the emphasis is more on collaboration between users rather than on simulation (Oliveira et al., 2000). Benford et al. (2001) define CVEs as "virtual worlds shared by participants across a computer network", and, as they put it:

> *CVEs can be seen as the result of a convergence of research interests within the VR and computer-supported cooperative work (CSCW) communities.*
>
> (p.79)

They are "applications that provide distributed virtual reality technology to support cooperative work" and play. More specifically, CVEs "consist of virtual spaces that enable participants to collaborate and share objects as if they were present in the same place" (Quax et al., 2003, p.137). They are used for applications such as collaborative design, training, telepresence, and telerobotics

(Oliveira et al., 2000). However, online games have emerged as the most common form of CVE in use as "nearly all video games sold today contain CVEs in some form" (Brown & Bell, 2004, p.350). Any online multi-player game where distributed users share the same virtual space may be considered a CVE.

> *Video games are of increasing importance, both as a cultural phenomenon and as an application of collaborative technology. In particular many recent online games feature persistent collaborative virtual environments (CVEs).*
>
> (Brown & Bell, 2004, p.350)

Games such as Sony's *EverQuest* and *World of Warcraft* are designed to be played by thousands of users worldwide (Quax et al., 2003). These games feature a "complex social organisation in which players develop strong social bonds as well as participate in economic transactions of significant value" (Brown & Bell, 2004, p.350).

Within CVEs, "participants are provided with graphical embodiments called avatars that convey their identity, presence, location, and activities to others" (Benford et al., 2001, p.79), They are "3D representations of users" (Shen et al., 1999, p.4). Avatars using humanoid characters are especially useful, as body movements and facial expressions can be used to enhance mutual awareness and facilitate non-verbal communication. Early versions of avatars were rather rigid and lacking in emotion (Vilhjálmsson & Cassell, 1998). The use of NVC elements is a solution that has been introduced both to create avatars that seem more alive and to support natural communication between users (Kujanpää & Manninen, 2003).

NVC is a significant part of social interaction – from indicating underlying emotions to conveying deeper meaning. If participants in CVEs are to feel socially aware, they must have an efficient and transparent method for conveying and observing changes in emotional state (Burford & Blake, 1999). In other words, they must be able to "use everyday conventions such as gestures, postures

and body language as part of the communication channels between users", although "the role of avatars in CVEs is essentially to represent a user's presence, orientation and location" (Salem & Earle, 2000, p.93). For CVEs to be effective, participants must feel that they are to some extent present in the virtual environment. It is believed that avatars using body-like figures increase that presence (Burford & Blake, 1999), because humanoid avatars emulate "conventional conversational habits, such as looking at the speaker, and using all the non-verbal communication techniques one has learnt to employ during a conversation" (Salem & Earle, 2000, p.94).

It is clear that both presence and non-verbal communication are concepts which are closely related to CVEs and only by fully understanding their application can computer-mediated communication (CMC) within a virtual environment challenge that of face-to-face interaction.

In summary, a CVE is a shared virtual environment accessed through a computer network which facilitates multi-user collaboration and aims to overcome physical distance by creating presence through avatars and NVC. CVEs have the potential to "radically alter the way we work, play, learn, consume and entertain" (Shen et al., 1999, p.1).

2.6 Summary

Presence is defined as "the sense of being in an environment" (Steuer, 1992), the sense of "being together with another" is known as social presence (Heeter, 1992; Biocca & Levy, 1995; Biocca, 1997) and the extent to which one feels present in a mediated environment, rather than in the immediate physical environment is referred to as telepresence. Therefore, the degree to which participants get the impression of sharing space with interlocutors who are at a remote physical site is referred to as social telepresence (see Figure 2.1). However, in this thesis the term "social presence" will be used synonymously with both the physical and mediated environments. In other words, this thesis is primarily concerned with both social

telepresence and social presence as the terms have become less accurately referred to in the majority of the literature.

Video games are being used as a method of virtual play for the purposes of entertainment, escapism and socialisation (forming of new social groups) since video games are highly immersive, contain many of the traditional elements of play and contain elements of fantasy, competition and exploration unlike anything else.

Non-verbal communication is a significant part of social interaction as it helps people to express their feelings or thoughts through the use of their bodies, facial expressions and other non-linguistic means. It is widely recognised that in traditional face-to-face interactions, besides what is actually verbalised, people exchange a considerable amount of non-verbal information. When applied to CMC the additional NVC found in richer media (media that utilise more modes of communication) would increase the extent to which messages can be accurately communicated and understood (Weisband & Atwater, 1999).

A collaborative virtual environment is a virtual space shared by participants across a computer network that enables multi-user collaboration and aims to overcome physical distance by creating social presence through avatars and NVC. CVEs have the potential to "radically alter the way we work, play, learn, consume and entertain" (Shen et al., 1999, p.1). Put simply, collaborative technology could ultimately free humankind from the constraints of our physical form and provide, albeit through an avatar, the advantages of "being digital".

Chapter 3

Methodology

3.1 Introduction

This chapter provides a brief overview of the most acceptable paradigms in Information Systems research which include research philosophies, taxonomies, data collection techniques and data analysis techniques. The chapter outlines the approaches and methods used in this study in order to investigate the phenomena of a video game enabled collaborative virtual shopping environment (VGECVSE). Please note, because the area of IS research methodologies is vast in itself, a full investigation is beyond the scope of this thesis and the purpose of this chapter is instead to provide the context within which the research has been conducted.

3.2 Research Philosophy

An epistemology is the theory and assumption about knowledge and how it can be obtained. As a whole, it serves to guide the research and act as a framework within which the overall philosophy of the study is developed (Myers, 1997; Collins Dictionary & Thesaurus, 2004).

At present, research philosophy can be categorised under five headings: positivism, interpretivism, critical, post-positivism and constructivism (Benbasat et al., 1987; Orlikowski & Baroudi, 1991; Galliers, 1992; Boland, 1995). However, the two most commonly used philosophies are positivism and

interpretivism (Orlikowski & Baroudy, 1991; Chen & Hirschheim, 2004). Therefore, only these two approaches will be examined further. Positivist research generally assumes that reality is objective and can therefore be described by measurable properties which are independent of the researcher and their tools (Myers, 1997), whereas, interpretivism assumes that access to reality is only attainable through the development of social constructions such as language and shared meaning (Myers, 1997).

Considering these definitions, the interpretivist approach was favoured because:

- The subject of video game enabled collaborative virtual shopping environments (VGECVSEs) may have been highlighted by various researchers (Murray, 1997; Nudd et al., 2000; Cummins, 2003) but it remains relatively un-investigated, something due no doubt in part to the fact that the phenomenon is yet to take place. Taking an interpretivist approach allows for an in-depth investigation of the current theories and concepts that contribute to the phenomenon, thereby helping to increase the understanding of the subject as a whole.

- According to Chen and Hirschheim (2004), interpretivist investigations should be welcomed and encouraged as they allow for different dimensions of the subject to be explored which positivist studies may overlook. This is important because the subject of VGECVSE is relatively new, looking at the phenomenon from a variety of different perspectives is essential to assemble a thorough view of the concept as a whole.

- Although positivist studies maintain a dominant position within IS research as a whole, according to Chen and Hirschhein (2004) over the past ten years the number of interpretivist studies has gradually increased. For example, in their 2004 study of the leading five IS journals Chen and Hirschheim (2004) found that the number of interpretivist studies has increased from 1.4 percent to 12.4 percent. Indeed, in the influential *Information Systems Journal* interpretivist studies have at several points

outweighed the number of positivist studies (Chen & Hirschheim, 2004). Overall, it is felt that before VGECVSE can be quantified through a positivist investigation, it is necessary for there to be a greater understanding of the subject area as a whole which can be achieved through an interpretivist study such as this present one.

3.3 Research Taxonomy

Research taxonomies aim to serve as a guide for data collection and analysis as they summarise the underlying aims of the study (Straub et al., 2004). According to both Chen and Hirschheim (2004) and Straub et al. (2004) there are three primary categories of IS research taxonomy, each of which are defined in Table 3.1.

It is entirely possible that a VGECVSE is already in development and that research is indeed being carried out, however such work is likely to be done behind closed doors due the significant financial benefits presented by such an environment. As this study will attempt to demonstrate, the industry and other forces are all moving in the same direction and it would be naive to assume that console manufacturers are not fully aware of the benefits presented by a VGECVSE. If there has already been work carried out, it is unlikely to become available for use outside the industry. Therefore, finding a suitable area for the collection of primary data is at least for the moment problematic. However, as the understanding of VGECVSEs increases and their potential is realised by the marketplace, examples of the phenomenon should come to the fore and be made available for research studies which can act as a continuation of the work done for this thesis.

Table 3.1: Taxonomy of Research Categories

Category	*Definition*
Confirmatory vs. Exploratory	Confirmatory research attempts to test and find support for predefined hypotheses (Gefen et al., 2000). Exploratory research looks at universally defining relationships between variables so that they can then be tested via statistical analysis (Gefen et al., 2000; Straub et al., 2004).
Empirical vs. Non-Empirical	Empirical studies provide the evidence upon which new concepts and theories are tested (Chen & Hirschheim, 2004). Non-empirical studies make a unique contribution to the existing literature by reviewing and developing new and existing theories and concepts related to a particular phenomenon (Chen & Hirschheim, 2004).
Quantitative vs. Qualitative	Quantitative studies are normally numerically orientated and focus on the collection of data to enable the analysis of causal links between the constructs of a phenomenon (Denzin & Lincoln, 1994; Myers, 1997). Qualitative studies focus on the use of textual data (in most cases) to help attain a better understanding of and explanation for social phenomena (Myers, 1997). Furthermore, qualitative researchers tend to focus on how and why new social phenomena have developed and what this implies, as apposed to how phenomena can be measured (Denzin & Lincoln, 1994).

The taxonomies chosen for use in this thesis are: exploratory, non-empirical and qualitative, such that the research has attempted to define the possible relationships between the contributing factors that have the potential to result in the creation of a VGECVSE. It has also concentrated on the development of new concepts and theories associated with VGECVSE based on existing research. This will provide the foundations on which the theories explored can later be tested via what Straub et al. (2004) define as *quantitative positivist research.* Furthermore, the qualitative approach was favoured because, as argued by Denzin and Lincoln (1994), it seeks answers to how a phenomenon has or will arise, and

what this indicates. Similarly, Kaplan and Maxwell (1994) have argued that the ability to understand a phenomenon is lost when textual data and theories are quantified. Therefore in order to better understand social phenomena such as the development of VGECVSE, it may be more applicable to adopt a qualitative as opposed to a quantitative approach. This has been the case in this thesis.

3.4 Data Collection and Analysis

Data collection and analysis represents the stage at which a study moves from its initial philosophical assumptions to the gathering of supportive data so that the theories and concepts associated with a phenomenon can be explained and defined.

Although a clear distinction between data gathering and data analysis is commonly made in quantitative research, the distinction is sometimes harder to make in qualitative research as the methods of data collection and analysis are often the same (Straub et al., 2004). The most commonly used qualitative approaches are defined in Table 3.2

Table 3.2: Qualitative Research Approaches

Approach	*Definition*
Action Research	Action research is the most widely accepted and practised form of participative research in IS investigations. Also referred to as participatory action research, it primarily involves researchers becoming part of the study, which in turn means that they are able to affect and are themselves affected by the study topic (Myers, 1997; Straub et al., 2004).
Case Study	Case studies investigate phenomena within a 'real world' context, where the boundaries between phenomenon and environment tend to be blurred.
Ethnography	Derived from social and cultural anthropology, ethnographic research involves researchers spending a significant amount of time in the field. Thus allowing them to, understand humans and organisations and gain a greater appreciation of the context within which actions occur (Myers, 1999). Ethnography uses relatively few predetermined instruments and relies more on structured observations and emersion into an environment (Miles & Hubermann, 1994).

Grounded Theory	Grounded theory is based on the principle that theory is ascertained from data that has been systematically gathered and analysed (Glaser & Strauss, 1967; Myers, 1997). Grounded theory is a continual process that uses much iteration in order to develop theory. It is becoming increasingly popular within IS research literature as it provides a useful tool in the creation of context-based and process-oriented descriptions and explanations of the phenomenon (Myers, 1997).
Phenomenology	Phenomenology along with hermeneutics provides the base upon which interpretive research is conducted (Boland, 1985). It is a contextual approach which concerns itself with the pragmatic underpinnings of knowledge (Holstein & Gubrium, 1994). The researcher attempts to understand what and why a particular phenomenon is occurring, and looks at the meanings that subjects attach to social phenomena in general (Saunders et al., 1997).
Mathematical Modelling	This approach models the 'real world' and presents the results as mathematical equations. In this approach, all variables are known and therefore included in the model. Mathematical modelling requires no human subjects (Jenkins, 1985).

The overriding research that has been selected for use in this study is phenomenology, and the primary means by which data has been collected has been via secondary research and through the analysis of the existing literature. This is primarily because the subject of a VGECVSE is in its infancy, with no suitable samples available for the collection of primary data. Table 3.3 shows the reasons for and against the use of secondary data.

Table 3.3: Reasons For and Against Secondary Research (adapted from Saunders et al., 1997)

Advantages of Secondary Research
Fewer Resource Requirements: Because secondary data has already been collected, fewer demands are made on the researcher's time and efforts. This means that instead of collecting data the researcher is able to spend more time interpreting existing concepts and theories and is therefore able to obtain a more comprehensive view of the concept or theory as a whole.
Within the context of this study because the subject of VGECVSE is relatively new and derived from a variety of different subject areas ranging from anthropology through to e-commerce, it was felt that before any measurable data

was collected on the subject, a full review of the pre-existing literature was of greater importance. According to Diamantopoulos and Siguaw (2000), if the theories and concepts associated with a phenomenon are incorrect, any later analysis based on that information will be unrealistic and not reflective of the 'real world' context of the subject.
Unobtrusive: Secondary data is quicker to collect than primary data and in some cases is of a substantially higher quality because it has been academically reviewed.
In the case of this study, it was felt that because of the infancy of the subject area, the collection of secondary information which had been pre-validated and reviewed extensively by peers in the field was more applicable than the collection of primary data, which, yet again, due to the fact that a VGECVSE is in its infancy would prove extremely difficult.
Possibility of Longitudinal Studies: Secondary data allows researchers to examine different aspects of a trend across different time periods, thereby providing a greater insight into how and why certain aspects of the theory or concept have developed.
Using secondary data has allowed for an investigation as to how the concept of a VGECVSE has developed over time. In addition to this, it has allowed a variety of different perspectives associated with the research subject to be examined simultaneously; ranging from the social aspects of telepresence to the latest developments in the games industry, to the business aspects of business-to-customer (B2C) Web commerce. Such an investigation would not have been possible using primary data as some of these subject areas are in constant flux.
Allows Findings to be Compared: Secondary data allows the researcher to place findings within the context of previous studies, therefore allowing for a comparative analysis as to how the findings are replicated or differentiated. This then gives the researcher a good indication as to the generalisability of the findings.
Although this is more applicable when quantitative data is being collected, because this study has derived hypotheses relating to the future of VGECVSE, it has enabled these theories to be compared to the existing literature relating to the phenomenon, thereby proving or disproving whether the concept of VGECVSE is not only feasible, but also representative of the next logical step in terms of distributed social interaction and e-commerce.
Disadvantages of Secondary Research
Access may be Difficult or Costly: Collecting research reports or gaining access to commercial data can often be costly and timely and in some cases not possible.

In the context of the current research, this has been one of the main drawbacks. As discussed earlier, due to the relatively new nature of the subject matter under investigation, there is limited access to environments within which statistical data can be obtained (as the majority of studies on VGECVSE are likely to be developed in-house). In the light of this, the current work is based on qualitative and primarily textual data only, and as will be discussed further in Chapter 8 (8.4), will still require validation via further qualitative and quantitative investigations.

In short, it is therefore acknowledged that while the collection of primary data would have been advantageous, due to the fact that a VGECVSE does not yet exist, it was not possible to obtain a sample for analysis.

3.5 Summary

Overall the research method used in this study is representative of the first stage in a three stage process designed to provide an in-depth analysis of the phenomenon of VGECVSE. According to Miles and Huberman (1994) a research investigation should firstly use qualitative data to explore the real-world environment; secondly, the information should be used to construct quantitative questionnaire to confirm findings, and thirdly qualitative techniques should again be used to deepen and enrich findings. Through the analysis of secondary data, it is hoped that the research carried out for this thesis has achieved the first of these stages thereby providing the foundation upon which later studies can construct quantitative tools which can then be used in order to confirm the theories and concepts that are presented in this thesis. In other words, it could be said this piece of work acts as a forerunner to a quantitative positivist study.

Chapter 4

The Games Industry

4.1 Introduction

This chapter focuses on the games industry and provides an overview of its history, impact and the growing popularity of video games. In addition to speculating on growth areas and expected future directions, it also attempts to identify why video games are so popular, as well as highlighting some of the problems and limitations facing the video games industry. This is followed by a discussion of the development of the console in terms of the changing nature of its use, notably in comparison to PCs. The background on the games industry is limited in scope to the subject areas that are relevant to this thesis. The intention is to make the reader aware of the past and present state of the industry as it relates to the subject of this thesis.

It has always been a part of human nature that people entertain and enthral one another with tales of grandeur. This has developed over the ages in a variety of ways, initially in the form of storytelling.

> *The oral tradition of early humans involved the telling of tales that transported each generation of listeners to a different time and place where the events occurred.*
>
> (Lombard & Ditton, 1997)

This subsequently evolved into theatre and, as more and more people were able to read, storytelling through the written word. More recently, storytelling has

developed through television and cinema, but the latest development is that of interactive entertainment in the form of video and computer games.

Immersion and telepresence are both important concepts relevant to this section; they deepen the involvement experienced by individuals, and lead to stronger and more frequent emotional reaction to events and characters in the story. Whether people play games to escape their stressful lives or to simply indulge in exciting adventure and storytelling, it is difficult to dispute that video games are an extremely effective method of delivering a story. The medium can make people believe they are somewhere else (telepresence) and actually taking part in the story, which can lead to a higher emotional involvement. Video games were the logical progression from film: instead of passively watching events players are actively making decisions which drive the story. Actions taken have consequences, and emotional involvement with onscreen characters can be experienced first hand.

4.2 Interactive Entertainment

In the area of interactive entertainment, the terminology has overlapped, and has led to the expressions 'video game', 'computer game' and 'electronic game' often being used synonymously. Nevertheless, the generally accepted distinction between a computer game and a video game is relatively simple: a game will usually be a 'computer game' if it is played using a personal computer such as a PC or Apple Macintosh, and will be a 'video game' if it is played using a dedicated electronic device with a visual display, the emphasis being placed on the output method, and usually referred to as video game console. In this thesis, the expression 'video game' will be used when referring to any computer-controlled game played on an electronic device, and will thus include games played on a games console, personal computer (PC) or any other device such as a mobile phone.

4.3 Video Game Popularity

The global success of video games in recent years has seen the industry threaten the film and television industries for supremacy as the most profitable entertainment medium. "In the US, sales of video games and related hardware climbed to $9.4 billion in 2001 – surpassing box office receipts of $8.4 billion" (Lee, 2005, p.2). It is self evident that video games are popular because they are enjoyable to play. If a game is not fun to play, it will not sell in the marketplace (Federoff, 2002). Therefore, the real question is what makes video games so enjoyable to play? Malone (1982) suggests three characteristics that affect the pleasure obtained from playing video games: challenge (competition), fantasy, and curiosity (the reaction to unexpected game events). Vorderer (2001) recommends the psychology of play as a useful explanatory framework for research on media entertainment, in particular video games. Also important are interactivity and competitive elements (Vorderer, 2003). Greenfield (1984) explained the appeal of video games by, amongst other things, their visual dynamism, personal involvement or control, discernable goal, audio effects, and speed (Greenfield, 1984, p.90-91). In addition, exploration of the unknown is a drive that some would argue makes humans very different from animals and a trait that enables mankind to continually strive to push past the limit of their understanding. This "drive to know" can be seen from an early age: "Exploratory behaviour is enjoyable, as it is similar to the playful actions children perform to try out what they can do and cannot do with an object" (Vorderer, 2003, p.2) (see Chapter 2, Section 2.3.2). However, Vorderer goes on to state that it is the competitive elements that are considered the most important determinant of the enjoyment. Although exploration maybe entertaining, it is the suspenseful coping with challenges, such as tasks and threats, that generate the basis of the entertainment experience. An example of these essentials in practice is the world renowned *Tomb Raider* series, which epitomises the blend of such qualities by combining exploration with the completion of tasks and the elimination of threats.

4.4 Personal Computer vs. Games Console

Today the personal computer (PC) is the primary platform for the delivery, storage and consumption of most digital content in the home, but this stranglehold is under threat. Video game consoles are evolving into highly versatile machines, mirroring many aspects of the PC (a phenomenon forecasted by Negroponte (1995, p.82-3) over a decade ago). This phenomenon is defined by Athreye and Keeble (2000, p.228-9) as 'technological convergence' (see Chapter 7, Section 7.2). It refers to the fusion of computing and telecommunication technologies. However, it is not just the PC that is under threat from technological convergence in the games industry:

> *The increased capabilities of next-generation consoles such as the Xbox 360 and PlayStation 3 will likely bring them into greater competition with other device categories.*
>
> (Canalys, 2005)

These ideas bring the console into direct competition with a broad range of electronic devices as the console manufacturers continually endeavour to increase their machines' functionality and appeal.

Kirriemuir (2000) discussed four fundamental differences between the PC and the games console; *Price*, *Stability*, *Application* and *Connectivity*. At the time the two devices were balanced, with the games console being more stable and far cheaper and the PC being able to perform a variety of tasks and able to be easily networked to each other and the Internet. However, one console generation on from Kirriemuir's research and the application of the console is beginning to increase beyond that of just playing video games. Connectivity has improved to equal that of the PC; consoles can be locally networked together or connected through the Internet. Some applications are arguably better than their equivalent on the PC (e.g. voice communication) for the simple reason that the technology is standardised, which means widespread incorporation by developers which in turn leads to greater usage. Furthermore, the cross-platform boundaries of console-

based communication are set to be broken down with the announcement of Live Anywhere at E3 2006, which will enable a variety of non-*Xbox* devices such as Windows Vista PCs, Windows mobile phones and Java-enabled mobile phones to connect to *Xbox Live*. Microsoft is on the verge of interconnecting Windows Live Messenger, Windows Mobile and *Xbox Live* to create an integrated gaming world (Microsoft Press Release, 2006). This unified platform vision will offer consumers an entertainment network in which they have one identity and one friends' list. It will facilitate cross-platform communication, multimedia transfer as well as cross-platform gaming.

In addition to consoles being supported by a variety of external peripherals (headsets, cameras, DVD remotes) the machines themselves are becoming increasingly component based, with upgradeable RAM (*N64*), replaceable hard drives (*Xbox 360*, *Playstation 3*) and external HD DVD drives (*Xbox 360*), all serving to increase the console's life-span by creating a more flexible system. Furthermore, the computer-standard USB connection port has been adopted with the aim of allowing devices that would previously connect to a PC also to connect to a console. All of this seems to give the console a significant advantage over the PC in terms of usability, from setting up a local-area network to plug-and-play components such as headsets and cameras. All designed to work immediately as expected and do not require any complicated installation or configuration. Even the downloadable game updates, game content, general service improvements and bug fixes are installed easily and automatically, successfully hiding the complex intricacies from the user.

Although Sega attempted to provide online connectivity with the *Dreamcast*, the distinction between console and PC was significantly reduced when Microsoft announced that its *Xbox* console would contain a hard drive and online capabilities. Since this revelation, what has followed has been a progressive increase in functionality with each manufacturer trying to outdo the competition by offering consumers more for their money. The resultant machines have now caught up with the PC's significantly converged state, so much so that the

specifications of the latest video games console read like that of a PC. As the war wages on, console manufacturers seem set on increasing the functionality and connectivity of their machines yet further with the announcement of cameras (*Xbox 360*, *Playstation 3*, *Playstation Portable*), GPS (*Playstation Portable*), TV recording software (*Playstation 3*, *Playstation Portable*), TV tuner (*Playstation Portable*), HD DVD drives (*Xbox 360*) Web-browsing software (*Playstation Portable*, *DS*). It looks as if the functions incorporated into the next generation of gaming platforms are set to expand across other multimedia forms including telecommunications and broadcasting whilst utilising new wireless technology.

As the console endeavours to extend its appeal, so the differences between the two diminish, the most obvious difference being the primary method of input. For the console, this is a controller whereas the PC uses the mouse and keyboard combination (during the course of this work it was announced that a small attachable QWERTY keyboard was planned for the *Xbox 360* controller to complement the Windows Live Messenger feature). And, of course, the PC is used for work and the console for play, but this may change.

The only other important factor is the quality of the screen on which they are viewed, however this too is changing.

> *The only significant advantage computer games have over video games at the moment is the resolution of the screen. Which is set to change as HDTV becomes affordable, following the adoption curve of new television display technologies will be a correlated decline in PC game sales.*
>
> (Canalys, 2005)

Some suggest that "as the television display becomes better, gamers will migrate toward the cheaper and more stable hardware of the console for their gaming" (Thomas, 2002). If this is true, then perhaps the recent shift in console functionality is, in fact, responsible for the recent decline in PC game sales.

> *The experts at PWC predict that the PC game market will continue to shrink, PC game sales are projected to decline from $771 million in 2004 to $655 million in 2009.*
>
> (PricewaterhouseCoopers, 2005)

The expensive task of keeping a PC up to date (hardware and software), configuration issues (hardware and software) and corruption problems can all be solved by switching to a console. The previous advantages offered by PC gaming are quickly dissolving; it seems that "their niche in the home entertainment space is being eroded at by the video game console market" (Canalys, 2005). However it should be noted that in terms of work based activities the PC remains second to non due to its flexibility and utilisation of a keyboard and mouse combination which lets a user undertake a wide variety of tasks.

What we are seeing, then, in the new generations is not a console, not just a dedicated electronic machine designed to play video games, but much more. The games console has evolved beyond its own classification and is actually an entirely new hybrid machine, part console, part PC, part communication device and part media player. The manufacturers have taken the best features of all such devices: the stability and affordability of the console, the connectivity and multi-application nature of the PC, the 'always in contact' nature of instant messenger, the voice communication of the telephone, the digital delivery of the Internet, the audio capabilities of a stereo system, the movie playback quality of a DVD player, and have combined them. The end result is one multifunctional, cross-compatible, highly useful yet usable machine, and it is this usefulness that has caused it to be relocated from the bedroom into the main living, recreation and relaxation areas.

4.5 The History of Video Games

There is much debate about who created the first video game. This is because throughout the 1950s and early 1960s there were many documented examples; the front runners are as follows.

Ralph Baer is accredited by some as the inventor of the video game as he first suggested the idea that interactive games could be played on a television set as far back as 1951 (Dalmau, 2004), although it took until September 1966, before he wrote a four-page paper on the use of video games on TV sets (Baer, 1966). Following this, his ideas were fully realised in 1967 with a chase and tennis game. Baer went on to patent the interactive TV game in 1968, which led to the first home console, the Magnavox *Odyssey*.

In 1952, Alexander Douglas presented a paper on human-computer interaction at Cambridge University and used a computerised tic-tac-toe (noughts and crosses) game to illustrate the principles (Dalmau, 2004). In 1958 Willy Higginbotham a physicist who worked in the Brookhaven National Laboratory, programmed an interactive table-tennis-like game displayed on an oscilloscope in which one could plot the trajectories of the ball (Herman, 1999). Higginbotham did not patent the device as, apparently, he did not realise what he had created, "even when people started waiting in line to play the game at Brookhaven" (Dalmau, 2004).

Another popular choice for the first electronic game was *Spacewar* constructed in 1961 by Steve Russell a graduate in engineering at MIT (Herman, 1999). The game was for two players, each controlling spaceships that could shoot at one another. *Spacewar* has widely been accepted as the first video game built for the sole purpose of entertainment and it was shown to the world in 1962. Nolan Bushnell translated *Spacewar* into the first coin-operated arcade game, which was commercially released in 1971 although he renamed it *Computer Space*. This was made possible only because of the enormous advances in computer technology,

both in processor size and price. Despite such advances, the machine was unpopular as it was too difficult to play.

In 1972, Magnavox (licensing Ralph Baer's paddle and ball TV game), manufactured and unveiled the first home video game in *The Odyssey*. Even though the game was in black and white and had no sound, Magnavox still managed to sell 100,000 units in 1972 (Herman, 1999).

Bushnell realised his next game would have to be simpler, and after viewing the paddle and ball game on *The Odyssey*, he co-founded Atari with the intention of developing it. Bushnell reinvested the profits made from *Spacewar* to create *Pong*, which became the first widespread arcade success (Wolf, 2002). However, on its release, Magnavox sued Atari for copyright infringement and Atari were forced to pay Magnavox a licensing fee to market its games (Herman, 1999).

> *Although Atari had applied for a trademark and patent and trademark for Pong, the company didn't receive them in time to stop a wave of copy-cat games that were released on the wave of Pong's success.*
>
> (Herman, 1999)

In the lead-up to the first video game crash of 1977, the market was flooded with companies manufacturing their own versions of video Ping-Pong, very few of them spending any money developing new games (Herman, 1999). This ultimately led to store shelves becoming saturated with similar products and the combined effect, with increasing competition from the new portable electronic market, bankrupted many manufacturers. This was an important lesson for those companies developing video games. It is imperative that the games industry continually breaks new ground in order to keep consumer' interest, the impact of user-expectation was beginning to be realised: players would not be satisfied with the same game thrown at them in different packages.

The second video game crash occurred late in 1983, caused by the opposite of the 1977 crash: there were just too many games on the shelves, and consumers could

not distinguish good from bad. This second crash has been described by some as more of a shakedown, the advances in computer capabilities together with a drop in price leading to a plethora of home console machines, each with its array of poor-quality games. Consumers simply stopped buying, which caused the sudden bankruptcy of a number of companies producing home computers, and third-party publishers. The surplus stock was sold off at discounted rates, which meant that those companies still in business could not compete against these heavily discounted games, "forcing quality games into a cycle of discounting and loss" (Herz, 1997).

Video games finally hit mainstream audiences in 1985 with the release of the *Nintendo Entertainment System* (*NES*) and *Sega Master System.* Both were cartridge-based 8-bit systems. Nintendo also managed simultaneously to capture the portable market with the *Game Boy* released with the game *Tetris* in 1989. Despite their efforts, other companies could not compete against Nintendo and Sega: the two Japanese companies had cornered the market.

The dominance of Sega and Nintendo continued as they successfully fought off all other contenders throughout the 16-bit era. In 1991 Nintendo worked with Sony to develop a CD player to work with the *Super Nintendo Entertainment System* (*SNES*), but two years down the line the project was abandoned. Resentful, and after a legal battle for the name 'Playstation', Sony took what they had learnt and created their very own 32-bit CD games console, in an effort to overthrow Nintendo's control on the market.

The 32-bit era was a race to produce high-tech systems with the *Sega Saturn* and *Sony Playstation* hitting shops in 1994. With a lower than expected price tag and an assortment of good release titles, Sony experienced large sales. Nintendo released the *N64* a year later, and although more powerful (64-bit), the company struggled to complement its machine with quality software. By 1996 Sony had increased its market share by dropping the price further and announcing a large variety of new titles. In one year the company went from a zero market share to

having the world's best selling system (Herman, 1999). Part of their success was undoubtedly due to the Sony's development of CD gaming when compared with Sega and Nintendo's cartridge-based systems. It was clear that consumers welcomed Sony's innovation.

During the console war of the mid-1990s, the PC CD-ROM emerged as a viable medium for delivering games on home computers, replacing the 3½ inch floppy disk. The new format could hold considerably more data, which meant the graphical quality increased as did the appeal, which ultimately lead to an influx of PC gamers. In November 1998, Sega attempted to recapture the market by being the first company to release the next generation of machines. However, the *Dreamcast* failed to gather enough momentum before the release of the *Playstation 2*, a year later. Despite being the first console to offer online play, the *Dreamcast* could not compete with the features of the *Playstation 2*. Backward compatibility meant that old *Playstation* games were not made redundant, which helped Sony retain much of their existing market share. In addition the *Playstation 2* was also a DVD player, which proved to be a huge selling point, primarily because the machine was cheaper than many DVD players available at the time. These two features, an attractive vertical design and console-exclusive games, ensured for the *Playstation 2* a worldwide shipment total of ninety million units (Sony Computer Entertainment, 2005). Sony's success caused Sega to discontinue the *Dreamcast* in early 2001 and announce their withdrawal from the home console business.

Although extremely popular for strategy, simulation and online role playing games, the PC gaming industry has experienced a decline since the turn of the century. In 2004, the market dropped 12.3 percent from the year before, and PricewaterhouseCoopers' Global Entertainment and Media Outlook forecasts a steady decline over the next four years (PricewaterhouseCoopers, 2005). Despite the aforementioned advantages of PC games, there were also a growing number of problems with both making and playing games on a PC. To begin with, developers faced the continued challenge of making games for an assortment of

hardware and software requirements. Furthermore, PC games frequently had to be configured to the specification of each individual PC (this is still the case to a great extent) and downloading patches was often frustrating for the user (particularly if they lacked an Internet connection!). Although games could run directly from the CD-ROM, designers often chose to download the content onto the hard drive to make them run even faster. Unfortunately a PC holding several games often became corrupt as processing-conflicts between them inevitably occurred. Finally, the constantly evolving nature of the PC hardware meant that PC gamers had to continually upgrade their machines in order to play the latest games, which naturally proved costly.

In 2001, Microsoft boldly entered the console industry with the launch of the *Xbox*. Perhaps they feared that the sale of PC games was struggling in comparison with console games. Microsoft up to this point had only been involved in developing PC games, although they did collaborate with Sega in porting *Windows CE* to the *Dreamcast*. They built the *Xbox* around PC hardware, unlike the traditionally proprietary design of nearly all other gaming consoles. Features included a hard disk, which not only served as a disk cache for faster game loading times, but also allowed users to download new content for their games from their online service (*Xbox Live*). It also allowed its users to copy music from standard Audio CDs so they could personalise the soundtracks of various *Xbox* games. Also in 2001, Nintendo arrived with their fourth home video game console offering, the *Gamecube*. Despite arriving late on, Nintendo managed to carve out a loyal following by pricing the machine far below those of their competitors and offering some unique games.

Although brand loyalty, technical capabilities and price certainly play their part, it appears that the main factors that determine the success of a console are first-mover advantage and third-party support. The first-mover advantage is simply the benefit achieved by being the first to release a new generation machine. The best example of such a strategy was with the *Sega Megadrive* during the 16-bit era. However, Sega learnt to its cost that being the first mover does not always

guarantee success, as it discovered with its 128 bit system, the *Dreamcast*, which failed to reap the benefits as consumers decided that they would rather wait for the *Playstation 2*. In addition to when the console is released, a console manufacturer also needs to have ample third-party developer support, to ensure that quality titles are released. When it comes to consoles, it is often said that it is "all about the games"; people tend to purchase the console that offers the games they enjoy most. This is often stated as the reason why the *N-Gage* failed (Nokia's attempt at combining a handheld gaming device with a mobile phone), "the poor sales performance can be attributed to the poor selection of games" (Wikipedia, 2006a). This is also the reason why Microsoft bought up so many top game developers to make games exclusively for its system (e.g. Rare, Bungie). Third-party support also extends as far as providing developers with additional support to assist in the creation of software, with the aim of making the platform easy to develop games on. The success of the *Playstation* over the *Saturn* was attributed in part, to how easy *Playstation* games were to develop (Wikipedia, 2006b).

4.6 Growth of the Video Games Industry

The video game market has grown steadily throughout the 1990s and the growth shows no sign of diminishing in the 21st century.

> *Over the last six years (1997 - 2003) the interactive leisure software market in the UK has grown by over 100 per cent, far outstripping cinema box office (30 per cent), VHS/DVD rental (14 per cent) and music retail which has actually fallen by 4.5 per cent over the same period.*
>
> (ELSPA, 2004)

This trend continued into 2004. The UK leisure software market was worth £1.22m in 2004, a 6 percent rise from 2003, and in Europe as a whole, games software sales grew to their highest ever level in 2004 - €5.6bn (ELSPA, 2005).

In the past, much of the industry's revenue has come from only four regions: North America, Western Europe, Australia / New Zealand and Japan (ESA, 2004). According to Pricewaterhouse Coopers, the video game market in the Asia/Pacific region will grow from $8.4 billion in 2003 to $23.8 billion in 2008, an astonishing 23.2 percent compound annual growth rate (PricewaterhouseCoopers, 2005). These growth rates are also evident in the United States, where the Entertainment Software Association (ESA) released the sales data shown in Figures 4.1 and 4.2.

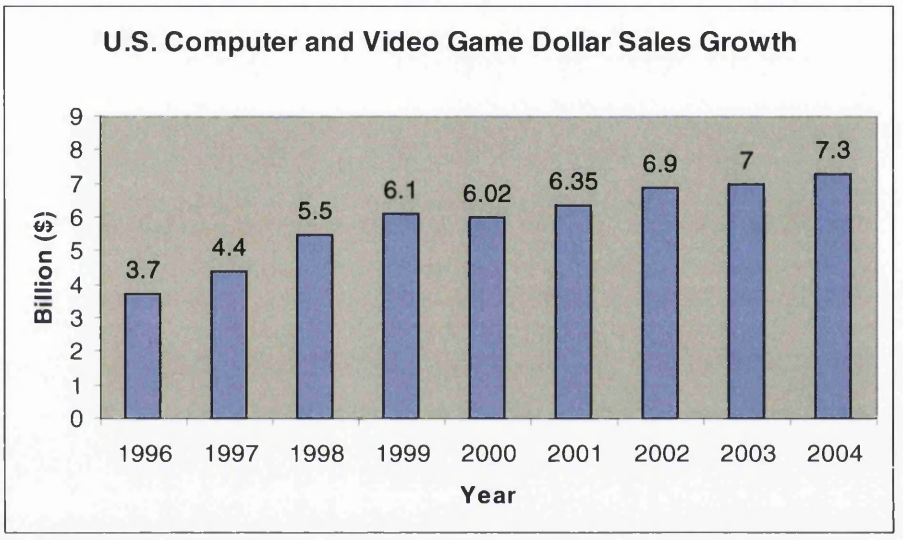

Figure 4.1: Graph Showing the Increase in U.S. Computer and Video Game Dollar Sales Growth (source: ESA, 2005)

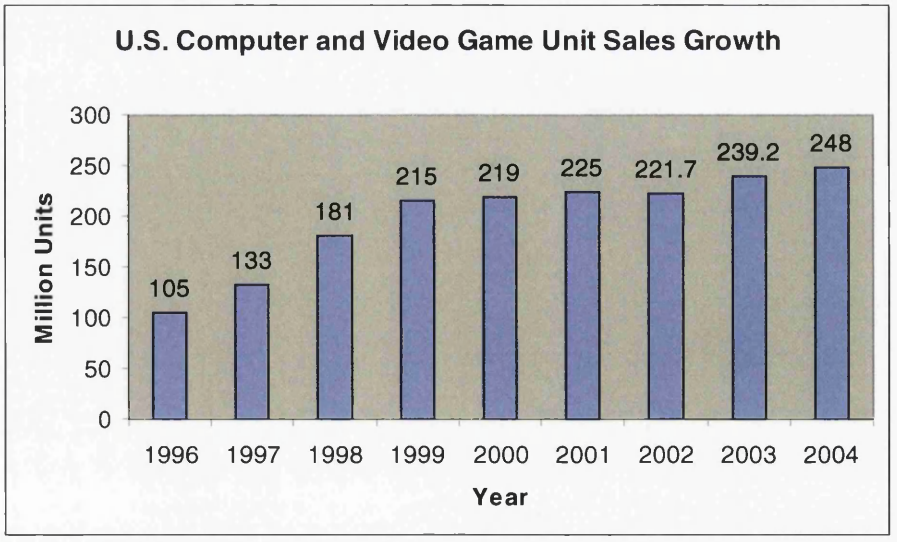

Figure 4.2: Graph Showing the Increase in U.S. Computer and Video Game Unit Sales Growth (source: ESA, 2005)

International business consultancy Deloitte estimate that the global interactive leisure software retail market was worth $18.2bn in 2003, up 10.8 percent from 2002 (Lee, 2005). Figures 2.2 and 2.3 clearly show that the games industry has a growth rate far beyond that of any other of the creative industries. What is even more remarkable is that these growth rates show no signs of stopping and are set to continue into the foreseeable future, Deloitte predicting a five-fold growth in the games industry by 2010. (Lee, 2005)

> *After a drop to single-digit growth in 2005 as the current generation of consoles enters its last year, growth will ramp up in 2006 as the next generation of console hardware is introduced, leading to a new round of console game software spending. Online and wireless will become important distribution channels for video games, helped by growing broadband penetration and new mobile phones that will be used as much for entertainment as for communication. Overall, the video game market will expand at a 16.5 percent to $55 billion in 2009 driven by growth in Asia/Pacific, the largest market.*
>
> (Pricewaterhouse Coopers, 2005)

> *In less than a decade, electronic gaming has transformed itself from an industry niche to a global powerhouse and that trend is expected to continue through at least 2010.*
>
> (Lee, 2005)

Although retail sales of video games persist in attaining new heights year after year, it is the new distribution channels of networked and online gaming that are now expanding fast.

> *Mobile and online have become significant markets in their own right and we expect all forms of networked games exploitation to account for 20 per cent of the total Western world market by 2008.*
>
> (ELSPA, 2005)

It is important to understand that the growth of the video games industry is being driven by demographics. Ten years ago, the primary consumers of video games was teenage boys; the primary audience today has shifted to those aged between 18 and 35 and involves an increasing female contingent. The digital generation is as comfortable with interactive entertainment as the previous generation was with passive media like television, and this is seen as is a direct result of growing up in a digital world (ESA, 2004). However, it is thought by some that if growth rates are to continue, video games need to become more mainstream and appeal to non-gamers.

4.7 Moore's Law

Throughout its history, video games have developed at a steady rate, from 2D to 3D to HD (High Definition), physics engines, vertex lighting, particle shading, surround sound. All these techniques have become possible only with advances in processing power (see Table 4.1 and Figure 4.3).

Table 4.1: The Growing Power of Electronic Game Consoles (source: Processor speeds obtained from www.wikipedia.org)

	Console Name	***Year of Release***	***Media Format***	***Processor speed (MHz)***
8 bit	*Nintendo Entertainment System (NES)*	1985	Cartridge	1.66 - 1.79
8 bit	Sega *Master System*	1985	Cartridge	3.38 - 3.41
16 bit	Sega *Mega Drive*	1988	Cartridge	7.61 - 7.67
16 bit	*Super Nintendo Entertainment System (SNES)*	1991	Cartridge	2.68 - 3.58
32 bit	Sega *Saturn*	1994	CD-ROM	Two 28.6
32 bit	Sony *Playstation*	1994	CD-ROM	33.87
64 bit	*Nintendo 64 (N64)*	1996	Cartridge	93.75
128 bit	Sega *Dreamcast*	1998	GD-ROM	206
128 bit	Sony *Playstation 2*	2000	DVD/CD ROM	294 – 299
128 bit	Microsoft *Xbox*	2001	DVD/CD ROM	733
128 bit	Nintendo *Gamecube*	2001	Mini DVD	485
256 bit	Microsoft *Xbox 360*	2005	Dual-Layer DVD-ROM	Three 3.2 GHz

256 bit	Sony *Playstation 3*	2006	Blu-ray BD-ROM	Cell 3.2 GHz
256 bit	Nintendo *Wii*	2006	12cm Optical Discs	Two 1.8 GHz

In order to display Table 4.1 in a graph effectively, it is necessary to take the log of the processor speed. The resultant diagram is shown in Figure 4.3.

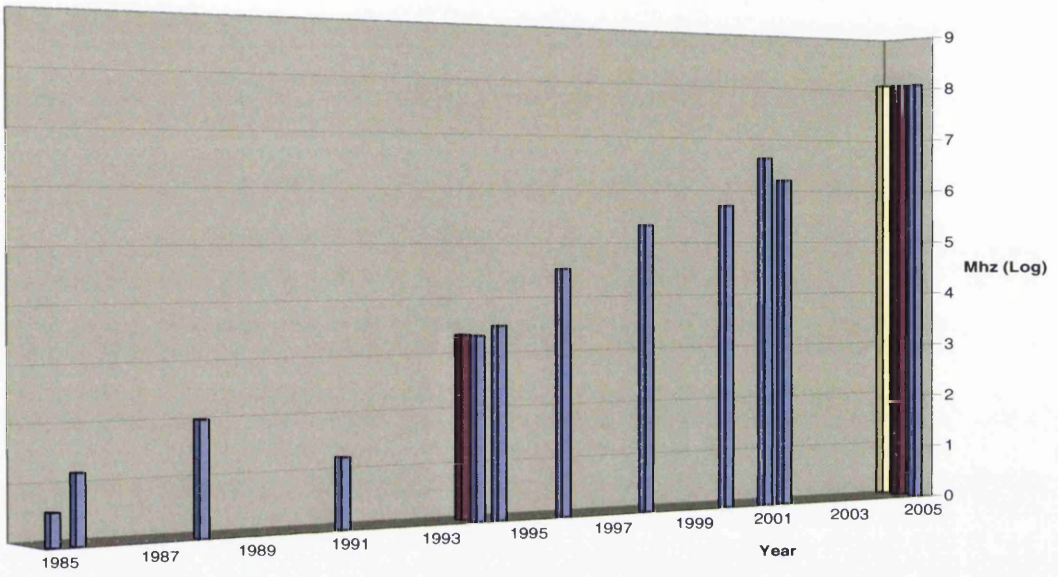

Figure 4.3 Diagram Showing the Log Increase in Processor Power in Video Game Consoles over the Past Twenty Years (source: Table 4.1)

The slight anomaly brought about by the *SNES* in 1991 can be explained, because:

> *The design of the Super Nintendo/Super Famicom was unusual for its time. It featured a low-performance CPU supported by very powerful custom chips for sound and video processing.*
>
> (Wikipedia, 2006c)

The exponential increase shown in Figure 4.3 is a good representation of Moore's Law which states that:

> *The transistor density of a silicon chip will double every two years, driving a similar improvement in processor performance.*
>
> (Lee, 2005, p.6; quoting Moore, 1965)

Based on reports from IBM and Intel, Moore's Law is expected to hold true until at least 2010, implying an eight-fold increase in processor power (Lee, 2005, p.6). However, it is important to note that for the next generation of consoles, the performance improvement is likely to be even more dramatic. This is because the processors being developed are at the forefront of integrated circuit development, rather than those that are proven and reliable (Lee, 2005, p.8), a good example of this exponential improvement in performance being Sony's *Playstation 3*. The industry's transformation is largely being driven by continuous technological advances. Electronic gaming has moved to the forefront of technology development, pushing and being pushed by the latest developments in technology (in contrast to the early days when video gaming was a minor computing industry niche).

To summarise, the design, development and visual capabilities of video game consoles have improved steadily over the years. They have been driven by both increasing processor speeds (Moore's Law), and the strong desire within the games industry to stay ahead of the competition, in a market which has been continually growing in popularity and therefore presenting an escalating financial incentive.

4.8 Problems and Limitations

Today, a top video game title can cost as much as a Hollywood film to develop. However, it is the originality of these games that is frequently being called into question. The problem is to create a ground-breaking title which inevitably carries with it a certain amount of risk. In the world of software development, new technologies carry with them a lot of uncertainty and there is always the possibility for projects to take longer and cost more. However, the relationship between cost, risk and originality explains why there is currently far more originality and innovation in mobile, Internet and interactive TV games than in console games: they are generally cheaper to produce. "You can be as risky as

you like with games on mobile phones, interactive TV and the like," (BBC, 2005a).

Nevertheless, the escalating cost of video game development has created a dilemma for developers: do they risk their investment by developing an innovative title, or do they safeguard their investment by following a more tried and tested formula? "These days game design is a costly competitive industry, so risk reduction is the order of the day, and the best way to reduce your risk, is don't do anything new" (Langley, 2005; quoting Philip Oliver, CEO of Blitz Games). Mark DeLoura of Sony Computer Entertainment America voices concern.

> *I do worry that we are going to see decreased risk and decreased innovation. I fear that players are going to get bored because when they go to the store, they will see the games they played last year.*
>
> (BBC, 2005b; quoting Mark DeLoura)

The argument put forward by Philip Oliver is that they are only responding to consumer interest:

> *If the public buy creative new ideas, then we'd make creative, new ideas. If the public go out and buy 'Harry Potter', 'James Bond', 'Lord of the Rings' and 'FIFA', then that's what we'll supply. That's the biggest thing that impinges on creativity [...] It seems that the success of the industry, paradoxically, has ultimately restricted the creativity of games designers, as they must now follow consumer trends rather than their own innovative whims.*
>
> (Langley, 2005; quoting Philip Oliver)

Repetitive titles are certainly evident in the shops as first-person shooters (FPS), film tie-ins and sports titles swamp the shelves. However, just as Sony discovered with the *Playstation*, innovation beyond the conventional if done correctly is often greatly rewarded, and with the current competition within the industry,

staleness seems unlikely. Nevertheless the lesson from the first games crash of 1977 should not be forgotten: originality is key, the boundaries must be continually pushed no matter what the risk.

Restructuring games into shorter episodes (not dissimilar to TV programs) and delivering them periodically over an online service will create a constant income stream. This will severely reduce the amount of investment and commitment needed to create one full title; instead, a short 'pilot' could be created to test the market. Popular pilots, innovative or not, could then be given the green light and unpopular pilots discarded (see Chapter 4, Section 4.10).

Furthermore, allowing the gamers to create the content while they play will not only save a considerable amount of time and money but will allow very detailed worlds to be created.

> *If only 1 percent of our audience that plays Halo helped construct the world around Halo, it would be more human beings than work at Microsoft Corporation. That's how much human energy we could harness in this medium.*
>
> (Borland, 2006; quoting Allard, 2005)

Many in the industry would like to increase the price of their games in order to guarantee a financial return, since with "the bill for some big budget games now reaching £5.4m, producers are facing costs of up to £10.9m a title" (Hermida, 2005). However, this would be a dangerous solution as a common reaction by consumers would be to purchase only from the second-hand market (eBay, Gamestation).

Nonetheless, the future suddenly looks promising as the next generation of machines appears to have addressed the input limitation by installing motion-sensing technology built directly into the controller. This has the potential to change the manner in which players interact with the game, and is likely to open up radically new possibilities, allow developers to innovate once again.

While there appears to be an inverse relationship between video game production cost and innovation, the escalating costs associated with game development restricting the amount of innovation, this can be avoided if the structure of game delivery changes. Episodic content over an online service may reduce the amount of investment and create a constant income stream (see Chapter 2, Section 2.2.9).

4.9 Input and Output Development

Since its inception in the early 1970s the games industry has advanced at a remarkable rate, and this trend seems set to continue well into the foreseeable future. "In 10 years the graphical output has improved by 1 million per cent. It's hard to comprehend but what we're playing today will be a million times better looking in 10 to 15 years from now" (Smith, 2005). By comparison, the way in which we interact with the video game console has hardly changed at all. The input devices used are still handheld controllers, they might have more button, vibrate and be wireless, but they are essentially the same as they were 20 years ago. This is also true of the output devices: video games are still being played on televisions screens. The only exception is sound output which has advanced from mono to stereo to, more recently, multi-channel audio support (5.1 surround) which can be seen as a significant improvement.

The lack of innovation regarding video game content could well be attributed to the fact that developers have exhausted so many avenues whilst working within the current input and output restrictions.

> *We live between two realms: our physical environment and cyberspace. Despite our dual citizenship, the absence of seamless couplings between these parallel existences leaves a great divide between the worlds of bits and atoms.*
>
> (Ishii & Ullmer, 1997, p.234)

Significant breakthroughs in the way players interact with the computer and vice versa (input/output) are therefore long overdue. This is not to say that there have not been any other input/output devices produced: there have been many innovative devices released including dance mats, driving wheels, camera input (reproduce player's movements onscreen), Game Trak (detects glove movements), but none have come close to threatening the controller's versatility. Likewise, 3D visors and virtual reality have been around for years, but until such technology is cost effective and less cumbersome, it will not enter the mainstream consumer market. Furthermore, even though many alternative input devices are available, it does not make good financial sense to invest heavily developing a game which solely utilises one of them, because it severely reduces the size of the market to those who own such a device.

Fortunately, technology endeavours to find a way, especially when the solutions are so profitable, and it would seem the industry stands on the cusp of this long overdue interface revolution. Furthermore, when these breakthroughs inevitably occur, they are likely to tip the lazy video game player stereotype on its head by making video games considerably more physical. The ramifications do not stop there, as they also have the potential to influence many other industries including the communication, e-commerce and exercise industries. Video game input devices seem set to move from the fine motor control of fingers and thumbs towards also forcing players to make larger movements and use more of their body. Such devices will need to be able to capture and recreate these movements accurately within the game, which is exactly what Nintendo has managed to achieve with their revolutionary new controller. Nintendo have abandoned the traditional controller held with two hands in favour of an all new freehand style unit held with one or two hands.

> *Shaped like a television remote control, the Revolution controller uses internal sensors to translate your wrist, arm and hand movements on screen.*
>
> (Morris, 2005)

Not to be outdone, Sony announced that their new controller although keeping to the tried and tested shape and layout, will also contain motion sensing technology. Innovations such as this will not only increase the movement dynamics of video games but also dramatically affect game content and game-play by giving third-party developers the flexibility to innovate, for example:

> *Rod in hand, we were able to move the controller around to move our virtual rod up and down, right and left, and back and forth on the screen, which affected the position of the rod's lure. The controller would rumble with each fish nibble, we simply had to pull back and flick our wrist back at the right moment to snag our catch.*
>
> (Torres, 2005)

The controller can be used to improve the players' fine and gross motor control in relation to a given sport by providing feedback in, for example, tennis and golf. Theoretically, skills can be learnt playing video games that could actually be transferable to the associated sport.

Webcams and the associated software (for instance *Eyetoy: Chat*) are real-time cameras that send video and sound across the Internet between two or more conversation participants. These cameras connected through the Internet are likely to impact on the way in which long-distance communication occurs, due to ease of use, innovative features and cost savings. Similar to the way in which text and video messaging has seen success in the office and classroom, console-based chat will be the equivalent from the home. The reason webcams are so advantageous is because (so it is claimed) more than 65 percent of the information exchanged during face-to-face interaction is expressed through non-verbal means (Argyle, 1988). What is more intriguing however, is how the games console is "perfectly" positioned to provide far greater social telepresence through the virtual embodiment of avatars.

There is a big disparity between when a technology becomes possible and when it becomes affordable. Virtual-reality goggles have been available for some time,

but sooner of later will become cheap enough, and light enough, to enter the consumer market. Needless to say, an advancement of this kind would revolutionise the industry, fundamentally altering the way in which games are played. What is more, the technology appears to be getting closer to fruition: a company called eMargin claims to have created an affordable headset:

> *It has come up with a 3D visor that uses two micro displays to create a stereo vision of a game. The headset has a tracking system using gyroscopes that lets players look around a game by moving the head from side to side.*
>
> (BBC, 2006a)

Ultimately such a device will trick players' brains into believing they are present in the virtual environment (telepresence): the ramifications for telecommunications are immense.

Video game input devices are likely to evolve from fine motor-control to gross motor-movement making video more physical in nature. Output devices are likely to move from viewing on 2D screens to true 3D via headsets, both giving developers the flexibility to innovate and potentially revolutionise, for example, the communication and exercise industries, and, as especially relevant to this thesis, e-commerce.

4.10 Online Multi-Player Gaming and Digital Distribution

Video game consoles have recently entered an online era which has enabled multi-player gaming, networked communication and digital distribution, all of which has been available on the PC for many years. Current console multi-player games generally support up to 16 players, however many games also allow the single-player story mode to be played co-operatively by distributed players. As for digital distribution, the announcement of episodic content could see periodic digital delivery, similar in structure to television programmes.

Online gaming has had a profound impact on the video game console experience. First and foremost it has introduced the social element to video games that was previously only possible when players shared the same physical space (see Chapter 6, Section 6.2 and 6.4). No longer do players need to crowd around one television screen, but instead can join online communities of potentially millions and play with or against whomever they please (provided they have a console, game and desire to play) from anywhere in the world (provided there is an Internet connection).

The way in which these online multi-player games are played is fundamentally different to single-player games, as too are the skills needed to play them. This is primarily because online multi-player games require co-operation and collaboration between players in the form of team work. The need to communicate and work together in a team in order to overcome human opposition, presents a significant challenge and can be a hugely rewarding experience. Online gamers can share and even sell their created content. Furthermore, if gamer-created content could be harnessed and used by developers, it might even save time and money. The time intensive task of creating detailed content would be passed over to the gamers and then distributed or amalgamated via the Internet. A good example of this can be seen in Will Wright's *Spore*, a simulation game which allows players to control various life forms from the cellular to the galactic level.

> *The real secret weapon for the game is that each player's creations will be uploaded to the company and then downloaded to other players' computers. Once a species reaches space, for example, it will visit other worlds inhabited entirely by cities full of beings created inside another player's game.*
>
> (Borland, 2006)

In some respect, this concept is similar to the phenomenon known as massively multi-player online role playing games (MMORPG) which are already extremely

successful on the PC (e.g. *World of Warcraft*, *Final Fantasy XI*, *Ultima Online*, *Star Wars Galaxies*, *EverQuest*). These are persistent virtual worlds, so they do not end when players log out, but continually change and develop in cyberspace with players logging in and out of the game 24 hours a day. The success of MMORPGs and the consoles' new online capabilities have meant that the transition to them was inevitable. The first console-based MMORPG was *Phantasy Star Online* which was released in May 2003 for the *Xbox* and *Everquest Online Adventures* followed in October 2003 for the *Playstation 2*. More recent examples include *Final Fantasy XI* for the *Xbox 360* and *Playstation 2*. It should be added that MMOPRGs are not a new concept. Text-only versions of such games existed from the early 1980s onwards, often played on mainframes or mini-computers as opposed to servers. One example was *Federation II* which, even in the days before global online communications, attracted large numbers of players - see, for example, Jacobs (1990). However, the modern games are far in advance of those early attempts.

In addition to multi-player games, a networked video games console can also provide a new cheap distribution channel and deliver digital content direct to the consumer. "It (*Xbox Live*) lays the foundations for a digital distribution system where games may no longer exist as shiny discs but as downloads" (BBC, 2005c). At present, game content, game updates, music videos, movie trailers, arcade games and wallpapers among other media can be purchased or downloaded free of charge.

As already discussed, video games are costing more to develop, fortunately digital delivery presents a longer-term solution; re-packaging a game into smaller chapters or episodes could not only reduce the upfront investment and provide a more constant revenue stream for the developer. It could also reduce the upfront cost for the gamer and give them the opportunity to abandon the game if players did not like it, or buy the next chapter if they did. Alternatively, the first episode could be downloaded free of charge with subsequent episodes requiring purchase, similar to how a demonstration disc released with gaming magazines attempts to

entice the consumer. In the same way that television companies fund pilot episodes so too could more innovative titles be given the chance of full financial support if consumers' interest warrants it.

Episodic delivery of video games has never really taken off in the past, however this approach is attempting to establish itself in the mainstream market, *Half Life 2: Episode One*, *GTA 4* and *Alone in the Dark* are all confirmed episodic titles. Episodic games seem to be suitable only to the single-player narrative, but non-narrative games can still benefit from the same approach: updates and patches can radically alter a game. Furthermore, broadband speeds and storage capacities are both on the increase, so there is no reason why in the future full video game content cannot be purchased and delivered digitally (see Chapter 2, Section 2.2.12).

4.11 Summary

Video game consoles have improved steadily over their relatively short history, these developments having been driven by a steady growth in popularity, increasing processor speeds (Moore's Law) and the strong desire within the industry to stay ahead of the competition. Apart from two industry crashes, the market has seen continual growth which has spurred on competition by presenting an escalating financial incentive. As the popularity of video games has grown, so too has their influence and reach, resulting in their penetrating multiple industries.

The importance of innovation should not be overlooked. It keeps the industry fresh and moving forward. However, the escalating cost of video game development has forced an apparent fall in originality in order to reduce the associated risk and safeguard investment. Unfortunately, it appears that developers are following consumer trends rather than their own innovative whims. Luckily, a solution is already at hand in the form of episodic delivery: restructuring games into smaller chapters, thus reducing the cost by delivering them digitally. It is likely to significantly reduce the amount of investment needed

and create a constant income stream. Such a solution is only now possible because game consoles have recently entered an online era which has enabled multi-player gaming, networked communication and, most importantly, online distribution.

It seems that games consoles are evolving into highly versatile machines, mirroring many aspects of a PC as they endeavour to increase functionality and appeal. To the extent that the previous advantages offered by PC gaming are quickly deteriorating, it seems that the PC's niche in the home entertainment space is being eaten away by the console market. Furthermore, it is not just a PC that is under threat; the increased capabilities of next-generation consoles such as the *Xbox 360* and *Playstation 3* will, in all likelihood, bring them into greater competition with other device categories.

The industry that in its infancy was considered an adolescent waste of time now has the potential to outperform television and film in terms of consumer usage? The children of the video game revolution may have all grown up, but many have not abandoned their love of games, as was expected. They have embraced it, pumping more money into the industry which has helped it evolve from a childish fad into a global phenomenon. The modern video games console is quite possibly destined to become the epicentre of a household's entertainment experience, facilitating film, music and game downloads, distributed human interaction and media transfer, organisation and playback, – and thus to shopping

It should be noted that the games industry is a vast topic and it has not been the intention of this chapter to provide coverage of the complete subject area, but rather to provide the reader with an insight into the background specifically relevant to this thesis, and provide an overview of the necessary characteristics so that the remainder of this thesis can be viewed within its proper context.

Chapter 5

Electronic Commerce

5.1 Introduction

This chapter centres on e-commerce, specifically business-to-consumer (B2C) Web-based e-commerce. It discusses how the Internet and the World Wide Web came to be, and the subsequent development, growth and success that followed. Although the benefits are covered, the essential part of this section aims to bring to the reader's attention the limitations of Web-based B2C e-commerce, specifically, the lack of social context, product interaction and agency (control). The background on e-commerce will be limited in scope to the subject areas that are relevant to this thesis, specifically Web commerce.

The information age has seen the emergence of computers to the point where they are currently inescapable in the modern world. This growth was boosted by the development of the Internet which enabled the world-wide distribution of information through networked computers. The escalating use of computers and the ability to move information between distributed locations necessitated the digitisation of all media. This need has now filtered through various industries and manifests itself in how these media are captured and handled. Significant changes with respect to digitisation can be seen in photography, telecommunications, entertainment and broadcasting. These recent technological advances have also radically altered what is possible in the world of commerce. Digitising the purchasing process provides numerous advantages to the consumer, but inevitably these changes have also caused some fundamental limitations.

5.2 Clarification of Terms

The general public often use the terms "the Internet" and "the World Wide Web" synonymously, but the two terms are not interchangeable. "The Internet is a network of networks or an internetwork linking computers world-wide, in its physical form the Internet is composed of wires, routers and communication links" (Kalakota & Whinston, 1997). The Web on the other hand is "a universe of network-accessible information" (W3C, 1997) and is therefore an application which uses the physical infrastructure of the Internet to access information (multimedia). The Web is just one way in which information can be distributed over the Internet. Other applications that utilise this "network of networks" include email, instant messaging, file sharing and video games.

E-commerce has been defined as the ability to share a wide range of communications, data and resources between trading partners through the use of telecommunications and technology enabled networks (Adams, 1994; Lederer *et al*, 1996; Gatautis & Neverauskas, 2005). In other words, any commerce that takes place through electronic telecommunications means can be considered e-commerce This therefore also includes pay-per-view television, purchasing ring tones with a mobile phone, or extra content for a video game. If the term e-commerce is too broad a classification, it is possible to use more specific definitions to highlight more accurately what area of electronic commerce is being referred to. Internet commerce or I-commerce, which is a subset of e-commerce, focuses on business or transactions occurring solely over the Internet. Similarly, Web commerce, which is a subset of I-commerce, refers to business or transactions that are occurring over the World Wide Web. Finally, mobile commerce (m-commerce or mobile e-commerce), also considered a subset of e-commerce, is defined as "the use of mobile hand-held devices to communicate, inform, transact and using text and data via connection to public or private networks" (Lehner & Watson, 2001; quoting Skiba et al., 2000).

Contrary to popular belief, e-commerce is not a new phenomenon, its origins lying in the financial trade transactions of the 1970s. During this period,

applications such as electronic funds transfer (EFT) were used to move money between financial institutions via telecommunications networks. This fast and secure form of e-commerce has now become the standard means of transferring funds in the financial sector (Barnes and Hunt, 2001).

It is also worth mentioning Electronic Data Interchange (EDI) which is:

> *. . . the movement of business documents electronically between or within firms in a structured, machine-retrievable, data format that permits data to be transferred, without re-keying, from a business application in one location to a business application in another location.*
>
> (Sriram & Banerjee, 1994)

The importance of EDI is to some extent unrecognised but in an era of XML, the Internet and the Web, EDI is still the data format used by the vast majority of e-commerce transactions in the world today.

5.3 A Brief History of the Internet and Electronic Commerce

The origins of the Internet go as far back as 1957. From its small beginnings, the Internet has been transformed into a vast cross-referenced collection of multimedia documents. This was only made possible with the creation of Hyper-Text Markup Language (HTML) and an accompanying document retrieval protocol called Hyper-Text Transfer Protocol (HTTP). The two physicists who conceived it named their invention the "World Wide Web" (WWW). It was truly world-wide, and was a new killer application that could instantaneously bring together unrelated buyers and sellers from around the world in seamless, interactive and low-cost ways. The subsequent diffusion of the World Wide Web led to the commercialisation of the Internet content and the emergence of e-commerce applications.

> *The invention of the World Wide Web catalyzed the development of commercial content and applications by simplifying the Internet and providing a set of standard protocols for delivering a wide variety of content to almost any desktop.*
>
> (Mowery, 2002)

What followed in the 1990s was an influx of start-up companies selling products or services through the Internet. The venture capitalists observed the fast rise in valuation of these companies which caused a speculative frenzy of investment in Internet and Internet-related technical stocks and enterprises (the dotcom boom) (Wikipedia, 2006d).

Subsequently a stock market bubble occurred, speculators noted the fast increase in value and bought in anticipation of further rises, rather than because the shares were undervalued. Typically, many companies thus became grossly overvalued. When the bubble burst, the share prices fell dramatically, and many companies went out of business (Wikipedia, 2006d).

Figure 5.1: The NASDAQ Composite Index Peaked in March 2000, Reflecting the High Point of the Dot-Com Bubble (source: Wikipedia, 2006d).

However, the burst of the dotcom bubble in late 2000 and through 2001, although costly, did not represent the end of e-commerce over the Internet; it was merely a setback. Historically, economic bubbles occur with nearly every technological revolution: steel mills, railroads and canals all experienced similar surges in investment followed by financial collapse. Virtually every real breakthrough in technology has had a bubble which burst leaving many investors broke but also often left the infrastructure for the next golden age (Perez, 2003).

5.4 Types of Electronic Commerce

In the past ten years there has been an acknowledged move to an Internet-based society that appears to have the potential to impact upon almost all aspects of our lives; according to Turban et al. (2000) one of the more significant changes is the manner in which we conduct business. The emergence of e-commerce and the phenomenon of virtuality are viewed as being among the most significant of these changes (Kalakota and Robinson, 1999). According to Whinston *et al* (1997) commerce can be defined on a continuum ranging from traditional commerce to pure e-commerce. Traditional commerce uses physical delivery and payment methods and is concerned with the sale of physical goods. Partial e-commerce deals with transactions that utilise both traditional and digital means. For example, buying a product over the Internet that is then delivered by post to the customer's door. At the far end of the scale is pure e-commerce, which focuses on all aspects being conducted by digital means. For example, the purchase of video game content through a games console, which is paid for by card and delivered directly through the Internet using communications technology (see Figure 5.2 for clarification).

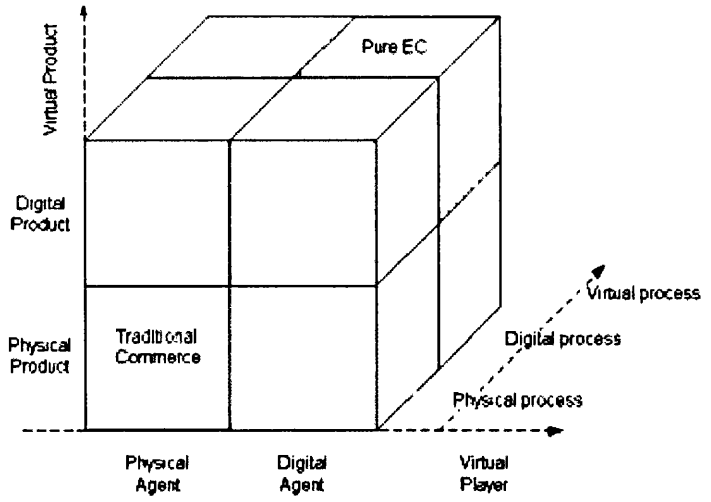

Figure 5.2: The E-commerce "cube" (source: Choi et al, 1997, p.18)

A more popular way of categorising e-commerce is by defining the transaction by user group, this is best illustrated in the e-commerce matrix in Table 5.1.

Table 5.1: The E-commerce Matrix (source: The Economist, 2000).

	Business	***Consumer***
Business	**B2B** GM/Ford EDI Networks	**B2C** Amazon Dell
Consumer	**C2B** Priceline Accompany	**C2C** EBay QXL

As shown in Table 5.1, e-commerce has four segments: business-to-business (B2B), business-to-consumer (B2C), consumer-to-business (C2B) and consumer-to-consumer (C2C). B2B e-commerce generally involves large-scale transactions between companies, or groups of companies and represents the largest segment of the matrix in terms of revenue. For example, the online purchase of raw materials by U.S. car manufacturers General Motors or Ford. B2C represents typical retail activity on the Web, such as bookselling by Amazon.com or computer selling by Dell. C2B, a much smaller component of e-commerce is also known as 'reverse auctioning' and takes advantage of the interactive nature of the Web to drive transactions in reverse. For instance, with passengers bidding for airline tickets on

Priceline.com, the airline companies are left to decide whether to accept offers made by the customers. Finally, C2C refers to e-commerce between two individuals and covers a new kind of consumers' auction such as eBay, where individuals place items onto an online auction and consumers bid against each other.

As previously mentioned, this thesis is primarily concerned with Web commerce (as defined in the classification of terms), specifically business-to-consumer (B2C) Web commerce (see Table 5.1). An amalgamated definition would therefore be: business or transactions occurring over the World Wide Web, typically in the retail direction from businesses to consumers.

5.5 The Benefits of B2C Web Commerce

Web commerce effectively creates business automation and this brings with it a number of distinct advantages including reduced investment and labour. The Web enables businesses to increase their consumer base and therefore their potential revenue, while unavoidably opening up the doors to global competitors. In turn Web commerce gives consumers access to stores from around the world instead of those from their local high-street. Perhaps most importantly, it creates a hugely competitive market where consumers have access to a wide variety of products and services, ensuring competitive prices. Some of the benefits are mentioned above and others are listed in Table 5.2.

Table 5.2: The Benefits of B2C Web Commerce for Businesses and Consumers

Benefits for the Business	Benefits for the Consumer
Expands the size of the market from local, regional or national to international level.	Enables consumers to purchase products and services 24 hours a day, 365 days a year from any Internet connected device.
Enables businesses to target a niche or more selective market.	Gives customers a significantly wider range of choice when it comes to choosing a vendor from which to purchase.
Enables pull type processing – allowing customisation of products which reduces storage space and gives the business a competitive advantage.	Allows consumers to customise their product or service.
Decreases the cost of creating, processing, storing, distributing and retrieving paper-based information on customers.	More competition ultimately encourages competitive pricing so consumers benefits from consistently cheaper prices.
Reduces the personnel and space required to complete business processes	Search-engines can quickly compare the cost of a single product over numerous sites and present the results in seconds.
Improved customer services, order history, order status, and direct customer analysis of service provided.	Provide quick delivery of products and service particularly digital products delivered over the Internet.
Automatically collect valuable customer data which can be used for cheap targeted product promotion to existing customers.	Receipt of purchase is instantaneous and order tracking services inform consumers where the product is in the delivery process.
The ability to have 'Affiliates' that display and market products in return for a small commission.	

5.6 The Limitations of B2C Web commerce

As previously discussed, digitising the purchasing process creates numerous benefits to consumers, but inevitably these changes have caused some fundamental problems. Before looking at the technological impediments to B2C e-commerce as identified by Rose et al (1999), it is important first to look at the more innate characteristics that have been lost by making commerce electronic.

5.6.1 Traditional to Electronic – What Has Been Lost?

Traditional shopping involves personal relations with friends and informational relations with shop assistants for advice and guidance. This social context combined with the capability of close interaction with the product facilitates a well known browsing experience where the purchasing decision is often made on impulse, and is linked to recreational shopping, where a consumer's intentions to buy are not pre-determined and may simply be a result of situational desire.

This highlights a fundamental difference between traditional shopping and Web-based shopping, and identifies what has been lost by making the process electronic. Three interdependent factors have been identified which are fundamental to recreational shopping but absent in Web-based B2C e-commerce, namely the social context, product interaction and agency. A study into perceived risk as barriers to Internet and e-commerce usage by Liebermann & Stashevsky (2002) identified nine different risk components, two of which were: "missing the human side in Internet purchases" (social context) and "lack of physical contact" (product interaction). Nizami Cummins (2002) states that e-commerce developers should recognise that users tend to remain at arm's length from systems once they are displaced from proper agency and unable to affect the virtual world, to manipulate it according to their own intentions.

Lack of Social Context (Social Presence)

When we connect with others in new social situations, we create social presence or a degree of interpersonal contact (Gunawardena & Zittle, 1997). However, individuals participating in online shopping are separated by physical or geographical location and therefore find themselves in isolated conditions. The ability to establish interpersonal contact with others greatly diminishes because all contact is electronic. In other words, the lack of social context occurs once IT is introduced into the process of shopping and the social interaction is removed (Maamar, 2003).

Traditional shopping involves interaction with friends and shop assistants for advice and guidance as well as bargaining with vendors over price, all of which impact significantly on both the satisfaction achieved and the decision-making process of the shopper. This important social context is absent during Web-based shopping, something which can make the experience both solitary and unexciting. This viewpoint is further supported by research into the importance of social factors which has found that 90% of shoppers prefer to communicate while shopping (Schummer, 2001). The principal factor responsible for making recreational shopping such an enjoyable social experience is clearly absent in Web commerce.

Lack of Product Interaction 'Touch and Feel'

A significant amount of traditional commerce involves an assessment of the product in the shop before making any purchase decision, whether that involves trying on items to see how they feel, searching for product imperfections, smelling perfume or just gauging a product's aesthetic appeal.

> *Online consumers cannot depend on all five senses to make a purchase; instead they must rely on limited product representations such photographs and text descriptions.*
>
> (Koufaris, 2002)

This could go some way to explaining why the success of B2C e-commerce tends towards being limited to certain low-involvement products. Specifically these are products with a low product category risk such as DVDs and books, which require very little physical assessment. Put simply, these are products where purchasers know exactly what they will get. Bhatnagar et al. (2000), define *product category risk* as the consumer's belief regarding whether the product would function according to expectations. Users are forced to take calculated risks when purchasing from a website because of the lack of sensory information necessary to make an informed decision. This is exactly why some market experts have predicted that retail stores will ultimately survive because of this old

fashioned "feel the merchandise" mentality (Moukheiber, 1997), although the success of B2C e-commerce may be proving such early prediction wrong.

Loss of Agency

The process of purchasing a product online for the computer literate is fairly straightforward, but the inexperienced, less technologically aware consumers face many obstacles, and their endeavours may result in frustration and annoyance. This is because the process of purchasing online remains very different from that of the traditional purchasing experience.

A major difference is the issue of perceived control, which has been defined as the level of one's control over the environment and one's actions (Koufaris, 2002). This is especially true if the user lacks computer skills. The original e-commerce architecture involved users navigating through a maze of options which appeared to be designed to maximise "user capture" above everything else. Fortunately there has been a shift in focus towards empowering consumers which has resulted in search-engines and other helpful features which inform consumers of their location within a website.

However, this aspect runs deeper than simply whether users think they are in control of their own navigation, and as useful as hyperlinks are for navigation, it is human nature to desire a more all-encompassing, not to mention more intuitive, navigation system.

> *Our desire for agency in digital environments makes us impatient when our options are limited. We want an open road with wide latitude to explore and more than one way to get somewhere.*
>
> (Murray, 1997)

In terms of environmental psychology, consumers want to feel "unrestricted or free to act in a variety of ways" (Mehrabian & Russel, 1974), and until there is a digital environment which returns full agency to the user, similar to that

experienced with traditional shopping, consumers will always feel frustrated and constrained.

5.6.2 Technical Impediments

Rose et al. (1999) identified six categories of technological impediment which pose the greatest threat to B2C electronic commerce. It would be reasonable to assume that these could be out of date as the research was conducted seven years ago, however, the lack of any significant emerging solutions means that the same problems persist. Nevertheless, to ensure validity more up to date research will be used to support the six categories of technological impediment stated by Rose et al. (1999).

Download Delays

Most e-commerce websites would like to include as much multimedia content as possible to entice their potential customers and help sell their products or services. Unfortunately the use of multimedia in B2C Web commerce is limited by the fear of creating excessive download delays which might frustrate and therefore negatively affect their customer base. "Long download times result in increased frustration and dissatisfaction, as well as lost profits for e-commerce websites" (Selvidge et al., 2002). Similarly, Rose and Straub (2001) hypothesized and to some extent proved that download delay in an e-Service retailer's Web application has a negative impact on consumers' attitude toward that Web retailer. Luckily for the UK, broadband has become more prevalent at home as well as the office so websites have been able to significantly increase in complexity. Today most delays arise when someone with a slow connection (56 kbs) attempts to access material intended for a fast connection. More professional websites ask the user to select a connection speed to optimise performance or offer a plain-text version of the website, but this is not always the case. Insufficient telecommunications bandwidth is less applicable to the UK which is experiencing a broadband push, but applies to areas of the world where the telecommunications infrastructure is less developed. As long as connection

speeds vary, those considered behind the standard speed will invariably suffer download delays as online shops (e-tailors) strive to offer more.

Limitation of the Interface

This limitation is closely related to the lack of product interaction mentioned in the previous section and highlights the physical limitations of the graphical user interface (GUI). As already discussed, if consumers are unable to touch or feel the product, they are disadvantaged when it comes to making a purchase decision. Smell and taste are considered less important but "both of these senses have been shown empirically to directly impact consumer buying behaviour" (Rose et al., 1999, p.21; quoting Johnson, et al., 1985; Miller, 1991; Wilkie, 1995).

> *The development of electronic commerce has been constrained by the inability of online consumers to feel, touch, and sample products through Web interfaces, as they are able to do in conventional in-store shopping.*
>
> (Zhenhui & Benbasat, 2004)

Although Web browsers are media rich and can display coloured text, images, sound, animations and video it still only engages the user through two of the five human senses, namely sight and sound, and even these still have scope for improvement as sound is not often supported and the sight component is yet to be fully utilised in terms of creating visual immersion and telepresence. Until electronic communication can replicate the five senses and produce three-dimensional displays it will not be a one-for-one replacement for face-to-face communication or traditional commerce (Rose et al., 1999).

Search Problems

The enormity of the World Wide Web, together with a lack of clean-up procedures, make it incessantly difficult for users to find their way between the nine billion Web pages available. Existing search-engines are effectively keyword searches which are used to search for pages in the engine's database. This often results in tens if not hundreds of thousands of Web addresses, far too many than can be realistically viewed. The results are prioritised according to popularity (the

amount of traffic each website receives), inbound and outbound hyperlinks and meta-tags (HTML elements used to provide keywords on a Web page which are used to match a search query). Unfortunately the reality of a competitive market dictates that companies will all endeavour to get onto the first results page and attempt do so by using a variety of methods to boost their rankings. The result is a list of the most eager businesses wanting to be found rather then the most accurate matches according to a search. As Rose et al. (1999) state, "In short, current search-engine technology provides both too much and too little information. While it does aid in helping users find specific hypermedia, it is still severely limited," (p.25) and little has changed in this respect since that was written.

> *It is becoming increasingly difficult for users to find documents that are relevant to their particular needs. Users must either browse through a large hierarchy of concepts to find the information for which they are looking or submit a query to a publicly available search engine and wade through hundreds of results, most of them irrelevant.*
>
> (Gauch et al., 2003)

> *The problem with search engines is that they are more about quantity than quality. Typing in general or non-specific questions can easily return thousands or even millions of results.*
>
> (Fox, 2006)

Inadequate Measurement of Web Application Success

Although computers are well suited to capturing statistical data such as how many times a Web page is viewed (hits), they are unable to provide an adequate measurement of success. The problem is "we do not know what makes an appropriate metric of success for a hypermedia application (Rose et al., 1999, p.27; quoting Hays, 1997). Furthermore, what is considered a "success" does in fact change from website to website. For some it could be sales, for others time

spent viewing pages or degree of interest. What is clear is that the number of hits received is simply a vague representation of how often the page is deliberately accessed. A single hit can be attributed to a genuine visitor, an accidental visitor, a search-engine spider (a program responsible for mapping the structure and content of websites) or simply the action of refreshing a page. Moreover, it is not possible to distinguish multiple visits by a single potential customer from separate visits from multiple potential customers. All of which makes the number of hits an unsatisfactory method at gauging success.

At one time it would seem that the solution lay in using cookies, which are small pieces of data placed by the server on the client's hard-drive that track Web-browsing activity. Unfortunately, companies began using cookies and other pieces of software which subvert a computer's operation to build up marketing profiles which they could then sell. Such practices quickly got branded as spyware, slowed down the speed of a computer, corrupted files, contained viruses, were used by hackers to intercept passwords, or simply launched incessant advertising messages. For these reasons, many users strongly objected to such practices and subsequently a new industry of anti-spyware programs emerged which offered to remove unwanted cookies and keep a computer running smoothly.

There has been much work done on creating a measurement of Web application success. Primarily "end user satisfaction is suggested as the operational measure of system success because it is the most cited surrogate of Information Systems success by researchers and practitioners" (Srivihok, 2001). In a study conducted by Srivihok (2001), ten constructs for users' evaluation of Web commerce measurement were established, they included accuracy, locatability, currency, ease of use, navigation, security, page loading, assistance, presentation and system reliability. However, the problem then arises that some of these constructs will be held in higher regard than others by Web users. Further reiterating the complexity involved in determining the success of a Web application.

Lack of Security (Real and Perceived)

Security threats exist for both consumers and electronic retailers alike, but whereas business can hire specialists to protect their systems, the average consumer is far more susceptible. Apart from the usual viruses, worms and spyware, the biggest concerns for Internet shoppers is credit-card fraud and identity theft. "What most people (40%) feared was that a criminal would get hold of their credit or debit card details and raid their bank account" (BBC, 2005d). It is also apparent that concerns about identity theft are beginning to put people off shopping and banking online, 17% of people saying that they had stopped banking online, while 13% had abandoned Web shopping (BBC, 2005e). Transaction security involves either ensuring that exchanges remain private or making sure that an e-tailer is legitimate. If a financial transaction is not encrypted correctly, it can potentially be accessed by unscrupulous individuals looking to benefit from such a lapse in security. Alternatively, look-a-like websites of popular banks and other financial institutions trick people into visiting them and giving out personal information concerning their bank account such as card details, pin numbers and passwords. Rose et al. (1999) argue that the weaknesses in Internet security are caused by a failure to utilise existing security features of the Internet such as authentication and encryption. Whether this is true or not, the simple truth is that a lack of Internet security perceived or otherwise, causes a great many people to avoid shopping online altogether.

Lack of Internet Standards

Internet standards are used as guidelines for the development of Internet software which conform to generally accepted rules for communication between applications. The difficulty is that many solutions to a single problem may coexist simultaneously without an agreed-upon standard (Rose et al., 1999). The current generation of Web browsers vary in their implementation of Internet protocols and standards, therefore it is not always possible to make a website work optimally in all browsers. This makes it difficult to design a website that can be understood by all, the only solution being to create and maintain multiple

versions of the same website, but this is costly and hardly an ideal solution. Furthermore;

> *As we learnt during the "browser wars", software vendors can state their support for open standards while deploying proprietary extensions which can result in services which fail to be interoperable.*
>
> (Kelly et al., 2003)

5.7 What the Future holds for the Internet and Electronic Commerce

The Internet is already becoming more deeply integrated into our physical environments enabling telecommunications and broadcast media to proliferate around the world. Internet telephony has already arrived, offering cheap global phone calls (Skype), and just around the corner Internet Protocol Television (IPTV) will offer the viewer "television on demand". The Internet is facilitating a shift in focus towards the consumer: as Negroponte (1995; p84), said, "Being digital will change the nature of mass media from a process of pushing bits at people to one of allowing people (or their computers) to pull at them"

The Internet as an infrastructure is likely to continue to improve and develop thanks to research initiatives such as the Internet2. This is a consortium consisting of 207 universities working in partnership with industry and government to develop and deploy advanced network applications and technologies (mostly for high-speed data transfer). One of their aims is to ensure the rapid transfer of new network services and applications to the broader Internet community. The Internet is not complete and must continue changing at the speed of the computer industry if it is to remain relevant.

Furthermore the future of e-commerce, although heavily dependent on the Internet, is not necessarily tied to the World Wide Web. It is entirely possible that a new application will emerge that will overcome some or all of the limitations

highlighted in this section. It is important to appreciate that "the Internet was not developed for one application but as a general infrastructure on which new applications could be conceived" (Leiner et al., 1997, p.104) and for that reason, "new modes of access and new forms of service will spawn new applications that in turn will drive further evolution of the net itself" (Leiner, 1997, p.108).

5.8 Summary

Emerging in parallel to games industry, the Internet and the World Wide Web have created a global market through electronic commerce. Both have enabled e-commerce, specifically Web commerce, to flourish by allowing companies to greatly increase their consumer base and by creating a hugely competitive market in which consumers have access to a wide variety of products and services which ensures competitive prices.

Digitising the purchasing process has produced numerous benefits to businesses and consumers alike, but inevitably these changes have also created some fundamental drawbacks. The major technical limitations to B2C Web commerce include; download delays, limitations of the interface, search problems, inadequate measurement of Web application success, lack of security (real and perceived) and the lack of Internet standards. However, more fundamental and inherent problems have been created by digitising the purchasing process, specifically removing the social context, product interaction and agency (control).

It should be noted that e-commerce is a vast topic and it has not been the intention of this chapter to provide coverage of the complete subject area, but rather to provide the reader with an insight into the background specifically relevant to this thesis.

Chapter 6

The Social Effect of Video Games

6.1 Introduction

Multi-user games enable millions of avatar personas to interact with one another through text, voice and gesturing. This chapter is concerned with the social interaction that occurs between those who play video games, specifically such distributed multi-player video games. It represents an exploration of the way in which social presence is communicated through various modes of communication, and highlights the significance of games in this respect.

6.2 The Social Effect of Video Games

Despite being played between friends and acquaintances, both in the same location (players are said to be co-located using multiple controllers on the same machine or a LAN on different machines) and distributed (Internet), computer and video games were, as recently as five years ago, perceived as representing a mostly isolated activity (Zagal et al., 2000). This statement was undoubtedly influenced by the single-player element of video gaming, however the industry has returned to its multi-player conception. The format is again evolving, and the availability of 3D graphics together with Internet connectivity offers the potential for a rich communication medium to support social interaction as forecasted two decades ago by Daft & Lengel (1986). It seems that playing video games is becoming less and less a solitary activity and increasingly a social experience (King & Borland, 2003).

The notion that video gaming is an isolated experience, true of course of single-player games, may even be so for multi-player games when there is limited interaction between online players. Specifically, when players compete against each other for the purpose of facing intelligent, human opposition, while they may be aware that they are playing against another real player, there may be little or no social exchange. However, whatever the level of exchange, it is clear that "users prefer[red] competing against other people to playing against the computer" (Wadley et al. 2003, p.240) Wadley et al. also found that "users cited various reasons for this preference including enjoyment derived from competition with others, the unpredictability of human players, and social interaction with friends" (p.240).

There is research to suggest that social interaction is limited due to the action being technology-centred, resulting in a loss of social interaction. As Magerkurth et al. (2004) have put it, "contemporary entertainment technology does not commonly incorporate social interaction as an integral part of the entertainment experience" (p.2). This is because "games do not exploit the full potential of using different forms of communication possibilities between players, and therefore result in problems in sending and receiving messages" (Kujanpää & Manninen, 2003, p.220). There are many barriers inhibiting human-to-human interaction over a computer-centred entertainment medium; in short, there are no social cues. Again, according to Magerkurth et al. (2004):

> *The richness of human-to-human interaction involving eye contact, mimics, and gestures is far from being captured in the purely virtual gameplay of computer games.*
>
> (p.2)

This is further supported by Sproull & Kiesler (1991) who argue that in communicating face-to-face, we make use of a number of verbal and non-verbal social cues, these being inherently absent when interaction occurs through a video game. Therefore it follows that if the social context information is removed or

reduced, the information exchanged between participants is degraded or in some way negatively affected. This is, in part, supported by Collins (1992), who states that "face-to-face communication is the richest in social context cues and any form of mediated communication lessens the cues available" (see Chapter 2, Section 2.4).

Most multi-player online games can convey basic information as to whether a player is crouching, running, or shooting. Still, the tools used to convey messages, such as expressions and gestures have remained rather minimal (Kujanpää & Manninen, 2003). If social interaction between players is to occur successfully in video games, such barriers inhibiting human-to-human interaction must be overcome to enable mediated information exchange between conversation participants.

As already mentioned social cues can be gauged from non-verbal cues such as eye contact, facial expression and gestures, however these can be collectively incorporated into one concept, that of social presence (see Chapter 2, Section 2.2). Short, Williams, and Christie (1976) postulated that the inability of these media to transmit non-verbal cues would have a negative affect on interpersonal communication. It was Short et al. (1976) who introduced and defined the term *social presence* as "the salience of the other in a mediated communication and the consequent salience of their interpersonal interactions" (p.65). In other words the degree to which a human actor can be perceived through computer-mediated communication (CMC) (Bradner & Mark, 2002; Lee & Nass, 2003) or "the extent to which individuals in electronic environments are perceived as real" (Aragon, 2003, p.64).

The challenge is to create a strong social presence through devices which complement verbal interaction with non-verbal social exchanges between participants, with the intention of increasing sociability and improving distributed human-to-human communication.

The graphical and technical advancement of video games has enabled multi-player games to create realistic environments and detailed and fully controllable avatars. Visual information on all avatars' actions is transmitted in real-time between players, along with the audio events occurring in the vicinity of players. This includes other player's speech (proximity voice) together with a visual indication of which avatar is speaking.

In spite of these advances, non-verbal communication (NVC) possibilities between these avatars is still largely unrealised, since, as Kujanpää & Manninen (2003) put it, "the tools used to convey messages, such as expressions and gestures, have remained rather minimal" (p.221). Despite the recent incorporation of hand gestures and facial expressions in some online multi-player games, the implementation of this NVC by users remains slow and relatively unnatural. It will be shown later in this chapter that developers are just scratching the surface regarding the far-reaching potential of NVC between avatars.

Exactly which NVC element to implement, and how, is the challenge the games industry is faced with. The most obvious device to supersede voice communication is video communication and cameras are available on the next generation of consoles. Whether cameras are going to be extensively used within game environments remains unclear. Such a device would of course facilitate NVC through the observation of facial expressions and gestures, but this may negatively affect immersion if used within a game, as it breaks the illusion of the environment. It would effectively recreate those aspects of multi-player co-located gaming where socialisation occurs between players in the real world and gaming occurs between avatars in the virtual world (see Section 6.4). It is for this reason that in game NVC should ideally be implemented through an avatar and not a video link. A camera seems better suited as a separate conversational tool used between gamers to socialise with others (known and unknown) as it offers many advantages over voice.

Beyond using video as a straightforward capture device for NVC, in the future cameras are almost certainly destined to become far more advanced. Ultimately they could capture facial expression, lip movement and body movements including hand gestures, and recreate them on the player's avatar in real time, with full lip synchronisation. All of which will have the combined effect of recreating an individual's social presence, via an avatar, within a video game or CVE, whilst maintaining immersion. As Burford & Blake (1999) put it:

> *The conveyance of accurate facial expressions will increase the user's sense of presence and provide a more convincing and compelling virtual experience.*

This may very well culminate in the ability to create a strong social presence without any of the constraints of reality: it could even be possible to mould a player's real or intended persona into any conceivable humanoid avatar character. As long as virtual bodies keep human proportions in their body parts, an animation can be accurately applied to any avatar. Work on NVC tools is already being researched undoubtedly under development for future inclusion in real-time communication between avatars (Babski & Thalmann, 1999; Burford & Blake, 1999; Kujanpää & Manninen, 2003). It should be noted that such developments may not be driven solely by the games industry as film companies strive for faster methods to create animated films. The ability to fluidly represent an actor's performance into various character models would save the animation team the task of animating each character around a pre-recorded voice. This would greatly reduce the current lengthy production times, saving the film company money and easily justifying any investment spent on development such as that undertaken by Williams (1990), Chuang & Bregler (2002) and Borshukov et al. (2003). Other advantages include multi-lingual benefits, for example, instead of making a film in one language and dubbing over another, it would become possible to recreate the lip movements of each character from the language actors whilst their voice was being recorded.

Most of the NVC advances in video games have been in massively multi-player online role playing games (MMORPG – see below) such as *World of Warcraft*, *Final Fantasy XI*, *Ultima Online*, *Star Wars Galaxies*, *EverQuest* 1 and 2, the list is long and the popularity far reaching.

A study into the demographic factors and playing variables in online computer gaming by Griffiths et al. (2004) found:

> *...that 81% of online game players were male, and that the mean age of players was 27.9 years of age. For many players, the social aspects of the game were the most important factor in playing.*

This suggests that people want to socialise with others, but the nature of role playing games (RPGs) suggests that they do not necessarily want to socialise as themselves, which underlines the idea that video games are a form of escapism or play-acting. Leading to the question, if a computer could participate and recreate effective conversational interaction in these RPGs, would players mind? If so, then ultimately players enjoy the fact (and deep down they know) that they are talking to real people. However, if not, then these conversations simply function to make the fantasy (false reality) more realistic, in the same way that playing against human opposition is more challenging then facing artificial intelligence (AI).

6.3 Modes of Communication

The various forms of communication utilised by video games are beginning to broaden, including the incorporation of voice communication through headsets and NVC through cameras. The use of these different modes of communication for video games is discussed in this section, along with the different forms of communication that have, and are likely to have an impact on the games industry and CMC.

6.3.1 Text-Based Communication

Distributed communication through video games first became possible in the late 1970s, when designers took advantage of the opportunities presented by the Internet, and in doing so they created complex social worlds where people could communicate, play and interact. The 'worlds' in which they did so were known as a multi-user dungeon (MUD) and the games were purely text based due to the restrictive computer and networking speeds. As time passed, these restrictions were gradually overcome, leading to the incorporation of 3D graphics, and as a result a new genre emerged, mentioned above, known as the massively multi-player online role playing game (MMORPG). Today, MMORPGs are extremely popular particularly on PCs, hundreds of thousands of players interacting on a daily basis.

The use of text as a means of communication in online games is by no means unique to these role-playing games (RPGs). It spans all genres of online PC game, and before voice became feasible, text was widely adopted as the main communication medium between players. This was largely due to its low demand on resources and straightforward implementation, allowing developers to concentrate on the graphical and game-play elements. Developers knew text was not an ideal form of communication but used it for a long time due to technological and speed limitations as it was simple and effective. However, today the games industry is entering the high definition era and the ability to utilise the various modes of communication is now recognised as an integral part of the all-round gaming experience.

Although text is beginning to take a secondary role it should be noted that, apart from its use in RPGs, it was never an ideal form of primary communication due to the fact that it was a time consuming distraction away from the primary controls:

> *In fast-moving contemporary games, where gamers 'inhabit' an avatar in a 3D virtual world, both hands are necessarily occupied with the control device, performing other activities. This makes typing and sending messages hard to do.*
>
> (Halloran et al., 2004, p.1215)

Assigning frequently used messages to hotkeys (a key or set of keys on a keyboard that performs a predefined function) was one attempt to reduce the time spent away from the control device. However, this severely limits the length of the messages available to the player, as well as losing the flexibility associated with freely typed messages. For example, in some early online MUDs such as *Federation II*, navigation commands (walk south, fly north, enter room and such like) could be saved as hotkeys, but the free interaction with other players, the very core of the game, had to be typed in real time, slowing down the interaction considerably (Jacobs, 1990).

Speech was the obvious solution, since it completely removes the control problems associated with sending text communications, allowing the player's hands to be occupied exclusively with the demanding control issues, as well as enabling additional information to be conveyed through tone of voice.

6.3.2 Voice Communication

Voice communication facilitates immediate feedback between conversation participants and can hold additional information in intonation and rhythm of speech. Voice is therefore regarded as a richer medium than text, able to convey more complex messages (Ngwenyama & Lee, 1997). Hew at al (2004) states that:

> *The context of the message, the shared culture of the participants, and the history of the communication also play an important role in the richness of the communication. Thus, the virtual environment in games as well as the shared culture of regular players contribute to the player's ability to engage in rich communication.*
>
> (p.54)

Arguably, then, the most significant development in communication within games has been the advent of new voice-based communication tools like *Xbox Live* and *Roger Wilco* which have made it possible for people in distributed online multi-player games to talk in real time to each other, dramatically increasing the level of possible social interaction:

> *Our findings show that voice over IP for multiplayer games appears to be well-suited to supporting a distinctive and enjoyable social experience, both by providing a high 'presence' (i.e. increased energy, engagement and vividness), and by revealing information about player's real identities.*
>
> (Halloran et al., 2003, p.130)

Voice communication is immediate, the additional information in the voice about the identity and emotion of the speaker adds an important dimension of communication, and, as a by-product, the player's hands become free. In addition, studies have suggested that voice communication is an important part of the process of learning for less experienced players (Halloran et al., 2004), since veteran players are better able to teach the novices, in this way encouraging the vision of community the industry has in mind.

While voice may not be an advantage in every situation (revealing information about a player's true identity may carry with it all manner of disadvantages, from intention to questions of privacy), some research has identified the fact that when other players are known, there are high levels of presence, such that players become more rapidly and more easily immersed in the social experience (see Section 6.4). This is clearly a step forward in terms of social interaction which seems set to continue to improve and develop. Microsoft's *Xbox 360* encompasses the principle by generating a gamer profile which sums up all the gamers' information, experience and achievements (it even holds a profile photo) and facilitates the communication of an identity. The intention is that this profile should allow players, previously unknown to one another, quickly to familiarise themselves with each other, so that richer communication can occur.

However, such advances, as with any innovative technology, are not without limitations and teething problems. For example, players do not know when to talk, a problem associated with a lack of non-verbal cues which are inherently absent when interaction occurs through a video game. Haloran et al. (2004) agrees:

> *For an effective social experience to take place, talk needs to be integrated with avatar actions in ways which can restore the postural, gestural and proximity information that embodiment provides.*

Another issue is that interaction between players is hindered by players being complete strangers. One study found that although the social experience is enjoyable, it is difficult for players to get to know each other. In particular, gamers are inhibited when they do not know who is talking (Haloran et al., 2004) (see Chapter 6, Section 6.4), something which reflects a lack of coupling between voice and the visual representation of verbal action. According to Bowers et al. (1996), who studied talk and embodiment in CVEs, "people find it hard to take turns, preferring to wait for others". In a group situation with close to zero non-verbal and social cues there will undoubtedly be conversational problems, so that there should be as much conversational information available as possible: this essentially means immediate, clear identification of the speaker.

Knowing exactly who is talking is a design issue that is currently being resolved with various graphical representations which identify verbal actions. One such example is a speech bubble appearing above an avatar's head. In this way, and as an added bonus, tone of voice is inferred rather than heard, leaving room for the imagination and thus not negatively affecting the immersive game dynamics.

However, overcoming even more difficult issues, such as player-inhibition, is far more complex and a problem which may be only partly overcome by creating friendly environments, regulating conduct and finding suitable ways to ban offenders, bullies and those who intimidate others.

Whatever the reasons for seeing voice as an obstacle, it is clear that as things stand at present, in MMORPGs text is still the preferred choice over voice as the principal method of communication, whether or not contained in speech bubbles.

The feeling seems to be that too much information about players is communicated through voice. For some games this may be an advantage, but in RPGs it is likely to negatively affect the level of immersion experienced by players. Nevertheless, Richard A. Bartle, designer of *MUD* in the late 1970s and a respected researcher on the subject, states that the use of voice in RPGs may overshadow any negative consequences:

> *Voice communication may come to the fore in role playing games (RPGs) which rely fundamentally on player interaction and conversation. On the other hand, some industry commentators and game designers have recently disputed this assumption and opined that voice conversation will distract from the immersion experience of RPGs precisely because of its media richness.*
>
> (Hew et al., 2004, p.55)

Bartle (2003) also offers the following notion as an adjunct to the advantages of voice, one which helps to keep true identities at least partly hidden, and which accordingly help to preserve the illusion of the fantasy world:

> *[...] in theory, I could say something in my male, English voice, it could be converted into text, then replayed to listeners in a female, New English voice. It would be real-time voice communication, but no more "me" than my graphical avatar: just clothing for an alternative identity.*
>
> (Bartle, 2003)

6.3.3 Video-Based Communication

Video-based communication such as video conferencing or video teleconferencing facilitates real-time interactions between participants as if they were co-located. Usually showing the face, head and shoulders of individuals at

the remote end (so-called talking heads), the more advanced systems of this type are known as media spaces. Auditory and visual information can be used to make contact, co-ordinate turn allocation, and monitor attention and understanding. From the caller's perspective it is necessary first to locate the intended recipients and then assess their availability for interaction. Should this person be currently engaged in some form of activity, the caller must decide when it would be appropriate to interject based on information gained from observing the individual concerned (Frohlich, 1995). Visually pertinent behaviours such as patterns of gaze and bodily orientation between speaker and listener are functionally relevant to marking out and maintaining a speaker's active occupation of the conversational floor (Daly-Jones et al., 1998). Duncan and Fiske (1977) also suggested that the current speaker can employ gestures as a powerful visual deterrent to turn-taking attempts by others, while ceasing to gesticulate is described as a "turn surrendering" signal. In Clark's contribution theory of discourse (Clark & Brennan, 1991) it is crucial that a speaker monitors his or her audience for evidence of continued attention and understanding. Argyle (1969) also pointed out that visual access to graze patterns, facial expressions, gestures and body posture are all strongly implicated in the provision of evidence regarding the level of attention, attitude and response of an audience. As Daly-Jones et al. (1998) put it:

> *It is apparent that auditory and, most notably, visual cues are employed when establishing contact between would-be interactants. There are also grounds to suppose that the importance of visual information grows when the number of potential participants exceeds two.*

Additional implications for such video-based communication technology includes the use of shared artefacts, whether objects, documents, drawings or diagrams. McCarthy and Monk (1994) argue that the ability to point to a shared artefact accounts for the efficiency of many utterances in everyday communication.

With the inclusion of a webcam with the next generation consoles, the future use of video communication in the games industry seems unavoidable, and the consequences desirable. However, a note of caution is in order: there is a real danger that seeing a player's real identity will break the fabricated reality of the virtual environment. It is for much the same reason that developers of RPGs are reluctant to use voice communication: co-located gaming causes sociability to occur outside the gaming world, thus at the cost of in-game immersion. Video communication, in an attempt to increase socialisation between players, could certainly reduce game immersion. Furthermore, while, as noted above, the visual aspect of video communication facilitates gesturing between participants, thus enabling the conveyance of semantic information, in observing an individual directly, everything is communicated including unintentional information. This may add to the problems of inhibition: people rarely place pictures of themselves in Internet forums, chat rooms and real-time messenger services, no doubt for similar reasons. On the other hand, it was thought, during the era of text-based MUDs, that any inclusion of graphics would detract from the power of the imagination, something which, even if true, has not held back their use in multi-user games, just as TV drama has hardly been held back by the mind-pictures peculiar to radio drama.

Whatever the pros and cons of video links, and whatever happens to the incorporation of video conferencing in-game facilities, the future for the games industry appears to lie in motion capture of facial expressions, head movements and body gestures which are then translated in real time into those of an avatar.

6.3.4 Non-Verbal Communication and Gesturing

In the words of Francis Bacon, "As the tongue speaketh to the ear, so the gesture speaketh to the eye". Hand gestures convey semantic information, that is information that contributes to the utterance's intended meaning (Grice, 1969; Searle, 1969).

In games, gesturing was first encountered – somewhat bizarrely – in text-based MUDs: players became tired of the communication limitations and typed character gestures to expand the interaction experience. Two classifications of gesturing have developed since, namely player-created gesturing and developer-enabled gesturing.

In the 3D era before voice communication, player avatars could communicate only through text but the nature of the interactive medium meant that one avatar could observe another. This led to players creating their own actions to gesture meaning, for instance running in a small circle in front of another player to signify a 'follow me' gesture. Game developers have now implemented game-enabled gesturing to complement in-game communication between players. *Star Wars Galaxies*, a popular MMORPG released in July 2003 and one of the first to introduce gesturing as a way of enriching interaction, incorporates 340 gestures.

> *Selecting another player and typing "/smile", for instance, produces two results: a public sentence of the form "You smile at [target name]" is sent to the other players in the area, and in some cases the avatar's physical appearance changes to reflect the "social" (here a smile appears on the avatar's face).*
>
> (Ducheneaut & Moore, 2004, p.362)

The important distinction here is that although the gesture appears as text it also changes the avatar's physical appearance to reflect the gesture selected. Being able to communicate on this level is of some significance as it represents face-to-face human interaction more accurately by reintroducing non-verbal cues for communicating semantic information.

Even with the uptake of voice communication, this trend seems likely to spread to other genres. Upcoming FPS strategy titles are rumoured to be implementing gesturing as a means of communication between players when talking would be inappropriate (i.e. when in earshot of an enemy) (Gamespot, 2006). While this communication form is still largely undeveloped, it is almost certain that in the

future NVC will be used to complement speech, and thus to simulate physical face-to-face communication, since in interpreting a gesture's meaning, the interpreter relates some feature of the gesture to the meaning of the speech it accompanies (Krauss et al., 1996).

6.4 Classification of Video Games by Social Situation

In order to reveal the extent to which multi-user video games induce a genuinely social experience, it is first necessary to classify such games according to the different situations in which they are played. As Halloran et al. (2003) have said:

> *Verbal communications in multi-player contribute to the social experience in ways that can differ, depending on whether gaming is co-located or distributed, and whether people know each other.*
>
> (p.137)

Halloran et al. (2004) found three main social situations in multi-player gaming. These were that gamers tended to play with friends in the same location (co-located), with others gamers they did not know over the Internet (unknown, distributed) and with friends over the Internet (known, distributed). The social experience varies enormously between these groups; for example, a group of friends in the same location results in a coupling of the virtual world of the game to the real world of the room with a high level of presence. Playing against unknown players on the Internet is the least sociable of the three, and Halloran at al. (2004) highlight problems similar to those found in real life when sociability is hindered by identity protection, whereas playing with friends known in real life, over the Internet, causes players to become engaged and absorbed in the social experience, and leads to a greater immersion in the virtual world.

Classification has been achieved using Halloran et al.'s (2004) three social situations. The process has resulted in four groups: single player, multi-player 1 (co-located and known), multi-player 2 (distributed and unknown) and multi-

player 3 (distributed and known). Given the nature of co-located multi-player games, although possible, it is unlikely that a co-located unknown situation will arise, see Table 6.1.

Table 6.1: Classification of Video Games by Social Situation

	Co-located or Distributed	*Known or Unknown*	
Single Player	n/a	n/a	Solitary due to activity being played alone.
Multi-Player 1	Co-located	Known	Creates a blend of socialising in the real world with gaming in the virtual world, where players jump between these states. Highly sociable but sociability occurs outside the gaming world at the cost of in-game immersion (Halloran et al., 2003).
Multi-Player 2	Distributed	Unknown	Limited social interaction. Time taken up predominately with small talk. Issues of identity protection and social inhibition. As well as the possibility of creating new identities (Turkle, 1995).
Multi-Player 3	Distributed	Known	Psychological distance overcome by existing relationship with player, therefore player enforces no restraint and can become fully engaged. Playing with friends known to the player in the real world is more engaging, and creates a richer social experience (Halloran, 2004).

It is also worth mentioning that when communicating to unknown individuals, it becomes possible for the user to present an alternate persona instead of their true self, i.e. a new identity (Turkle, 1995). This is not so much of a problem but an opportunity, and developers in the future are likely to exploit this as a key feature of their game.

Communications that are not face-to-face cause so-called 'psychological distance', which reduces sociability (Short et al., 1976). It is this psychological distance that must be overcome so that an individual's identity can be successfully communicated to others, allowing a social presence to be created.

Any online multi-player game that utilises few modes of communication will find it difficult to bridge this psychological distance, thereby preventing social interaction between players. Similarly, the more types of communication open to the player, the more effectively the psychological distance is bridged, resulting in greater social interaction between players.

Current methods of communication include gesturing, text, and more recently voice, such that it is necessary to classify further for distributed multi-player games (see Table 6.2).

Table 6.2: Classification of Video Games by Social Situation and Mode of Communication Utilised

	Mode of Communication	*Solitary or Social in Nature*
Single Player		**Solitary** – Due to activity being played alone.
Multi-Player 1 (Co-located Known)	Full	**Social** – Creates a blend of socialising in the real world with gaming in the virtual world, where players jump between these states. Highly sociable but sociability occurs outside the gaming world at the cost of in-game immersion.
Multi-Player 2 (Distributed Unknown)	Text	**Social** – Slow, requires keyboard tool and use of hands to type. Have some advantages over voice in that it does not communicate identity.
	Gesture	**Social** – Relatively weak in isolation, most effective when used in conjunction with voice.
	Voice	**Social** – Instantaneous and instinctive. However when conversation participant unknown, most time taken up with small talk.
Multi-Player 3 (Distributed Known)	Text	**Social** – Slow, requires keyboard tool and use of hands to type.
	Gesture	**Social** – Relatively weak in isolation, most effective when used in conjunction with voice.
	Voice	**Social** – Instantaneous and instinctive. The most effective social situation leading to significant immersion.

Co-located gaming, although extremely sociable, suffers from a number of drawbacks, in particular; it requires physical effort and organisation to set up, split screens are required (if one machine is used) which reduce the potential size and quality of the game experience, it also breaks the immersive quality of the game environment. All of which points towards a future of distributed multi-player gaming. The key difference is whether the players in the distributed multi-player game are known.

The advantages of playing with friends are that the friends are more likely to work as a team and not as individuals, resulting in a feeling of unity and making success a shared experience. Friends are also less likely to be inhibited, and because no identity protection is necessary, there should be greater involvement. If developers can incorporate a means of allowing distributed players to get to know each other as much as possible, interaction and enjoyment levels should improve.

Halloran et al., 2004 found that although the social experience is highly enjoyable, it is difficult for strangers to get to know each other, and that playing with friends known to the player in the real world is more engaging, and creates a richer social experience. The difficulty of getting to know fellow participants should be noted as one of the biggest current drawbacks to distributed gaming, "where identity was obscure, satisfaction was lessened" (Wadley et al., 2003, p.240). The main development focus up to this point has understandably been on other issues, but it is clear that merely expecting socialisation to take place during a multi-player game is insufficient. Ideally, socialisation between players needs to take place outside of the game environment so that when the game begins the players know one another and communication exchanges are primarily game orientated. Current socialisation between players primarily takes the form of small talk or phatic communication, this is a conversation whose only function is to perform a social task as apposed to conveying meaningful information.

A good example of how gamers steer development, and their need for more tools to assist with distributed social interaction, is the way in which groups of players meet together within multi-player maps, not to play the game but to chat between avatars and fool around in the virtual playground. Microsoft's Xbox 360 addresses the problem through the new Xbox gamer card which acts as a gateway and is consistent across all games. It allows gamers instantly to connect to their games and their friends. The gamer profile holds information on players and their gaming achievements so that they can instantly connect to people who share similar interests and lifestyles. 'Visual Representation' (a picture!), online reviews by other players, a player's location, a player's achievements, mean more ways to meet people from around the world and build relationships. It seems that the next generation of console machines is set to address the need for distributed players to form new friendships with previously unknown players. The next generation also seems set to implement more meaningful socialisation between players outside of the game environment, so that in-game exchanges are kept game-orientated.

6.5 Summary

Playing video games may be predominantly a solitary activity but it is increasingly becoming a social experience (King & Borland, 2003) and there is a desire to recreate the social presence that exists in face-to-face communication over CMC. Text, gesture and voice are all useful and unique forms of communication, each one bringing something different to the interaction. Collectively the variety of modes are beginning to create a notable social presence but truly to recreate an online social presence which will enable multifaceted CMC, more tools need to be used (lip sync, facial expression, etc). The application of full social interaction through CMC is likely to reach far beyond that of the games industry. Co-operative work and co-operative play may also benefit from these advancements.

Chapter 7

A Video Game Enabled Collaborative Virtual Shopping Environment

7.1 Introduction

The aim of this chapter is to provide an insight into a possible future convergence between video game technology, telecommunications and electronic commerce through the utilisation of collaborative virtual environments (CVEs) and avatars. More specifically, it introduces the concept of a video game enabled collaborative virtual shopping environment (VGECVSE), examines supporting research, highlights technical specifications, predicts its likely emergence via the console industry and discusses the associated benefits and limitations. The chapter ends with evidence suggesting its inevitability together with some existing barriers.

7.2 The Digital Revolution

The unprecedented development of computers and communications technology in the last half century has lead to a digital revolution. "The world, as we experience it, is a very analogue place" it is continuous (Negroponte, 1995, p.14). However, by capturing this continuous world and converting it into 0s and 1s we can make it discrete (i.e. digitisation). The main disadvantage of this is that quality is inevitably lost, forget what the advertising industry would have you believe; digitally encoded data does not represent the infinitely variable nature of information as faithfully as analogue (Smith, 1999). There are however numerous

benefits to digitisation, once in digital form, the medium can be manipulated, replicated, compressed and more importantly transmitted across many transportation channels. It is important to remember that, continuous and discrete, analogue and digital are co-dependent; they could not exist without each other (Negroponte, 1995). The digital format has merely become the capture and playback method of choice due to the associated benefits mentioned above.

Digitisation has enabled the movement of digital media across numerous multi-purpose electronic devices, throughout the electronic, communication and broadcasting industries. Furthermore, single function devices are evolving into multifunctional devices in an effort to establish themselves as a focal point of this digital phenomenon, eager to position themselves at the centre of the consumer's digital life (e.g. mobile phones and games consoles).

> *The two biggest players – Sony and Microsoft – are each spending billions of dollars in an arms race to develop their next generation of video game consoles. The objective? Not just dominance in the lucrative gaming market, but even more importantly, the pole position in a race toward digital convergence that is occurring in living rooms around the world.*
>
> (Lee, 2005, p.8)

The far reaching benefits of digitisation has revolutionised many industries, no more so than communications and commerce, however very few industries have escaped unaffected. This is evident in both the home and office, the replacement of the analogue TV signal by a digital TV signal, video cassette lost out to DVD and more recently HD DVD, tape cassettes were made redundant by CDs which are in turn being threatened by the MP3, traditional exposure cameras are now digital cameras, cheque books to chip and pin cards, letters to emails, the list goes on. The digital revolution appears relentless, as even people are becoming represented in digital form (avatars) for the purpose of communication, social networking and entertainment.

Digitisation is already enabling the collaboration of many industries currently unrealized or previously unfeasible, old barriers between different technologies are disappearing, thereby opening up a range of development opportunities.

> *Until recently home entertainment has been the province of TVs, DVD players and hi-fi stereos (so-called AV), rather than PCs. But these two spheres of personal computing and consumer electronics are inching closer together, merging technologies so that the lines between them dissolve.*
>
> (BBC, 2005f)

It would seem that as the world becomes digital many industries will be able to collaborate in new and exciting ways, these new developments will in turn breed new opportunities and so on.

> *As one industry after another looks at itself in the mirror and asks about its future in a digital world, that future is driven almost 100 percent by the ability of that company's product or service to be rendered in digital form.*
>
> (Negroponte, 1995, p.12)

Digital and technological convergence is becoming increasingly evident in all aspects of electronic technology, and this trend is set to continue according to Negroponte (1995) until "information and communication converge into a digital nexus". "The proposition that all modes of communication and information will converge into a digital nexus has been circulating for about twenty-five years" (Mueller, 1999, p.11). Convergence is really a takeover of all forms of media by one technology: digital computers, a technological system with solid state integrated circuits (ICs) at its core (Mueller, 1999). Yoffie (1997) describes convergence as the unification of functions – the coming together of previously distinct products that employ digital technologies.

7.3 Collaborative Virtual Environments

As discussed in Chapter 2, CVEs are virtual worlds shared by participants across a computer network which support collaborative work and social play. Participants are provided with graphical self representations – avatars – that convey to others the player's identity, presence, location, and activities. They are able to use these avatars to interact with the contents of the virtual world and to communicate with one another using different media including audio, video, graphical gestures and text (Benford et al., 2001, p.79). Singhal and Zyda (1999) summarised the common features of networked virtual environments, which are also applicable to CVEs, as:

A shared sense of space: all participants are presented with the illusion of being located in the same place, such as in the same room, building, or terrain.

A shared sense of presence: when entering the shared place, each participant takes on a virtual persona – an avatar – which includes a graphical representation, body structure model, motion model, physical model, and other characteristics.

A shared sense of time: participants see each others' behaviour as it occurs. In other words, the CVE enables real-time interaction.

A way to communicate: most CVEs strive to enable some sort of communication among the participants.

A way to share: the user's ability to interact with the virtual environment itself and other users.

Online multi-player games are a good example of successful CVEs built for leisure and entertainment purposes. However, examples are continually emerging that explore the diverse potential of CVEs. For example, in the broadcasting industry Radio 1 recently piloted a simulation of a concert in Dundee (*The Big Weekend*) in an online virtual world known as *Second Life*. Digital

representations of people in this virtual world were invited to teleport or fly to the Radio 1 Island where large screens were broadcasting live video from the concert.

> *Simply simulating the event by broadcasting audio or video only begins to utilise the strengths of these online worlds. We are hoping that the bands featured on-air will have their own custom-built avatars, playing in the virtual world, mimicking the action in the real world.*
>
> (BBC, 2006b)

With this is mind, could a CVE be built to overcome the limitations of business-to-consumer Web-based e-commerce (see Chapter 5, Section 5.6)? This present chapter sets out to find whether an online Collaborative Virtual Shopping Environment (CVSE) using modern video game technology and high-speed broadband connectivity has the potential to revolutionise the online B2C e-commerce shopping experience.

7.4 Collaborative Virtual Shopping Environments

This section attempts to justify the emergence of a CVSE by applying video game characteristics to the current B2C Web-based e-commerce limitations. The intention is to show how video game technologies can be used to overcome these limitations, and to highlight the likelihood of a future collaboration between the world of B2C e-commerce and online video gaming.

When Web-based e-commerce emerged, it was considered a retail revolution because it fundamentally altered the supply chain and brought suppliers and consumers much closer together. Many business models changed; shorter supply chains and no shop overheads meant that products could be sold for less to a global market. Consumers have not only benefited from cheaper products and global choice, but also customisable products and convenient home shopping accessible 24/7. Unfortunately, it also created its own drawbacks that inevitably came from stepping out of the physical world into the digital world. These

included an apparent loss of control by consumer over independent movement, severely reduced product interaction, and potential social isolation. A study into perceived risk as barriers to Internet and e-commerce usage identified nine different risk components, two of which were "missing the human side in Internet purchases" and "lack of physical contact" (Liebermann & Stashevsky, 2002) (see Chapter 5, Section 5.6.1).

Web-based e-commerce has been found by many to be frustrating and overwhelming (Sacco, 2005). Users are often taken to pages where they do not wish to go and are continually fighting against the tide of redirection and forced advertising. They are never placed in complete control of the medium as they should be; instead, control is shared between users and the page architects. Placing the customers back in control is an idea supported by Cummins (2002) who describes the current information architecture of e-commerce as being a maze designed to maximise "user capture" where the user is thoroughly removed from the system.

> *Our natural desire for agency within the environment corresponds to a sense of satisfaction at being able to affect things around us.*
>
> (Cummins, 2002, p.365)

The importance of giving customers full control of their online movements and actions is reinforced by Murray:

> *Our desire for agency in digital environments makes us impatient when our options are limited. We want an open road with wide latitude to explore and more than one way to get somewhere.*
>
> (Murray, 1997)

It is this freedom of choice and complete control of movement that is desired by the consumer and exactly what a CVE-enabled solution would provide. What has become clear is that the Web needs to radically alter its approach. "Re-

empowerment will not come from retooling or reconfiguring content management systems" (Cummins, 2002, p.366).

In contrast, the primary focus of video game development is end users. Goal setting, rewards, difficulty, control, perceived freedom of choice all directly effect enjoyment. If the control system is flawed or feels unnatural, the movement restricted or the goals unclear, the gaming experience will suffer and the game will not sell. The development team must ensure that consumers enjoy the experience.

> *All has to work across devices, whether it's calling people, seeing their presence, knowing what they're interested in, making it easy for them to navigate; it's got to be user centric.*
>
> (Gates, 2006)

The upshot of this is twofold. Firstly, video game technology can be used to reintroduce agency into the electronic shopping experience, to introduce a more "open road" 3D environment. This is a view supported by Cummins (2002) who outlines "a new direction for e-commerce applications, which sees them integrating into games. The principle behind this new model is to restore the user to full agency". Secondly, games designers already possess the skills and understanding to not only build such an environment, but more importantly to focus on providing end users with a satisfying experience and the complete freedom of choice they desire. Jaron Lanier, the father of Virtual Reality, stated that: e-commerce's future is in video games, since interactivity gives consumers psychological control. Nudd et al. (2000) quote Lanier:

> *There is a big disconnect between the industry and the format people want it in, in 20 years, somebody will have figured out how to make a video game front for commerce that's more appealing.*

Witmer and Singer (1998) state that "the more control a person has over the task environment or in interacting with the virtual environment (VE), the greater the

experience of presence" (p.228). They go on to specify four factors that will influence the level of presence experienced: actions having consequence (*Immediacy of control*), ability to predict outcomes (*Anticipation),* ability to modify objects *(Physical environmental modifiability)* and *Mode of control* – "presence in a situation may be enhanced if the manner in which one interacts with the environment is a natural or well-practiced method for that environment". This supports the idea that a shopping environment should take the form of a shopping centre so not only navigation but the whole experience is intuitive.

When it comes to product interaction, existing e-commerce applications on the Web provide users with a relatively simple 2D browser-based interface to access available products, comprising mainly of images and text. Needless to say, consumers do not connect with the product in the same way that they would if it shared the same space. Marketing literature indicates that lack of touch is a problem with direct marketing of all sorts, electronic or otherwise (Rieck, 1998). The lack of physical contact with the product is clearly reflected in what consumers tend to purchase online, specifically low product-category risk items (books, DVDs). These are products which are low in price, not ego related, likely to function according to expectations and where touch and feel are not important (see Chapter 5, Section 5.6.1). Market experts have predicted that retails stores will ultimately survive because of this old fashioned "feel the merchandise" mentality (Moukheiber, 1997), as well as, as common experience tells us, the pleasure for many of physical window shopping.

Accurate recreation of the touch and feel aspect of traditional shopping as experienced in the physical world is currently inconceivable through distributed computer technology. However, within a three-dimensional environment, the possibilities for product interaction increase dramatically. For example, avatars could wear digital items of clothing or drive virtual cars, both of which may not inform the user of an item's physical quality, but would demonstrate its aesthetic appeal. At the very least, this would open up an enormous branding opportunity for companies to get their products noticed. Furthermore, telepresence achieved

by video game-type immersion techniques could make consumers believe they were present at the same location as the product (see Chapter 2, Section 2.2.2). This would result in a far higher connection between product and consumer, not to mention a recapturing (to some extent) of the product-assessment element present in physical recreational shopping, where a consumer's intentions to buy are not pre-determined and may simply be a result of situational desires.

Digitising the process of shopping has resulted in the social aspect that is enjoyed by so many shoppers being completely overlooked and forgotten (see Chapter 5, Section 5.6.1). Traditional shopping, in addition to window shopping, involves interaction with friends and shop assistants for advice and guidance which impact significantly on both the satisfaction achieved and decision-making process of the shopper. However "once IT is introduced into the process, the social context is ignored" (Maamar, 2003, p.253), which can make the experience both solitary and unexciting. This is supported by research into the importance of social factors which has revealed that 90 percent of shoppers prefer to communicate with people while shopping (Schummer, 2001).

In contrast, video games have evolved in the opposite direction. What started out as a solitary activity now facilitates cross-continent social interaction made possible through Internet-enabled multi-player gaming (see Chapter 6, Section 6.2). Players' avatars interact within these digital environments and each other, and can communicate with some degree of social telepresence. With this in mind, it becomes clear that the social telepresence experienced when utilising various modes of communication in video games (as discussed in Chapter 6) can be used to counter the lack of social context in Web-based shopping (as discussed in Chapter 4), leading to a mutually beneficial collaboration between the two industries. This social context combined with virtual product interaction and true unconstrained user movement, if successfully implemented, could bring traditional recreational shopping to the digital world. With the creation of a virtual shopping mall, simulations of most of the actual shopping environments and users' interactions can be achieved (Oliveira et al., 2000). Such interaction

between fellow shoppers, clerks and products will all help to reproduce the traditional process of shopping:

> *Designing e-commerce applications that simulate the feeling of being in a real market will definitely give more confidence to users in carrying out their transactions. Similar to 3D video games, the e-commerce applications will enhance the customers' shopping experience by allowing them to walk around the streets of the market, visit shops, read ads, and chat with vendors.*
>
> (Maamar, 2003, p.255)

A CVSE would transform the world of e-commerce by recapturing the social enjoyment of browsing, where the purchasing decision is often made on impulse. Being able to ask for advice from sales assistants and friends, together with the ability to see and interact virtually with the product, will all serve to reduce the perceived risk associated with purchasing the product electronically. Shopping is an activity that is socially facilitated: when done in the company of others people engage in it more often and enjoy it more (Puglia et al., 2000).

From a user's perspective, Web-based e-commerce is at present unsatisfactory and it is clear that it can be greatly improved upon. Shifting the focus to the consumer in terms of functionality and usability will serve to increase usage and reduce product category risk. Furthermore, shopping within a CVE will reintroduce many elements of traditional shopping which are lacking in current Web-based e-commerce applications. Social interaction, unconstrained movement and deeper product interaction are all key elements associated with shopping that can be provided by a video game enabled solution (see Figure 4.3).

As previously noted (4.4) networked video game technology is no longer restricted to the PC, there has been substantial growth in this area with respect to the games console. This means that a CVSE solution could be theoretically implemented on either a PC or a games console.

7.5 Personal Computer or Games Console

This section sets out to establish whether a CVSE is likely to emerge on a PC or on a games console by comparing the current trends and key differences between the two in terms of development, standardisation and positioning.

The PC has always been the primary platform for the delivery, storage and consumption of digital content in the home, and is currently the primary method of access to the Web. However, video gaming has witnessed a steady increase over recent years; both in terms of usage by consumers and technological development (see Chapter 4, Section 4.6). Games consoles are evolving into highly versatile machines, mirroring many aspects of the PC. The console industry is changing rapidly with a much greater focus on online gaming and increased functionality, and what can only be described as a bold repositioning strategy which aims to place the console in the centre of consumers' living rooms. If successful, such an initiative will enable console manufacturers to provide a gateway to the entire world of digital media and reap the potential financial rewards associated with such control. Perhaps more importantly, this also means that the console would be "perfectly" positioned to deliver a 3D e-commerce environment directly to consumers. Obtaining a large market share has never been more important in commerce generally, and this can be seen by the scale of the investments undertaken to achieve it. It is also possibly the reason why the next generation of consoles is likely to be sold at a loss, because in the not-too-distant future, the outlay could be made back many times over.

Another significant factor is how console manufacturers, driven by competition, have moved to the forefront of technological development (see Chapter 4, Section 4.7). Due to increasing financial returns, new commercial opportunities made possible by digital delivery of content (downloadable music) and continual competition, video game manufacturers are no longer prepared to be held back by the computer industry: they are taking an active role in their own development. This even extends to the development of human-computer interfaces (e.g. Nintendo's motion sensing controller, Xbox's camera recognition). Console

development has shifted to the cutting edge, innovating new technologies which put them in good stead for creating a CVSE.

As the functionality increases, video game consoles have the potential to deliver all entertainment sectors to consumers by encompassing all aspects of digital media in one easy-to-use consumer-focused globally networked box. (The *Xbox 360* already delivers non-game related film trailers and music videos.) Furthermore, by utilising their networking capabilities they have diversified into telecommunications allowing people from around the world to chat to one another through text, video and audio channels (e.g. Sony *PlayStation 2 EyeToy*, *Xbox 360* camera, the *Eye* for the *Playstation 3* and *Live Anywhere*).

> *Imagine a games console that truly bridged the gap between the living room and the millions of people who use chat software on their PCs every day.*
>
> (BBC, 2005f)

Consider also that Microsoft is due to launch a new text input device that attaches to the bottom of the *Xbox 360* controller through the headphone connector. The device is designed to allow players to chat with friends using a keyboard that is the same width as a controller. The device also has keys that light up to alert users of an incoming message (Gamespot, 2007).

Even if CVE communication and digital delivery develop separately, the step involved in combining the two is a relatively small one. The console manufacturers appear to have developed much more than a games console, but rather a box that is being marketed as an entertainment hub, one machine that can perform the function of many, and this trend is likely to increase.

These new video game consoles are, then, a "perfect" example of digital convergence: a single device capable of performing many functions and which is fully compatible with a variety of other devices. Given the choice, consumers are far more likely to purchase one multi-functional machine as it will save them

money, space and reduce connectivity complexity. A similar strategy can be seen with Microsoft's *Origami*, its ultra mobile PC which is a small hand-held device with a touch screen similar to a tablet PC (BBC, 2006c). Users can work and keep mobile, organise their agenda and connect wirelessly to the Internet as well as play music, videos and games all on one compact piece of equipment. All of which suggests digital convergence is not only occurring but it is having a profound impact across many industries: the PC for work and the console for play; consumers will need to move media from living room (console) to office (PC) and vice versa. This suggests that the PC and the console will not only coexist but will be interconnected, so that media can be shared between the two (e.g. The *Xbox 360* can be linked to a PC running Windows XP). Nevertheless, it is clear that the console is out-manoeuvring the PC which tends to remain in offices, bedrooms and back rooms.

Electronic commerce on the Internet primarily utilises the Web, which is made up of Web servers which store and disseminate Web pages to be accessed by the user via a Web browser application such as Internet Explorer, Netscape, Safari, Opera or Firefox. These media-rich Web pages contain text, graphics, animations and videos and are available to anyone with an Internet connection. The browser renders the pages on-screen, and as the Web evolves and develops new presentation technologies, the browser automatically suggests additional software as it becomes needed. These new and improved standards come from a variety of sources, and competition together with an open source mentality keeps the Web moving forward. However, ISPs, cable and telephone companies want to give users connectivity while webmasters want more visitors. Intranet managers want more security, while the publishing industry wants to preserve its copyrights, and hardware and software vendors want to make every product Web-accessible.

If a CVSE was to emerge on PCs, it seems likely that this would occur via a new independent piece of software, rather than via the continued development of the Web browser. The reason for this is primarily because the process of going from a 2D Web browser to a 3D environment would involve a complete overhaul of user

interfaces, product interaction and navigation techniques, but also because of the high level of collaboration that would be required between multiple interest groups, each with its own agenda. Such matters would inevitably make this a slow process. Attempting to satisfy everyone would only serve to lose sight of the most important group of all, the end users. The games industry, on the other hand, is able to evolve far more quickly, because it is a single business entity and also has the finances to support such a radical change. In a world of 3D graphics, surround sound, CGI movies, and high definition televisions, the 2D browser-based interface is starting to look seriously dated.

One major advantage the console has over the PC is that of standardisation. To create a piece of software capable of working on and between all configurations of PC is far harder than creating the same software for a single standardised machine. The PC's specifications vary from machine to machine in terms of processor power, graphical capabilities and Internet-access speeds, all of which are essential when it comes to creating an effective CVE, and if these characteristics are fixed then the task becomes substantially easier.

> *B2C e-Commerce technologies vary widely on the consumer end, are often beyond the control of the e-Retailer and are hard to predict or even identify. Specifically, each person on the Internet is using different hardware/software configurations and e-Retailers are not privy to the specifics of those configurations. Management within this technological environment is significantly more difficult.*
>
> (Rose et al., 1999, p.7)

Let us also not forget that the games industry already possesses the necessary skills in environmental design, animation, online multi-player gaming, communication, and user acceptance; and that video game consoles are increasingly positioning themselves in the living room which aims to be the centre of the consumer's multimedia entertainment experience (see Chapter 4, Section 4.4). If this repositioning strategy is successful, then digital distribution of

all digital media (not just video game related content) will become the next objective. Surprisingly, it is the video game console rather than the PC that has become "perfectly" positioned to recreate the three absent characteristics of recreational shopping, namely unconstrained movement, product interaction and socialisation, potentially bringing three-dimensional e-commerce to the console and further increasing its functionality.

Although both the PC and the games console could support a CVSE, it seems likely, then, that 3D online shopping will come to fruition on the games console. Console manufacturers have the financial strength combined with a united corporate vision. They possess the necessary skills in networked gaming, communication, environmental design, animation, user-interface design and user acceptance. The industry as a whole is developing at a fast rate, and the drive to innovate will only increase as a result of increased competition and revenues. By comparison, Web development is arguably becoming restricted due to the shear number of interest groups involved and time needed for a standard to become accepted and adopted, whereas the standardisation of processor power, graphical capabilities and Internet-access speeds on a games console present a considerable advantage over the PC and a perfect platform from which to build a CVSE. Not to mention the new repositioning strategy which sees the console move in on the PC as the consumer's multimedia centre, the success of which is critical to its multifunctional future. E-commerce will inevitably make the step into the third dimension, but whether the environment is delivered to the consumer on a PC or console will in large measure be dependent on the success of the console's entertainment-hub repositioning strategy, and given the probable success of that strategy, the future in the area of CVSEs looks to be with the console.

7.6 The Emergence of a CVSE

Although nothing can be said for certain, based on current trends, it appears, then, that the development of an online CVSE is unlikely to occur in isolation, but will evolve gradually through the driving forces of the games industry. However, in the event that the major console manufacturers are insufficiently aware of the e-commerce and telecommunication opportunities, and the CVSE does not evolve naturally through the console's online service, it will take an independent developer to create awareness through the production of a CVE social game built primarily for communication purposes, similar to how instant messaging services facilitate communication over the Internet.

Nevertheless, online communities, friendships and social groups are growing based around multi-player game services, such as *Xbox Live*, which facilitate communication between friends through voice headsets. With a camera attachment and audio communication supported, it would appear that the games console is well positioned to become a cutting edge telecommunication device. Numerous games allow for personalisation of characters (avatars) in order to create an individual online persona. There is a definite focus on creating an online community in which users can talk to friends, communicate their chosen identity as well as purchase digital media.

> *Every Xbox title uses the same interface to set up online play, this interface will hold details of the player's statistics and skill level on a gamer card as well as give access to a store where people can spend small amounts of cash to buy extras for their avatars or add-ons, such as maps or vehicles, for games they possess.*
>
> (BBC, 2005g)

These trends are set to continue and diversify into larger online communities where gaming becomes just one aspect of the experience which will come to include full avatar conversational interaction, purchasing products, and searching for general information.

Consider the recent trend toward game-genre convergence made possible by continually increasing processor speeds, and apply the same phenomenon to the growing console-based online community currently restricted by networking speeds. Ten years ago, video game genres were clearly distinguishable: among some others, there were driving, shooting, flying, strategy and role playing games. Today, due to greater processor power and higher budgets, these boundaries have tended to disappear. Distinct game types have converged so that within one game a player can shoot, drive, fly, and so on. This game convergence has occurred to the extent that there are now games within games, which is effectively what a console-based CVE would be: an environment facilitating social interaction where players meet online in 3D form before entering the actual game. Currently, interaction between gamers occurs on a 2D menu screen, where problems in communication frequently occur due to a lack of visual cues (see Chapter 6, Section 6.3.4). Just as games have converged across genres, as networking capabilities increase, 3D online environments are likely to emerge where players can meet, socialise, enter games and discuss tactics and results. Giving the user a customisable avatar to use outside of the game world for the purpose of identity, communication, and ultimately recreational shopping, this could result in an expansive network of digital societies, linked together in a similar fashion to the Web. The ability to step between these online worlds and CVEs should become as quick and seamless as stepping into or out of a vehicle in a video game.

As touched upon above, the console is more than capable of supporting this change. Not only does the console-games industry receive revenue from console sales, accessories and the games themselves, but it also receives a subscription fee for using the online service and in due course commission from digital sales and money from advertising. It is this repeat income that can be used to improve the service and make considerable advancements. As the service improves, more users should subscribe and additional features can then open up new revenue possibilities.

The emergence of a CVSE on a games console can be mapped out in terms of development steps which can be seen in Figure 7.1.

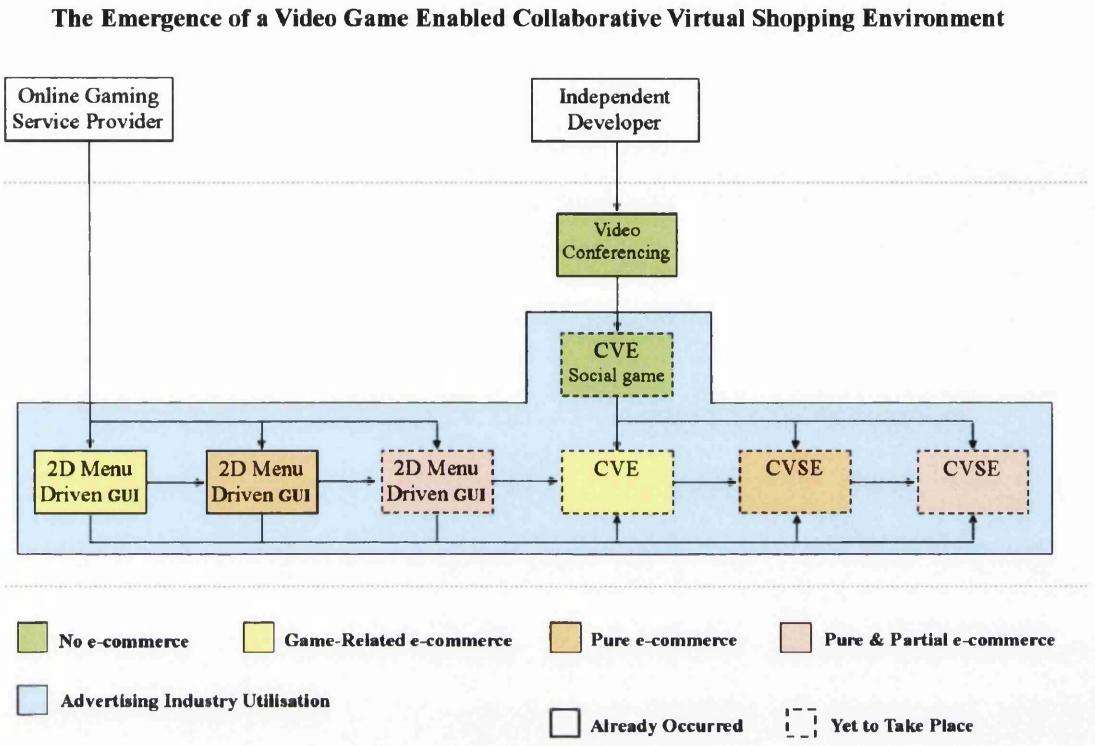

Figure 7.1 The Emergence of a Video Game Enabled Collaborative Virtual Shopping Environment

Figure 7.1 represents the various emergence possibilities for a VGECVSE, multiple pathways can be plotted through Figure 7.1 thereby covering the different paths to fruition. The three most likely are given in Figure 7.2.

The industry currently utilises a two-dimensional menu driven graphical user interface (GUI) and provides both game related products (e.g. arcade games, full games, extra content and expansion packs) and non-game related products (e.g. music, movies and HD movies). There are two major developments that need to be realised if the service is to progress from the current state to a CVSE, firstly, the interface needs to be enhanced from a two-dimensional menu driven GUI to a three-dimensional CVE. Secondly, the currently capabilities of pure e-commerce (which focuses on all aspects being conducted by digital means) must be expanded to both incorporate pure and typical e-commerce (whereby a product is

purchased over the Internet but delivered to the customer's door by post (see Chapter 5, Section 5.4)).

The online gaming service provider (e.g. *Xbox Live*) is built and maintained by the manufacturer of the console. Therefore, it should be noted that the online service provider and the console manufacturer are one and the same.

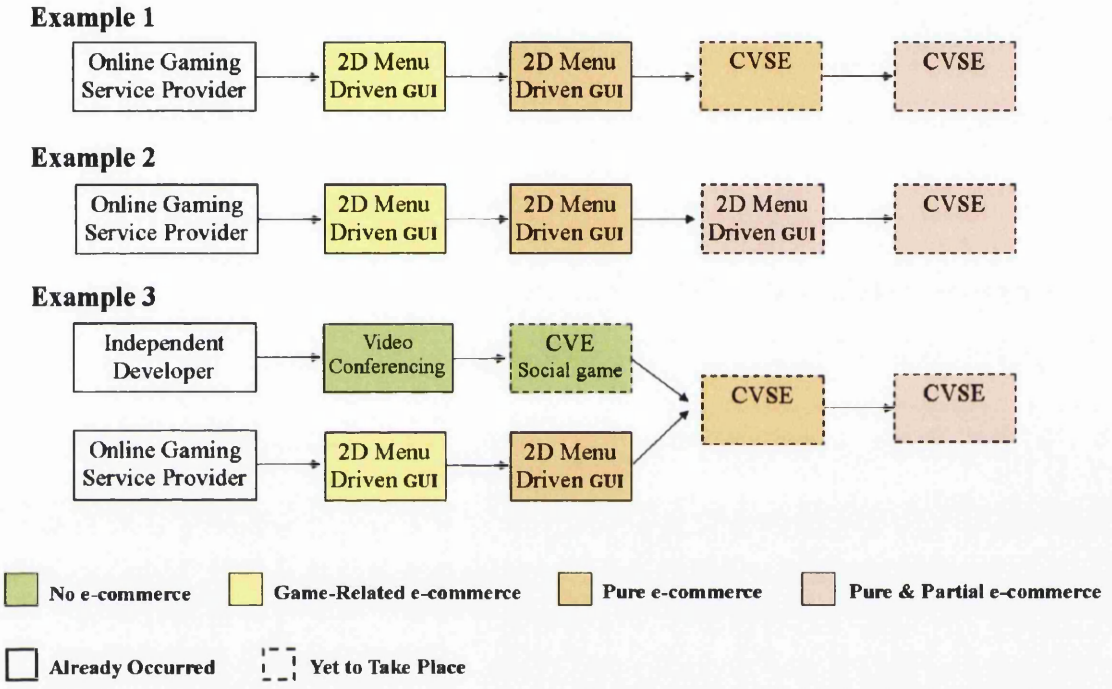

Figure 7.2 VGECVSE Emergence Pathways (source: Figure 7.1)

Example 1 – Natural Evolution

The emergence of a CVSE will in all likelihood be developed through the console's existing online services and evolve out of the current features associated with those services (purchasable downloadable content, micro-game related transactions, etc.). When the average household is equipped with fast enough broadband to support such a venture, the online GUI (Graphical User Interface) will be replaced by, or work in conjunction with, a CVE. This environment will still be capable of supporting pure e-commerce but in addition will be able to provide avatar-controlled face-to-face social interaction albeit avatar face-to-face. After continued investment and development, the e-

commerce capabilities will eventually include the sale of physical products, presented in digital form.

Example 2 – Via a Web-Equivalent Format

Also developed by the console manufacturer's online service, however, is the excursion into pure e-commerce followed by an expansion into hybrid e-commerce. This remains in a 2D format, similar to that of the Web, before giving a free rein to the console's graphical ability in a final step where a CVSE and avatar-controlled communication system is implemented. It would, however, be possible to employ a browser-type application on a console to enable it to display Web pages instead of starting from scratch or translating pages. The practicality of such a move is, however, questionable. There are many reasons to avoid it, including security concerns, control issues, and the fact that it could in fact be pointless as the PC already provides this interface in the Web.

Example 3 - Independent Developer Innovation CVE Social Game

In the absence of a CVE being created within the console manufacturer's online service, it seems inevitable that sooner or later an independent software developer will release a title which will unleash the diverse telecommunication potential of the online games console. It is clear that video game technology can be used to generate 3D environments and avatars with the primary focus being on the players' interaction rather than being game-based (i.e. voice-based conversations supported by avatar enabled NVC). Not only are games consoles currently the best equipped machines to deliver such a communication technology, but there are also many strong driving forces pushing towards such an eventuality, including demand from consumers and competition. The *EyeToy: Chat* was released on the *Playstation 2* in February 2006 and is the first console-based videophone. It enables both live videophone chat and video mail through the console when networked (see http://www.eyetoy.com). A camera has also been released for the *Xbox 360* and "The Eye," Sony's *Playstation 3* camera, is due in the not-too-distant future. A global virtual meeting place, where players can customise appearance, meet friends, exchange media, chat using NVC and play

basic games would not be excessively difficult to implement. The impact of such a title would be far reaching and would serve to highlight the potential of such an environment to the service providers.

The most likely scenario is that the emergence of a CVSE is going to be seen through the console manufacturers' existing online services and evolve out of the current features associated with the service. The resulting revenue obtained from pure e-commerce and advertising will only serve to finance further enhancements in a continuing development cycle. However, there is also a chance that an independent developer will take advantage of the networked console solely as a CVE messenger-style telecommunication device, especially if the console manufacturers are found not to be leading the way. This would undoubtedly serve to prompt the online service into a quick adoption, especially when the revenue potential is apprehended.

7.7 Technological Possibilities

This section attempts to bring to the reader's attention what would be possible in a CVSE and how current and future technological developments would lend themselves to such an environment.

7.7.1 The Environment

The shopping environment can be created using a modern games engine and could either resemble an actual place or be entirely fictitious. When designing these environments, the focus must remain with the end users, and must therefore be attractive and contain unique features to prevent confusion and disorientation.

The static structure of the shopping centre and operating protocols could be sold on a purchasable disc or downloaded and installed on a hard drive. The dynamic environment itself could run off a dedicated server similar to MMORPGs (massively multi-player online role playing games). Such servers could contain updateable internal shop layouts and advertising content. Modifications and

improvements could be downloaded to local consoles as and when they become available. After such updates are complete, the bandwidth will only have to deal with the users and their interactions with the environment and each other.

Customisable environments would mean that users would be able to see and hear what they wanted instead of the default setting. For example, a user could choose to change the ambient music or the style of the architecture. These customisations would be held on their local machine, thereby allowing two users to interact with one another while each experiences a completely different environment in accordance with personal preferences. Similar to how websites allow customisation through the utilisation of cookies being stored locally but on a much grander scale.

It is extremely important that such an environment is able to grow, upgrade and evolve over time so that it does not stagnate, much in the same way that the Web has been able to evolve and introduce new standards. However, achieving the necessary balance between standardisation (necessary for compatibility) and upgradeability (necessary to prevent stagnation) will be a considerable challenge.

7.7.2 The Avatars

Avatars would be fully customisable: height, build, weight, hair colour, etc. Although they would become an individual's digital self-representation, whether individuals choose to represent themselves accurately would be their own prerogative. People could create parallel identities that enable them to construct and experiment with sexuality, race, gender and power (Turkle, 1995; Reid, 1996; Tamalo & Ligorio, 2001; Bailenson & Beall, 2005). There would be an obvious advantage to making the avatar a true self-representation, as friends could recognise one another (and clothing could be virtually worn and visually assessed). It might well be beneficial to allow users to have two customisable avatars which they can shift between, one for their actual self (used in shops) and one for their alter ego.

The aforementioned principle of local customisation could also be applied to whom is visible in the environment, and would allow users the option of only viewing from the server those members which have been nominated from their contact list. This would prevent overcrowding and restrict the likelihood of slow-down (lag). However it would create a problem as avatars would appear to talk to thin air. To resolve this, secondary associates could be ghosted indicating that they are unknown to you but are an acquaintance of a friend.

7.7.3 Movement, Control and Navigation

This would currently involve the use of a controller. The most common method of efficient environmental navigation is by using the left analogue thumb-stick to move an avatar's body position and the right analogue thumb-stick to move the avatar's head. The benefit of this kind of control system is that it allows the users to simultaneously move in a direction whilst adjust the viewing angle. However, this is likely to change as new input devices emerge, and a more instinctive control system would potentially benefit consumers. The Wii's gyroscope controller aims to do just that, taking users away from the gamepad interface and making games control more intuitive. Likewise, improvements in output devices such as virtual-reality goggles could serve to increase telepresence and therefore improve on the experience by making consumers feel as though they were actually "there" (see Chapter 2, Section 2.2.2).

7.7.4 Proximity Voice Volume System

Current video game headset communication between online participants utilises a system called proximity voice (e.g. Halo 2). This monitors the distance between players within the environment and calculates the volume heard relative to distance between the player and the sound's source. It means that players can shout to get the attention of those "further away" and stand close and whisper if they want to prevent others from hearing. With the right system in place, these sounds can also be delivered in real time 5.1 Dolby Digital Surround. This means that a sound appearing to originate from behind the player to the right in the environment will be channelled through the back right speaker and be heard by

the user from a corresponding location. Recreating real-world audio accurately through multiple communication channels serves to trick the brain into thinking the digital environment is real. This is a "perfect" example of how increasing the number of communication channels can improve upon users' computer-mediated communication (CMC) experience. In the future, these channels should continue to grow as technological advances and new delivery and capture methods envelop the user in a believable telepresence experience.

7.7.5 Voice Activated Non-Verbal Communication

The importance of NVC during human interaction is undeniable: it is believed that between 65 to 93 percent of all meaning in human encounters between people is determined by non-verbal cues such as tone of voice and body language (see Chapter 2, Section 2.4). Despite its importance, NVC has been grossly under-utilised within the telecommunications industry. Although video conferencing (webcams, video phones) have emerged, it is far from "perfect" and lacks the ability to convince users that they are "present" at a remote location.

However, until more sophisticated information-capture technology emerges, voice-recognition software could be used to initiate gestures and facial expressions. Voice recognition has advanced a great deal in thee past few years. It has already been implemented in video games and serves to increase realism (e.g. *Rainbow Six 3*). "Speech recognition and speech provides a more natural interface for users. It frees the hands for other tasks and allows the users to take advantage of their natural voice communication skills" (Shen et al., 1999, p.4). This technology could be employed to activate NVC in a number of ways.

Static – NVCs are triggered by using a set of preconfigured designated words or phrases (as a trivial example, every time the user says the word "hello" the avatar waves and smiles).

Dynamic – NVC is activated by users holding down a button and speaking a trigger word. When the button is held, no speech is communicated (again a very

simple example would be that after saying goodbye to a friend, the user holds a button down and says the word "wave" which causes the avatar to wave).

Automatic – NVC is activated by general voice characteristics such as volume (e.g. shouting results in a double cupped-hands gesture while whispering results in a single cupped-hand gesture).

Such voice-activated NVC would simply provide a temporary solution until the technology that captures gestures and facial expressions directly from the user is invented and becomes affordable. It is worth noting in this context that in the not-too-distant future, facial movements and gestures are likely to be captured in real time using spatial cameras. Microsoft is reported to have patented a new method of spatial measurement, initiating rumours that their next-generation system's camera will allow for gesture-initiated game-play, where players can uses gestures to silently give their team-mates orders to advance or retreat (Gamespot, 2006b). This idea is supported by Salem & Earle (2000), who originally conceived the system to be used with text but recognise that it would also work with speech.

> *A system needs to be developed where the text messages are scanned for keywords. When detected these keywords trigger an appropriate gesture. A similar approach could be adopted for spoken discourse. A speech recognition module would extract key words from the discourse.*
>
> (Salem & Earle, 2000, p.97)

7.7.6 Video Games

The fact that a CVSE is likely to emerge from and utilise video game technology means that games will always be a major component even after diversification. Players will meet online in digital form and play a variety of games from card games to the latest multimillion-pound blockbusters. However, video games will not be a compulsory component: just being able to meet, chat and shop will

entertain many, and may even lead to an entirely different marketing approach separate from that of gaming.

7.7.7 Telecommunications

The success of instant messaging and social networking websites is a clear demonstration of how people like to stay in constant contact with friends, family and colleagues. It also highlights the real-time communication possibilities of the Internet. Furthermore, it is thought that "a third of people in the US and Europe will abandon phone lines in favour of wireless and broadband telephony come 2009" (BBC, 2005h). As telecommunications develop on consoles, it is possible that the ability to convey social presence and NVC will make such an environment a preferred method of communication and together with cost implications may even make it more favourable than the telephone. Other advantages include the future ability to phone from within this online environment to an outside landline or mobile phone through the Internet and vice versa.

7.7.8 The Shops

Walking into a digital shop could redefine the electronic shopping experience. Due to the very nature of "being digital", it could open up enormous interactive potential and creative possibilities. The scope and scale of these interactions will more than likely be down to the retailer and the associated environmental designers, but at the very least simulations of real-life shopping environments and user interactions can be replicated.

> *The virtual mall brings together the services and inventories of various vendors and provides customers with the same shopping experience, as they would have in an actual store or shopping mall.*
>
> (Zhao & Georganas, 2001)

For example, customers in a virtual clothing store will be able to try out various clothes combinations, just as they would in a physical clothes shop. However, they would also be able to switch from a first-person view to a third-person

perspective and customise products by altering colours, fabrics and designs in real time.

7.7.9 Broadcasting

With the pending introduction of Internet Protocol Television (IPTV), watching live TV programmes on a computer through the Internet is already a reality. *Sky Anytime* already lets Sky subscribers download TV to their computer or mobile phone.

> *Broadband television will ultimately adopt the attributes of the web, providing access to an almost limitless selection of programmes.*
>
> (BBC, 2005i)

TV programmes and films, like most other media before it, have become digital due to the numerous associated benefits including distribution and on-demand viewing. The ever growing functionality of games consoles appears to be taking this into consideration. For example, the new *Xbox 360 Elite* console has a HDMI (High Definition Multimedia Interface) connection and an extra large hard drive to store TV shows and movies.

> *Microsoft also announced deals to bring new high-def video to the Xbox Live Marketplace, including New Line Cinema's film "Snakes on a Plane" and upcoming releases from Warner Bros.*
>
> (ABC, 2007)

From here, it is not too difficult to imagine a CVE or CVSE using digital TV to broadcast news, sport and entertainment on screens within the virtual environment.

7.8 Benefits of a CVSE

This section looks at the advantages of a CVSE for users, discusses additional benefits, and highlights who would actually benefit from such an environment.

As seen in Figure 7.3, a CVSE has the potential to combine all the benefits of online shopping.

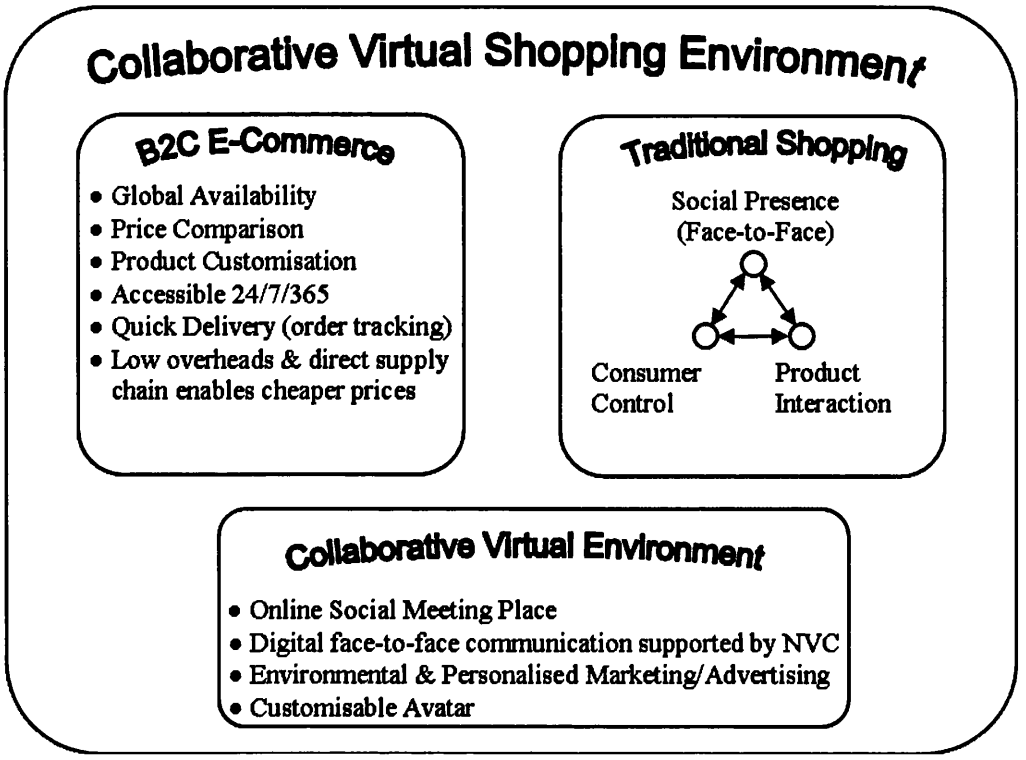

Figure 7.3 The Advantages of B2C Electronic Commerce, Traditional Shopping and a Collaborative Virtual Environment as found in a CVSE

Utilising video game technology, it is possible to combine the associated benefits of B2C e-commerce and traditional shopping. As discussed above, the resultant 3D environment would dispose of the socially isolating Web browsing software and replace it with a rich online community, returning full control to the user. In addition, the technology could facilitate far deeper product interaction and let consumers customise, wear and use products virtually. In this CVSE, multifaceted communication could occur between distributed users and shop vendors to partially reproduce the previously absent characteristics of face-to-face human interaction found in traditional shopping.

7.8.1 The Evolution of Telecommunications

Distributed human-to-human communication has evolved through various media formats over the past hundred years. Some use sound (the telephone), others text

(emails, SMS – Short Message Service), while more recent developments use video and audio (videophones, videoconferencing). However, none of them compare favourably with face-to-face communication. This is primarily because it is thought that between 65-93 percent of the information exchanged during face-to-face interaction is expressed through subtle non-verbal means (see Chapter 2, Section 2.4). Even video communication which successfully communicates some of these non-verbal actions does not measure up to a conversation in a shared space. Nevertheless, communication technologies must strive to reproduce the characteristics of face-to-face interaction and endeavour to communicate these non-verbal expressions and gestures. The ultimate goal is a technology which makes a distributed communication experience perfectly resemble a face-to-face interaction, in other words, "to make interactions with remote people and environments nearly the same as interactions with local people and environments" (Feiner et al., 2004).

There are two contrasting methods to make this possible: either by presenting the digital in the physical world through three-dimensional holograms, or by taking a representation of the physical person into a digital world using virtual reality (CVEs). This thesis concentrates on the use of a CVE, and the use of holograms has only been rarely touched upon, principally because the technology at present seems so remote. However, the use of a CVE and avatars has the potential to recreate face-to-face interaction, and this is where the concept of social telepresence becomes important. It becomes necessary for users to believe that they are present with others at the remote location (social telepresence) so that they can effectively receive non-verbal signals. Technological developments and communication speeds should open up an increasing number of modes of communication, each serving to recreate the remote emotion, gestures and body positioning more accurately (see Chapter 6).

7.8.2 Attract the Female Sector

Female gamers, although on the increase, still only represent about 25 percent of the gaming population in the UK (BBC, 2005j). The telecommunication facilities

combined with the virtual shopping experience offered by a CVSE could significantly increase this percentage.

> *More than half of women (54%) say they enjoy socializing when they shop, and 25 percent say it's because they enjoy getting outside opinions about their purchases from friends.*
>
> (Frank About Women, 2003)

The games industry has been lacking an appeal to this huge market sector for many years. "Traditionally, video games have been made by men for men" (BBC, 2004).

7.8.3 Human-Controlled Avatar Assistant

Retail websites have attempted to create a virtual shop assistant with mixed success. The infamous Miss Boo was "brought to life to provide customer support, but users found her to be more annoying than helpful" (Siegrist, 2003). The problem remains: it is extremely difficult to create computer AI that effectively produces human-like conversational responses to realistically answer human questions (see Turing, 1950).

> *Creating a computer program that can converse as fluently as people has long been the aim of artificial intelligence researchers around the globe. But over 50 years of work has shown little more than how difficult it is to program a computer to do something that comes effortlessly to most people.*
>
> (BBC, 2001)

Video game developers face a similar challenge when using AI to replicate human behaviour in their games. To side-step the issue completely, some developers have realised that a temporary solution is to make games multi-player so that all actions become human-like, for the simple reason that all characters are human-controlled.

By adopting a similar approach to the games industry, a human-operated shop assistant avatar could converse with customers with the intention of providing

assistance, information and advice. Within a virtual shopping mall, simulations of most of the actual shopping environments and user interactions can be achieved. Real-time interactions among entities in the virtual environment, such as collaborative-shopping and shopper-vendor avatar interactions can be implemented (Zhao & Georganas, 2001). A human-controlled shop assistant would put customers at ease by creating a friendly atmosphere and answering "unknowns" that could potentially prevent a purchase, thereby positively impacting on sales.

A working Web-based example of this can be seen on a website called *Lands' End Live* (http://live.landsend.co.uk/servlet/Trailhead). Shoppers who go online in order to purchase can now connect directly with a customer service representative to discuss product options.

> *The shopper could not find a favourite suit style in a larger size for her growing child. She clicked on the Lands' End Live button and was connected immediately to a personal assistant who listened to a description of the item and then displayed several options for the mother who identified the bathing suit she was looking for and made a purchase.*
>
> (Cisco, 2000)

A survey by market-research firm Jupiter Communications found that 90 percent of online customers prefer some sort of mediated human contact during an e-commerce transaction (Cisco, 2000).

7.8.4 A New Channel for Advertising

The advertising industry is facing a tough future, the rise of advertising volume having coincided with a decline in advertising effectiveness (Ries & Ries, 2002). This alone would be a considerable problem, but coupled with the development of new technologies that allow viewers to record programs in advance and then skip advertisements with ease (e.g. *Sky+*), is making it even harder to reach audiences.

In the same way that advertising opportunities increased with the introduction of the Web, a CVSE will present a vast array of new advertising possibilities. The industry should welcome an additional advertising channel through which brands and products could be communicated to their target audiences in new engaging ways. For example, customers could be referred to by name and billboards could be personalised according to users' information (therefore different on each machine). Additional possibilities include walking into shop level advertisements to transport the avatar to the corresponding shop and being able to show the product in 3D at the advertisement location. Brand owners could also give away free virtual clothing containing their logo so that avatars, while walking around the virtual environment, promote brand awareness. An early example of such branding can be seen in Yahoo's avatar Instant Messenger where it is already possible to customise self representations with branding such as Adidas and FCUK (see http://uk.avatars.yahoo.com).

It would be necessary for the service provider to control the application and extent of advertising within the environment so that it does not become overwhelming, otherwise it would result in consumer bombardment and negatively affect the overall CVSE experience. Conversely, carefully branding products within the CVSE and realistic positioning of advertising signs and products would serve to increase the authenticity of the environment.

> *Contrary to the assumption that highly pervasive ads would detract from the game play and frustrate gamers, a majority of study participants said*

that when the product is relevant to the game, advertising enhances the experience.

(Activision, 2005)

7.8.5 Financial Beneficiaries

There are likely to be substantial financial rewards available for the console manufacturers who successfully incorporate a CVSE into their online service and into the living rooms of millions. However, such an environment would also create revenue for a number of different industries falling outside the scope of the service provider. The potential financial beneficiaries are listed in Table 7.1.

Table 7.1: The Person, Group or Organisation that will benefit from a CVSE

Beneficiary	*Obtain revenue from*
Online Service Provider	(i) Purchasable disc (if necessary) (ii) Online service subscription fee (iii) Commission on product sales (iv) Leasing virtual retail space to retail outlets (v) Advertising
Game Developers	(i) Designing shop layouts and interactive products (ii) Designing interactive advertising
Retail Outlets	Video game enabled e-commerce
Advertising Industry	Creating virtual advertising campaigns
Employment	Virtual shop assistant

The service provider stands to earn considerable amounts of money through various channels including service subscription charges, advertising and possibly even a small commission on sales. The most remarkable potential income, however, is the ability to sell or lease virtual space; the disparity between the cost to create and its potential retail value is immense. This can be seen in the online role playing game *Project Entropia*, where a virtual space station has been bought for £56,200. *Entropia* allows gamers to buy and sell virtual items using real cash, therefore virtual property can be managed as a business and the investment earned

back from the 236,000 participants (BBC, 2005k). Game development companies can be employed by the retail and advertising sectors to create shop layouts, interactive products and advertisements. In return, these industries will have access to a new distribution channel offering substantial creative potential, a large customer base and digital interactivity. Finally, real employment could be created in the form of virtual shop assistants who could even be given the incentive of commission based on sales.

7.8.6 Reduce Usage Barriers

Libermann and Stashevsky (2002) identified nine different risk components that acted as barriers to e-commerce usage. These derived from scientific literature, interviews with Internet experts and interviews with consumers. Table 7.2 shows how a CVSE solution could reduce and remove some of these risk components and therefore potentially increase e-commerce usage.

Table 7.2 CVSE Solutions to Electronic Commerce Usage Risk Components

Risk Component	*CVSE Solution*
Internet credit card stealing	Purchase online credit from service provider in the form of top up cards
Supplying personal information	Responsibility of service provider
Pornography and violence	Policed by service provider
Vast Internet advertising	Controlled by service provider
Information reliability	Monitored by service provider
Lack of physical contact	Increases interaction with product
Not supplying Internet products purchased	Shops accountable to service provider
Missing the human side in Internet purchases	Shop with friends and ask shop assistants for advice
Internet usage addiction	Likely to increase

7.9 Limitations of a CVSE

A CVSE is likely to have limitations and brings with it new concerns, some of which are highlighted in this section.

7.9.1 Language Barriers

One of the most obvious problems with bringing a vast amount of people together across virtual environments is the inability of users to communicate with one another due to language barriers. Translation software is still far from producing spoken real-time natural-language translation of an acceptable quality where all ambiguity is covered. Hutchins (2000) believes that "machine translation is unlikely to ever achieve human-quality idiomaticity". Nevertheless, it may be possible to use existing machine-translation technology to provide some sort of indeterminate state to enable some level of communication between participants. Where simpler information is conveyed using a combination of text translation technology (see Google Translate) and non-verbal cues.

7.9.2 Hacking and Modding

Any networked application is a potential target for hackers, so it is imperative that effective security is in place. It is vital that the CVSE is perceived as a safe and secure system through which transactions can be made. Any breaches of security would increase the perceived risk associated with online transactions and negatively effect purchasing. 'Modding' is a slang expression for the act of modifying a piece of hardware or software to perform a function not intended by someone with legal rights concerning that modification; this too must obviously be prevented.

7.9.3 Behavioural Issues and Social Concerns

The civility of the environment would be the responsibility of the service provider who would therefore be required to control any anti-social behaviour. Consequently, such a virtual environment would have to be monitored and policed, varying length bans perhaps serving to deter inappropriate behaviour (similar to *Xbox Live* code of conduct; see http://www.xbox.com/en-US/live/legal

section 8). As voice-recognition software becomes more sophisticated, it is possible that in the future this technology could be implemented to target individuals participating in vocal profanities, taunting, bullying, verbal abuse, etc.

7.9.4 Sight, Sound, Touch, Taste, Smell

Web-based e-commerce principally communicates information to the consumer via the visual modality. Sound (music, verbal assistance) also plays a part and can feature to varying degrees. As mentioned above, the lack of touch and feel is considered a major drawback to e-commerce, which also lacks a mechanism to transmit smell or taste. Although less important than the others, both of these senses have been shown empirically to directly impact consumer buying behaviour (Rose et al., 1999; quoting Johnson et al., 1985; Miller, 1991; Wilkie, 1995). Until electronic communication can replicate the five senses and produce three-dimensional displays, it will not be a one-for-one replacement for face-to-face communication or traditional commerce (Rose et al., 1999, p.22).

7.9.5 Usability

The ability to freely navigate a three-dimensional virtual shopping centre returns agency to the user in terms of freedom of movement, but unfortunately also creates an entirely new barrier in terms of usability. Viewing a 3D environment on a 2D television screen while operating a handheld controller is a skill many will find difficult to learn, and will more than likely prove too difficult for the less technologically knowledgeable. It will take more intuitive input devices and more encompassing output devices, as discussed in Chapter 4, to prevent potential usability limitations and make the environment more widely adopted.

7.9.6 Prevent Low-cost Start-ups

The simplicity of the Web enables individuals and businesses alike to set up websites with very little expertise or expense. By allowing for direct, ubiquitous links to anyone anywhere, the Internet lets companies build interactive relationships with customers and suppliers, and deliver new products and services at very low cost. However, establishing a virtual retail shop-presence in a CVSE

will cost significantly more to build and maintain. Any business attempting to create a virtual shop will need financial support to cover the creation, maintenance and upkeep, not to mention paying for the virtual shop space and any staff requirements. This would more than likely prevent the low start-up ethos created so successfully by the Web being replicated within a CVSE.

7.9.7 Complete Control

Unlike the Web which is not owned by any one commercial entity, a CVSE would be controlled by a single corporate body. As outlined above, in all likelihood this would be a console manufacturer. The console manufacturer that provides the online service would thus have an enormous amount of power to dictate prices and conditions. The users, retail outlets and advertisers would have little power by comparison and would probably have little choice but to adhere to their demands.

7.9.8 Usage Addiction

The existence of such virtual environments populated with friends where individuals can chat, shop, play games, exchange media, customise appearance could potentially lead to the danger of excess usage. Similar to that of online role playing games, where some players spend an unhealthy amount of time in the game environment, practically living in the virtual world.

7.10 Driving Forces

This section looks at what factors are likely to support and drive the emergence of a CVSE on a games console.

7.10.1 Demand Exists

Serving a popular consumer demand if profitable should guarantee uptake, usage and therefore revenue. It has already been mentioned above that many consumers find the Web a frustrating and lonely experience. How much more satisfying to talk to friends while they shop, view and interact with products in 3D and execute

complete control of movements? Consumers desire an application that is instinctive to use, safe in terms of viewable content, secure in terms of personal and financial information, a place where advertising is controlled and where recompense for not completion of contract can be guaranteed.

It has been discussed in Chapter 5 (Section 5.6) and Chapter 6 that consumers find existing communication technologies restrictive as they are unable to fully express themselves. Text-based conversations using mobile phones or instant messenger have seen users create text abbreviations for communicating emotions and intentions (e.g. LOL - laugh out loud). A message can be interpreted in any number of ways if circumstantial information is unknown. Once this phenomenon was observed, developers introduced a NVC shorthand called 'smilies' for communicating emotions and gestures in messenger applications. Yahoo Messenger has taken this one step further, and has evolved to include customisable 2D avatars which assist communication by visually expressing facial gestures during conversations (http://uk.avatars.yahoo.com).

Voice communication allows for emotion to be communicated through variations in pitch, tone, volume and intensity. This information can be used by the listener to understand the emotional state of the person talking, assess whether they are happy, sad or angry and then apply meaning to what has been said. It is also possible to detect a whole array of additional information through voice such as tiredness, sarcasm, boredom, confusion, disappointment, embarrassment, even flirtation. However, there is still more to a message than the words and the way in which they are spoken. People also send signals about what kind of person they are and what they are thinking or feeling, whether they are relaxed or nervous, lying or telling the truth, open to conversation or not, feeling guilty, scared, confident or surprised. For example, the arm-cross presents a guard-like stance, suggestive of arrogance, disliking, or disagreement. Information is also communicated by an individual's eyes, facial expressions, body movements and body positioning, something which highlights not only the importance of NVC

(see Chapter 2, Section 2.4), but the degree to which current communication technologies are lacking.

> *Communication is therefore seen as a global system in which interactors construct meaning by using and interpreting not only words, but also intonation, gesture, posture, attitude and the space between them (proxemics).*
>
> (Riva & Galimberti, 1998)

Video communication is one of the most advanced forms of CMC available to date. The only obvious drawback is that individuals conversing do not feel as though they are in a shared space. This is perhaps why gamers are using online first-person game environments to meet friends and talk face-to-face using their game avatars as a socialising alternative to playing the game. Competition within the games industry should force developers to exploit this new avenue, and create a social environment primarily for communication purposes.

7.10.2 Financial Reward

A service provider stands to earn vast amounts of money through various channels including service subscription charges, advertising and selling virtual retail space (see Section 7.8.5). A large financial incentive will likely drive those capable of providing such a service into action, and competition between providers should prevent stagnation.

7.10.3 Additional Driving Forces

Competition within the games industry drives innovation (see Chapter 4, Section 4.6). A CVSE seems inevitable because it can surely only be a matter of time before this potentially profitable avenue is explored. As mentioned above, there is an ongoing technological trend to increase the number of forms of communication between distributed individuals. Throughout the development of text, voice and video communication, consumers have continually demanded more than what the medium can deliver. This desire to communicate through an increasing number of communication forms is more than likely born of a

frustration of not being understood and the inability to express oneself. This is likely to continue until communication technology develops to the extent where a distributed communication experience resembles a face-to-face interaction, "[making] interactions with remote people and environments nearly the same as interactions with local people and environments" (Feiner et al., 2004).

Recognition of this desire by providers will drive these tools in the right direction and ultimately lead to the creation of a CVE for sole purpose of multi-channel communication. Figure 7.4 shows how electronic communication technologies have advanced from text and voice to video. It also shows the next logical step to enable deeper human interaction which is virtual reality within a CVE using avatars. The diagram also highlights the significance of digital convergence and its effect on distributed communication.

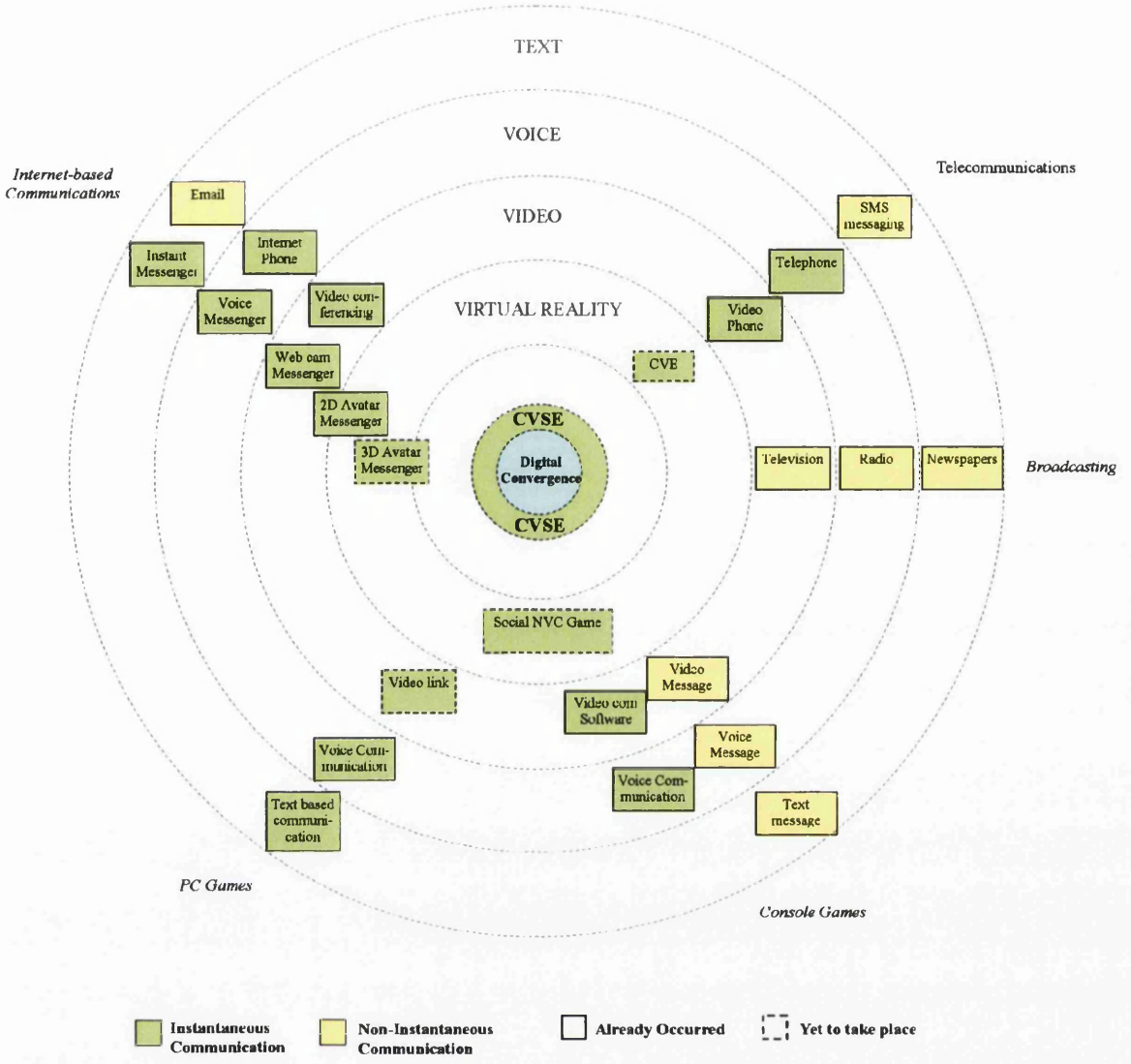

Figure 7.4 Diagram Showing the Progression and Likely Future Convergence of Distributed Communication

An example of this can be seen in Microsoft's *Live Anywhere* which unites different industries by interconnecting PC, console and mobile phone to facilitate cross-platform communication.

The reason why it can be said that a CVSE will emerge with some degree of confidence lies in the combined effect of many driving forces: demand from consumers, financial incentives, competition within the games industry, the desire to express oneself across telecommunications, and the underlying pull of digital convergence.

7.11 Confounding Factors

More often then not, there are barriers impinging on the acceptance of any new technology. These consist primarily of how useful consumers think the new technology is and how easy it is to use. The technology acceptance model (TAM) was proposed to explain the determinants of users' acceptance of a wide range of end-user computing technologies (Davis, 1986). The model was intended for organisational use but the principles can still be applied to the acceptance or otherwise of a recreational computer system. The two primary determinants of system-use are perceived usefulness (PU – "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context"), and perceived ease of use (PEU – "the degree to which the prospective user expects the target system to be free of effort") (Davis, 1989). Potential users of a CVSE must recognise and deem the application useful to them in some way, and must also believe that they will be able to operate the application effectively.

Chen et al. (2004) identified five critical success factors for virtual stores, *product offering*, "virtual stores must carefully evaluate the product retail channel fit and make adjustments to their product offerings accordingly" *information richness*, "online consumers may expect rich product information and robust product comparison functions from virtual stores". *usability of storefront*, *perceived service quality* and *perceived trust*. Virtual stores must address all barriers that could potentially negatively effect consumers' motivation to purchase online. Regarding perceived trust, Gunawardena et al. (2001) posit that "social presence facilitates the building of trust and self-disclosure within an online learning environment" (Aragon, 2003, p.61; quoting Gunawardena et al., 2001). So it seems promising that a CVSE could well facilitate the building of trust and self-disclosure by increasing social presence which the Web format has been lacking ever since its conception.

7.12 Summary

The advantages of "being digital" are numerous, so much so digital media quickly disseminated through to the Internet due to its unique distribution qualities.

> *. . . everything is moving to the Internet. What is telephony moving to the Internet? That's voice. What is TV moving to the Internet? That's Internet TV or IPTV.*
>
> (Gates, 2006)

As a result, it is now possible to bring together various modes of communication into a shared virtual space and present ourselves in digital form. This avenue has already been explored for entertainment purposes in the form of online multi-player video games, and as this industry grows and develops, opportunities in e-commerce, telecommunications and advertising are likely to emerge. Online communities are already prevalent in the gaming world but as bandwidths improve so to will the ability to step between these online worlds and CVEs. This will likely result in a seamless transition not only between video game environments but between CVSEs, virtual classrooms, chat rooms and virtual office spaces.

Utilising video game technology, a CVSE could be built to overcome the limitations of B2C Web-based e-commerce. For example, the social telepresence experienced when utilising multiple modes of communication in video games can be used to counter the lack of social context in Web-based shopping. In addition, telepresence can also make consumers believe they are present at the same location as the product, and a 3D environment would offer many interaction possibilities. Furthermore, video game technology can be used to reintroduce agency into the electronic shopping experience and introduce a more "open road" 3D environment where users are in complete control of their actions. The same environment could be used to reproduce the characteristics of face-to-face interaction and endeavour to communicate non-verbal expressions and gestures between a distributed group of individuals – as well as creating a vast array of

advertising possibilities brought about by the medium's three-dimensional interactive qualities.

A CVSE is more likely to emerge on a games console because console manufacturers have the finances to develop and support such an endeavour. They possess united corporate vision and are continually driven to innovate. However, the two biggest factors impinging on this are standardisation and positioning. It will be far easier to develop a CVSE on a standardised machine, and a console's new position in the centre of the living room will enable it to function as the epicentre of the digitally converged world. Emergence of a CVSE is most likely to be developed through a console manufacturer's existing online services. Yet by allowing a single service provider to take full responsibility of e-commerce, means that a single corporate body becomes accountable. This is both a positive thing, as this accountability would serve to reduce the associated risk of shopping online, and a negative one as complete authority and control over such an environment by a single organisation could result in a monopoly.

A CVSE would stand as a symbolic testament to the digital convergence phenomenon: a virtual reality in which digital self-representations (avatars) converse and socialise in online virtual communities simultaneously using various forms of communication. Human controlled avatars can exchange digital media, download digital products and purchase physical products presented in digital form. The games console used to run such an environment would connect the digital world to the physical world by becoming the gateway between the worlds of bytes and atoms. As a result of standardisation and cross-compatibility, digital cameras, mobile phones, MP3 players, memory sticks, PDAs and PCs could all become connected so that photos, music, movies, documents and other digital media can be uploaded and downloaded. It does not end there – the very same multifunctional device could be used to play games (offline and online), watch DVDs, play MP3s and CDs, video-conference, video-message, record television, view photos, etc. Where we go from there becomes difficult to fathom.

Chapter 8

Findings, Limitations and Future Research

8.1 Introduction

This chapter aims to summarise the findings of this thesis, and comment on the limitations of the study as well as suggesting possible areas for future research.

8.2 Findings

The advantages of "being digital" are numerous, so much so that digital media have quickly disseminated through to the Internet due to its unique distribution qualities. As a result, it is now possible to bring together various modes of communication into a shared virtual space and present ourselves digitally (as avatars). This possibility has already been exploited for entertainment purposes in the form of online multi-player video games. However, as this industry grows and develops, opportunities in e-commerce, telecommunications and advertising should be realised. Online communities are already prevalent in the gaming world, but as bandwidths improve so too will the ability to step between these online worlds and collaborative virtual environments. CVEs represent applications that provide distributed virtual-reality technology to support collaborative work and play. More specifically, CVEs consist of virtual spaces that enable participants to collaborate and share virtual objects as if they were present in the same place.

Furthermore, the dynamic nature of the information-technology industry means that although CVEs are still in their infancy, consumers are already looking for the next digitally enabled phenomenon. This could take the form of the collaborative virtual shopping environment (CVSE). In fact, as this thesis has attempted to show, enhanced VGECVSEs are likely to represent the next step in complete home entertainment as they can utilise the current interactive capabilities of video games (via the creation of 'real world' 3D environments), with the growth and dominance of the Internet as a core distribution and communication channel. This would thereby allow consumers to gain access to not just the Web but an at-home shopping and communication environment providing all the advantages of the 'real world' without the need physically to leave their homes.

By utilising video game technology, a CVSE could be built to overcome the limitations of B2C Web-based e-commerce such as a lack of user-control and lack of product interaction. Indeed, the social telepresence experienced when utilising multiple modes of communication in video games can be used to counter the lack of social context in Web-based shopping, in this way enhancing the user's online experience. In addition to this, telepresence can also make consumers believe they are present at the same location as the product, and a 3D environment would offer many interaction possibilities. Similarly, video game technology can be used to reintroduce unrestricted control into the electronic shopping experience and introduce a more "open road" 3D environment where users are in complete control of their actions. Again, the same environment could be used to reproduce the characteristics of face-to-face interaction and endeavour to communicate non-verbal expressions and gestures between a group of distributed individuals – as well as creating a vast array of advertising possibilities brought about by the medium's three-dimensional interactive qualities. All these ideas have been discussed in this thesis with the overall finding that they are not only well within the realms of possibility but considered likely to be implemented sometime in the near future.

It has of course to be said that although there currently exists the capability to develop a CVSE on consoles or PCs, commercial CVSEs have yet to be developed. Yet despite this, it is believed that a CVSE would stand as a symbolic testament to the digital convergence phenomenon: a virtual reality in which user controlled self-representations converse and socialise in online communities simultaneously using multiple forms of communication. Human controlled avatars could exchange media such as images, download digital products such as audio files, and purchase physical products presented in a digital form. The machine used to run such an environment would connect the digital world to the physical world by becoming the gateway between the worlds of bytes and atoms. As a result of standardisation and cross-compatibility, digital cameras, mobile phones, MP3 players, memory sticks, PDAs and PCs could all become connected so that photos, music, movies, documents and other digital media can be uploaded, shared and downloaded. Similarly, the very same multifunctional device could be used to play games (offline and online), watch DVDs, play MP3s and CDs, video-conference, video-message, record television and view and store photographs. This would essentially create a digital gateway to a world that could expand and develop far beyond the conventional limitations found in the real world.

The possibilities in a digital world thus become endless. Only through digital convergence is it possible to bring all media forms (and therefore all modes of communication) together in a virtual space where we as avatars can be presented and understood digitally. Provided we can successfully improve the level of telepresence experienced through new human-computer input and output technology, there is no reason why digital communities can not replace the functionality of many real world communities, effectively serving to eliminate the boundaries and limitations of the physical world and restrict our experiences only by that of the human imagination.

In summary, by utilising the same technology used to create social telepresence through computer-mediated communication in multi-player video games, a

traditional shopping environment can be synthesised by introducing agency, social interaction and product interaction to the e-commerce process, serving to re-empower the user and instil the confidence necessary for shoppers to carry out their transactions. The social telepresence experienced through utilising various modes of communication in video games can be used to counter the lack of social context in Web-based shopping, with video game technology being used to reintroduce agency into the electronic shopping experience and introduce a more "open road" 3D environment where users are in complete control of their actions. In short, a CVSE would enable consumers to share the same virtual space as the product enabling a deeper connection between product and consumer than is currently experienced through Web-based commerce.

It has, however, been suggested in this thesis that the development of a CVSE is more likely to emerge on a games console than on a PC due to issues of standardisation, financial strength and unification. It has also been suggested that allowing a single service provider to be accountable would serve to reduce the associated risk of shopping online at the cost of a possible monopoly.

8.3 Limitations and Future Research

This work hopefully represents a worthwhile contribution to the relevant literature on the subject, however, there are a number of limitations that must be taken into account when interpreting the predictions made in this thesis. The following section outlines what are believed to be some of the most significant limitations but which may also point to avenues for future research.

It is believed that there are three major limitations to the research presented in this thesis, namely *limited access to an appropriate research environment*, *lack of empirical data* and *the dynamic nature of the research subject,* any or all of which could initially constitute a valid criticism. The first two of these limitations are interlinked because at present there exists limited access to what may be perceived as a CVSE given that CVSEs represent a theoretical as opposed to a

'real world' concept. This has meant that the collection of quantitative data relating to the subject was not possible. As discussed in Chapter 3, collecting research reports or gaining access to commercial data can often be costly and timely and in some cases simply infeasible. In the context of the current research, this (combined with the lack of empirical evidence) has been one of the main drawbacks. Due to the relatively new nature of the subject matter, there is limited access to environments within which statistical data can be obtained as the majority of studies on VGECVSE if they are already in development are likely to be kept in-house. In the light of this, the current work not only requires further validation via the collection of both additional qualitative and new quantitative data, but future research should aim to examine whether a dynamic concept such as a CVSE is in fact quantifiable and if it is, what are the key factors that determine and characterise the environment in the 'real-world'. Perhaps a scenario-based approach could be employed; this would involve the concept of a VGECVSE being described to a group of subjects and then through a questionnaire elicit the views and opinions of this select group potential consumers. Alternatively, this approach could focus on independent industry experts and employ the Delphi interactive forecasting method in an attempt to predict the likely emergence of such an environment.

The third limitation relates to the dynamic nature of the topic under investigation. Due to the relative infancy of the subject matter and the dynamic nature of its content (technological innovations and digitisation), during the course of this investigation propositions have become fact and consequently led to the work quickly becoming out of date! For example, the ability of a games console to sell non game-related products (such as music) through the Internet was originally stated as the next step in an emergence path (see Chapter 7, Section 7.6). It has now become a reality. Whilst every effort has been made to amend the thesis where possible, it may be the case that at the time of submission topics have been discussed which may have changed in nature, or perhaps there has emerged an environment within which quantitative data can be collected. Put simply, the field

moves so rapidly that any submitted thesis on the subject is likely to be out of date by the time it is read by the examiners.

In addition to the aforementioned limitations, it is also important to note that the current research also has a number of standard limitations associated with any new research. Examples include the current work having been limited by time, size and resource restrictions. The matters have meant that whilst every effort has been made to obtain a full overview of all the factors that have contributed to the potential development of a CVSE, such as the understanding of social presence, communication methods and industry analyses, the surrounding subject-areas are so vast that it was not possible to cover them in detail. Rather, it has been the aim of this thesis not to provide an in-depth full analysis of each of the contributing factors to a CVSE but to provide as comprehensive an overview as possible of the phenomenon.

Overall, then, the aim of this study has been to provide the foundation upon which later studies might be built and within which future qualitative and quantitative research could be conducted. It is hoped that this would validate the current findings by providing further insights into the mechanisms of digital convergence and CVSEs.

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