

**House Committee on Energy and Commerce
Subcommittee on Telecommunications and the Internet**

***Online Virtual Worlds:
Applications and Avatars in a User Generated Medium***



**Written Testimony Submitted
By
Dr. Colin J. Parris
Vice President, Digital Convergence
IBM Corporation**

April 1, 2008

1. 3D Internet and Virtual Worlds.

As readily evidenced by rapidly growing usage, ardent discourse by industry and academic leaders, and heightened coverage by media and analysts we have firmly entered a new era in the evolution of Internet capability. This era augments the significant capabilities of the Internet by extending the current participation, collaboration, and innovation functionalities.

There are many terms used to collectively describe these new capabilities (one of the terms that we at IBM have used is the 3D Internet) but at their core they provide 3D visualization, synchronous social interaction through avatar personification, simulation, and immersion through new devices and interfaces. The expression of these emerging capabilities occurs in virtual worlds and virtual spaces.

Virtual worlds are computer-based, simulated, persistent, environments that support synchronous interaction between users personified as avatars. The avatar and environment representation can range from 2D “cartoon-like” to 3D “life-like” imagery with the interactive interface capabilities ranging from simple keyboard and mouse devices to gesture based devices and to headsets that interpret brain waves to initiate commands and reflect your facial gestures on your avatar in the virtual world. These virtual worlds also support community actions and may support economies.

Virtual worlds and spaces are quickly becoming powerful tools with the potential to transform enterprise and government processes by increasing top line and bottom line growth, improving efficiency and productivity, and

augmenting our ability to innovate and spur entrepreneurial growth. These worlds allow the deepening and enriching of the customer's product, service, brand, or program experience. They also significantly increase our individual and team learning capabilities driving increased innovation and collaborative problem resolution.

With the global transformation of enterprise and government processes made possible through the use of virtual worlds, we envision both an increase in entrepreneurial activities and growth in current business. As with our experience over the past decade and a half with the Internet has taught us there will be a new generation of companies created that provide business and consumer value with this new technology and interactive model. We will also see current businesses re-making themselves to engage in these opportunities and prospering as a result. There will be opportunities to create new virtual worlds and environments to augment and redefine marketing and commerce, to support virtual collaboration and events and to integrate them to real world events, to drive new modes of training and education, and to change and streamline business process management and operations.

These new environments will be integrated with the current Internet and legacy business systems, creating new business models to unlock business and societal value. All industries will experience direct economic benefit to their line of business results and will be positively impacted by the results of improved training and better collaboration. These opportunities will spur entrepreneurial

activity and incumbent business growth resulting in accelerated job creation and increased prosperity.

The Information Technology, Communications, Electronics, and Energy industries (to name a few) that provide the foundational support for this expansion will readily see the economic benefit of these opportunities. This growth will expand the base for ripple entrepreneurial activity and business growth with additional job growth and overall economic benefit.

1.1 Virtual World Growth.

At this time, strong growth in the virtual worlds market space is occurring as indicated by several key metrics. While none of these early indicators are guarantees of future market growth, we are cognizant of the fact that many of these indicators gave early insights into progress in prior Internet eras. At an aggregate level these indicators can be grouped into three categories: End Consumer Adoption indicators; Enterprise Investment indicators, and Ecosystem Development indicators. In all cases these indicators show significant growth supporting the notion that this is an accelerating and credible market space.

The End Consumer Adoption category includes indicators such as the increase in the number of virtual worlds, the increase in the number of avatars, and the increase in usage time in virtual worlds and spaces. There has been a marked increase in the number of accessible virtual worlds and the number of announced virtual worlds over the past year. While no definitive sources (analysts, academic, or government studies) have confirmed this, a survey of

several web sources and our internal efforts show a year-to-year (YTY) increase of 22-36% of “widely known” worlds.

The number of avatars is also increasing at a rate of over 18% with astronomical growth experienced at virtual worlds such Club Penguin and Webkinz (over 200% YTY). A survey of web sources report the number of online avatars range from 142-210 million. The number of premium (paying) clients is also on the increase in many of the worlds. Another indicator of growth is web usage. While much of the data is anecdotal, tracked statistics for leading worlds (such as Second Life) over 90% increases in usage over the past year.

The Enterprise Investment category covers a variety of items where the main indicators are the level of Venture Capital (VC) investment, the engagement of enterprises in known virtual worlds, and the related products and services entering this market space. *Virtual World Management* published that from October 2006 to 2007 there was \$1.02B of VC investment in virtual worlds with an additional \$425M reported in the fourth quarter of 2007. There has been significant enterprise (business, government, educational and non profit organization) engagement over the past two years with over 112 well known corporate brands represented in Second Life (as of this writing) and even greater educational, government, non-profit representation. Many enterprises have also created presences in other virtual worlds with many entities in multiple worlds. The Toyota Scion brand has representation in five virtual worlds.

There has also been a substantial increase in enterprise engagements as evidenced by the number of clients consulting and deploying 3-D Internet (3DI)

business value services (such as IBM's 3DI services). In addition, clients are using 3D virtual world content creation providers and service providers, or leveraging internal resources to create these virtual world and virtual space presences. There is accelerating growth in this category.

The final category of Ecosystem Development indicates increasing growth and interest as indicated by the number of announced partnerships and community initiatives in this emerging market space. Over the past year there has been a marked increase in partnership activity with a broad diversity of partnership arrangements across many shareholders. The collaborations of educational institutions and virtual world platform providers (e.g. Duke University and Proton Media), media companies and virtual world platform providers (e.g. Turner Broadcasting and Kaneva), and virtual world service providers and IT companies (e.g. Second Life and IBM) are accelerating the creation of value in the market space.

There are also other qualitative indicators of growth such as the increase in the number of communities (technological, legal, and societal to name a few) developing in this space. Of noted relevance are the open source initiatives such as Open Sim, Open Croquet, and Project Darkstar that are building open source virtual world platforms enabling rapid ecosystem expansion on these "free" platforms. These qualitative indicators are also showing strong growth in this category.

In summary, these three indicators show a strong acceleration of the market and portend that these emerging virtual world capabilities will globally

transform enterprise processes and increase the consumer experience in a manner that increases economic opportunity, jobs and prosperity.

2. Applications and Services in Virtual Worlds and Spaces.

There are several virtual world and space offerings that exploit these 3DI capabilities and state that they are commercially successful. The more notable of these offerings fall into two major categories.

In the first category are virtual worlds that combine social networking with virtual world capability allowing a richer, more socially collaborative and immersive experience. The dominant commercial examples exist as virtual worlds that are focused on kids and Tweens segment such as Club Penguin and Webkinz. There are other worlds that cater to older segment groups such as There.com and Kaneva.

In the second category are virtual worlds that provide social networking capabilities in a 3D virtual environment but also enable co-creation and support economies. These worlds provide the capability to create the landscape and buildings in the world and enable trade (barter) at some level. In some worlds there is a defined, supported, monetary system to facilitate trade between citizens. Examples of such worlds are Second Life and Entropia.

Both of these offerings are commercially available and illustrate viable business models that use the sale of premium subscriptions, rental of land, sale of real and virtual world objects, and the sale of advertising space. One indicator of business validity is the current acquisitions that are ongoing in this space.

Many of these worlds are being viewed as high potential media properties and are being actively sought. The acquisition of Club Penguin by Disney for \$350M last year was a key inflection point for market demand. While these are valid business examples, we are still at the early stages of market development when considering the full potential of this technology. There is still potentially an enormous business value yet to be unlocked in this market.

2.1 Future Applications and Services.

To unlock this value, there are a significant number of global enterprises, government, educational, and non-profit entities currently experimenting with new applications and services with significant potential. These emerging applications can be grouped by into four functional categories or applications. They are:

- Marketing and Commerce
- Collaboration and Events
- Training
- Process Management and Operations.

Each of these functional areas uses differentiating 3DI capabilities to transform a business or organizational process or to deepen or augment the experience of the end user. The transformation of the business or organization process can have as its objective to:

- Increase the current revenue stream or create a new product or service revenue streams

Congressional Hearing

- Increase the efficiency and productivity of the process by reducing cycle time (time to product completion), reducing time to resolution of a problem, reducing cost, reducing process and complexity errors, or increasing throughput
- Increase the amount and degree of innovation by increasing individual and team learning and facilitating richer and more creative collaborations.

2.1.1 Marketing and Commerce.

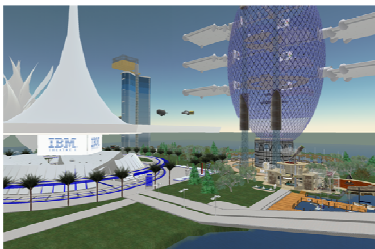


Marketing and Commerce includes applications that support a variety of requirement gathering and pre-sales activities. The requirement gathering activities allow creators, designers, and developers to engage the end consumers quickly to obtain feedback on key features of a current product or server or on a new product or service proposal. An early example that we, at IBM, have been engaged in is with the hospitality industry where hotel developers and operators are using the low cost simulation capabilities of virtual worlds to design new hotels and obtain consumer feedback. The consumer, as an avatar, can walk through these virtual hotels and comment on both the physical appeal and service operations. These virtual prototypes gain early market feedback and are cost and cycle time effective as they are done early in the development cycle thereby mitigating costly errors.

By utilizing the spatial and simulation capabilities of virtual worlds, consumers before purchasing are provided with an immersive experience using the product or service in an environment customized to look and seem like their own. A consumer can design a kitchen to match the dimensions of her or his kitchen and ask the designer (who can be in another part of the country) and their contractor (who can be remote in his office) to join as avatars in the virtual world to determine the best solutions to her or his taste, budget, and physical situation.

This “remote consulting” leverages the virtual world capability of “shared avatar experience” allowing a customer to shop in a manner that approximates that in the real-world, using friends, relatives, and experts for motivation, guidance, and support in the shared shopping experience. These enhanced pre-sales activities can increase the percentage of successful sales encounters, the level of customer satisfaction, and the degree of customer loyalty.

2.1.2 Collaboration and Events.



Collaboration and Events includes applications that deepen collaboration capabilities leveraging the 3-D spatial capabilities to create new visual presentations and simulations in virtual worlds. These presentations can show the full life cycle associated with a product and its use in different scenarios, highlighting variances in a more meaningful and visible way. These new 3-D spatial presentations can incorporate current media (PowerPoint,

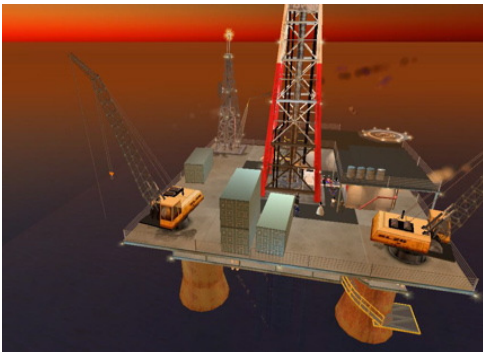
video, or other streaming feeds) and extend the experience by using the simulation and 3-D capability to place the product and service in “life-like” scenarios and business situations.

Collaboration and Events also includes applications that enable the mirroring of real world events in the virtual world. This not only extends the reach of these events to users that are not able to participate in person but allows users to experience other perspectives at the event.

An example of a “mirrored” event was the work that was done by IBM at the Australian Open in which telemetry data, provided by sensors on the courts, was projected into a virtual world simulating the Australian open stadium. This data provided near real-time movement of the ball and the players depicting all of the live action in the virtual court. However, in this virtual event it was possible to change the viewing perspective to examine every shot from a different point of view or to be positioned as a player avatar to better appreciate the flow and nuance of the game from that player’s perspective. These types of events are fertile grounds for introducing newcomers into virtual worlds and spaces as there is significant effort placed into leveraging all of the 3DI capabilities to produce a stellar (“wow”), memorable, experience.

This example illustrates the newly emerging capabilities but events can also be a launch point for other related follow on activities such as breakout sessions (virtual space collaborations) or training session at an event. All of these activities can be accomplished at a reduced cost in a medium able to embrace both attendees that are at the event and attendees that are remote.

2.1.3 Training.



Training includes applications that take advantage of the significant information retention associated with simulations and the shared avatar experience fostering team based learning. Studies on learning show that lecture based instruction (associated with complex subjects) results in 5-10% retention, group discussion based instructions results in 40-50% retention, while simulation based instruction results in 70-90% retention.

These significant learning advantages when applied to complex, dangerous, or high cost exercises (e.g. shutting down of a plant, management of a product line, assembly of a complex component, managing a natural crisis) provide a considerable improvement in both learning effectiveness and a reduction in cost while managing the risk to expensive equipment and time critical processes. One example here is the ongoing work on training simulations of an oil platform evacuation in a critical situation (i.e. a fire or hurricane). This training uses the physics game engine capability in virtual worlds to simulate the physical phenomena and the avatar capability to model the human unpredictability in a crisis situation. IBM is also engaged with government agencies that are exploring logistics training in mission planning exercises.

In addition to the use of simulation based training for complex tasks, there are other forms of training that have significant benefits. The creation of “mirror”

corporate or government campuses in a virtual space for the orientation and onboarding of new employees in remote locations provides both the ability to connect new employees with each other and to introduce them to distributed campus locations. These orientation sessions leverage the collaboration capability of virtual world to start and support communities of interest that meet in the mirror campus. In addition to the increase in training effectiveness, there is significant cost avoidance benefits associated with travel, lodging, and wasted time.

2.1.4 Business Process Management and Operations.



Process Management and Operations encompasses applications that utilize the simulation, spatial, and immersive capabilities of virtual worlds to model and depict business,

government, or social processes. This permits insights to be gained by allowing shared observation and analysis of the process through process rehearsals and critical event simulations.

With critical event simulations, context relevant scripted and un-scripted scenarios can be used to test the resiliency of complex processes. This enables us to understand and manage the informal processes and human-error situations that tend to occur in these situations. These process rehearsal or management

applications can also allow us to determine productivity gains, cost saving, and risk mitigations before real-world investments and potential mistakes are made.

These types of applications also leverage virtual world capabilities to execute real world processes. Benefits can be gained from shared avatar collaboration across geographic boundaries while reducing costs of physical infrastructure overhead and error management.

One relevant example is in the area of product lifecycle management in the fashion design process. In this effort, major process components associated with product design, material selection, costing alternatives, product feature selection and productions were instantiated in a virtual space. Product decisions and tradeoffs can be made during virtual meeting sessions where stakeholders across the full lifecycle can make decisions at key process junctures leveraging each other expertise while viewing the product. This type of process transformation results in reduced cycle times as well as reduction in errors and travel cost.

2.2 Technology Requirements and Dependencies.

These emerging applications provide the base for a significant process transformation and economic growth, however, there are several underlying technological requirements and policy assumptions that are critical for success. While there are many individual technological requirements that need to be addressed they fall into three major categories. These are:

- improving the end point interface and experience,

Congressional Hearing

- ensuring the presence of a business grade virtual world infrastructure, and
- integrating back end business systems and creating interoperability between virtual worlds.

It is instructive to note that the major requirements that are being proposed to ensure that virtual worlds are fit for business are similar in structure to those that were needed in the early era of the Internet.

The first requirement, improving the end point interface and experience, is a major contributing factor to the consumer experience which is a core differentiating capability of virtual worlds. At a high level, improving the endpoint interface and experience would require that the navigation and representation interfaces be easier to use to accelerate client growth. Graphics capability will also need to be improved especially when used for highly visual applications. Also required is the support of a variety of access devices for broader accessibility and faster end point response time for real-world like interactions.

The next requirement, and clearly an imperative, is the stabilization of the platform for high-volume, secure, business use. Stabilization requires that enterprise-grade requirements for scalability, reliability, availability, performance and serviceability are met. It would also require that all business integrity requirements pertaining to security, privacy, and identity management be met and/or exceeded. In addition, improving the tooling systems for enhanced creativity and improved content management for the 3D data is needed.

In order to maximize the transformation potential of these virtual world capabilities it is essential that the current business applications and data repositories be leveraged by integrating these core business systems into virtual worlds and spaces. This legacy integration is the third and mandatory requirement for the rapid dissemination of broad business capabilities into virtual worlds.

Interoperability between virtual worlds is also essential as it supports the network effect whereby a consumer avatar will have access to resources in other worlds and virtual worlds would have access to many more potential consumers. Interoperability between virtual worlds can allow movement of content, avatars, and capabilities among worlds leveraging the network effect to reduce cost, to reuse assets, to increase investment protection, and to mitigate business risk.

3.0 Policy Issues.

To realize the significant potential of these emerging capabilities it is imperative that we have a policy framework that allows market expansion and facilitates economic growth. As these emerging capabilities are another evolutionary step in the development of the Internet and electronic commerce it is clear that we must continue leveraging the framework that has served us well in the past decade and on which we have build significant experience and viable processes.

Towards this end the Framework for Global Economic Commerce that was established by the White House in 1997 should remain our guiding

framework for policy. Leadership by the private sector, avoiding undue restrictions, enforcing predictable, minimalist, simple legal environments, recognizing the unique qualities of virtual worlds, and facilitating on a global basis are all principles that are as relevant in this era as it was 11 years ago.

IBM has continued the use of this framework in this space with the creation and dissemination (internally and externally) of the Virtual Worlds Guidelines for IBM employees. The guidelines were created to re-affirm IBM's consistent policy position in the context of these new capabilities and to clarify any uncertainties due to the expected discourse in marketplace. These guidelines encourage employees to explore responsibly and to further the development of new spaces of relationship-building, learning and collaboration while being guided first and foremost by our values and our Business Conduct Guidelines. They outline 10 guideposts for consideration and empowering while limiting restrictions, regulations, and undue process that would hinder exploration and innovation. Our observation over the past year is that this has worked successfully.

In 1997, President Clinton said while announcing the Framework for Global Electronic Commerce,

“In the 21st century, we can build much of our prosperity on innovations in cyberspace in ways that most of us cannot even imagine. This vision contemplates an America in which every American, consumers, small-business people, corporate CEO's, will be able to extend our trade to the farthest reaches

of the planet. If we do the right things now, in the right way, we can lead our economy into an area where our innovation, our flexibility, and our creativity yield tremendous benefits for all of our people, in which we can keep opportunity alive, bring our people closer to each other, and bring America closer to the world.”

That validity of that statement is equally as, if not more, apparent today.

As we examine the ever growing landscape of virtual world applications, the empowerment of the end consumers by their ability to make choices more suitable to their expectations, and the familiar embrace of these technologies by the younger generation of consumer and workers, it is rapidly become apparent that the adoption rate of these virtual world capabilities may exceed the rates that we have seen before. There is also a significant global interest in these new capabilities as their enriching of the experience allow the representation of culture and ideology in a manner that was not easily possible before. These social factors of generation and culture are additional significant motivators that will play a large part in the acceleration and success of this evolution in the Internet. Taken holistically, the transformation potential of the evolving capabilities, the rate of growth of entities and useful applications in this market space, and the social motivation factors may well enable this to be the most impactful Internet evolution as the human personification becomes much more closely integrated into the Internet.