

**DEFENSE COMBAT SIM OLYMPICS  
–METHODOLOGIES INCORPORATING THE “CYBER GAMING CULTURE”**

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## ABSTRACT

There have been many changes in the past twenty years in the implementation of simulation and computer games, including game development, usage in fixed locations, and event-based experiences both in the civilian and commercial spaces. This paper examines each of these three areas individually in order to predict their likely future developments. It then evaluates the dynamic potential for the military that lies at the crossroads where these trends are merging, and relates their interaction to the growing popularity of the online computer gaming experience. Although far from a complete study, this paper aims to add to the discussion of these industry trends.

The paper proposes that there is a strong benefit to the military for recruiting, pre-training, and training of active duty members through the combination of :

- Choosing, building, or modifying effective combat simulation games for military use.
- Operating computer game competitions with significant military presence – similar to the air shows of today – for event-based and location-based computer gaming competitions
- Using the combined venues of (a) online gaming competitions, (b) location-based game centers, and (c) large scale gaming competitions
- Operating under the sports model of Leagues (by appropriate military warfare specialty for each League) and further dividing the Leagues into competing Divisions.

By reaching out in this way to a wider spectrum of possibilities for including the cyber entertainment culture, the military will, we predict, experience benefits in recruiting, pre-training, and training, making further use of the compelling attraction of computer games that has been demonstrated by games’ recent rise to a predominant role for military age people in our society.

## AUTHOR BIOGRAPHIES

### **Dr. Michael van Lent**

Dr. Michael van Lent is a research scientist at the University of Southern California's Institute for Creative Technologies. His research interests include artificial intelligence, machine learning, and automated explanation systems as they apply to computer games and after action review in training tools. Dr. van Lent has a B.A. in Computer Science from Williams College, a M.S. in Computer Science from the University of Tennessee, Knoxville, and in 2000 received his Ph.D. in Computer Science and Electrical Engineering from the University of Michigan.

### **Flack Maguire**

Mr. Flack Maguire is the founder of Defense Combat Sim Olympics; the combination attractive power of video games with intertwined threads of the military experience. His primary area of focus is applying successful elements from the business sector to youth not-for-profit programs that combine the areas of modeling & simulation, recruiting, and training in such a manner that both provides value to the military and to programs for disadvantaged youth with an emphasis on mentoring development. Mr. Maguire is actively involved in the use of computer games and educational material to work with youth with a direction toward military careers.

Maguire has over ten years of experience with business plan development, strategic industry analysis and launching new ventures. His last six years have been focused on his leadership role with Military Aviation Training Association and its evolution into the computer game competitions. Mr. Maguire holds a B.A. from the University of Southern California's Entrepreneur Program. He continues to serve as an officer in the Navy Reserves with a primary emphasis on aircraft carrier operations.

### **Marc Prensky**

Marc Prensky is an internationally acclaimed speaker on games and learning, the author of *Digital Game-Based Learning* (McGraw-Hill, 2001), and the founder and CEO of games2train and Corporate Gameware LLC. His book included extensive research on the use of training games in the military.

Marc has created over 100 software games, including games2train products, custom business training games and financial trading games. His creations *Straight Shooter!* and *The Monkey Wrench Conspiracy* were the world's first fast-action videogame based training tools. His *Knowledge Tournament* game is a worldwide, multi-player, multi-team on-line competition. His clients have included The Harvard Business School, The Boston Consulting Group, IBM, Bank of America, Nortel Networks, JP Morgan Chase and Nokia, among many others.

Marc has been featured in articles in The New York Times, The Wall Street Journal, Newsweek, Fortune Small Business, Fast Company and several other industry and learning magazines, and has appeared on CNN, MSNBC and many other TV shows. In 2000 he was named as one of training's top "New Breed of Visionaries" by Training magazine. At the 2002 Games Developer's conference, he led several panels, including "How to Make Educational Games That Don't Suck."

### **Ronald W. Tarr**

Ronald W. Tarr is a research faculty member at the University of Central Florida and Director of Advanced Learning Technology at UCF's Institute for Simulation and Training. Ron leads a team of inter-disciplinary researchers who function as analysts, planners, integrators and educators of the Simulation & Training community. He has conducted research and workshops on distributed simulations and learning technology applications across the full spectrum of DoD and the S&T community. Other projects managed by Ron, include research and analysis of current technology approaches in adult learning being used across multiple military, state and private agencies, including applications of Advanced Distributed Learning, high tech web based training for NASA engineers, non-traditional education for Forensic Scientist, and research into the utility of COTS PC based video games for support of military training. Ron is a retired Army officer who served for 22 years in a variety of command and staff positions.

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**Table of Contents**

Introduction  
Gaming Development for Military Uses  
    1.0 Military uses of Games  
    1.1 Games & Simulation  
    1.2 Games for Readiness and Training  
    1.3 Games for Recruitment  
    1.4 Games for Rehearsal  
    1.5 Games for Retention  
    1.6 Historical Development Models of Simulation and Game Development  
    1.7 Future Trends and Potential Models for Military Benefit  
Location Based Simulation & Gaming  
    2.0 Current & Future Trends in the Military  
    2.1 Current & Future Trends Outside the Military  
    2.2 Potential Models to Benefit the Military  
Event-Based Competitions  
    3.0 Introduction  
    3.1 Historical Context  
    3.2 Key Advantages of Event-Based Competitions  
    3.3 Industry Trends  
    3.4 Future Trends and Potential Models for Military Benefit  
Conclusion

## INTRODUCTION

The implementation of computer and simulation games by the military, including game development, usage in fixed locations, and event-based experiences, has changed considerably over the last 20 years. We look at each of these three spaces to predict their likely future developments. It is our belief that the greatest potential value for the military lies at the crossroads of the trends in each of these three spaces, combined with the growing popularity of the online computer gaming experience.

The aim of this paper is to examine both military and civilian trends, pointing to specific examples as references. We specifically highlight Large Scale Event-Based Gaming Competitions. Because online computer gaming has already received close attention, this paper will not explore this topic except tangentially.

We conduct a high level review of the trends in each of the three segments in order to gain greater understanding of the interaction among multiple forces. Although not an exhaustive study, this paper's goal is to add to discussions of these industry trends, their interaction, and their potential for significant positive impact on military recruiting, pre-training prior to military service, and military training.

### *GAMING DEVELOPMENT FOR MILITARY USES*

#### **1.0 Military Uses of Games**

Although the earliest use of games for warfare is credited to Mother Nature – animals learning to hunt and fight – the military has not been too far behind: Strategy games have been used by militaries for millennia. But since the introduction and spread of computers in the second half of the 20th century, military “simulation” has typically gotten more attention and funding than military “games.”

This situation is now changing. Military commands are realizing that at least half their current soldiers and officers and all their recruits are from the generations that grew up playing computer games – by one estimate over 10,000 hours by the time they are 20. In attempting to communicate in the language of these so-called “Games Generations,” all the branches now employ a variety of games, in a wide variety of formats, for almost everything the military does. Among the areas where the military currently uses games are

Recruitment, Readiness, Rehearsal, and Retention. And using games for the “real thing” is probably not far off.

#### **1.1 Games and Simulations**

What is the difference between simulations and games, and why is it important? Simulations are typically “copies of reality” and not, in and of themselves, games. Simulation has many important military uses, such as the ability to practice in safety (and/or at lower cost), and to do “what if” experimentation. But once the initial novelty of simulation wears off, it is not always easy to motivate someone to use a simulator – no matter how good its fidelity. Games, on the other hand, are extremely good at stimulating and motivating. So one way to achieve the motivation we require is to turn simulations into games. This involves adding additional structural elements, such as fun, play, rules, a goal, winning, and competition.

Military simulations, of course, have traditionally had very different objectives from entertainment simulation games. While creators of military simulations have worked hard to be as “physically” correct as possible, entertainment games have been driven by excitement and fun, so that players will pay to use them over and over. Dangerous and unrealistic situations, exaggeration of hazards, multiple lives, and heroics have been acceptable and even desirable to increase the excitement of entertainment games, while defense simulations have typically stressed realistic environments and engagements, seriousness, heavy dependence on environmental factors, and relied heavily on the user's ability to coordinate actions with others. (David R. Pratt, DoD Joint Simulation Systems/Joint Program Office)

Yet increasingly, these differing objectives are being combined and reconciled in many instances, leading to military “games” that go beyond the pure “simulations” of the past. While one can have a game that's not a simulation and a simulation that's not a game, having both is often the best of all possible worlds. (Elliot Masie, training consultant) For that reason games are becoming an important adjunct to pure simulations in many areas.

One key reason for this has to do with the “mind set” of the user. While simulations are typically serious, games trigger a user's playfulness, competitive/cooperative spirit, achievement, greed, and victory elements. According to Masie, games also challenge the users' inhibitions – one tries things in play one might not try in life. The “gameplay” of a good game requires almost continuous decision-making under increasing conditions of complexity as the levels

increase. Players typically find this both stimulating and motivating, particularly when the game continuously adapts to their skill and performance.

Additional explanation of why games are effective tools comes from Dr. Robert Ahlers and Rosemary Garris of the Navy's NAWCTSD Submarine Lab. (Ahlers and Garris, in Press) They found that games create a self-perpetuating virtuous cycle in users, as players initiate and control game play, practice skills, solve problems, persist to the end and strive to win (which often translates as "learn"), a process which then leads to re-initiation.

## 1.2 Games for Readiness and Training

Readiness and Training has been the largest consumer of military games to date, employing a combination of commercial games, templates and custom games. If one were to classify these training games by type of learning (knowledge, skills, strategy, behavior, judgment, procedures, communication, etc.), level of people using them (recruit, NCO, junior officer, senior officer), and type of structure, (off-the-shelf, template, custom), and construct a three dimensional matrix, one would find many, if not most, of the boxes filled in with examples.

On one end, there is growing interest in using commercial PC games for military training. Advances such as high-speed processors, expanded memory, and high-performance video cards have made PC-based computer game technology extremely inexpensive. Additionally, commercial game companies' use of reputable military data sources for game models have made these games increasingly attractive to the military (Coleman & Johnston, 1999). Powerfully realistic PC simulation games can be easily modified for military training, providing the training benefits of wider usage and offloading of certain training functions from high-fidelity simulators.

PC flight games provide a good illustration of how commercial game software can be modified for military use. An example is the Navy's modification of Microsoft's *Flight Simulator 98* computer game for undergraduate pilot training. The software has been incorporated into a high-end workstation with a 29" display and realistic input controls, leading to a significant perception of immersion in the scenario. There has been strong acceptance of this workstation and plans are to implement a formal training program around the flight simulation software (Dunlap & Tarr, 1999). Likewise, the Air Force is evaluating games such as DID's *F-22 Total Air War*, Jane's *F-15*, and *Microprose Falcon 4.0* as potential low cost flight simulators (Coleman & Johnston, 1999). At the Air Force Academy, Captain Ed Kaplan has actively been

using High Tech Creations' *Aces High* with cadets, noting how much the cadets learn without even realizing it because of the entertainment value of the flight simulation game.

In addition to flight simulators, other military-themed COTS (Commercial Off-The-Shelf) PC-based games, often allowed on-base, provide strategy training for recruits and NCOs. Special game kiosks, installed by a company called uWink, increase enlistees' knowledge through training-related "trivia question" templates. The Marines have modified GT Interactive's *Doom II* source code (shareware from id Software, Inc.) to produce another version of the game called *Marine Doom*. The game was designed to be first-person, fast moving, and networkable. The Marines are using the game to train on teamwork and following orders in close-quarters combat scenarios. Their expectation is that the game will improve soldiers' decision-making skills by providing practice with variation (Riddell, 1997). The Marines have also received research funds from the Office of Naval Research to develop a low cost individual Marine, squad-to-company level close combat tactics game by modifying Microsoft's *Close Combat III* PC game. The game will be modified to simulate modern Marine Corps organizations and equipment. Modifications to the commercial PC game will include specific Marine Corps missions, Marine Corps units, and mission-oriented terrain.

A number of custom military training games have been or are being built. In 2000, the Office of the Joint Chiefs created *Joint Force Employment*, a scenario-based PC game about employing the joint force doctrine in a variety of pre-built and tunable scenarios for local CINCs and their staffs. The Navy developed *Bottom Gun* to provide recruit-level submarine periscope training. The University of Southern California's Institute of Creative Technologies (ICT) is creating two army unit training games, *Combat System XII* for the PC and *C-Force* for the Microsoft X-Box.

Traditional flight and battle simulations are incorporating more game-like elements as well. MaK Technologies is modifying their *Spearhead* tank simulation game ([www.mak.com/pr\\_spearhead2.htm](http://www.mak.com/pr_spearhead2.htm)) for both use by the Army and commercial sales. With its multi-player, Internet-based capabilities, the game will train tank crews and commanders in tactical decision-making. The game's accurate simulation of mobility and combat operations will make it one of the most realistic entertainment simulations ever produced. MaK has successfully modified *Spearhead* to make it compatible with the Department of Defense's High Level Architecture (HLA), which offers the military and the game industry a long-desired goal – interoperability between its different games.

### 1.3 Games for Recruitment

Games are also being utilized as military recruiting tools. The target audience for any military recruiting effort – young men and women in their late teens and early 20s – overlaps almost exactly with the audience targeted by much of the game industry, particularly for console games and action games (often called “twitch” games). Because of the draw of these games for the military’s primary recruiting pool and the game industry’s experience with marketing to that audience, it is a good fit to include games and the game industry in recruiting efforts. Many of the action games, both on consoles and on PC’s, are military-themed, and although the experience of playing these games is often far removed from the actual experience of military life, the audience for these games has already self-selected into a group with at least some interest in the military. Games will continue to be, we predict, a key tool in communicating the military’s recruiting message to the “Games Generations.”

A recently-launched game-based recruitment effort is *America’s Army: Operations*, a first-person shooter, action game funded by the U.S. Army, and developed at the Naval Postgraduate School’s MOVES Institute, under the direction of Dr. Michael Zyda, with the support of the Assistant Secretary of the Army for Manpower and Reserve Affairs. In *America’s Army: Operations* the player moves through a series of missions that include training on various aspects of the game and a series of multiplayer missions. The game is built on the most recent “Unreal” engine from Epic Games, allowing state-of-the-art graphics. The developers have included many realistic aspects of Army missions not previously seen in games. For example, not only can weapons jam, but the animation for clearing a jammed weapon corresponds closely to the official Army weapon-clearance drill. *America’s Army: Operations* was released on July 4<sup>th</sup>, 2002 and is available gratis at [www.americasarmy.com](http://www.americasarmy.com).

### 1.4 Games for Rehearsal

The virtual environments of computer games create opportunities for new forms of mission rehearsal that are distinct from the traditional mission rehearsal aspects of training. Many games, especially action games, allow the player community to easily create and distribute new “maps” or “levels,” including new terrain, new opponents, new graphics, new weapons and often new styles of game play (capture the flag, king of the hill). To support the creation of new maps, game companies and software-savvy players develop

very powerful software tools that allow them to easily and quickly create and modify the virtual terrain.

The modifiable virtual environments of these games, and the map-editing software, make them ideal for mission rehearsal. Using topographical maps and building blueprints, a complete virtual model of a mission objective can be created in a few hours. The units to be involved in the mission then use the virtual model, often with immersive head-mounted displays, to familiarize themselves with the objective’s terrain, plan the mission and rehearse the mission plan. The rapidity with which the virtual terrain can be created means that the mission rehearsal environment can be ready within hours of obtaining the terrain and blueprint data.

One effort exploring the application of commercial game technology to mission rehearsal is *VBSI*, under development by Coalescent Technologies ([www.ctcorp.com/capability06.html](http://www.ctcorp.com/capability06.html)), built on the Oxygen II commercial game engine, which was used in the game *Operation Flashpoint: Cold War Crisis*. *VBSI* is designed as both a training application and a mission rehearsal tool supporting both area of operation familiarization and advanced mission planning. A second effort in this area is the *VIRTE* project (<http://virte.org/>) funded by the Office of Naval Research.

In addition to virtual environments, computer games also focus on interaction with virtual characters. Although the capabilities of virtual characters in today’s games are fairly limited and usually heavily scripted, research underway at ICT seeks to build fully realized virtual humans for a mission rehearsal application. The ICT’s *Mission Rehearsal Exercise (MRE)* ([http://www.ict.usc.edu/disp.php?bd=proj\\_mre](http://www.ict.usc.edu/disp.php?bd=proj_mre)) avoids the traditional mission rehearsal focus on strategic and tactical combat missions, and instead focuses on a peace-keeping mission where personal and political considerations take precedent over tactical considerations. In the MRE the users play the role of a lieutenant whose unit has been involved in a car accident seriously injuring a civilian child. They must decide how to best resolve the incident in the face of an emotional mother, a gathering crowd, and a news cameraman recording the situation. The key to making the exercise work is artificial intelligence research in the areas of speech recognition, natural language understanding, generation and dialogue, emotion modeling, and perception and speech synthesis. This research is applicable to all computer games both military and commercial.

### 1.5 Games for Retention

The Naval Postgraduate School’s MOVES Institute has also developed a second game called *America’s*

*Army: Soldiers*. Like *America's Army: Operations*, *America's Army: Soldiers* is used as a recruiting tool. However, where *Operations* focuses on fun and familiarization with the tactical aspects of being in the Army, *Soldiers* focuses more on familiarization with different Military Occupational Specialties (M.O.S.), the values that make a good soldier, and the training process. *America's Army: Soldiers* can therefore serve as a retention tool helping soldiers who have already enlisted better select an M.O.S. that suits them and thus increase their chances of remaining in the Army.

## **1.6 Historical Development Models of Simulation and Game Development**

In the 1980s, expertise for building commercial computer games often came from those already working to build simulation for military needs. For example, MicroProse's development of the highly popular *Falcon F-16* computer game under the leadership of Gilman Louie followed the company's losing bid to build the simulation for the military. In those days the military had distinct advantages in the quality of its simulations and could justify the extremely expensive equipment that was needed to produce notable results.

However, by the early 1990's the computer game industry's financial capability to build simulations began to surpass that of the military's own proprietary simulations. But at that time standard PC's were still not advanced enough to compete with the simulation equipment used by the military. However beginning around 1995, as home PC power continued to increase, the differential creating an advantage to the quality of military simulation began to slip. Since 2000, an increasing number of military simulations are being designed to operate on standard PCs. At the same time, the amount of investment being made in military simulation for the civilian world far exceeds the military investment. The result is that we now see increasing examples of the military's seeking to reconfigure COTS games for military training. Although the key differentiation between commercial games and military simulation remains an entertainment versus a training focus, numerous opportunities exist for the military to benefit from finding common ground.

## **1.7 Future Trends and Potential Models for Military Benefit**

All the military applications of games discussed so far are either developed, or in development. However, there are numerous potential game applications for military use that to our knowledge have not yet been

explored. One example is the use of games in simulation-based acquisition. Employing the same flexibility and rapid prototyping features that make mission rehearsal possible, a virtual test-bed could be created based on an existing game engine or game technology in which virtual models of proposed, anticipated and imagined systems could be rapidly developed and tested. Introducing these virtual models into an ongoing game and watching as the players explore novel ways to use the new systems could provide insight as to how the proposed systems could be used in the real world.

We also suggest that an ongoing "persistent" military "game" might be a source for new military tactics, techniques and procedures. In existing massively multiplayer persistent games such as *EverQuest* and *Asheron's Call* the player community numbers in the hundreds of thousands (over 400,000 for *EverQuest*). In many cases this huge community has self-organized to develop, rehearse and carefully document new (sometime very novel) tactics to address the challenges in the game. An ongoing military game might likewise result in new Tactics, Techniques, and Procedures (TTP) emerging from the player community, which might, in some cases, suggest improvements to the military's existing TTP.

We also surmise that as remotely controlled and unmanned systems become more and more common on the battlefield, the line between "training" and "doing" will increasingly begin to blur. Many of these systems have interfaces quite similar to the interfaces of today's more realistic games, and both training in simulation and mission execution are performed through the same interface. As the battlefield becomes more "wired" and commanders have more digital information available, their C4ISR systems will start to look more like computer games also. This could eventually lead toward much of the military using the same game-like interfaces for both training and fighting, at which point the line between reality and fiction – as in Orson Scott Card's classic novel *Ender's Game* – will become less and less clear.

## **LOCATION BASED SIMULATION & GAMING**

### **2.0 Current & Future Trends in the Military**

#### ***Military Training Uses***

The entire high tech workforce of the federal government, including DoD and NASA, is being challenged by advanced technologies and the rapid pace of technological change, and the government is striving to apply learning technologies cost-effectively. Forty percent of the Federal workforce is due to retire in less



than 5 years, and capturing the knowledge and experience of older generations of government workers and making it available in a timely and engaging manner to the younger generation is a great challenge, both technically and culturally. One potential solution is to borrow experience from the entertainment and gaming communities, especially for the new “computer generations.”

The PC games and simulation industry has dramatically driven its costs down while improving the quality and realism of its games and desktop simulation technologies. In addition to the military, several government agencies are exploring the use of low cost COTS PC games, either to replace costly training, such as high fidelity simulators, or for situations where other types of training are not available, such as in Peace Keeping Deployments.

To achieve the required level of realism and suspension of disbelief, most military training simulations have, up till now, followed the path that high-end video games had previously taken: establishing arcades populated with expensive, high-end game modules, where the required infrastructure to support such activities could be economically provided. In the military these “arcades” are called SimCenters, and are of two types: (1) clusters of virtual simulators, such as tank or flight sims, usually with the capability to be networked to allow team training and to bring several crews together for mission training. This type includes Centers such as the one at Ft. Knox that has as its primary system the Close Combat Tactical Trainer (CCTT), a medium fidelity, networked armor simulator of various configurations, including the M1A1, M2/3 and other specialized workstations. (2) Wargaming Centers, set up to look like Unit Command Centers, where the Commander and his staff “fight” the battles against simulated enemies. Battle realism is provided by a complex, series of high-end networked constructive simulations, such as Command Battle Simulation (CBS) for the Army or its Air Force counterpart AWSIM. These are often networked to other SimCenters, often in very dispersed geographic locations, to allow units that may have to deploy together in the future to learn to synchronize their actions and learn to fight as a single unit. SimCenters usually have additional high end capabilities such as advanced After Action Review (AAR) suites, video teleconferencing for live interactions between commanders and staff at different locations, and situation and briefing rooms to allow observers to be part of the action.

On several occasions the two types of SimCenters have been integrated, in some cases with live equipment training, to provide a much broader-based experience at various levels of command. But

unlike the game community, which moved to a large extent online, the military has not been able to move beyond this “location based simulation” because of limitations in infrastructure, bandwidth, and in some cases the need to enhance unit cohesion and team training. This has caused some real challenges in scheduling, making utilization often an issue. For example, there is only very limited access by the National Guard and Reserve forces, both of which are now playing an increasingly large role in supporting operational missions, and have a more pressing need for training.

A fundamental challenge facing the military training community is how to break out of the solely SimCenter “location-based” mentality to also include a more distributed model, while insuring that training objectives are met. The value of widely distributed PC Games/Sims has not been proven, and there are extensive challenges in infrastructure, cultural orientation/training tradition and the practicality of integrating such distributed and decentralized activities into a cohesive program of training.

## 2.1 Current & Future Trends Outside the Military

Just at the time the military is questioning its heavy reliance on location-based simulation – especially isolated location-based simulation – for its training needs versus distributed simulations, the commercial segment is seeing growth in networked location-based simulation games. Location-based events for civilians have increased their allure because of the increasing social and team interaction they provide. They allow the simulation experience to go beyond the game itself and include the interactions and steps taken by the participants. (Ironically these are the same types of interactions so desired by the military.)

This differentiation in trends is understandable, given that the military’s primary objective of using simulation is cost-effectiveness, while many civilians just want to “play” military. Some newly established civilian sites have gone to great lengths so that individuals can come together to enjoy a lifelike simulated experience of acting as a military unit.

Location based simulation experiences In the civilian sector come in two types: (1) Simply configured local area networks, similar to computer labs but where the systems and set-up are especially designed for computer gaming experience. These are found typically in Cyber Cafes, and occasionally use corporate resources, as will be noted with Gateway. (2) Specialty locations where the PC game is specially designed for specific equipment and the experience is immersive beyond interaction with the simulation itself.

### ***Cyber Cafes***

While South Korea leads the world with an estimated 20,000 Cyber Cafes, it is estimated that the United States currently has over 450 today, up from 3 in 1995. (Source: iGames.org) As with event-based gaming competitions (see section 2.3), Cyber Cafés have the advantages of social interaction, suppressing cheating, and removing any advantages due to varying latency rates of different servers. Cyber Cafes are best understood as a blend between a computer lab and a coffee shop, with the owners earning their revenue from renting time at the computers, selling food items, and running events.

Sponsors of Cyber Café-based competitions benefit from the opportunity to strongly promote their products during the events at the Cyber Cafes. We believe military recruiting could benefit from this highly valued face-to-face interaction time by becoming one of the sponsors of these events. With its potential to bring in “real” military elements such as visits by SEALs, display of military equipment, etc, the military brings a highly-valued proprietary attractiveness. We wonder whether the generational gap between military leadership and those more familiar with these Cyber Cafes (which have started becoming part of the younger generation’s normal experience) is the reason that this venue has yet to be tapped by military recruiting.

### ***Gateway Competition***

Another model of location-based gaming competition approach was recently provided by the Gateway Corporation, which held a gaming competition in the numerous “Country Stores” across the nation in which they sell their products. For this competition they installed two particularly high-end computer systems in each store, linking these systems across the country. The game was *Jedi II: Jedi Outcast*. As in the Cyber Café model, there was no additional configuration around the computer gaming experience itself. Gateway’s divided the \$60,000 prize money equally over two age divisions: 13-24 and 25+. The event benefited both Gateway, which drew additional people into their stores and promoted their name in the gamer community, and the game’s producers, through the increased promotion.

### ***Specialty Locations***

Although there are as yet relatively few examples of specialty locations, they can best be described as “next-generation arcades.” The actual simulation is surrounded by a wider experience of face-to-face team mission planning, mission briefing, and a de-briefing following the execution of the mission. (This has dramatic similarity to the experience of the

military). An example is Mach Combat in Irvine, CA ([www.machcombat.com](http://www.machcombat.com)) whose physical layout and scheme is designed to match the look & feel of an aircraft carrier.

The primary objective of specialty locations is the entertainment of participants who want to “play” at being in the military. They therefore try hard to create the illusion of being in a real military situation – in Mach Combat’s case a naval squadron.

Mach Combat was established by Dave Kinney, a former military aviator. The center’s 14 interactive flight simulation module stations are highly advanced in their configuration, using real aviation headsets and multiple screens that allow splitting of gauges and external view, plus additional keypads for various actions and a specially configured throttle/stick. The experience has been greatly enhanced by a defined configuration, which allowed programming creativity normally constricted in the design of PC games, which must work on any computer configuration. The configuration includes design engineering for a station at which administrators establish the layout of the event (SAM sites, weather, enemy planes, etc.) and can change the conditions of the experience on the fly during the combat simulation. Individuals communicate with each other using headsets, with over 1,000 channels available to split out separate channels for such things as formations, squadrons, and guards.

A compelling aspect of the Mach Combat center is its close adherence to real military operating procedures. The center has a large number of regular customer members who belong to various squadrons with designated rank and structure. Squadrons train together on a regular basis and have scheduled times of flying against the other squadrons at the facility. All proper military protocols are followed, and common military air simulated spaces are used. As one officer, Captain David Buss, pointed out during a visit to the center, every aspect from initial mission planning to mission debriefing is in almost complete sync with methodologies used for real military operations.

We believe it is likely that in addition to their entertainment value (they also get revenue from walk-ins and parties) specialty locations can accomplish training which directly creates skills useful in military employment. They carry a potential benefit to the military for building familiarization, pre-training, and recruiting. Anecdotally, one individual who used to actively participate in the Mach Combat center as a teenager is now the top candidate for flight school at the Air Force Academy. Local Navy Recruiting representatives have used the center in a limited manner for an initial visit by potential recruits and will be further testing more in-depth uses. And ROTC midshipman used the center during their 2002 summer

training exercises as a way for them to get an additional flavor for being part of a squadron flying together.

## 2.2 Potential Models to Benefit Military

As the military moves further toward a distributed simulation model, there are advantages for tapping into the experience gained by the online gaming community in Cyber Cafes and specialty locations. There is strong initial evidence justifying exploration of the potential use of centers like Mach Combat to further familiarize and pre-train our future military personnel. In addition, sponsoring existing special events at Cyber Cafes can also benefit military recruiting.

### LARGE SCALE EVENT-BASED COMPETITIONS

#### 3.0 Introduction

The rapid growth of the computer gaming industry – US Computer game software sales were \$6.4 billion in 2001, with almost 8% growth and over 225 million units sold – is fueled in part by the growth, in size and number, of large scale event-based computer game competitions. These multi-day events are conducted by a range of organizations, predominantly not-for-profit, whose support comes from an growing list of major corporate sponsors. Additionally, some countries outside the US are actively promoting such events. In South Korea, the Honorary Chair of the World Cyber Olympics is the country's president. In Taiwan, the Minister of Education has pushed for the presence of computer gaming centers approved for school campuses and the provision for class credit for certain uses.

Attendance at a large scale event-based computer game competition can be a significant eye-opener to those not familiar with this growing phenomenon among the younger generation. One event, The Gathering ([www.gathering.org](http://www.gathering.org)), held for the last eight years in Norway, has had an attendance of 5,000 in each of the last three years, with the limit due only to the fact that the stadium they use does not permit a higher occupancy. They estimate that last year they turned away 3,000 additional visitors. Another event, the Cyber Athlete Professional League (CPL) ([www.theapl.com](http://www.theapl.com)) attracts over 3,000 participants yearly to Texas for a competition giving out over \$100,000 in cash prizes. Although the CPL and Quakecon (a similar event based on id Software's game Quake) ([www.quakecon.org](http://www.quakecon.org)), are held here in the United States, European and Asian countries far outpace the US, which is a distant third in this area.

In contrast with dedicated locations such as Cyber Cafes, the predominant characteristics of Large Scale Event-Based Activities are the following: (1) A location is rented for one to six days using commercial facilities such as convention centers, sports facilities, and hotel accommodations. The key requirements are a large covered space for the setting up of rows of tables in which to set the computers, and plentiful power supply. (2) A temporary computer network is set-up that can service anywhere from 100 to 3,000 computers. Setting up such a large network for the higher-end events would provide a significant challenge for any IT professional. Doing this with only two days advance prep time is considered almost impossible by all except those who have learned and perfected the skills over years as their events grew. (3) Attendees typically pay a fee in the range of \$40-75. (4) "BYOC" (Bring Your Own Computer) is the norm. While typically the final contestants in the double ladder competition play on the 10-150 computers that are provided by sponsors – providing uniformity between competitors – the bulk of the computers plugged into the network at these events are brought by those attending, with only a very small quantity rented at the event through vendors. (5) It is not uncommon for a large event to draw participants from two or three other continents. Because many game players actively know each other through online game competitions, there is far less recognition given to national status than at other events. (6) Attendees often bring their own sleeping bags and use spaces set-aside for them. Pizza and soda deliveries are typically at very high volumes. Many attendees play for entire days, several days running, without ever leaving the location. (7) Unlike in those traditional sporting events that use double-tree elimination, players who lose, and therefore do not go forward in the competition, are not sidelined watching the remaining competitors. These individuals start many freestyle game matches, sometimes with hundreds of competitors at the same time in one single game. It is often not until only the last 30 "official" players (or less) remain that prior competitors will leave their free-style network competitions and watch the final players on large screen displays. (8) Prize money to winners at many of the largest events can reach the range of \$40,000 to \$250,000. John "Fatality" Wendel, the top *Quake III* player, earned \$111,970 over two years in competitions, plus an estimated additional \$60,000 from sponsorships. (<http://old.smh.com.au/icon/0105/05/games4.html>)

To further explore Large Scale Event-Based Activities, we will now look at the historical roots that led to this currently developing industry and social experience, the advantages of such competitions, the current status and industry configurations, and potential military applications to leverage these activities.

### 3.1 Historical Context

The roots of Large Scale Event-Based Activities go back to the early 1980's, when people began to gather at locations such as home garages, libraries, or temporarily loaned industrial spaces to swap games and play games against each other with the very limited capability that a few games of this era allowed. People in these circles would often refer to the events as "Copy Parties." Although not pleasing to software producers, people were attracted to such events by the cheap games and an opportunity to socialize with peers.

Beginning around 1985, these gatherings started incorporating two growing new elements. One was known as the "demo scene" in which people would show off their skills by producing short pieces using the various mediums of sound, graphics, and programming. The other was a much more hard-core group who were playing computer game competitions against each other as game technology advanced. This group was known simply as "the gamers". Over time, the gamers grew in size and popularity, as did the spaces they rented. Designed for the most passionate players, these events became fiercely competitive. The players in the top third take these competitions very seriously, often viewing themselves as professional athletes.

These large-scale events grew in frequency as the popularity of computer games themselves grew, benefiting from more game players, increased computer capabilities, and greater penetration of computers among home users. The competitions eventually came to be known as "LAN Parties," The name coming from the fact that as games became increasingly network capable, the host would establish a local area network (LAN) for those bringing their computers, in order for them to compete against each other in real-time.

LAN Parties continue today in large and growing numbers throughout the world, with thousands of such events happening each year. A visit to any of the many web sites dedicated to such events, such as [www.lanparty.com](http://www.lanparty.com) or [www.bluesnews.com](http://www.bluesnews.com), will provide an additional overview. Although the authors searched for more precise numbers for the frequency of such events, it appears that this is currently not being tracked.

Out of the LAN party events evolved two additional gaming experiences. The first is the Cyber Cafes discussed in Section 2.1: permanently set-up locations, with configurations that strongly resemble traditional computer labs, except that the computers are used almost exclusively for "gamers" to come together and compete. The second is large scale event-based gaming competitions, drawing in substantial numbers

of competitors, with full ranking and substantial cash prizes. The difference is that although the permanent Cyber Cafes provide an ongoing location to play, they cannot financially justify maintaining the hundreds, sometimes thousands, of machines needed for a major competition.

### 3.2 Key Advantages to Event-Based Competitions

The "draw" of event-based competitions for gamers is based on three major benefits: (1) the social interaction factor; (2) the opportunity for sponsors to promote their products; and (3) overcoming the issues of online cheating and variances in ping rates.

#### *Social Interaction*

Some observers have falsely assumed that the rise of online (web-based) competitions would destroy live competitions, much as at the beginning of the home movie rental industry some speculated that this would undermine movie theatres. However just as sports fans still enjoy going to a live game, gamers still enjoy coming together to compete live against others. The ease and efficiency of web-based gaming does not negate that people still want opportunities to come together with like-minded peers, to meet with the developers of their favorite computer games, to share their experiences, and to be publicly recognized for their talents. In fact, the larger the events have become, the more the attraction that comes with the opportunity to be part of large social experience has increased.

#### *Sponsorship Opportunities*

Historically, large scale events began with individuals coming together motivated only by the opportunity to interact with others. Over time, numerous corporations have learned to take advantage of these opportunities to market their products, leading to an ever-growing available pool of sponsorship funds. The demographics of these large-scale events are a good match for many companies' targets and the venues offer them a highly targeted and concentrated opportunity to promote their products in an engaging manner. Increasing sponsorship dollars have led to higher quality events and larger purses for winners, creating a positive feedback loop increasing the attendance at such events.

#### *Cheating & Ping Rate Issues in Online Competitions*

As sponsors and others have sought to provide rewards, cheating in web-based competitions has remained an issue that is too difficult to completely stop. Although some claim to have established fully secure configurations, the general community of gamers still places little faith in such claims. Just as

hackers continue to break new “secure” systems, those wishing to cheat are just as motivated, if not more so, to accomplish this task, especially given the additional benefit of a competitive leg-up in the competition. If the online competitions were run with financial rewards to winners, the motivation for clever forms of cheating would only increase. As id Software co-founder John Carmack, one of the leaders in multiplayer game development, pointed out in a discussion of online cheating, “The problem is really only solvable by relying on the community to police itself, because it is a fundamentally ‘unwinnable’ technical battle to make a completely cheat proof game of this type.” (<http://www.webdog.org/plans/1/>)

An additional issue that plagues web-based gaming competitions is the “ping rate” between each player’s individual computer and the main internet server serving as host to the competition. Ping rate, or latency, is the time that it takes for information to flow from the PC the gamer is playing on to the server and back. Given different levels of bandwidth and degrees of physical separation from the server itself, ping rates can vary significantly from one player to the next. Varying ping rates affect how quickly each player’s system is updated as to the location of game elements, such as one’s competitors. This causes difficulty because it can prevent a clear demonstration of the most skilled player.

### 3.3 Industry Trends

Large scale event based competitions have suffered from a lack of formal research and little accumulation of empirical data. (Two of the authors are currently conducting a much greater in-depth study of this space with the intention of providing a more thorough report.) However, the trend in the large scale event-based gaming competition space has clearly been from not-for-profit, to commercial, and lately to government-sponsored competitions, although these stages overlap.

#### *Not-for-profit Events*

These events began under the auspices of computer enthusiasts, and many continue today under such a structure. Norway’s “The Gathering” typifies this structure, demonstrating a “Johnny Apple Seed” mentality in their support of advancing the gaming community. Their leaders have been directly involved in encouraging and providing initial technical support to numerous other large scale not-for-profit gaming events around the globe. The not-for-profit computer gaming enthusiasts run events that typically focus not on large prize monies, but rather on the entire experience. They are almost all run through enormous

efforts of large groups of volunteers. Other events with this structure include: (1) “The Party” (Denmark). Started in 1991, its membership exceeds over 3,000 per year. It has continued to host a major event in a small town setting. Similar to very many other such events, the number of attendees and the yearly growth in numbers has astounded the expectations of those hosting the event. (2) “Dreamhack” (Sweden). Started in 1997, it has grown to become the world’s largest gaming event, reaching 6,000 attendees for four days of events. Typical of such events, participants are provided space in one of the large auditoriums to bring sleeping bags and inflatable beds in order to remain at the event 24/7.

(3) “Assembly” (Finland) Founded in 1992 and held yearly, it attracts roughly 4,500 players. Like gaming competitions in Taiwan, the Assembly has been actively supported from the beginning by Finland’s Ministry of Education.

#### *Commercial Events*

Although the US has many Cyber Cafes, and many small scale events hosted each year by enthusiasts, the development of large scale event-based gaming competitions in the US has taken a more commercial turn. In 1997, both the Professional Gamer League (PGL) and the Cyber Athlete League (CPL) ([www.theapl.com](http://www.theapl.com)) were established. The PGL was launched out of the Total Entertainment Network (TEN) with \$2 million in seed capital, hosting its first major event in San Francisco’s 3COM park with Atari founder Nolan Bushnell operating as League Commissioner. However in 1999, TEN pulled their efforts in this direction.

Following this, Angel Munoz, a former investment banker who foresaw a need to grow computer gaming into a recognized sport, launched the CPL as a for-profit company (with far less initial support). Munoz sought and successfully acquired numerous corporate sponsors, such as Intel, Gateway, Alienware, NetGear, Nvidia, and other companies with interests in the “gamer” demographic. The “gaming computer” offers a distinct benefit to many technology corporations in that gamers require the products with the highest-level of performance in each computer generation. The sponsors made it possible for Munoz to award prize money ranging from \$25,000 up to \$250,000 for a single event.

There are now an increasing number of regional “qualifying” competitions, leading up to the large yearly event. Munoz has aspirations to make the CPL into a \$1 billion company and feels that when they reach their first \$1 million purse that this will be solid validation of the concept (Bruce Geryk, “Virtual Blood,

Sweat, and Tears: The Growing Sport of Professional Gaming” [www.gamespot.com/features/virtual/index.html](http://www.gamespot.com/features/virtual/index.html)).

The second major event-based gaming competition held in the US, is “Quakecon” ([www.quakecon.org](http://www.quakecon.org)), which is also, although technically a not-for-profit entity, distinctively commercially supported. Just as the CPL has done, Quakecon has engaged numerous corporate sponsors, and provides prizes to winners. Begun in 1996 by enthusiasts of the *Quake* game produced by id software, they expected 50 participants and wound up with 150. In 1997 attendance reached 650, in 1999 they drew 1,100 attendees, and in 2000 over 3,000 people attended. The commercial displays at Quakecon are similar in size and cost to those at the industry’s E3 Game Expo ([www.e3expo.com](http://www.e3expo.com)). In 2002 Quakecon will offer a total of \$100,000 in prize money. Given their direct benefit from this annual event, id Software is an active participant in its development.

### **Government-Backed Events**

In October 2000, South Korea held the World Cyber Game Challenge (WCGC) and in December of 2001 held the “1<sup>st</sup> World Cyber Games (WCG2001). These events marked a shift in the large scale event-based gaming competitions. Although government representatives had previously taken various supportive roles in gaming competitions, this was the first gaming competition directly launched by government and top corporate leaderships, actively expressing the importance of a healthy digital entertainment culture in their country. The high level of support for South Korea’s launch of the World Cyber Games is indicated by the fact that the President of South Korea is the WCG’s Honorary Chair; the Minister of Culture and Tourism in South Korea and the Vice Chairman & CEO of Samsung Electronics are co-Chairs; the Government Ministers Subcommittee has members from Korea’s National Assembly; the Press & Broadcast Media Subcommittee has presidents of major companies or publications; the Education & Culture Subcommittee has Presidents of various universities; and the Promotion Subcommittee is dominated by heads of major associations and company presidents.

According to Nam-Kung Jin, Korea’s Minister of Culture and Tourism, “The Korean Government is willingly investing much into developing the game industry. We are hoping to construct a common ground for the future population through games, which will help the country to leap forward as a culturally and economically advanced country. As the first step, The World Cyber Games will bring together gamers from around the world, which will compete with one another in the name of their countries. The World Cyber Games will provide

opportunities for the most recently developed games to be exhibited before a world audience. It also provides the chance for our national game industry to be recognized worldwide.” ([www.worldcybergames.org/infor/organizing.asp](http://www.worldcybergames.org/infor/organizing.asp)).

Korea’s World Cyber Games 2002 – billed as “Beyond the Game” – hosted 500 representatives from 52 countries over six days of competition with \$300,000 in prize money being awarded. The WCG selected the games for the competition based on those most popular in the computer gaming community. They have been establishing “WCG National Organizers” who manage events, promote the WCG vision, and run preliminary competitions in their own countries using the selected games. The goal of the World Cyber Games’ leadership is to make computer gaming competitions similar in status to current sporting events in the traditional Olympics. All indications are that South Korea is on a solid path to become the world leader in this effort.

### **3.4 Future Trends and Potential Models for Military Benefit**

Just as the creation of Air Shows in the 20<sup>th</sup> century led to both successful civilian airport shows and military air base events, the future of large scale and small LAN party gaming competition can include both events with a civilian focus and those with a military orientation.

The World Cyber Games’ focus is on the most popular games, whether military-based or not. The US military has an excellent opportunity to collaborate in operating similar events, combining the element of a focus on combat simulation games with the proven models of large scale event-based gaming competitions and the standard air show. Combat simulation games closely match up both military’s and gamers’ objectives, which could, we think, create a substantial interest in the military within the computer gaming world, providing numerous benefits to the military.

For example, such events would provide incentive to developers and publishers to build combat simulation games mindful of military interests from “first code,” because of the increased exposure for those games chosen for the events. The rewards from seeing increased sales of their product in stores would no doubt be greater than those from contracts to reengineer already-drafted games for military benefit. Additionally, while in the past numerous combat simulation publishers have in vain sought formal military endorsement that, given legal constraints, is highly unlikely, those games chosen for events done in collaboration with the military would get an “implied” informal endorsement. Sponsors of gaming events with

a military association also benefit from the “patriotic” overtones of such an event along with increased exposure for their games. We expect that the total experience would create a substantial draw within the computer gaming and game development communities.

Currently the military plays a very active role in air shows and demonstration teams and employs large Public Affairs staffs in Hollywood. While these investments are wise choices that have served the military well, the games business in the US has now overtaken the movie box office. It is time for the military to consider the benefits of tapping into the new social dynamic of event-based computer game competitions. In so doing they will be meeting their key demographic where they congregate, and in a manner that – if the events are properly configured – provided rewards that go well beyond recruiting value.

## CONCLUSION

Many of today’s commercial military computer games have grown substantially in the direction of matching military operations, while military operations are increasingly being managed by computer systems that have a distinct “game-like” feel. With the staggering growth in PC power over the past several years, current thinking in a number of military circles is to build consumer computer games that match *exactly* with the real world military computer interfaces, leading to enhanced military training value. Centers such as Mach Combat have already crossed many lines that take them beyond pure entertainment value. By employing specialized but highly affordable PC equipment, they reach a level that allows them to have capability for real military flight school preparation, and to be an excellent venue for military recruiting events.

At the same time, the military is also seeing a trend away from fixed location-based and toward distributed simulation to serve troops on location. The concept of locally distributed Cyber Cafes meets this need, as do LAN parties and large scale event-based competitions. Each of these genres has experienced growth in attendance far beyond their expectations. Commercial events are attracting numerous well-financed sponsors, offering large purses, and striving to make gaming an official sport. Government sponsorship of these events has already begun in several countries. Up till now the US government and military have notably lacked a presence of any significance in large-scale gaming events relative to numerous other countries.

We propose there is substantial value to the military to combine and exploit these trends through:

- (1) Military use of computer games that fully maintain

their entertainment value but are designed from the initial code to also accomplish recruiting, exposure, and/or pre-training (or are reconfigured to do so) and then actively used in gaming competitions. (2) Collaboration by the military in gaming competitions that incorporate significant military presence. (3) Military participation in running competitions in the three possible venues of (a) online competitions, (b) location-based competitions, and (c) event-based competitions. On-line competitions have the disadvantages of cheating and latency while lacking a social dynamic. Location-based competitions can use Cyber Cafes and other computer lab sites in society and on military installations. Event-based competitions can be conducted as partnerships between nonprofit entities and the military. (4) Operating competitions using the sports format of leagues and divisions. Leagues can be defined along various lines such as warfare specialties of surface, air, ground, armor, intelligence, etc. Divisions within each League can be stratified along numerous lines including age (likely more appropriate to civilian events), service branch and/or warfare focus for the active duty events, geography, or a combination of these areas given the objectives of those running such events. (5) Incorporating of real military participants into these events, such as by having real tank commanders talk with players in the Armor League and offering the opportunity to walk around a tank during the competition events. Flight Sim Leaguers who make it into the last ten competitors might get even a chance to play against a real Blue Angel.

“Defense Combat Sim Olympics” may be a fitting way to describe such a combination (or combinations) of experiences and events. The value to the military lies in tapping the interactive forces that are creating these highly attractive experiences, which, with properly configured programs, could, we believe, create valuable benefits for military recruiting, pre-training, and training of active duty service members, taking advantage of participants’ natural motivations. There exist no technological or sociological barriers to the military co-sponsoring programs and events that increase civilian attraction to these experiences while adding value for military purposes. These experiences also benefit existing partners in military gaming, including developers, publishers, and corporate sponsors.

Surprisingly, it is not the US but Korea that has moved to the forefront of exploiting these trends. We believe it is time for the US military to take the next step beyond tapping the value of the game/human interaction by embracing a wider spectrum of opportunities within the growing computer gaming society.