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E-commerce transactions in a virtual environment: virtual transactions

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Abstract E-commerce is a fundamental method of doing business, such that for a firm to say it is trading at all in the modern market-place it must have some element of on-line presence. Coupled with this is the explosion of the "population" of Massively Multiplayer On-line Role Playing Games and other shared virtual environments. Many suggest this will lead to a further dimension of commerce: virtual commerce.

We discuss here the issues, current roadblocks and present state of an e-commerce transaction carried out completely within a virtual environment; a virtual transaction. Although technically such transactions are in a sense trivial, they raise many other issues in complex ways thus making V-transactions a highly interesting cross-disciplinary issue. We also discuss the social, ethical and regulatory implications for the virtual communities in these environments of such v-transactions, how their implementation affects the nature and management of a virtual environment, and how they represent a fundamental merging of the real and virtual worlds for the purpose of commerce.

We highlight the minimal set of features a v-transaction capable virtual environment requires and suggest a model of how in the medium term they could be carried out via a methodology we call click-through, and that the developers of such environments will need to take on the multi-modal behavior of their users, as well as elements of the economic and political sciences in order to fully realize the commercial potential of the v-transaction.

Keywords Electronic commerce · E-commerce · Virtual environments · Virtual worlds · Metaverses

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1 Introduction

Although some would argue that it goes against the original non-capitalist instincts of their early development, one of the principal reasons why the Internet and the World Wide Web have become such intrinsic parts of modern day-to-day life is the ability to shop there. A modern firm cannot truly to be said to be in business unless it is open to e-commerce and has the ability to undertake credit card transactions over the web [1] or at least has some form of web presence. This has led to some firms essentially emigrating totally on-line, with the Internet being their main or even only channel of commerce [2].

Alongside this has been the rapid development of Massively Multiplayer On-line Role Playing Games (MMORPGs or just MMOGs/MMOs), ranging from traditional MMORPGs designed for gaming [3–5], to virtual environments designed for socializing, so-called social MMOs [6–8]. Many MMOs having undergone exponential growth and for their many players/residents they have evolved far beyond mere games in personal significance. This has led to the re-creation of many real world trading activities in virtual environments. This releases them from many physical constraints and many businesses are making real world money out of virtual or even real world assets from within virtual environments (VEs), whilst others are even trying to obtain patents on potential aspects of this trade [9]. This has led to economist Edward Castronova [10] to state "We're witnessing what amounts to no less than a mass exodus to virtual worlds and on-line game environments."

At the time of writing, the current record for the highest real world price paid for a virtual asset is approximately US $ 300,000. This was paid by Erik Novak, via his avatar Buzz Erik Lightyear, at an auction in the game Planet Calypso for the Crystal Palace space station. With ownership of the station came the surrounding land, as well as the associated virtual hunting and mining rights. Novak stated that he intended to earn his money back by charging other players to use these facilities. The developers of the game, First Planet Company, claimed he could do this within as short a time span as two years, although this was met with some skepticism by some technology commentators [11].

Another oft mentioned example in this area is the first virtual millionaire, Anshe Chung, who became the first person to become a real world US dollar millionaire based purely on the projected worth of virtual assets held in the social MMO Second Life (SL) [12]. Her portfolio at one stage included; real estate equivalent to 36 km^2, cash holdings of several million Linden dollars (L$, SL's in-game *currency*), shopping malls, store chains and stocks in other Second Life companies. However some have argued that this virtual fortune was perhaps spurious, based on optimistic valuations of *cashing in* these virtual assets, but this can be countered by pointing out that many people's real world fortunes are based on equivalent valuations of stocks, shares and other paper holdings. It can be argued that despite being connected to real world institutions these exist in just as much a purely virtual or informational space as Chung's purely virtual assets.

Chung's fortune is part of the surprisingly large real world economy connected to the virtual economy of SL. In 2009 the total size of the Second Life economy grew 65 % to US $ 567 million, about 25 % of the entire U.S. virtual goods market. Gross

Resident Earnings were US $ 55 million in 2009—11 % growth over 2008 [13]. Highlights for the Second Life economy as a whole in 2009, include [13]:

- User-to-User transactions in 2009 totaled US $ 567 million in 2009, growth of 65 % over 2008.
- The total amount of virtual currency in circulation reached L$ 6.95 billion, growth of 23 % over December 2008.
- The US Dollar value of L$ in circulation totaled US $ 26.5 million in December 2009.
- Sales of user generated virtual items on Xstreet SL, reached L$ 1.6 billion or US $ 6.1 million, growth of 74 % over 2008.
- The total US dollar value of all Linden dollars traded on the LindeX currency exchange in 2009 reached US $ 115 million in value, 7 % growth over 2008.
- The total US dollar value of all Linden dollars traded on the Xstreet SL currency exchange in 2009 reached US $ 1.5 million in value, 169 % growth over 2008.

About 64,000 users made a profit in Second Life in February 2009, of whom 38,524 made less than US $ 10, while 233 made more than US $ 5000 [13]. Profits being derived from selling virtual goods, renting land, and a broad range of services. Furthermore, in 2009, Second Life had its first few entrepreneurs, who have grossed in excess of US $ 1 million per year [14]. More widely, according to trade media company Engage Digital Media [15], commercial investments in the "virtual goods" sector were in excess of US $ 1.38 billion in 2009 [16].

However, especially in the Second Life context these were principally real world money for virtual products type transactions. There is now increasing interest in moving this forward into real world products being sold within these virtual environments.

Although, the scale of the purely virtual side of these economies in itself has led to the study of them in their own right, for example the ground breaking work of Castronova et al. [17]. This undertook to confirm that a set of real world macroeconomic indicators varied in the way expected by real world theory when applied to the purely virtual component of the economy of an MMORPG, Everquest 2 [5]. To a certain extent the first reaction to this confirmation is "So what?", but more deeply this confirms that the economic and financial decisions of the users of a virtual environment are still based on the same commonsense and personal reasoning as real world ones. Further, this suggests the fascinating prospect of using virtual environments as a platform for economic experiments in a way impossible with a real world economy, whilst being able to record information about the economy down to a single transaction level. This would enable cross linking between macro and micro economic theory.

The ICDT model of Angehrn [18] divides the business opportunities of the Internet into four parts:

Information: A means for economic agents to display and access product and service related information (marketing, advertising, etc.).

Communication: Channels for economic agents to engage in relationship-, idea- or opinion-building activities (lobbying, negotiations, etc.).

Distribution: Means for economic agents to distribute products and services (digital goods and content, software, tele-consulting services, etc.).

Table 1 Extending the traditional taxonomy of Business to Business (B2B) trading by adding the virtual or *meta* dimension

	Real	Electronic	Meta
Real	B_r2B_r	B_r2B_e	B_r2B_m
Electronic	B_e2B_r	B_e2B_e	B_e2B_m
Meta	B_m2B_r	B_m2B_e	B_m2B_m

Transaction: Methods for economic agents to initiate and execute business related transactions (orders, payments, etc.).

Fully within the confines of a virtual environment all of these aspects have been carried out and implemented except **T**; Transactions. A Virtual Transaction; an e-commerce transaction executed completely from within a virtual environment, has not been fully implemented.

Some argue [19] that transacting in VEs greatly extends the range and scale of economic activities, in a similar way to how the Internet created the scope of e-transactions and that this requires an extension of the traditional taxonomy of transactions by adding a new dimension, see Table 1, for the B2B case.

V-transactions would lead to a full virtualization of the business model demonstrated by US consumer electronics company Circuit City and the computer firm Dell. Starting from their flagship stores within SL, customers could previously purchase real world items which were then delivered to their homes. Although notably both of these stores have now closed.

This specific form of e-commerce, which we call v-commerce, can deal with two of the perceived (by some) principal disadvantages of traditional e-commerce, lack of appropriate product presentation and interaction, especially for fashion and design products [20] and a lack of social interaction [21]. Thus being able to virtually experience products before purchase in a VE shared with others is hoped to improve the shopping experience and lead to higher sales [22, 23].

Although the essential technical issues of such a v-transaction are trivial; they lead to multiple and complex issues of ethics, social engineering, legal status, regulation, etc. Hence, we intend here to present a cross-disciplinary review of the wider issues thus this document gives a high-level overview of current e-commerce solutions and comments on their applicability to virtual worlds as a space for e-commerce for real world goods. We then discuss how close to a virtual transaction we have come, and the benefits of and road blocks to such an implementation, and how the implementation of v-transactions would greatly affect a VE, its development, management and the virtual communities within them.

From this we highlight the minimal feature set a v-commerce VE requires, that a strong community of users is required to fully commercially exploit a VE but that such a community is ipso facto more likely to resist such commercialization. This along with the problems of interfacing the real world economy with an up and running in-world economy of a VE, and the current legal status of virtual currencies, as well as the perceived third party trade problem of direct in-world credit card transactions, all leading us to suggest a methodology for v-transactions via a technique we call *click-through* that redirects them to a traditional e-commerce channel. In this way it is hoped this could then lead to wider acceptance of a fully v-transaction.

Both the in-world community and economic aspects show that retro-fitting v-transactions into a running VE would be immensely difficult and potentially damaging, and it would be far easier and more likely to lead to success if they were implemented from day one of a VE's development. In which case the developers of such a v-commerce VE may require expertise in real-world economic and political theory to best create and maintain their VE, its economy and its regulatory framework.

2 VEs?

What exactly do we mean by a virtual environment?

Understanding that we are describing a VE which would be most useful for the implementation of v-transactions, we would state that the minimal set of features for such a v-commerce VE would be as follows:

Environment A VE by definition is a virtual representation of a space. Although commonly most modern MMOs are 3D spaces, this does not have to be the case as shown by Club Penguin [7] and other VEs in 2D and 2.5D (drawn in a 3D style but with fixed movement in a 2D plane). The user should be able to traverse and interact with the space via an Internet connection and each user should be, in some sense, aware of the presence and actions of the avatars and so the other users in the space.

Personal Avatars Although the word *avatar* is now commonly used to describe the representation of a user within a virtual space it is interesting to note that the Oxford English Dictionary [24] still has a primary gloss of "*chiefly Hinduism* a manifestation of a deity or released soul in bodily form on earth; an incarnate divine teacher", with the VE usage being the third gloss. Some might even go so far as to say that their might be some psychological significance of the VE usage of the word and how by association it empowers the user by placing them in the role of deity. Avatars in a v-commerce VE should be identifiable and exclusively associated with their user, as well as have a customizable appearance to other users/avatars, either by interaction with the environment or by direct selection by the user.

Avatar-to-Avatar Communication As we shall discuss in Sect. 5, for the full commercial benefits of a VE to be realized requires the construction of a virtual community of the users of the space, this requires that each user via their avatar be able to communicate with the avatars of other users within the space.

3 Virtual environments in a business context

Alongside using VEs in a purely e-commerce buying and selling mode, much practical use has been made of such environments for wider business applications. We shall give here an overview and background to some of them.

3.1 The virtual conference suite

Another use of a virtual environment for business is in the creation of meeting spaces; for business-to-business commercial activity or even internal interactions for multinational firms. This can reduce geographical limitations on such meetings, as it can prove to be much more cost effective than travel, or even video conferencing. The use of Second Life for supporting seminar activities (i.e. lectures or any other educational purposes) has been documented in a number of recent reports [25]. For example, Sun Microsystems have created an island in SL dedicated for the sole use of their employees, as well as more public spaces [26], and the US armed forces have an entire archipelago of such spaces (Air Force—My Base, Navy—NUWC and the Army—Taradoc and Defense Web) collectively called *Military Lands* [27]. Thus VEs can be exploited in business to support distributed or location-independent working groups or communities [28].

An even more cost effective method is to forego the construction of a VE and appropriate someone else's. As demonstrated by the wonderful merging of content and location that was the "Convergence of the Real and the Virtual" conference, which was held within the MMORPG World of Warcraft in May 2008. This being the first academic conference to be held entirely within a commercial on-line virtual environment.

We ourselves at the Serious Games Institute carry out a regular extended seminar series, called *Second Wednesdays*, which are held in both our real-world conference room as well as an amphitheater in our Second Life region. Each being simultaneously broadcast to the other. An example of using the technique to widen the audience of a real world event.

3.2 The VE as 3D advert

Many companies and organizations have used VEs as a new and novel form of advertising, allowing access to a particularly tech-savvy customer demographic whilst reducing cost in comparison to real world advertising. Currently the primary advertising method in VEs can be described as a themed corporate space, as demonstrated by the many such current and former locations in SL [26]. This enables the advertiser to explore the wider associative and lifestyle messages of a given campaign or product.

Of course many companies have also created such VEs in more of a social mode, for example the former BBC festival islands in SL [29]. This generally allows a wider dissemination and participation in real world publicity events by allowing customers from around the world to access a parallel event which also adds to the *buzz* and media interest [30].

The concept of advertising within a virtual environment does have a particularly long history via the games industry. From the early days of product placement and sponsorship deals, for example the game Zool [31] in which the first three levels were entitled the *Sweet Zone* and contained rather large examples of the products of the Chuppa Chops Lollipop company. This led to something of an outcry at the time, and led to more subtle inclusion in later games, i.e. Worms 3D [32] used the energy drink "Red Bull" as a health pack, more subtly placing the product within the mechanics of the game.

Perhaps of more direct relevance is the placement of adverts within the VE of games, especially those with an on-line component. This has seen an interesting almost complete reversal in potential business model. In the early days of digital entertainment, designers wishing to place adverts in their games to increase the sense of realism would have to pay brand holders to display their livery. This led to many developers taking a satirical approach with imaginary brands that *coincidentally* looked like real world ones. The most famous examples of which being those within the various Grand Theft Auto (GTA) games [33–36], which have gone on to be almost as famous as their real world counterparts within the *gamer* subculture. Now with the financial strength of the modern games industry the flow of money is reversing with games developers offering to sell advertising space in their games, with some firms supplying middle-ware technology to supply content to in-game billboards, other advertising media and even product placement, whilst charging advertisers on a *per eyeball* basis [37].

3.3 The virtual training centre

A further example of VEs as a method of reducing business travel as well as many of the other related costs, is the idea of training within a VE. Such VEs can provide excellent capabilities for creating effective distance and on-line learning opportunities by supporting distributed groups (on-line chat, the use of avatars, document sharing, etc.). VEs in this way can facilitate the development of new collaborative models for bringing together subject matter experts and tutors from around the world by offering opportunities for training, rehearsing and role playing [38]. This can mean potentially that an employee can stay *at post* whilst carrying out a course of instruction that otherwise would require travel, accommodation, etc. Potentially, reducing the cost of training by two orders of magnitude compared to training that requires dedicated equipment and/or space [39]. If set up with sufficient sophistication the VE can supply the educational benefits of a fully qualified tutor who can be questioned whilst the training is in progress, and the chance to exchange ideas and otherwise interact with others students on the course. All via their respective avatars. Further, testing and exercises for the course can take full advantage of the interactive nature of the VE.

On the Job Training (OJT) is argued to be particularly effective in complex tasks where a great deal of independence is granted to the task performer. The Virtual Environments have become increasingly prevalent within education and training institutions vis-à-vis delivery solutions, as this approach can enable individuals to learn and continuously maintain and upgrade their knowledge and skills [40]. For example at DELL providing a risk free environment where learners evaluate how decisions they make would impact their business [41]. Even though the simulation was acknowledged to be an expensive tool, it has proven quite effective training within DELL and future simulation initiatives are expected to take place. Whilst at Motorola participants trained in VEs have proved to perform better than those having had the same amount of real world training time.

Once again re-purposing of existing VEs is possible (e.g. WOW [42]), although it should be noted that this case was for a degree-level course on games design, making the VE experiences more on par with educational field trips.

4 E-commerce: basic concepts & requirements

An e-commerce payment system allows the acceptance of electronic payments and as such allows on-line financial transactions to take place. Such systems have become increasingly popular due to shopping and banking becoming widespread on the Internet. Although, up take of such technology was slow at first with many consumers being apprehensive of using their credit and debit cards over the Internet. Now over 54 % of people in the UK believe that it is safe to shop on-line, an increase from 26 % in 2006, but 30 % still do not shop on-line because they do not trust on-line payment systems [43]. Whilst in North America almost 90 % of all on-line B2C transactions were made with credit cards, and it is essentially impossible for an on-line retailer to operate without supporting credit and debit cards due to this widespread use [44].

The front end of a credit card payment system on regular e-commerce web sites is the so-called shopping cart/basket software. This software allows on-line customers to accumulate a list of items for purchase, described metaphorically as "placing items in the shopping cart". Upon checkout, the software typically calculates a total for the order, including postage and packing (i.e. shipping and handling) and charging associated taxes. This then hands over to the Payment Gateway provided by the credit card company (CCC). This presents the customer with a virtual terminal integrated in to the website—customers login by entering their details and the CCC can then take payments securely, by confirming the transaction, checking the customer has sufficient funds and is secure. The precise implementation of these services can vary from provider to provider. In a VE accessed on-line, communication over HTTP or HTTPS to access such systems directly is technically feasible, and in principle the same technology which allows e-commerce to be carried out via websites is directly applicable to VEs.

The various components of the CCC's payment system are bespoke to the client dependent on the requirements of the site and the payment method; a CCC could in principal build a bespoke payment gateway for a VE. However there would be strong concerns and issues with any payments made in this way, as they could be considered to constitute third party trade [45]. This being a problem which we shall discuss later, in Sect. 6.2.

The greater acceptance of credit card use in general and for e-commerce in particular is in large part due to increased security measures [46], with on-line merchants having to comply with stringent regulations laid down by the credit and debit card issuers to have security protocols and procedures in place to ensure transactions are secure [47]. All traders need to work to the Payment Card Industry Data Security Standard (PCI DSS), and most CCCs offer such services: Streamline [48], American Express, etc.

The principle reason a business would wish to accept payments on-line is simple; the more transactions that can be processed without human intervention then the more scalable the business model and the greater its potential growth. Once e-transactions are setup they are generally simple to manage and maintain. This allows for a focus on sales and marketing rather than the nuts and bolts of an order payment. Finally, accepting credit card payments also improves cash flow, due to payment being received at the time of the order.

However, a number of other electronic payment systems are now available for trading on-line beyond the standard credit, debit and charge cards. These include new technologies such as mobile payment and e-cheques, as well as digital-wallets and e-cash like smart-card systems. A smart-card is similar to a credit card, with the addition of an embedded microprocessor and uses electronic cash which transfers from the consumer's card to the seller's device. Despite their widespread use in western countries, there are still a large number of countries that are considered to have problems with credit card security. Therefore, the use of smartcards has become highly popular in dealing with such locations.

5 Virtual communities & social aspects of VEs

The cliché of the computer user is tragically still one of a lone person, locked away in a darkened room with their machine. This has been an ever increasingly inaccurate stereotype since the general acceptance of high speed on-line connectivity, and ignores the highly social aspects of modern computer usage of various websites and other on-line services, especially in the games field.

The study of such virtual communities or v-communities, whether this be the group of users of a traditional 2D website's forum or the more literal case of the community of users of a VE, can be seen as a continuation of the study of real world communities. Tönnies [49] was one of the first to study the concept of *community*. He suggested a separation between society and community, by defining *Gemeinschaft* (community) as intimate, private and exclusive living together, whilst the wider *Gesellschaft* (society) was public life. The virtual communities of users within virtual environments have in many cases a very strong sense of *their* community, which has been known to engender a *them and us* attitude to the wider society.

Even back in what could semi-jokingly be described as the ancient history of the Internet, 1993, the concept of a *Virtual Community* was broadly discussed. Rheingold [50] described them as a "social aggregation that emerges from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace."

Moving more to the middle ages, 1997, when Hagel and Armstrong [51] moved this more to a business point of view and described communities of *Virtual Enterprises*. However, they made the important observation that many social communities on the Internet oppose their own commercialization, and went on to argue that once these communities realize their full market potential they will be willing to engage in commerce. Little evidence has been seen of such a change in mindset, with the subsequent perceived failure of some real world commercial projects within Second Life being anecdotally blamed on just this type of resistance, along with the on-going hostility between long term SL users and its developers Linden Labs.

In 1999 Schubert and Ginsburg [52, 53] pulled the concept more towards our current discussion by describing *Virtual Communities of Transactions* as "the union between individuals or organizations who share common values and interests using electronic media to communicate within a shared semantic space on a regular basis." This *communities of transactions* concept still holds a great deal of interest in the

development of a modern VE for v-commerce purposes. Schubert and Ginsburg [52, 53] described it as requiring a trustworthy communication and social environment or community platform for bringing together vendors and clients, highlighting the necessity to consider the social aspects of building trust. This platform would give mutual support and the means for the identification of individual users needs based on shared community knowledge (they suggested this being collated and accessed via databases, a VE expands this via direct social interaction as well). Thus leading to increased buying power for the clients with vendors better able to tailor their products to their requirements, e.g. customized community products.

It should be pointed out that this early work was dealing with an exclusively 2D on-line experience and only lo-fi social interaction, for example Schubert and Ginsburg's principal case study [52, 53] was Amazon.com's recommendation system! However, such v-communities are still of interest and modern examples of the traditional 2D Internet are the v-communities surrounding the discussion boards Mumsnet [54] and Netmums [55], whose perceived strong sense of collective identity produced by the support network they supply has led to real world social consequences. During the 2010 UK government election campaign, each were courted by the major political parties and even the founders of the sites were interviewed by the mainstream news media as representatives of British motherhood.

Much work in the literature has a basic message of "Virtual Communities: Good" for e-commerce, as they provide unparalleled customer loyalty and impressive economic gains for both the community organizer and its members [51, 56]. Although nothing in the literature, as far as we are aware, actually suggest how one would go about constructing a suitable community, assuming it to already be in place or taking a "if you build it, they will come" attitude. It should be noted that in the marketing, advertising and other PR industries (especially in association with the games industry) the rôle of "Community Manager" for carrying out just this sort of community building/social engineering is now well established.

It can easily be seen that VEs are strong breeding grounds for virtual communities with a very strong sense of *Identity*. This clearly makes them potentially highly lucrative if commercialized, but highly difficult to commercialize due to this sense of ownership leading to an especially strong dislike and distrust of *their* world being commercialized. This suggests that attempting to retro-fit v-transactions into an existing VE would be immensely difficult with the potential to destroy or at very least greatly antagonize the very virtual community that the commercialization of the VE would wish to *exploit*. So that for such a virtual community to fully accept v-transactions the VE would need to be built from day one with them, so that the mind-set of the community knew from the start that it was at least in part a commercial space.

6 V-transactions: current problems & work arounds

We shall discuss in this section some methods currently suggested for carrying out v-transactions and their associated problems, as well as some of the general problems faced by v-transactions and the VEs they would take place in.

6.1 Virtual currencies

Although the concept of purchasing items in a virtual world is a common and long standing one, it is usually the purchase of virtual items in an in-world currency, e.g. Linden Dollars in Second Life, Gold in World of Warcraft. When real world currency can be exchanged for them, these can be seen as the VE equivalent of digital-wallets and e-cash, as they become essentially the same thing.

An example is Cyworld (www.cyworld.com), which includes a virtual currency called *dotori*, literal translation: acorns. One acorn has a fixed exchange rate of 100 Korean won, approximately US $0.10, and players are encouraged to use them to purchase virtual items such as clothing, decorations, musical instruments, songs, videos, and other entertainment goods for their avatars. Most of Cyworld's items are time-limited, and automatically disappear once that time has expired. Cyworld includes 25 % of the total population of South Korea as registered participants, with an average of 20 million daily unique visitors. Cyworld's revenue in South Korea was estimated to be around US $300,000 daily in 2005.

In the case of Second Life, it is possible to purchase Linden Dollars with real world currency, as well as trade them back. The exchange rate is controlled by Linden Labs, depending on the supply and demand in the market, using various economic *sources* and *sinks*. More embedded within the game world is the firm XChange4L$ [57]. This uses an appealing real-world simile in that you can 'withdraw' Linden Dollars from an ATM or a wallet worn by your avatar within Second Life. However, this is quite an awkward multi-stage process, with steps both in the real and game world, and only intended for those who do not have a full residence account with Linden Labs with associated payment details and only intended for occasional transactions. Users with full accounts can transfer funds back and forth more easily. The more alarming aspect of the Linden Dollar for the purpose of commerce is the following at the end of clause 5.1 in the SL terms of service [58]: *You agree that Linden Lab has the right to manage, regulate, control, and/or modify the license rights underlying such Linden Dollars as it sees fit and that Linden Lab will have no liability to you based on its exercise of this right. Linden Lab makes no guarantee as to the nature, quality or value of the features of the Service that will be accessible through the use of Linden dollars, or the availability or supply of Linden dollars.* Most other VEs with internal currencies have similar clauses in their user agreements, meaning that a VE could disappear over night with the subsequent loss of all holdings in it and its currency and there would be no legal or financial recourse to the VE's developers.

Recalling that SL is a VE which is more geared up towards e-commerce than most MMOs, and yet it still has this highly protective clause, it is therefore unlikely that a serious firm would be willing to trade in such a virtual currency so the capability to carry out v-transactions in the medium term is likely to require an interface with current on-line financial transaction systems. However, this risk can be seen as equivalent to trading in certain real world currencies of nations with fragile economies or politics.

According to Yamaguchi [59] for a virtual currency to become meaningful an exchange rate to real world currencies is required. This provides a strong incentive for

entrepreneurs to seek commercial opportunity in the VE. Although some would argue that an exchange rate and real world value are consequences of perceived meaningfulness rather than a cause. Essentially, if people want something badly enough, they'll find a way to pay for it—and demand drives supply. For example, the early days of gold trading in MMOs arose from player-to-player transactions rather than player-to-developer with players being responsible for setting up third party sites allowing Real Money Transactions/Transfers (RMTs).

Not surprisingly, allowing such currency exchange has profound implications for a VE operator's strategies [60] and the VE's users. Lehdonvirta [61] put forward ten different ways that users think of real-money trading and how it can affect the VE: i.e. *competition*, as real money trading can be considered cheating if it can be used to obtain a competitive advantage, or *socializing*, as real money trading allows players to express themselves through their buying behaviors, or *customization*, as real money trading makes it easier to obtain a set of assets that correspond to the player's taste, for example the game Battlefield Heroes were the majority of character customizations that can be purchased are purely cosmetic [62].

Although it can be argued that these predominately apply to themed VEs, i.e directly games based ones, in which character development is the primary goal of the user. The problem being that allowing a user to rapidly progress through the game by purchasing new skills, weapons, resources, etc. with real world currency from outside the VE can alienate other users. They may feel that this constitutes cheating and belittles the achievements of those who progressed to the same level without buying such progress. Furthermore, developers see a huge market of player-to-player transactions, but can't capitalize on it because those players are ultimately selling time rather than items. A developer can, of course, conjure an item from thin air, but in doing so has instantly devalued the time it takes to obtain it and hence reduces its value. As developers look for other ways to capture a bigger share of this economy (for example facilitating player to player transactions and taking a cut). Leading to many developers now favoring the free-to-play supported by purchasable in-game currency and items, the so-called *freemium* business model.

Clearly this is not as big an issue for non-goal orientated or socially based VEs such as Second Life, besides normal human jealousy. In fact the reverse is the case with Linden Labs allowing users to capitalize on their creativity acts as a strong incentive to innovate and find and fill gaps in the market.

Essentially, the primary problems for the developers of a VE of v-commerce using such an in-game currency become ones of economics, and ensuring that this interface with the real world economy does not unbalance the in-game one. This difficulty is well understood by the developers of game based VEs, who in many cases have to work hard to maintain a balanced in-game economy to set the required difficulty level within the narrative of the VE, for example the developers of Eve On-line have gone so far as to employ actual economists to help with maintenance and monitoring of the in-game economy [63]. This maintenance can be equated to in-game financial and economic regulations and we shall discuss how these could interact with real world regulation and legislation in a later section.

6.2 The third party trade problem

We now return to the previously mentioned third party trade problem. In a multi-vendor VE, that is one were multiple client companies are *in residence* and trading, the VE's developers would be responsible for all payments from customer to client, and thus hold all payment and then pay it onto the client companies. Currently, CCCs do not allow such third party trading unless they have separate contracts with each client in the VE and its developers took responsibility for the payment. They would also be liable for any charges. This essentially would make it impossible within the scope of a multi-vendor virtual environment, or at least highly unlikely that a VE developer would be willing to take the incumbent risk. Although, single vendor VEs where the world is being managed by the vendor are clearly just like standard e-commerce transactions and many VEs do allow such transactions, whether this is a regular subscription payment to access the world or one off payments, for example Linden Labs allows the purchase of additional Linden Dollars from SL's user interface, but not within the VE per se.

However, such single trader VEs crucially miss out on the savings of scale and the increased consumer traffic of the shopping mall effect of a multiple vendor VE. This allows for greater specialization, vendors can concentrate on the sale of their own products leaving management of the world to the VE's developers.

Although, certain 2D e-commerce websites do deal with this third party trade problem, for example Amazon with its Merchants scheme. Amazon is able to carry this form of business as it is a truly massive company easily able to absorb the potential charges they would be liable for, they also have standardized contracts for their merchants which fulfill the CCCs requirements, but most importantly they are a well know and trusted firm and such dealings are within the understood legal framework for e-commerce.

So it is this basic mistrust of VEs due to their perceived lack of legal precedent which is at the heart of this problem.

6.3 Legal status

Although in general e-commerce has much of the same legal protection as real world commerce, with the step into a VE it is not so clear cut and some legal issues still stand, for example, should such income be taxed? And if so how can it be enforced? In game currency or in real world currency? [64]. In the case of SL, VAT is exacted at the point of converting Linden Dollars into real world currency. Many governments are now beginning to consider legislation in this area, including that of the USA [65]. Whilst in Europe, the High Level Expert Group (HLEG) on the Social Aspects of the Information Society has called for research in the area of taxation of e-commerce. One suggestion being a so-called *bit tax*. The suggestion being that such a tax must be considered by governments to generate revenue in a world were value is mainly generated through systems and global networks, instead of production and exchange of material objects, i.e. virtual verses actual [66]. Soete and Kemp [67, 68] elaborate further on the idea, suggesting research and an improved understanding of the taxation issues related to e-commerce are needed.

For VEs to provide a sustainable business environment these issues must be addressed, along with a potentially legal framework to regulate the responsibilities of a VE's developers to its users. For example, the previously posed hypothetically of what would happen to in-world holdings if a developer closed down a VE? Legal frameworks would boost trust in VEs and encourage more investment in them.

The first steps in this direction have already been seen. In July 2007, in reply to an FBI investigation Linden Labs announced a ban on all in-world gambling. This stopped all wagering on games of chance or games dependent on the outcome of real life sporting events when they provide a payout in either Linden Dollars or a real world currency, and halved the size of Second Life's economy. This ban directly resulted in the collapse of a major virtual bank within SL called *Ginko Financial*. This started very much like the collapse of a real world bank with one of the first signs of trouble being the bank's customers being unable to withdraw Linden Dollars from Ginko's in-game ATMs. However, this was then followed with the VE twist of the ATMs then being deleted from the SL VE. They vanished, along with all the buildings constituting the branches of the bank.

The failure of Ginko had the consequence of severe liquidity problems for the rest of SL's virtual banks. Around US $ 700,000 was reported missing by Second Life residents who were Ginko account holders. An investigation was launched, leading to the punishment of the avatar Nicholas Portacarrero, the head of Ginko Financial [69]. As a consequence Linden Labs started to regulate the virtual banking industry in January 2008, and prohibited the offering of interest or any direct return on investment by all companies who were unable to provide proof of an applicable government registration statement or financial institution charter. Essentially equivalent to real world banking regulations.

Such application of regulation is considered a critical step in creating institutional trust, and making VEs into a stronger economic channel for commercial use. However, whether this legislation is in-world or real world, or is pulled in-world whilst waiting for the real world to catch up or a mixture of the two could greatly affect the potential business model of any future VE set up primarily for v-transaction based trade and we shall discuss this in a later section.

6.4 Social conventions

Spar and Bussgang [70] discussed the absence of established social conventions and rules on the Internet, which they maintained lead to a degree of distrust and uncertainty over a possible business partner. They pointed out that virtual communities can help to develop an essential social framework on which trust can be built.

However, whilst in the case of a social MMO VE this should lead to a social framework which is broadly convergent with real world social norms, there are some who worry that in a more game based VE that this might not be the case. Once again we shall discuss this further in a later section.

6.5 Side stepping the issues

Currently, the best method of producing something close to a v-transaction is a model we shall call *Click-Through*. The action to initiate a purchase brings up the relevant

e-commerce webpage for the item, thus side stepping the third party trading issue, the in-world economic problems of duel purposing of an in-world currency, and essentially most of the present issues and reverts back to standard e-commerce. The technology that processes on-line payments via a web-site can be quite expensive, so if nothing else it is likely to be more cost effective to reuse this infra-structure. It would also mean that current business practices can be used and negates the requirement of the creation and maintenance of a VE specific order taking process. This would then allow the consumer to navigate around the rest of the web-site and place other items in their shopping basket.

Interestingly, Linden Labs seem to see almost a reverse of this methodology as useful for trading in virtual objects in SL. In January 2009 they acquired two Web-based marketplaces for virtual goods, Xstreet SL and OnRez. Similar to e-commerce sites for real world goods, such as Amazon and eBay, Xstreet SL provides an on-line catalogue, where Second Life residents can browse, purchase and sell Second Life-related virtual goods and services.

Virtualeshopping.com, a multi-user virtual shopping mall uses this click-through mechanic, which suggests that such a multi-modal approach would be accepted by consumers. However, their business model very much comes from the advertising industry, with clients of the environment even referred to as advertisers. To quote from their announcement press release: "When shoppers click on the storefront doors in the mall, they are transported to the 2-D website of participating merchants. By clicking on an image, slide show or video in a storefront window, a shopper is transported directly to a featured item on the merchants' internal web pages."

Another example of this mode of operation is the world's first Interactive 3D Virtual Farmers' Market [71], this brings up the market's own web page to carry out purchases and places items in a shared basket. This method was thought best so that the customer would not have to check out for each virtual stall they bought items from.

Perhaps the most effective method of doing this click-through system, and one which also takes advantage of the interactivity of the virtual environment, is to allow the customer to customize their selection within the VE and then export that description to the e-commerce web-site for actual purchase. For example formally in the Dell factory on the Dell Island in Second Life, you could "customize your very own Dell computer in our Second Life factory, and then continue on-line to purchase a genuine Dell computer!"

This gives us most of the benefits of a true v-transaction in that it deals with the perceived problem of lacking of appropriate product presentation and interaction for e-commerce [20], and the lack of social interaction [21], as interacting virtually with a product before purchase in a shared VE can lead to an improved shopping experience and higher sales [22, 23].

A possible perceived problem especially for a narrative or game based VE would be a potential break in immersion with the VE content, although it can be dealt with to a certain extent with techniques equivalent to *HTML on a prim* in Second Life. Where a real world web browser can be embedded on to the surface of an object within the VE, see Fig. 1. This immersive break can also be dealt with by embedding the product into the VE by co-selling, this is not only have a click-through button

Fig. 1 An example of HTML on a prim in Second Life. Essentially creating an in-world web browser

but also a button which purchases with in-world currency an in-world version of the item.

Breaks in consistency, such as those induced by low frame rate, or this kind of discontinuity in VE content, are shown to have a significant negative impact on immersion [72]. However, such a break in immersion may in and of itself not be entirely a bad thing for v-transactions. We here introduce a concept that we call MMO double-think. The concept of double-think of course comes from George Orwell's 1984, whereby an individual is capable of holding two contradictory beliefs at the same time. MMO double-think relates to the dual state of the user of a VE, who are simultaneously *being* their avatar in the VE and the user controlling the avatar *outside* the VE. Any number of hypothetical scenarios can be conceived: The avatar is a rich nobleman owning vast tracks of land with treasure vaults over-flowing with gold, whilst at the same time the user is an improvised student working their way through college living in their grandmother's basement. Clearly it is in the interest of the vendor selling through a VE, at least on an ethical level but potentially on a legal one, to ensure that this user spends money in a manner appropriate to the latter mode and not the former. Hence the break in immersion with the VE can be excused with the idea that it clearly delineates that I have stopped the fun part of browsing for my purchase and I am now on to the serious part of actually carrying out the transaction and hence customers would be more likely to stick to their usual security and spending habits hence ensuring the correct MMO double-think mode.

In essentially forcing v-transactions back into a standard e-commerce channel we therefore reap a number of benefits: greater trust in the transactions as it returns to an established e-commerce channel, a return to the known e-commerce legal framework, and in practical terms a reuse of the already implemented e-commerce transaction channel.

Note that we only see click-through as only almost a v-transaction and not a fully virtualized one, but they would be an important first step in establishing the required multiple frameworks (ethical, legal, narrative, social and trust) as well as present a strong business case for a fully v-transaction.

7 Trust and acceptance of v-transactions

Much work has been done on customer acceptance of e-commerce ([73] and references there in). Crespo's work [73] was based on that of Gatignon and Robertson [74] which states that the formation of attitudes toward a new behavior or product is determined by four factors. Putting aside for a moment some of the possible possessiveness of users of an established VE, and looking more to the virtual community of one which had been originally established with a strong v-commerce component, we can see that such a community would be more inclined to accept v-transactions.

Individual's Personal Characteristics (in particular, personal innovativeness) This relates how much a person is likely to innovate in aspects of their personal experience, and although being a regular user of a VE is increasingly becoming a norm it still takes a certain degree of this to fully take part in a VE, meaning such users would be more willing to innovate and use v-transactions.

Characteristics Perceived in the Innovation Essentially, does this innovation have something for me, and clearly as the user has already chosen to take up *residence* within the VE they have already decided it to be of use.

The Uncertainty or Risk Associated with it As the user is likely to already have a financial relationship with the developer of the VE to access it, this may then go some way to allay some of these fears.

Influence of People or Groups of Reference A strong such *group of reference* for a VE user is likely to be the virtual community of the other users, who are to be expected to be strong users of the VE and its v-transaction system.

Crespo [73] showed that *attitudes towards the system* and *subjective norm* are the main determinants of the intention to shop online, and that perceived risk has no significant effect on adoption, and *personal innovativeness* only effects the first internet purchase.

The work of Bhatt [75] entitled *Bringing Virtual Reality for Commercial Websites* is informative, for a start the *Virtual Reality* it analyzes is a set of traditional 2-D e-commerce websites and their associated user communities, which modern readers are unlikely to consider as virtual. They highlight the work of Hoffman and Novak [76] which identified four properties of *flow* and applied them to the navigation of a commercial website. These were interactivity, enjoyable experience, loss of self-consciousness and self-reinforcing. In order to remain in a state of flow, the skills

and challenges must be balanced so the consumer will be paying maximum attention. Hoffman and Novak [76] state that such a balance leads to improved learning, participation and exploration as well as a positive experience in navigating a website.

This can be related to the matching concept of flow in games, with many games designers highly aware of the concept of guiding a player's experience through the game's VE under the principles of flow. One developer in particular espouses this view, thatgamecompany, with it's principle titles being called Flow and Flower (e.g. FLOWer).

Bhatt [75] reduced this to the three concepts of interactivity, immersion and connectivity.

Interactivity, according to Steur [77] refers to the extent to which a user can affect the *form or content of the mediated environment*. Bhatt highlights the importance of the speed, range and *significance* of such interactivity. The significance referring to the way that the mediated environment responds to human actions, with *realistic* responses scoring higher significance than those contrary to user expectation [78]. For example, a video game which mimics *realistic* physics had higher significance than a system whose responses appear abnormal or contrary to real-world actions [79].

Immersion refers to the feeling of being deeply engaged in a virtual world as if it were real [80]. Bystrom et al. [81] emphasized the significance of human senses in defining immersion, as they argue that immersion encompasses vision, hearing, taste, smell and touch. Steur [77] categorizes immersion along 2 axes: breadth of immersion (i.e. the number of sensory organs that are affected by the VE) and depth (i.e. the degree of *resolution*). The capacity to immerse users is a significant consideration, although the means for achieving this immersion can be diverse; from high definition visual content to less technical approaches such as narrative [82] and social immersion.

Connectivity refers to the awareness of the users in a VE of the presence of other human beings with whom they feel "socially affiliated" [50], allowing them to build relationships with others based on their experiences [51], and can be considered as a conduit for communication that deals with the users' concerns [83].

Bhatt [75] concluded that in order to attract customers, a website is required to create a balance between interactivity, immersion and connectivity. This balance was quite product/service specific. In the fashion industry, immersion was seen to be more critical, whilst for the financial industry interactivity was far more important. The other factors which needed to guide a company in this balance related to customer demands for content, convenience, customizations and community.

It can clearly be seen that a suitably designed VE should be far better at fulfilling all three of Bhatt's concepts than a traditional 2-D website, by being fundamentally more interactive, immersive and giving a greater sense of connectivity and could potentially use the games industry's skill at generating flow. However, this could all only be achieved with appropriate design of the VE and with strong consistent community management/regulation.

8 Virtual or real world ethics: would you buy a used sword from a goblin?

The modern wider acceptance of the Internet has led to much study of the relevant ethical dimension. For example, Brynum [84] noted that: "computer ethics identifies and analyzes the impacts of information technology on social and human values like health, wealth, work, opportunity, freedom, democracy, knowledge, privacy, security, self-fulfillment, etc.". Moor [85] also argued that the *IT revolution* would be a two stage process; the first focusing only on the development and use of IT, essentially the technological aspects. The second stage would see the development and use of the social aspects, with the merging of IT systems and processes with human and social interactions. It can be argued that VEs are very much a part of this second maturing phase considering their strong human and social elements.

As previously mentioned, one of the perceived barriers to the acceptance of previous e-commerce and in future of v-commerce is the lack of accepted social norms and codes of behavior. Essentially the absence of a known ethical framework. During the early stages of implementation and development of a v-commerce enabled multi-vendor VE, strong community management would be required to instill the *correct* ethical standards with regard to v-transactions. Although, an important issue when considering ethics in a VE is to ask which code of ethics actually applies. Is it the one that applies in the real world or is it a new code of ethics that comes from the nature or narrative of the world represented by the VE.

Thus returning us to our concept of MMO double-think, and we must highlight that it is not a binary transition between the two modes but a continuum and it is likely that preconceptions from one side will impinge on the other. For example, the anecdotal evidence that WOW players are more generous to female avatars when dividing up the spoils of a raid.

Especially in a narrative VE this crosstalk between the two MMO double-think modes could exacerbate various trust and acceptance issues by the requirement to place the v-commerce infrastructure/store within the context of that narrative. This is likely to be in the form of a duel purpose shop selling real and in-world items, and any number of amusing hypotheticals can be dreamt up: Would you be more likely to trust the long term investment plan of a bank run by a vampire clan? If a player, who's avatar is a goblin, reneges on a deal are they just acting as a goblin should or is it actually real world fraud?

Lastly, a narrative VE may encourage 'unethical' behavior by real-world standards in order for the user to play their part in the narrative. In many MMOs the user takes the role of a warrior, so killing or stealing may be the *correct* narrative based behavior. Although, you will always have some who will attempt to subvert the system, for example the small group of *pacifist* WOW players, who endeavor to level-up their avatars by purely non-violent means [86]. For some this is an ethical or political statement, for others an intellectual exercise.

An example of this ethical ambiguity with more of a commercial focus would be the infamous use of a pyramid investment scheme in Eve Online, which allowed a user to net 700 billion ISK (InterStellar Kredits, Eve Online's in-game currency), which could have potentially been converted to more than US $ 119,000 [87]. It is perhaps surprising that so much money was acquired with such a well-known real-world scam. However, if only considered within the VE it could be argued that such

profiteering is not unethical or illegal, but it is just the perpetrator playing the role of a space pirate. It is then only at the point that this virtual currency was converted to real world currency, that these ethical and legal questions can be raised.

This problem of ethical conduct within a virtual community diverging from real world standards is not limited to VEs, the standard 2-D Internet has similar problems. As anyone who has been caught in the middle of a flame war on a web forum can testify, and as codified by Godwin's Law (*a.k.a* Godwin's Rule of Nazi Analogies), which states: *As an on-line discussion grows longer, the probability of a comparison involving Nazis or Hitler approaches 1* [88]. Further, one can clearly identify the cultural differences between fora, for example from the author's own experience the digital-origami MIT newsgroup is frightfully friendly and polite, unless you mention copyright infringement, whilst any games development forum tends to be highly aggressive especially to those asking noob or newbie (i.e. beginners) questions, with much disparaging calls of "Google It!" and STFI!

Ironically one of the most potentially lucrative groups of VEs to commercialize, would perhaps be the most difficult to moderate. These being the non-persistent VEs which form the principal form of on-line play for the most successful genres of entertainment computer games: First Person Shooter (FPS) and Third Person Shooter (TPS) games. These are usually played on maps which constitute a section of the narrative VE of the off-line play (the so-called campaign mode) reworked for the purpose. Players login, play their match and then the world is reset. There is also a very strong business case for this *commercialization*, as it is usual practice that this VE is a free service included within the off-shelf price of the campaign mode. Also, it is common that much of the critical review will concentrate on this play mode as well.

The virtual communities of players of some of these games are know for their highly aggressive nature. Whilst this is not entirely surprising given the combative nature of the game-play, it can discourage some newcomers from playing entirely. The community of on-line players of the Halo series of games [89–91] for example are, anecdotally, especially noted for their unpleasant nature. This is perhaps a sad indictment of the world view of Halo's principle user base, young adolescent male Americans, but the application of the MMO double-think concept has perhaps a more worrying consequence. The Halo avatars are universally strong successful alpha-male military cyphers and these sort of attitudes are what Halo's player community believe are acceptable for them to express.

This dichotomy between real and in-world ethics and behavior is an issue that would need to be very strongly addressed by the developers of a v-commerce VE. However, it can be seen as an extension of the standard community management and in-game regulation already practiced by the games industry in the case of MMOs.

9 Two degrees of regulations and legislation

It is clear that there is a pressing need for the development of appropriate frameworks of regulation and even legislation that will direct the way that commercial activities develops in VEs, especially when in-world currencies can be converted to real-world

money. There is currently little or no such regulation, notwithstanding the fact that VEs represent a fairly recent phenomenon. Cromer [92] notes that corporate organizations embracing their corporate and social responsibilities should aim to protect their employees, their product/service users, the rest of society and the overall environment, whilst also achieving financial growth. Papagiannidis et al. [19] suggested that the developers of VEs need to be "proactive and to develop their own concrete ethical policies without expecting the government or other regulatory body to intervene."

It is important to note that users of VEs are expected to behave and act according to the defined sets of rules that a VE's developers set, usually within the context of the VE's usage or license agreement terms and conditions. These are theme dependent and ensure that there is not only a framework for how avatars are expected to behave but also that their real world users are protected as well. For example, privacy and harassment issues are generally taken extremely seriously, although enforcement is a highly non-trivial task. For example, in a child orientated VE "bad language" can be moderated with profanity dictionaries blocking certain text inputs, but context is impossible to ascertain with current technologies, leading to the blocking of innocent synonym/homonym usage and unfortunate names, whilst in a more adult themed VE abusive language might be banned but such a dictionary approach would be far too restrictive.

In fact, in many cases, it may be impossible to monitor rule breaking behavior by technological means. Consequently, great use is made of peer monitoring, with users policing and informing on the rule breaking of other users. In SL, for example, any object or avatar can be right-clicked and a *Report Abuse* dialogue can be opened, see Fig. 2. The developers are then expected to investigate each case and decide if a violation has occurred and take appropriate action. This method of policing can be very expensive in man-hours. For example, a former colleague of the author who wishes to remain anonymous, who was part of the community management team for a family orientated entertainment game with user generated content, spent the first hour in the office each morning on what he dejectedly called *Penis Patrol*, looking for and deleting all the inappropriate images from the user submissions to a community website.

9.1 V-economics

Moving to the scope of commerce and transactions, the regulation of behavior in a VE is potentially unusual as it can be seen as a two dimensional process; rules and regulations in-world as well the external legal framework of the real world. This can lead in cases of VEs with well developed internal economies to their developers using concepts from real world economic theory to help manage the VE as well as lay down in-world rules and regulations, as shown by the previously mentioned Eve Online.

The level of regulation or deregulation of an economy places it on a sliding scale from old soviet style centrally planned economies, where all economic behavior is directed from a central authority, through to the more laissez-faire of free market economics, where economic behavior is directed by scarcity driving value via supply

Fig. 2 Reporting abusive behavior in Second Life

and demand. The decision of where, when and what to regulate is generally seen as being based on the desired answers to three further questions: What? How? Who?

What should we produce?
How should we produce it?
Who gets what is produced?

If the answer to any of these questions diverges from the desires of the governing authority it is said to be a case of *Market Failure*.

For example, public goods, like defense, were the government must regulate to pay for a certain form of production as it would be impossible for producers to make a profit if the population where expected to pay directly for their proportion of the military defense of the realm. Externalities, like pollution, where the outcome of production does not effect the profits of the producer but does effect others to their detriment, and the authority must regulate to prevent it.

An interesting pairing of market failures is that of monopolies, where a producer exploits their commanding position in a market to produce excessive profit, and the lack of innovation produced by wide spread IP theft, the regulation for the latter being copyright and patents, essentially a short term regulated monopoly.

The level of regulation in any particular area of an economy is a measure of how much the governing authority is willing to spend in tackling a perceived market failure. In the case of a real world economy this is measured in money and man-power applied to policing the regulations as well as the stridency of the punishment, in VEs this is also the case with the already given examples of public behavior and decency. However, in VEs it can also be expressed in terms of software development time. For example, Linden Labs thought that issues of property and IP theft, vandalism

and trespass on private property were of such importance that they are encoded into the VE itself. Obtaining, copying or altering an object that is the property of another avatar or entering their real estate are all impossible without the express permission of the owning avatar/user. The VE developer's ultimate sanction is to essentially change the laws of physics of the VE's universe to make a prohibited behavior impossible.

Papagiannidis et al. [19] also further points out that the development of the second dimension of VE regulation, in the real world, would benefit the introduction of a global advisory or even regulatory body thus taking into account the global reach of VEs, or whether different countries, organizations or communities might introduce separate regulatory frameworks and legislative codes. From this Spinello [93], considered some options for possible Internet governance and suggested three top-down models: The first model, direct government/state intervention, could be abused by *regulation tourists* who shop around for more relaxed regulatory nations. However, this a common phenomena in real world regulation. The second model, coordinated international intervention, could address this problem due to the global nature of VEs as it would transcend geographical boundaries, although as the nations of the world do not seem capable of agreeing on such a framework for their real world trading Spinello seems extremely naive to think it could happen for VEs. The third model, self-internet governance, the option favored by the US government, but has problems of accountability and management of politics between the various stakeholders involved.

This problem with the final option could be the basis of the introduction of community advisory or regulatory bodies within a VE, so that the individual characteristics of each VE and its associated v-community were fully taken into account. This would essentially produce an in-world political system. This would probably be seen by the VE's developers as giving away significant control from their current position of effective benign dictators, but it could help build trust in the VE as a trading platform. It would demonstrate that all stakeholders have the opportunity to take part in the decision making process and so ensure that the development of the VE was directly influenced by its v-community of users, further building trust. Such community bodies could then be the face the VE presents to real-world bodies and policy makers.

This *VE Parliament* concept only *solves* the regulatory trust and basis problem for a single VE, what is really required is a potentially industry wide solution to set up general levels of accepted and trusted regulatory norms across VEs without resorting to international agreement. This could potentially be achieved by merging the second and third of Spinello's governance models; coordinated international intervention and self-internet governance. We then ask the question what do we mean by a *nation* in a VE context. Surely the VEs themselves should be considered the nations and their developers could cooperate at that level to create a Virtual Economic Community (VEC), with a shared regulatory and financial framework. This would allow the individual users and client companies of the VEs to have the assurance of an accepted framework with the addition of appealing to the authority of the VEC. This would all be without the developers loosing full control of their VE. At the same time a VEC could also lay down the potential framework for inter-VE commerce, although the larger technical problems are likely to make this a highly long term aim.

10 Conclusions

Whilst at the moment VEs are still something of a niche past-time, the ever growing population of MMOs and the even wider acceptance of entertainment computer games means that they will very soon be a mass media channel and therefore ripe for the full commercialization represented by v-commerce and v-transactions.

This is especially the case due to a race to the bottom that has occurred in MMOs over their cost of entry, which has led to a whole-sale movement from the high revenue subscription model over to the so-called freemium business model. Where the game is free to play but additional content can be purchased by micro-payments or similar. Thus leaving developers desperate to find further methods to *monetize* their VEs.

However, there are currently a number of hurdles to the full implementation of v-transactions, broadly all based around problems of trust and the lack of both a social and legal framework onto which to hang v-commerce via v-transactions. It is perhaps ironic that the very VEs and their users which would most strongly benefit from v-commerce, due to their strong v-communities and more highly developed virtual economies, are the least likely to be successfully commercialized by v-transactions due to both their v-communities' strong sense of ownership and the difficulty of interfacing their economies with those of the real world. It will therefore be future VEs which shall fully reap these benefits, but their developers will have a novel task having to take on board not only the computer science logistics of creating a VE but also the multi-modal behavior of its users under the thrall of MMO-doublethink. They will also need to be mini-nation builders creating regulatory and economic frameworks, whilst borrowing from economic and political theory. We may even see them creating a UN of the Internet as a VEC is created whilst waiting for the real nations of the world to try and legislate them.

Although, we believe that in the medium term our suggested model of almost v-transactions via the click-through mechanic will help to start building the trust in VEs as a commerce channel by directing it through the traditional 2D Internet, as VEs become a more broadly accepted concept a more true v-transaction will be achieved. Either via the acceptance of credit card payments in-world or a better understanding of the MMO-doublethink modes behind virtual currency use, an area which clearly requires further study. Also, little to no work has yet been carried out on the acceptance of click-through and whether this does lead to wider acceptance of a more truer v-transaction. Both of these areas require much further study.

This could see VEs transformed, especially socially based ones, from mere entertainment products into potentially the business hubs of the future. Whether through v-commerce, advertising, or other business functions, there is no doubt that the increasing growth of trade within VEs will expand from its gaming roots to encompass v-transactions of real world goods and services and potentially become a major contact channel for business.

VEs could literally add another dimension to the Internet. Why limit your organization to a traditional webpage, if you can have an entire virtual world with a dynamic social environment. Although, tremendous legal issues need to be resolved to regulate such a completely new world and there is a clear lack of experience in this area, given that the requirements for a VE are quite different from those of traditional web pages.

In a worst-case scenario VEs are just another variety of media that a company can use to get the attention of a highly creative and technologically advanced set of potential customers, but they may also be the bleeding edge of a fundamental revolution in how business is carried out.

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