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The Immersive Internet

Make Tactical Moves Today For Strategic Advantage Tomorrow

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The Immersive Internet: Make Tactical Moves Today For Strategic Advantage Tomorrow

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EXECUTIVE SUMMARY

The Immersive Internet is a collection of emerging technologies combined with a social culture that has roots in gaming and virtual worlds. Virtual worlds and campuses, immersive learning simulations, serious games, and three-dimensional (3D) business applications deeply engross the user and give people experiences that are perceived as real even though they take place virtually. Properly implemented, this technology promises to uncover previously unheard-of dimensions in engagement, which will in turn increase workforce collaboration, effectiveness, and retention. When the Immersive Internet is used with the extended enterprise, it will have similar positive impacts on customer, partner, and supplier relationships.

Adoption of the Immersive Internet for work is still in the "seedling" stage. We expect adoption will progress rapidly toward mainstream during the next five years because:

- A slow economy and the green movement are influencing business decisions
- Early case studies demonstrate return on investment
- We live in a video game culture
- Large business technology vendors are jumping into the fray
- Hardware, software, and networking technology have advanced rapidly
- Social networking is a way of life, allowing advocates and implementers to find each other

Investment in short-term Immersive Internet projects in 2009 is both strategic and cash-conscious. Project teams can extract tangible cost savings immediately, influence the vendors in an emerging technology market, and build the expertise needed for making sound larger investments in the future. Look for opportunities to improve business processes in seven main areas: learning and training, meetings and conferences, business activity simulation, collaborative design and prototyping, collaborative 3D data visualization, human resources management, and remote system and facility management.

The enterprise Immersive Internet technology market is made up of three main sectors: platforms, packaged applications, and custom apps. This emerging market is populated primarily by small software vendors and open source projects, making technology selection difficult and risky. The market will undergo significant change during the next five years as startups and educational institutions invent and innovate, large business technology vendors get in the game, and platforms and applications diverge. This may render some early technology implementations throwaways, though the experience gained will prove invaluable.

Long term, think of the Immersive Internet as an area of strategic investment that enables transformation of the way we work as well as business model innovation. The Immersive Internet allows organizations to connect more deeply with customers, partners, and suppliers. It enables business leaders to nourish and harvest human creativity and increase workforce and customer engagement. Ultimately, organizations will go far beyond the seven use cases we outline here and the Immersive Internet will become part of everyday life.

THE IMMERSIVE INTERNET: IT'S ABOUT ENGAGEMENT

Organizations are saving vast sums of money by bringing the work to the people rather than the people to the work. They save on real estate, energy, and transportation costs with telecommuting. They cut costs dramatically by outsourcing business functions and locating facilities in regions of the world where regulations, taxes, and wages are favorable and human talent is abundant.

As a result, being part of a globally distributed workforce is a way of life for many of us. We are accustomed to working on a daily basis with people we have never met. Sometimes they work for the same organization we do — many times they don't. When we aren't physically together we use a wide range of communication, publishing, and productivity tools to connect and collaborate with each other and access and share the information we need. Although this has become business as usual, it's not a perfect world:

- **Bringing the work to the people solves some problems but creates others.** Globalization, permeable organizational boundaries, outsourcing, and telecommuting take some cost out of the equation. They also deliver benefits to workers, such as increased flexibility and reduced time spent commuting and travelling. But these trends can also negatively influence business productivity. Face-to-face business interactions become more difficult and costly. Language, culture, and time zone barriers get in the way of people collaborating to deliver value. People who work away from the center of influence (e.g., headquarters, facility where the boss works, etc.) are inevitably second-class citizens who have less access to people and tools than their centrally located counterparts. (How many times have you dialed into a conference call and been forgotten by the people who were sitting together around the conference room table?) A result: low levels of employee engagement. In October of 2007, professional services firm Towers Perrin released the results of a global workforce study, which found that just 21% of workers surveyed are engaged in their work — meaning they are willing to go the extra mile to help their companies succeed. Nearly four out of 10 (38%) are partly to fully disengaged.[1] If these numbers are even close to accurate, we have a problem on our hands.

- **The Immersive Internet increases engagement.** Think IMAX® movies, surround sound, and World of Warcraft® applied to the Web and business applications, and you've got the *Immersive Internet*. Virtual worlds and campuses, immersive learning simulations, serious games, and 3D business applications deeply engross the user and give people experiences that are perceived as real even though they take place virtually (see Figure 1). In fact, some people who spend lots of time using immersive environments tend to experience the Web as flat, solitary, lonely, and asynchronous. The Immersive Internet promises to uncover previously unheard-of dimensions in engagement, which will in turn increase workforce collaboration, effectiveness, and retention — and, therefore, business productivity. When the Immersive Internet is used with the extended enterprise, it will have similar positive impacts on customer, partner, and supplier relationships, as well.
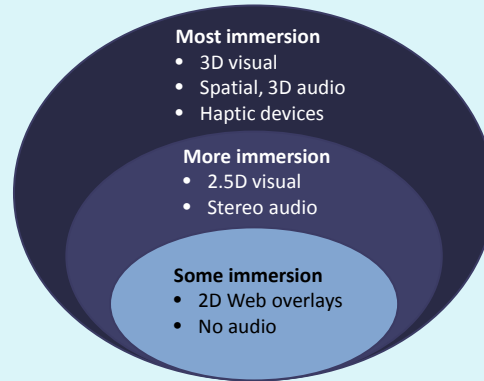
> **Definition: Immersive Internet**
>
> *A collection of emerging technologies combined with a social culture that has roots in gaming and virtual worlds.*

Figure 1: Technology contributes to immersive experiences

Immersive technologies
- Virtual worlds & campuses
- Learning simulations
- Serious games
- 3D business apps
- Haptic devices
- Motion tracking sensors
- Avatars
- 2D Web overlays
- 3D embedded chat
- 2.5D and 3D Web sites
- etc.

Most immersion
- 3D visual
- Spatial, 3D audio
- Haptic devices

More immersion
- 2.5D visual
- Stereo audio

Some immersion
- 2D Web overlays
- No audio

Source: ThinkBalm

The Immersive Internet Lets Us Do Things We Couldn't Do Before

The Immersive Internet allows us to do things we can't do in the physical world, and can't do — at least not as well — using other forms of communication and collaboration technology. The Immersive Internet allows us to:

- **Work in 3D — wherever we are.** We can use other synchronous collaboration technologies to meet virtually — such as conference calls, Web conferencing, instant messaging, and videoconferencing. Conference calls, though, are disembodied voices piercing the background noise. Even with photorealistic high-end telepresence systems, you can't shake hands with remote participants — in a virtual world, you can. Unless you have a camera strapped to your forehead, you can't take remote colleagues with you to show them the strange behavior of a piece of equipment on the factory floor. With remote system and facility management using the Immersive Internet, you can.

- **Interact with others spontaneously — wherever we are.** Telecommuters and contractors are estranged from their teams and organizational culture and miss out on the spontaneous "water cooler" conversations and building of social capital that occur among co-located people. Other synchronous collaboration tools — even video and telepresence — don't enable spontaneous interaction among variable numbers of participants who are located anywhere in the world. In contrast, you never know who you'll run into in a virtual world or what value you will get out of a short chat with other colleagues who show up early for or stay late after a scheduled meeting.

- **Work with a big group to create 3D mind maps and workflow charts.** Many collaborative activities like brainstorming, dreaming up designs, creating workflows, and analyzing value chains take place in person because they require lots of props and breakout discussions. But it's not feasible to have 16 people sitting around a conference room table in the physical world to quickly

and collaboratively create a huge three-dimensional mind map. With the Immersive Internet, you can (see Figure 2). In the physical world, we can collaboratively create 2D mind maps or flow charts on a whiteboard, but you can only fit so many people in front of a 10-foot wall. And you can look at a 2D mind map or flow chart from only one angle: the front.

- **Collaboratively build "quick-and-dirty" prototypes with remote colleagues.** Distributed, cross-functional teams can't quickly and collaboratively create low-resolution concept prototypes without the Immersive Internet. Designers who have experience with 3D modeling software might create a digital mockup and share it with others, but non-designers can't contribute to the model in an interactive, hands-on way. Co-located teams can work together on quick-and-dirty physical prototypes hacked together out of used packing materials left out in the hallway — but what about their remote colleagues?

- **See the invisible and do the impossible.** The Immersive Internet allows us to visually observe air and energy flow and heat maps and walk through a model of the human cardiovascular system. We can practice restarting a factory production line multiple times in an hour and literally sit on top of a mountain of data while talking to a colleague who is walking around behind it. We can travel through subatomic particles or fly above the earth. We can teleport from Hong Kong to Paris in 20 seconds —all in tandem with other people.

Figure 2: Sixteen people brainstorming together in 3D

Source: ThinkBalm

Enterprise Use Is In The Seedling Stage But Not For Long

While adoption of the Immersive Internet in the enterprise is still in the seedling stage as of late 2008, it will become mainstream within five years (see Figure 3). By this we mean that it will have a significant installed base within Global 1000 companies and large public sector organizations and at least a few successful large-scale implementations. ThinkBalm is placing its bets on this aggressive timeframe for a number of reasons:

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- **A slow economy and the green movement are influencing business decisions.** In this slowing economy, many organizations are curtailing spending that doesn't directly lead to cost savings. The trend toward saving the planet, including carbon emission consciousness, dovetails nicely with the need to cut costs. With the Immersive Internet, organizations are scaling back on business travel and commuting, thereby cutting costs and carbon emissions, and better managing energy consumption in data centers and other facilities.[2]

- **Early case studies demonstrate return on investment.** Implenia, for example, found that remote facility management can result in savings of 20% or more compared to traditional methods.[3] Microsoft found that virtual marketing events cost about one-third that of physical events. Accenture found that its investment in a Second Life island for recruiting tech-savvy employees paid for itself after five or six in-world events.[4] And a team at Shawnee State University used inexpensively created digital mockups of a motion capture studio to pave the way for more than half a million US dollars in funding and avoidance of costly mistakes.[5]

- **We live in a video game culture.** Both halves of this phrase are important: *video* and *game*. Teenagers today spend many hours playing video games like World of Warcraft. This is how they learn, collaborate, and build social capital. Once popular video game platforms like Microsoft Xbox LIVE and Sony PlayStation Home support avatars, the bar will be raised for all social networking experiences. Today's kids who grew up with multiplayer video games and social networking are tomorrow's customers, partners, employees, business leaders, and influencers. They will expect organizations to provide this kind of capability as a core part of the workplace environment.

- **Large business technology vendors are jumping into the fray.** Most large business technology vendors, with the exception of IBM and a couple of others, still look at the Immersive Internet with raised eyebrows. But this is changing and many organizations will find it easier to procure Immersive Internet software and services from their strategic IT suppliers than from the small vendors that populate the market today. Google has a couple of relevant products on the market: Lively and Google Earth. IBM offers professional services to organizations that want to move forward. Microsoft with its ESP product is expanding into the public sector market to help with emergency training simulation.[6] Nortel has a product in development called Web.Alive. And Sun Microsystems has an open source offering called Sun Java Project Wonderland.

- **Hardware, software, and networking technology have advanced rapidly.** We still have a long way to go before all workers have the technology they need to be able to use the Immersive Internet. But advancements in personal computer processing power, graphics cards, and high-bandwidth Internet access in workplaces and homes mean that many people can now have good experiences using 3D, interactive, multiuser environments. Even hand-held devices are starting to integrate with, as well as directly support, immersive technology. This will be critical for mainstream adoption.

- **Social networking is a way of life, allowing advocates and implementers to find each other.** During other major enterprise technology shifts, such as when people started using email, the Web, and instant messaging for work, early adopters shared best practices by going to local peer group meetings or travelling to conferences, networking with colleagues, and reading articles in magazines or online. Today, Immersive Internet advocates and implementers from all around the

world can connect and interact online via professional social networks. People who have Immersive Internet expertise and passion can easily find each other and share information, ideas, skills, and practices at a rate unheard of just a few years ago.

Figure 3: Enterprise Immersive Internet adoption is in the seedling stage
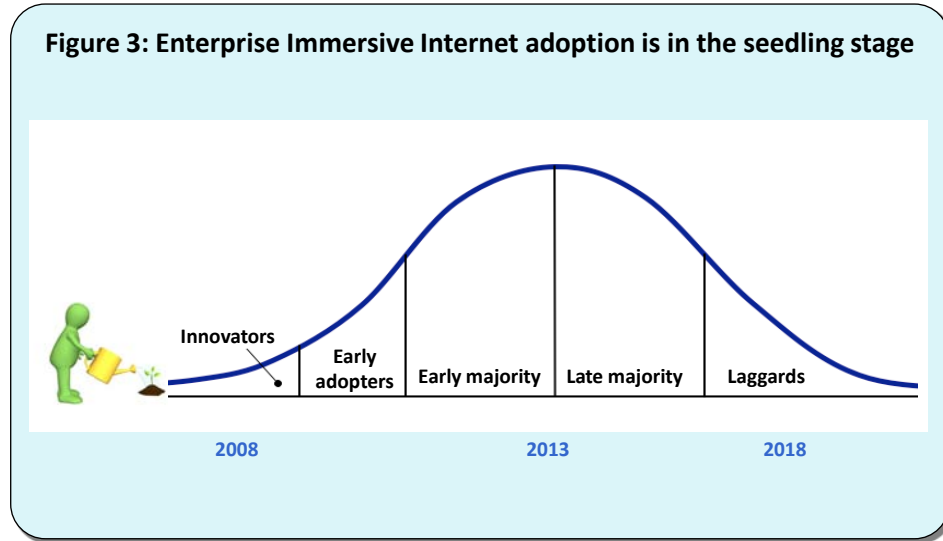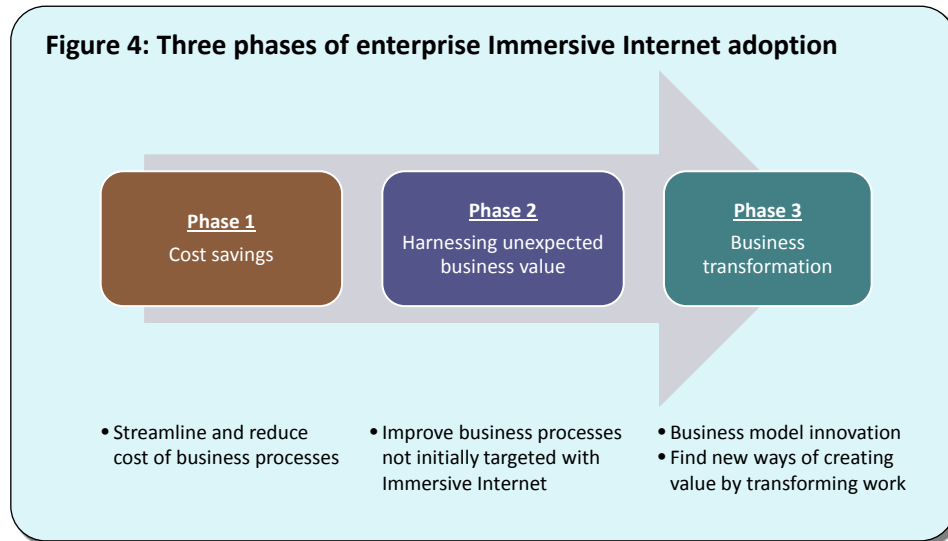
Source: ThinkBalm

For Most, The First Phase Of Enterprise Adoption Focuses On Cost Savings

ThinkBalm is aware of Fortune 500 companies and smaller organizations that view the Immersive Internet as strategic — not just as a way to save money, but as a means of achieving long-lasting business transformation and competitive advantage. For now, though, these are exceptions. Many Immersive Internet advocates and implementers are facing budget freezes or cutbacks and are limited to spending money only on projects that will result in cost savings. In most organizations, we expect to see adoption of the Immersive Internet occur in three phases (see Figure 4):

1. **Phase One: Cost savings.** Given the current economic environment, most early adopters are focusing their initial efforts on cutting costs and increasing efficiency and productivity. The most common early targets for cost cutting today are meetings and events and learning and training. This is just a start — the Immersive Internet presents cost saving opportunities as wide-reaching as product development, human resources (HR) management, system and facilities management, and business activity simulation.

2. **Phase Two: Harnessing unexpected business value.** Once project teams address their initial target business processes, are able to demonstrate quantifiable business value, and have gained valuable experience with the Immersive Internet, they will apply their knowledge and investments toward additional business processes and activities. This may mean investment in new technology because the enterprise Immersive Internet technology market is going to evolve rapidly. Even if in Phase Two new technology is required to replace technology used in Phase One, the experience gained in Phase One will prove invaluable.

3. **Phase Three: Business transformation.** In this phase organizations view the Immersive Internet as strategic. They put it to use to nourish and harvest human creativity and increase workforce and customer engagement. The focus is no longer on eliminating the cost of plane tickets — it is on intensifying the density of interaction (doing more and doing it efficiently); tapping into infinite creativity to come up with solutions to problems; leveraging infinite space as required by teams, sub-teams, and sub-processes; and creating places and displays that can be frozen in time or evolved as required. In Phase Three, organizations use the Immersive Internet to transform work and innovate with new business models.

Figure 4: Three phases of enterprise Immersive Internet adoption

Phase 1	Phase 2	Phase 3
Cost savings	Harnessing unexpected business value	Business transformation

- Streamline and reduce cost of business processes
- Improve business processes not initially targeted with Immersive Internet
- Business model innovation
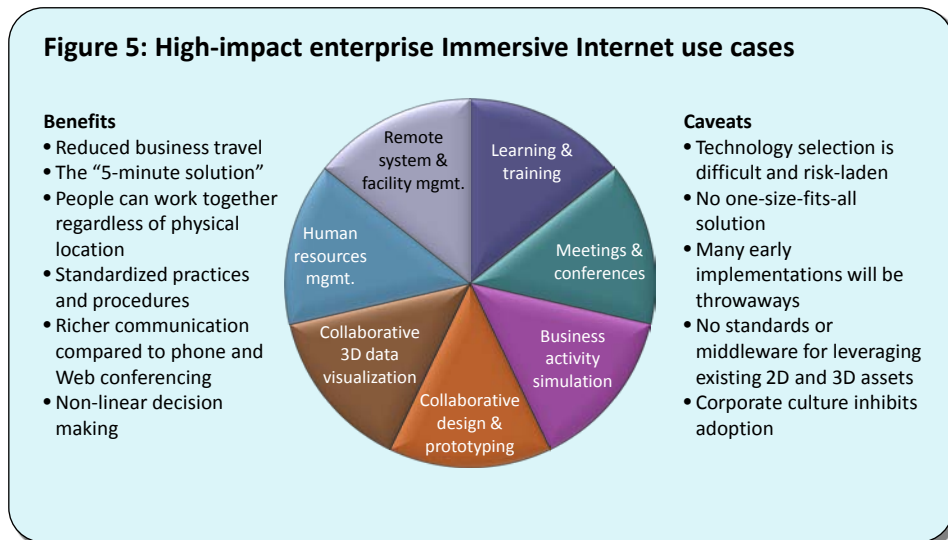- Find new ways of creating value by transforming work

Source: ThinkBalm

WHY PUT THE IMMERSIVE INTERNET TO WORK?

The Immersive Internet will radically transform the way work gets done, especially in seven core areas (see Figure 5). While this wide range of use cases impacts many different business functions and people in a variety of roles:

- **Some business benefits are common to pretty much all the use cases.** Immersive environments and applications allow people to feel — and perform — as though they were physically together, even when they are continents apart. As a result, organizations can standardize business practices and culture. Participants in a business process are able to coordinate and solve problems quickly with "the 5-minute solution" — bringing a colleague into an immersive space on an ad hoc basis to collaboratively solve problems as issues arise. People who are not co-located can engage in "hallway chat" and have serendipitous encounters, such as before and after scheduled meetings — things that happen when people are physically together but are nearly impossible with phone and videoconferencing, even telepresence. And, of course, organizations can reduce business travel (thereby cutting expenses) without sacrificing collaboration and productivity.

- **Enterprise use of the Immersive Internet has its caveats.** No one-size-fits-all technology solution exists. Immersive Internet technologies often have a steep learning curve. This is an emerging technology market populated primarily by small software vendors and open source projects, making technology selection difficult and risky. The market will undergo significant change during the next five years as startups and educational institutions invent and innovate, large business technology vendors get in the game, and platforms and applications diverge. Standards and middleware do not yet exist to make it easy to leverage existing 3D assets like computer-aided design (CAD) models — though standards efforts have begun. Most of the platforms and applications on the market today don't integrate easily with information worker platforms (e.g., collaboration and office productivity tools). Users cannot easily move assets from one platform to another. Many professional-grade laptop and desktop computers cannot handle high-end 3D graphics processing. Finally, corporate culture often inhibits adoption of technology with social or gaming roots and many IT groups use firewalls to block access to immersive technologies.

Figure 5: High-impact enterprise Immersive Internet use cases

Benefits
- Reduced business travel
- The "5-minute solution"
- People can work together regardless of physical location
- Standardized practices and procedures
- Richer communication compared to phone and Web conferencing
- Non-linear decision making

Pie chart segments: Remote system & facility mgmt.; Learning & training; Human resources mgmt.; Meetings & conferences; Collaborative 3D data visualization; Business activity simulation; Collaborative design & prototyping

Caveats
- Technology selection is difficult and risk-laden
- No one-size-fits-all solution
- Many early implementations will be throwaways
- No standards or middleware for leveraging existing 2D and 3D assets
- Corporate culture inhibits adoption

Source: ThinkBalm

High-Value Use Cases Impact A Wide Array Of Job Functions

Some benefits and caveats are common to all use cases while others depend on what you do with the technology (see Figure 6 through Figure 12). In general, the cost of development may be high for some forms of learning and training and business activity simulation, as well as for remote system and facility management. Likewise, the cost of system integration may be high for collaborative 3D data visualization, remote system and facility management, and some forms of HR management and collaborative design and prototyping. Development and system integration costs are likely to be lower for meetings and conferences and quick-and-dirty collaborative design and prototyping. Regardless of implementation cost, all of the below use cases allow you to do things less expensively than they can be done in the physical world or better than they can be done using alternative technology.

Figure 6: Collaborative 3D data visualization — Gain new insight into the meaning of data

Description	Potential Benefits	Caveats
• Display, combine, integrate, and share visualizations of complex data sets in 3D spaces • Collaboratively view, drill into, directly manipulate, and discuss the data with others	• Gain quicker, more complete understanding of complex data by seeing, walking through, drilling into, and manipulating it • Leverage collective intelligence — in parallel, not serially (one person may notice things another doesn't)	• Cost of integration with data sources • Business intelligence vendors have not yet entered the market — though they will

Source: ThinkBalm

Figure 7: Learning and training — Increase proficiency without raising training costs

Description	Potential Benefits	Caveats
• Conduct hands-on style training for familiarization with specific equipment or tasks • Hold lecture-style or classroom-style training sessions • Turn classes into tours (e.g., through systems, places, buildings, body parts, chemical structures, etc.)	• Increase proficiency but not training cost • Record, play back, and analyze training sessions at lower cost than with traditional training mechanisms • Reuse recorded materials for new classes • Accomplish higher level of engagement compared to traditional lecture-style learning • Enhance student-teacher and student-student interaction via multiple interaction modes • Explore endless possibilities for creating environments that achieve learning objectives • Reduce financial risk(e.g., train service pros virtually before they work with real customers)	• Potentially high cost of application development • Some vendors still migrating from single user to multi-user offerings • Not all the vendors focused on learning and training integrate with learning management systems

Source: ThinkBalm

Figure 8: Meetings and conferences — Be there without travelling there

Description	Potential Benefits	Caveats
• Hold virtual conferences, meetings, and events • Replace phone / video / Web conferences with immersive options • Augment or replace presentations with tours	• Reduce cost of hosting meetings and events • Increase participant engagement and contribution through visual stimulation and interaction, multiple channels of simultaneous communication • Host events for longer periods of time or for more extended hours to draw larger audiences • Give participants experiences, not just connections and information	• Integration with enterprise office productivity and collaboration tools is rare — typically limited to screen sharing

Source: ThinkBalm

Figure 9: Business activity simulation — Identify the best options and strengthen muscle memory

Description	Potential Benefits	Caveats
• Safely conduct business activity rehearsals that would be dangerous, expensive, or impossible in physical world • Run "what-if" scenarios • Role-play	• More effective work and teamwork practices • Easier best-practice sharing • More highly skilled workers • Fewer failures during events due to strengthened "muscle memory"	• High cost of application development — though the cost of developing an application that would be used repeatedly could be significantly lower than the cost of running a single physical simulation

Source: ThinkBalm

Figure 10: Remote system and facility management — Reduce operational costs

Description	Potential Benefits	Caveats
• Monitor and control multiple physical systems or facilities from a single virtual operations center • Collaborate with remote peers for rapid-response troubleshooting	• Facility operations become location-independent • Real estate cost savings through operations center site consolidation • Problem avoidance and quicker resolution through visualization and collaboration	• High cost of application development and system integration • High cost of maintaining high system availability depending on nature of facilities involved

Source: ThinkBalm

Figure 11: Collaborative design and prototyping — Demo ideas collaboratively, quickly, and cheaply

Description	Potential Benefits	Caveats
• Quickly and collaboratively create digital mockup of complex idea or item • Collaboratively build and refine 3D digital object (e.g., manufactured goods) and process (e.g., manufacturing process) models	• Engage cross-functional and inter-enterprise teams in design and development process • Run products through virtual simulation prior to manufacturing • Develop products faster, better, and at lower cost • Make changes to prototypes on the fly • Develop many more prototypes than is possible in the physical world • Enable people to experience complex ideas and concepts first hand • Get buy-in more quickly than with words and pictures alone	• Technical restrictions associated with rich 3D models • Available software varies widely in easy-to-use 3D content creation tools • Most platforms don't provide physics-based models of relevant materials and processes

Source: ThinkBalm

Figure 12: Human resources management — Differentiate from the competition while cutting costs

Description	Potential Benefits	Caveats
• Screen and interview job candidates • Hold networking events for potential job candidates • Create an anonymous venue for whistle blowing and employee counseling • Find and inform candidates wherever they live • Host team-building workshops • Onboard employees (orient them on business conduct guidelines, teach them internal technology tools, share the socio-cultural history of the organization, etc.)	• Challenge and test job candidates in new, fresh ways • Appeal to younger job candidates who grew up with the Immersive Internet and may be attracted to this style of interaction • Differentiate from other potential employers for highly sought-after candidates who have lots of available options • Reduce business travel for candidates and interviewers	• Many good job candidates are still unfamiliar with using and navigating immersive environments • Few, if any, vendors provide integration with HR systems

Source: ThinkBalm
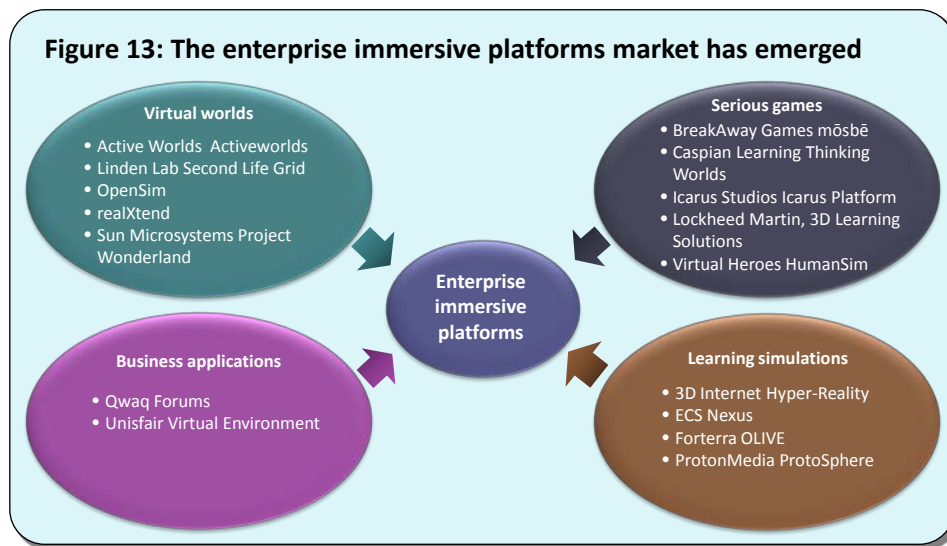
ENTERPRISE IMMERSIVE INTERNET TECHNOLOGY OVERVIEW

Enterprise Immersive Internet software vendors deliver value in three main forms: platforms, packaged apps, and custom apps. Many other software categories are related — like CAD, 3D modeling, 3D rendering, animation, 2D Web overlays (e.g., ROCKETON and Weblin), embedded 3D chat (e.g., Google Lively and Vivaty Scenes), and 3D Web sites (e.g., Altadyn 3DXplorer and ExitReality).[7] Many of these other categories either serve up content for the Immersive Internet or deliver niche functionality that will be absorbed into enterprise immersive platforms or other categories of enterprise software (like collaboration platforms).

Enterprise Immersive Platform: The Cornerstone Of An Immersive Strategy

One of the three core enterprise Immersive Internet market segments is *enterprise immersive platforms*. An enterprise immersive platform is software that, at minimum, includes: a 3D rendering engine, viewer, object and texture library, simulation engine ("physics"), and communication tools. Most of the platform vendors originated in one of four technology sectors: virtual worlds, serious games, learning simulations, and business applications (see Figure 13 for a sampling of vendors and products).

> ***Definition: Enterprise Immersive Platform***
>
> *Software that, at minimum, includes: a 3D rendering engine, viewer, object and texture library, simulation engine ("physics"), and communication tools.*

Figure 13: The enterprise immersive platforms market has emerged

Virtual worlds
- Active Worlds Activeworlds
- Linden Lab Second Life Grid
- OpenSim
- realXtend
- Sun Microsystems Project Wonderland

Serious games
- BreakAway Games mōsbē
- Caspian Learning Thinking Worlds
- Icarus Studios Icarus Platform
- Lockheed Martin, 3D Learning Solutions
- Virtual Heroes HumanSim

Enterprise immersive platforms

Business applications
- Qwaq Forums
- Unisfair Virtual Environment

Learning simulations
- 3D Internet Hyper-Reality
- ECS Nexus
- Forterra OLIVE
- ProtonMedia ProtoSphere

Source: ThinkBalm

In the enterprise immersive platforms market, offerings vary widely. Some platforms require more customization than others but they all require at least some configuration, add-ons, or applications running on top of them to meet customers' needs (thus the term "platform"). They vary widely in cost, vendor viability, ease of adoption for business people, and ability to satisfy IT requirements. They also run the gamut when it comes to features and functionality such as communication and collaboration tools, content, avatars, learning and training features, simulation features, and data integration functionality.
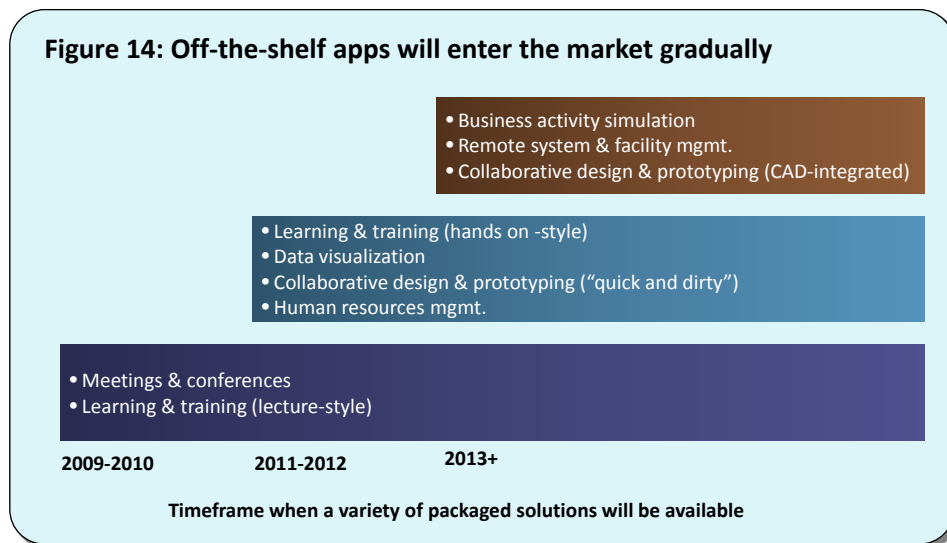
Packaged Immersive Applications

In this early-stage market, the distinction between platform and application is not always clear and in many cases the same vendor offers both. It is similar to earlier days when business applications shipped with their own built-in proprietary databases, application servers, and Web servers. In a nutshell, *packaged immersive applications* are purpose-built modules of functionality that may or may not run on top of enterprise immersive platforms. Packaged immersive applications fall into three categories:

- **App-and-platform combos.** Vendors in this category offer packaged immersive applications that run on a proprietary or open source built-in enterprise immersive platform. For example, Forterra Systems offers the OLIVE platform and a set of about 10 "content packs" (add-on applications for emergency response, medical training, meetings, and military training). ProtonMedia offers the ProtoSphere platform and application. Qwaq offers the Qwaq Forums platform and optional applications like the Virtual Operations Center.

- **Specialized apps that run on others' platforms.** Vendors in this category add value on top of enterprise immersive platforms. For example, Green Phosphor built Glasshouse and Malden Labs built 6th Space on the Sun Java Project Wonderland open source enterprise immersive platform. Rivers Run Red built Immersive Workspaces on Linden Lab's Second Life Grid.

- **Standalone apps, some of them Web-based.** Applications don't necessarily have to be 3D to be immersive, though 3D certainly enhances immersion. While the Web-based standalone apps run in a browser, most still require some form of download or plug-in. Many are serious games that use the Adobe Flash Player, which Adobe estimates is used by more than 2 million professionals and reaches 99% of Internet-enabled desktops in mature markets.[8] Vendors in this category include PIXELearning and Tandem Learning.

Some features of today's packaged immersive applications will eventually become part of enterprise immersive platforms, allowing the application vendors to leverage core platform services and deliver ever-richer functionality to customers. During the next five years, we will see an increase in the quantity and depth of available packaged immersive applications (see Figure 14).

Figure 14: Off-the-shelf apps will enter the market gradually

- Business activity simulation
- Remote system & facility mgmt.
- Collaborative design & prototyping (CAD-integrated)

- Learning & training (hands on -style)
- Data visualization
- Collaborative design & prototyping ("quick and dirty")
- Human resources mgmt.

- Meetings & conferences
- Learning & training (lecture-style)

2009-2010   2011-2012   2013+

Timeframe when a variety of packaged solutions will be available

Source: ThinkBalm

Custom Immersive Applications

Many Immersive Internet vendors build *custom immersive applications*. These are built to the customer's specifications rather than sold out of the box.

- **Some vendors offer custom-built apps that run on their own proprietary platforms.** These include 3D Internet, Breakaway Games, Caspian Learning, Engineering & Computer Simulations (ECS), Forterra Systems, Icarus Studios, Moondus, Unisfair, and Virtual Heroes. As vendors like these gain experience developing applications for customers, some of them will likely move into the packaged immersive apps market.

- **Numerous vendors offer custom apps that run on others' platforms.** Some are tiny development shops that typically focus on the Second Life or Open Sim platforms — companies like 2B3D, Community Chest, Daden Ltd., Designing Digitally, First Link, G2, and Metaverse Builders. Others are small but well-known startups like Electric Sheep Company and Millions Of Us. A few huge heavyweights also offer custom immersive apps that run on others' platforms, like IBM and Lockheed Martin (through its 3D Learning Solutions acquisition).

CRITICAL CONSIDERATIONS FOR 2009

In the near term, implementations will focus on cost savings and efficiency improvements associated with a distributed workforce and permeable corporate boundaries. Project teams should gain experience now by focusing on concrete cost-savings initiatives — unless you are fortunate enough to be part of an organization that already recognizes the strategic value of the Immersive Internet. Immersive Internet advocates and implementers should keep the following important considerations in mind when strategizing how to best put this emerging technology to use:

- **Plan early projects with a short lifespan to capture immediate value.** Pay special attention to capturing Immersive Internet knowledge and best practices that can be applied to business processes regardless of the technology used. Because the vendors in this emerging market are small companies or open source projects, and due to a variety of interoperability and standards issues, it is likely you will replace near-term implementations (those made during the next two years) as the market matures. Experience gained and practices instantiated now will prove invaluable down the road. Longer term, think of the Immersive Internet as an area of strategic business-enabling technology investment.

- **Keep an eye on emerging standards and interoperability efforts.** The industry currently lacks standards in many areas. There is no universal Immersive Internet client. We have no widely adopted standards for 3D content — though some are emerging out of groups like COLLADA and the Open File Formats technology working group. The Web3D Consortium is working on the X3D standard for communicating in 3D on the Web. And open source projects like OpenSim and realXtend are working on cross-platform interoperability, which would enable organizations to port their assets from one platform to another.

- **Budget extra for system integration.** We are seeing piecemeal integration today, most often with communication and collaboration systems. For example, Forterra Systems has integrated OLIVE with IBM's Lotus Sametime. Linden Lab released SLim, which enables Second Life residents to conduct voice or text conversations whether or not they are logged into the virtual world. Sun Java Project Wonderland enables people to connect to Wonderland sessions from a telephone. We eventually expect to see an immersion layer emerge, which will provide integration with existing enterprise platforms (initially enterprise directory services, enterprise collaboration platforms, and IT system management and facility operations software). But this is 5-7 years away.

- **Put together a team that includes gamers and evangelists.** Recruit project team members who play massively multiplayer online role-playing games (MMOs) like World of Warcraft. Not only will they have a gut-level affinity for the Immersive Internet, but as the Immersive Internet begins to play a more prevalent role at work, leadership skills developed in MMOs will translate directly into

leadership skills at work. Also identify and recruit evangelists. Evangelists have a fervent belief in something and have the marketing and sales skills to draw in others. Once you've gotten started on a project, give them the reins to create visibility and reel others in.

- **Don't expect to be able to reuse all your existing 3D assets right away.** Reuse of CAD models, for example, in immersive environments is not currently a viable option. Reuse requires huge amounts of finagling and models usually cannot be changed once they are imported into immersive environments. The most common way this is handled today is by using Autodesk Maya or 3ds Max as a middle translation layer. Likewise, 3D models created in immersive environments currently cannot easily be exported to and modified in more sophisticated 3D modeling software.

- **Spark a conversation between 3D designers and Immersive Internet advocates.** Most of your existing 3D assets were never designed to be used in immersive environments. Because of this, many assets will have to be redesigned to be useful in these new environments. To prevent ongoing problems, start a conversation between 3D designers and Immersive Internet advocates and implementers. Discuss 3D modeling practices and the new channels in which the models can be used, as well as any work practices that may need to change to support new uses of models.

- **If CAD models are a big deal to you, put pressure on your product life-cycle management vendors.** The eerie absence of the product life-cycle management (PLM) vendors from the Immersive Internet market is significant because many organizations want to leverage investments they have already made in CAD models. Although PLM vendors haven't yet made formal announcements about moving into the immersive platform market, we see significant unofficial evidence that this hole won't be empty forever. Now might be a good time to discuss your Immersive Internet vision with your strategic PLM vendor partners.

APPENDIX A: METHODOLOGY AND RELATED THINKBALM RESEARCH

Methodology

As an independent industry analyst firm, ThinkBalm has working knowledge of the Immersive Internet vendor landscape acquired through vendor briefings and demos, hands-on experience, user interviews, consulting work with our clients, and our work with the ThinkBalm Innovation Community. The ThinkBalm Innovation Community is a community focused on enterprise use of the Immersive Internet. ThinkBalm built the community on the Spigit serious game engine, which features an internal idea "stock" market, reputation score system, and currency system. As of November 2008, the community had about 150 members.

Related ThinkBalm Articles

- *Recipe for a great 3D brainstorming session*, November 10, 2008

- *Economic slowdown will spur enterprise Immersive Internet adoption*, October 29, 2008

- *The ThinkBalm Innovation Community brainstorms in 3D!* October 23, 2008

- *Immersive Internet insights from IBM's InnovationJam 2008*, October 21, 2008

- *Second Life survey says: "Try it for work — you'll like it,"* October 10, 2008

- *New technologies add immersiveness to the flat 2D Web*, September 29, 2008

- *Digital prototypes help university team get $550k+ in technology funding*, September 24, 2008

- *The ThinkBalm Innovation Community: What have we done lately?* September 11, 2008

- *A glimpse inside the ThinkBalm Innovation Community, 10 days in*, August 29, 2008

- *Accenture recruiting in Second Life cost-effectively targets the "Facebook audience,"* August 14, 2008

- *Daden Ltd. and VoxVue deliver immersive experiences about real places*, August 1, 2008

- *The Immersive Internet and Kevin Kelly's "5,000 days of the Web,"* July 31, 2008

- *A realism model for Immersive Internet apps: Part II*, July 21, 2008

- *A realism model for Immersive Internet apps: Part I*, July 21, 2008

- *At Microsoft, cost of virtual events about 1/3 the cost of traditional events*, July 18, 2008

- *My take on Microsoft's Immersive Internet play for information workers*, July 17, 2008

- *Dassault Systemes: An Immersive Internet contender to watch*, July 2, 2008

- *Heavy equipment manufacturer explores Immersive Internet for product prototyping*, July 1, 2008

- *"First life" versus "fake life" — when realism is important in the Immersive Internet*, June 30, 2008

ABOUT THE AUTHORS

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Erica Driver is a co-founder and principal at ThinkBalm. She is a leading industry analyst with 14 years of experience in IT. She is quoted in mainstream and industry trade press, including *The Wall Street Journal*, *The New York Times*, the *Boston Globe*, *CIO*, and *Computerworld*. Prior to co-founding ThinkBalm, Erica was a Principal Analyst at Forrester Research, where she launched the company's Web3D coverage as part of her enterprise collaboration research. She was also the co-conspirator behind Forrester's Information Workplace concepts and research.

While at Forrester, Erica served as a strategic advisor to a wide range of clients, including Alcoa, Bell Canada, Dominion Resources, GlaxoSmithKline, IBM, Marriott, Microsoft, Raytheon, Roche, the United Nations, and the U.S. General Services Administration. Prior to her tenure at Forrester, she was a Director at Giga Information Group (now part of Forrester) and an analyst at Hurwitz Group (now Hurwitz & Associates). She began her career in IT as a system administrator and Lotus Notes developer. Erica is a graduate of Harvard University and is a member of The eLearning Guild and the Association of Virtual Worlds.

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Sam Driver is a co-founder and principal at ThinkBalm. He is an inventor and entrepreneur whose take on the Immersive Internet is heavily influenced by science, game theory, and science fiction. At the University of Massachusetts Medical School, Sam was part of a team that discovered RNA interference (RNAi), which was awarded the 2006 Nobel Prize in Physiology and Medicine. He founded QIK Technology to develop intellectual property (IP) holdings in functional genomics and co-founded a small Rhode Island-based residential real estate investment partnership. He also founded and operates Evil Minions Games, an IP and product development company, and established and runs a regional gaming organization. He's also an instrument-rated private pilot. Sam earned his BS at Ohio Wesleyan University and a Masters in genetics from the University of Massachusetts Medical School.

ThinkBalm Innovation Community Contributors

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ENDNOTES

[1] Employees do not believe their organizations or their senior management are doing enough to help them become fully engaged and contribute to their companies' success, according to a global workforce study conducted by global professional services firm Towers Perrin. Source: Towers Perrin press release "Towers Perrin Study Finds Significant 'Engagement Gap' Among Global Workforce," October 22, 2007, (http://www.towersperrin.com/tp/showdctmdoc.jsp?url=HR_Services/United_States/Press_Releases/2007/20071022/2007_10_22.htm&country=global).

[2] Immersive Internet technology is well-suited to helping organizations cut costs and increase efficiency. Source: "Economic slowdown will spur enterprise Immersive Internet initiatives," *Immersive Internet Insights and Expertise*, October 29, 2008 (http://thinkbalm.com/2008/10/29/economic-slowdown-will-spur-enterprise-immersive-internet-adoption/).

[3] Implenia integrated its facility management systems with Second Life (demo environment) and OpenSim (production environment) to deliver remote facility management. Source: Duncan Graham-Row, "Our house in cyberspace," *Guardian*, February 26, 2008 (http://www.guardian.co.uk/technology/2008/feb/26/internet.buildings).

[4] Microsoft and Accenture have obtained a number of benefits from their investments in virtual worlds. Source: "At Microsoft, cost of virtual events about 1/3 the cost of traditional events," *Immersive Internet Insights and Expertise*, July 18, 2008 (http://thinkbalm.com/2008/07/18/at-microsoft-cost-of-virtual-events-about-13-the-cost-of-traditional-events/) and "Accenture recruiting in Second Life cost-effectively targets the "Facebook audience," *Immersive Insights and Expertise*, August 14, 2008 (http://thinkbalm.com/2008/08/14/accenture-recruiting-in-second-life-cost-effectively-targets-the-%e2%80%9cfacebook-audience%e2%80%9d/).

[5] Quick-and-dirty digital prototyping can be used as a communication tool to garner further investment in a project. Source: "Digital prototypes help university team get $550k+ in technology funding," *Immersive Internet Insights and Expertise*, September 24, 2008 (http://thinkbalm.com/2008/09/24/digital-prototypes-help-university-team-get-technology-funding/).

[6] Give it five years and communicating and collaborating with colleagues in immersive environments will be commonplace. Source: "Information work is going immersive," *Immersive Internet Insights and Expertise*, August 13, 2008 (http://thinkbalm.com/2008/08/13/information-work-is-going-immersive/) and "My take on Microsoft's Immersive Internet play for information workers," *Immersive Internet Insights and Expertise*, July 17, 2008 (http://thinkbalm.com/2008/07/17/my-take-on-microsoft%e2%80%99s-immersive-internet-play-for-information-workers/).

[7] Two-dimensional Web overlays are independent of underlying Web sites. Embedded 3D chat technology makes chat more animated. 3D Web pages turn flat sites into multidimensional spaces. Source: "New technologies add immersiveness to the flat 2D Web," *Immersive Internet Insights and Expertise*, September 29, 2008 (http://thinkbalm.com/2008/09/29/new-technologies-add-immersiveness-to-the-flat-2d-web/).

[8] Adobe's definition of mature markets for Flash Player adoption includes the US, Canada, UK, France, Germany, and Japan. Source: Adobe Flash Player Penetration (http://www.adobe.com/products/player_census/flashplayer/).

About ThinkBalm

ThinkBalm offers independent IT industry analysis and strategic advisory services to technology marketers and Immersive Internet advocates, implementers, and explorers. We focus exclusively on enterprise use of the Immersive Internet, which includes:

- Virtual worlds and campuses
- Immersive learning simulations
- Serious or industrial games
- 3D business applications

ThinkBalm also operates the ThinkBalm Innovation Community, a collaborative online community with a serious game at its core. The community is dedicated to propelling enterprise use the Immersive Internet forward.

What Sets Us Apart

- We are specialists focused 100% on enterprise use of the Immersive Internet.
- We operate and nurture the ThinkBalm Innovation Community, a serious game-based online community focused on propelling enterprise use of the Immersive Internet forward. Community activities include hands-on experimentation with Immersive Internet tools and technologies.

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