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GDC 2007 PREVIEW GUIDE INCLUDED

JANUARY 2007

# game developer

THE LEADING GAME INDUSTRY MAGAZINE

» 2006 FRONT LINE AWARDS  
HONORING THE BEST TOOLS  
FOR GAME DEVELOPMENT

» SEVEN FOR '07  
NEW YEAR'S RESOLUTIONS  
FOR PIXEL PUSHERS

» PRIORITIZING BUGS  
MORE DISCRIMINATION,  
LESS EXTERMINATION

**POSTMORTEM:**  
**BUILT FOR Wii:**  
**TONY HAWK'S**  
**DOWNHILL**  
**JAM**





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## POSTMORTEM

### 30 NOT YOUR TYPICAL GRIND: TONY HAWK'S DOWNHILL JAM FOR WII

Skateboarding at home, in the living room, on the couch, never felt to alive. In this postmortem of the newest TONY HAWK game, Toys for Bob lead designer Toby Schadt explains how playtesting was different for this Wii game, and how the legal department can hinder even the most generic design choices.

By Toby Schadt

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By Jill Duffy

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"There wasn't enough time to fix them all," said the game developers about the bugs they just couldn't get rid of. Sound familiar? Two test engineers from the Microsoft Games Test Organization have a theory about why developers should just let go and accept that some bugs are inevitable. But, they also have a plan for finding the bugs that count and exterminating them in a way that's neither costly nor overly time-consuming.

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## FULL TILT

**TO THOSE OF YOU WHO DON'T NORMALLY RECEIVE *Game Developer***, we bid you a hearty welcome. As part of outreach for the Game Developers Conference in San Francisco this March, we've decided to give out tens of thousands of extra copies of the magazine, alongside a preview guide of the show. Just flip the magazine over to read more about the GDC.

But if you keep paging forward through the main magazine, you'll find an extremely honest postmortem of a Wii launch title, thanks to Toys for Bob's **TONY HAWK'S DOWNHILL JAM** write-up, as well as the winners of the 2006 Front Line Awards, honoring the best tools, engines, hardware, books, and much more. For more information about *Game Developer*, including subscription specifics, visit [www.gdmag.com](http://www.gdmag.com).

### LAUNCH EXPECTATIONS

I want to talk about launch lineups for next-generation consoles and how they do (or don't) predict the success of any given machine. As people are wont to remind us, the PlayStation 2 launched with **FANTAVISION** as a first-party title on day one, and Lord knows fireworks action-puzzle games were not what the system continued to trend toward. However, I think game professionals are already able to derive a number of lessons from the PlayStation 3 and Wii launches.

The amount of time given to optimize and enhance launch titles to fit the unique capabilities of the target platform is often very limited, since final hardware and controller delivery often happens only a few short months before titles are due out. Since most competitive games take at least 12, and often closer to 18 months to complete, this means either a short development time after final kit delivery, or more likely, a certain amount of pre-planning that can limit the spectacular nature of any debut games. For the Wii, for example, there are several mini-games that are perfectly charming, but don't yet show depth of gameplay.

Conversely, there are a number of licensed launch titles for Wii that are straightforward conversions from other platforms. Their gameplay is functional, but doesn't feel especially designed to take advantage of Nintendo's new control scheme. Such titles have therefore fared in a lackluster way with critics.

Yet even the Wii-exclusive **TONY HAWK'S DOWNHILL JAM**, definitely one of the Wii launch titles I have enjoyed the most, feels a little like it has under-

used the potential of the Wii Remote compared to, say, **WII SPORTS**.

Have the extreme freedoms inherent in the Wii controller doomed all games that don't want incredibly freeform controls into feeling a little buttoned-down? I hope not.

### JUGGLING DIFFICULTY

As for the PlayStation 3, the difficulty for developers has been in wrestling with the complex hardware after final development kit delivery. Because of this, a lot of the game design behind the launch titles has ended up feeling reasonably staid. If a game's technical execution is going to have risk factors, the developers probably don't want to experiment heavily with design either.

The PlayStation 3 also suffers a little in comparison with the Xbox 360, which is a year ahead in terms of technical understanding and hardcore engine programming. But even on Sony's platform, there's cause for cheer driving recklessly over the horizon, thanks to games like Evolution Studios' **MOTORSTORM**, which was about to debut as of press time—and judging by the frenetic downloadable demo currently available for PlayStation 3, shows off impressive physics and visuals.

### CARRIAGE AND HORSE

It says a lot that standout titles for just-launched next-gen consoles—including upcoming games like Ninja Theory's **HEAVENLY SWORD**—have been in development for relatively long periods of time before the hardware was even available. These titles are often backed by first-party companies that can risk a certain amount of churn and uncertainty in order to get compelling content.

The results are often key hardware sales drivers for the console in question.

Will the game industry see hardware manufacturers or even major publishers starting key teams on titles for their next generation of consoles as much as two years before final hardware arrives? If they want classic titles for early adopters, it sounds like they should definitely consider it. ❖

Simon Carless  
Editor-in-chief

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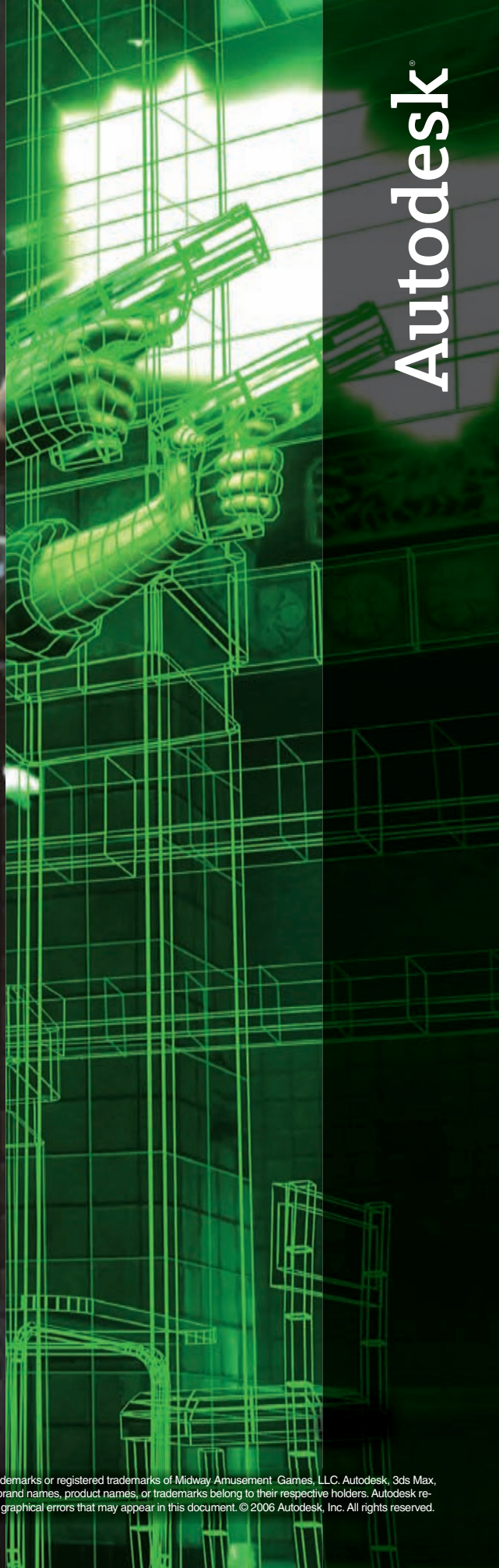
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## DEVELOPERS RESPOND: WHAT'S YOUR BIGGEST CONCERN FOR 2007?

The dreaded holiday season has passed, and developers can look once more toward the future. Light is finally breaking through the stormy next-gen clouds now that all the major consoles have been released. What, then, are the industry's major concerns for 2007? —Brandon Sheffield



**JULIAN EGGBRECHT,**  
PRESIDENT,  
FACTOR 5

There's one industrywide concern that I have: With next-gen, everybody was

suddenly talking about \$30 million budgets, and some companies might actually have been crazy enough to even pay those budgets, and I think there will be a backlash. People who expect to get these budgets and use them on a regular basis going forward might be in for quite a wakeup call.

My biggest concern for 2007 is after this crazy scramble of 'just jump onto next-generation development, get everything going, spend probably too much money while trying to do that, and also try to grow the company,' how do we get back to 'now let's be as efficient as we were with 15 people in a company of 150 people.'

The \$30 million budgets, and even the \$20 million budgets are huge and scary things. It's a top 10 market, and if you're not in the top five, then most likely your game won't break even. The budget increase is a big concern.



**MARK JACOBS,**  
GENERAL  
MANAGER,  
EA MYTHIC

My number one concern for 2007 is that any MMO released needs to meet or

exceeds players' expectations in a market that is, for now, dominated by *WORLD OF WARCRAFT*.

Like every game developed in the past, EA Mythic's *WARHAMMER ONLINE* needs to stand on its own two feet. However, unlike 99 percent of games ever created, *WARHAMMER* will be compared not just to a successful game from the past (like *UNREAL* was to *QUAKE*), but to a game that will, most likely, still be the industry leader at the time of *WARHAMMER*'s release. This is a challenge that we not only welcome, but embrace. However, that doesn't mean that it doesn't keep me up nights, coming up with new ideas.



**TED PRICE,**  
PRESIDENT & CEO,  
INSOMNIAC  
GAMES

Now that we've gone through the fire of releasing a game on the PlayStation 3, I can

say that 2007 seems a lot less scary than 2006 did. Of course, we're subject to the vagaries of the industry—we can't control how well the PlayStation 3 sells or whether the industry will continue to grow.

For Insomniac, 2007 is about refining our technology and trying to find ways to become more efficient while continuing to make bigger and better games. It seems as if everyone in this business is dealing with rising development costs and shrinking margins. Finding ways to control or even lower production costs while consumer expectations continue to rise is the Gordian knot we try to untie every year. The problem just comes to the forefront during console transitions.

## \$18.5M ON RED 5

**RED 5, AN INDEPENDENT DEVELOPER** of online games, has recently accumulated \$18.5 million in funding, mostly from venture capital firms Sierra Ventures and Benchmark Capital. The Red 5 team, which formed in late 2005, boasts a number of Blizzard *WORLD OF WARCRAFT* alums, including CEO Mark Kern.

Red 5's first game has found a publisher in South Korea-based Webzen, and the title is also the first to use the indie-developed Project

Offset engine. Although many developers at Red 5 are Blizzard veterans, the company isn't keen on making a me-too product.

"We're not going head-to-head with *WORLD OF WARCRAFT*. We're not doing a *WORLD OF WARCRAFT 2*. We're actually more interested in expanding this genre now that *WORLD OF WARCRAFT* has opened it up to gamers' eyes everywhere," Kern told *Game Developer*. "We're really trying to make games that appeal

to different parts of that gaming audience. We're only interested in creating original experiences, our own worlds, and our own stories. We don't do work-for-hire, and we don't do licensed games."

Although Red 5 has proved its worth to investors, the company won't be using that money to feed the glut of fantasy MMOs—something Kern cautions other developers against as well. "If [you're] a maker of epic RPG fantasy-

based MMOs, first of all, you're in an arms race," he said. "That's important to recognize. When Blizzard was developing *WORLD OF WARCRAFT*, Blizzard didn't have to just beat *EVERQUEST*—they had to beat *EVERQUEST* plus four expansion packs. So you're in this vicious cycle where you have to outdo the previous games over and over again, and it's at astronomical heights now."

Kern's advice to companies that want to try and directly take on Blizzard's seminal MMORPG: "If you're going into that arena, be prepared to go big or go home. And spend a lot of money doing it."

—Brandon Sheffield

# INDEPENDENT GAMES FESTIVAL FINALISTS

## FOR THE PEOPLE, BY THE PEOPLE

### MICROSOFT, WHOSE XBOX 360 HAS EMBRACED BOTH BIG

budget AAA titles and retro low-fi games, has started to put more development power into the hands of the populace. In

December, the company announced that anyone can build games, share them, and play them on the Xbox 360—provided they own Windows XP and have a subscription to the new XNA Creators Club.



The announcement came alongside the release of Microsoft XNA Game Studio Express, a home-users' game development tool based on Visual C# 2005 Express and Microsoft .Net Compact Framework. The software is downloadable and free to anyone. Membership to the Creators Club, however, costs \$49 for four months or \$99 for one year, but gives hobbyist developers access to thousands of game assets, whitepapers, starter kits, and technical support.

This month, to promote the open development arena, Microsoft is hosting a "Dream-Build-Play" contest, which is open to all XNA Game Studio Express customers on Windows as well as XNA Creators Club members. The winner's game will be published on Xbox Live Arcade, although complete details were not available as of press time.

Giving game developer pioneers the resources to fully produce and share work on a major console is a novel enterprise, and Microsoft's \$100 per year per person charge doesn't seem unreasonable, neither for subscribers nor for a profitable business plan. What remains unanswered is what type of community it will attract, be they students, hobbyists from other professions, independent developers, Xbox 360 devotees, or some other amalgamated bunch.

Games will become distributable to all Xbox 360 users, according to Microsoft literature, so long as a few requirements are met: 1) The intended recipient of the content must be logged in to Xbox Live and have an active subscription to the XNA Creators Club; 2) the recipient must have downloaded the XNA Framework runtime environment for the Xbox 360; and 3) the recipient must have XNA Game Studio Express installed on his or her own development PC.

Coinciding with the release of XNA Game Studio Express, XNA supporter GarageGames has launched an open beta for its Torque X platform, including Torque Game Builder. Based on the XNA Framework, the Torque X tools bring drag-and-drop development to Windows and Xbox 360. Final availability of the Torque X platform is scheduled for early 2007.

—Jill Duffy and Simon Carless

**WHAT'S UP-AND-COMING IN VIDEO GAMES DOESN'T NECESSARILY START OUT AS A** bloated \$5 million business plan. Innovation still exists among the little guys. Since 1998, the Independent Games Festival has been reminding game companies of the power of a great idea and a few dedicated developers. With more than \$50,000 awarded in cash and prizes, the IGF is not just a small victory in recognition, but a way for budding talent to secure a foothold in the industry. The IGF was created to encourage innovation in game development and to recognize the best independent game developers. It has grown in recent years to welcome student-created games, mods, and web-based games—so long as these are developed by independent gamemakers. The 2007 IGF finalists have been announced, and *Game Developer* congratulates them. For more information on the IGF, see the GDC Preview Guide (included in this issue).

—Jill Duffy



**AQUARIA** (top left) is a finalist in four IGF categories, while **ROBOBLITZ** (bottom left) is a finalist in two. **TOBLO** (top right) and **BLAST MINER** (bottom right) are finalists in the design innovation and technical excellence categories, respectively.



#### SEUMAS MCNALLY GRAND PRIZE

- AQUARIA**, Bit Blot
- BANG! HOWDY**, Three Rings
- ARMADILLO RUN**, Peter Stock
- ROBOBLITZ**, Naked Sky
- EVERYDAY SHOOTER**, Queasy Games

#### BEST WEB BROWSER GAME

- GAMMA BROS**, Pixeljam
- SAMOROST 2**, Amanita Design
- BUBBLE ISLANDS**, dot-invasion

#### EXCELLENCE IN AUDIO

- RACING PITCH**, Skinflake
- BONE: THE GREAT COW RACE**, Telltale Games
- EVERYDAY SHOOTER**, Queasy Games
- FIZZBALL**, Grubby Games
- AQUARIA**, Bit Blot

#### EXCELLENCE IN VISUAL ART

- CASTLE CRASHERS**, The Behemoth
- ROBOBLITZ**, Naked Sky
- AQUARIA**, Bit Blot
- GOLF?**, Luke Hetherington Company
- SAMOROST 2**, Amanita Design

#### DESIGN INNOVATION AWARD

- TOBLO**, DigiPen students
- EVERYDAY SHOOTER**, Queasy Games
- TORIBASH**, NABI Software
- ARMADILLO RUN**, Peter Stock

#### EXCELLENCE IN TECHNICAL

- ARMADA ONLINE**, EvStream
- BLAST MINER**, Cryptic Sea
- BANG! HOWDY**, Three Rings
- ARCANE LEGIONS**, Slitherine Software
- BUGS OF WAR**, NinjaBee

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### 2007 International CES

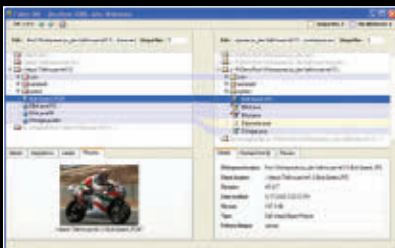
Las Vegas Convention Center (and surrounding venues)  
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[www.cesweb.org](http://www.cesweb.org)

### D.I.C.E. Summit

Green Valley Ranch Resort  
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Perforce Folder Diff

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And when you've been working offline, Folder Diff makes it a snap to reconcile and catch up with the Perforce Server when you get back online.

Folder Diff is just one of the many productivity tools that come with the Perforce SCM System.



# AUTODESK'S 3DS MAX 9

By Ronnie Ashlock

**IN THIS FIRST UPDATED RELEASE SINCE** Autodesk's acquisition of Alias, 3ds Max 9 has become a friendlier tool. There's no one standout new feature in Max 9, nothing to make an artist's jaw drop, but enhancements in ease of use, performance, and stability, alongside improvements to modeling, rendering, scene management, and animation are welcomed upgrades to this toolbox staple.

## HINT O' MAYA

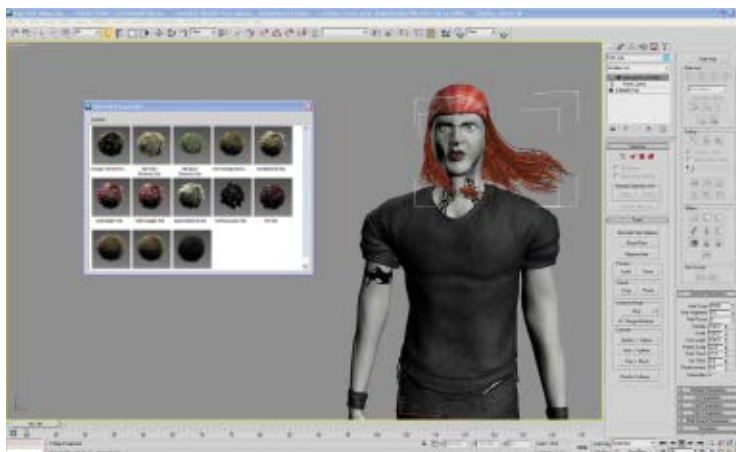
While version 9 may look like the same old Max, the software has taken on some Maya-esque touches. The most apparent change is a welcome screen that fires up when you first start the program. It's a first for Max, but is very reminiscent of the initial splash screen Maya users have been greeted with for some time now. New Quicktime movies that can be played from the welcome screen are right out of the Maya playbook, too, although experienced Max users will likely dismiss them altogether, since they can be turned off easily. New Max recruits will appreciate these movies, though, as they help to illustrate Max's basic concepts rather quickly.

Similarly, Max 9 has adopted the Maya convention of putting project files in the user folder branch of Windows. Instead of nesting all project-related folders in the main "Autodesk/3ds Max 9" directory located in Program Files, most of the working folders are now located in the user's "My Documents," similar to how it's done in Maya.

Also in the file department, support for the .FBX format has been improved, offering a very good method of file translation between Max, Maya, and MotionBuilder. The new Viewport Statistics feature, which displays poly, edge, and vertex count along with frames per second up display. Users can configure the display to show only the data they want to see.

## BIT O' CHOICE

3ds Max now comes in two flavors: 32- and 64-bit. Having a hard time deciding whether 64-bit is right for you? You're in luck. Max 9 ships with both versions on the



With version 9, 3ds Max now has improved features for Hair and Cloth.

same disc, and licensing for either version is identical. Moving from one version to the other is relatively easy if your hardware changes mid-project. This is a good move on Autodesk's part, since 64-bit adoption continues to spread but is not necessarily a forgone conclusion for many companies, for many reasons.

The 64-bit Max is designed to utilize the increased computational power and more robust memory management of 64-bit systems. For artists, this means greater performance in handling larger scenes and more complex models. With the floodgates of next-generation consoles opening wide, most developers will appreciate the increases afforded by 64-bit systems.

Even though 64-bit offers the greatest performance advantage, Max 9 has been dramatically optimized and stabilized for those of us still using good old 32-bit systems. The biggest performance difference over older versions of Max can be seen when handling large, detailed meshes. Complex, high frequency meshes no longer bring performance to a grinding halt, as was the case in Max 8. Now, complex meshes imported from a sculpting program (such as Zbrush 2) are much easier to manipulate.

Surprisingly, even really dense meshes can be edited with startling fast feedback, especially compared to the performance

of versions 7 and 8 (better late than never, I suppose). The new Bitmap Proxy feature also increases performance in the viewport by cleverly letting users down-sample and replace high-resolution textures with low-resolution proxies.

## TOUCH O' BOOLEANS

One of the handiest features included in 3ds Max 9 is the ProBoolean and ProCutter compound objects, which were released in 2006 as an extension to Max 8 subscribers. Hard surface and environment modelers will get a ton of use from these objects since Boolean cuts and joins are common but often difficult to get right and almost always require extensive clean up. The new tools intelligently make elegant cuts and minimize the nasty artifact geometry usually created in the Boolean process. Less time spent eliminating thin, crazy triangles means more time for other creative endeavors.

Animators can avail themselves of the new layering system in order to blend multiple tracks of animation onto a single object. Animators will also appreciate the new Point Cache Modifier, which bakes the vertex transformation data to disk rather than having Max evaluate each actual modified keyframe when playing an animation back, offering a significant

## AUTODESK



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## SYSTEM REQUIREMENTS

- For 32-bit operating systems: Microsoft Windows XP Professional (Service Pack 2 or higher) or Microsoft Windows 2000 Professional (Service Pack 4).
- For 64-bit operating system: Microsoft Windows XP Professional x64.
- Microsoft Internet Explorer 6 or higher.
- DirectX 9.0c.

[See web site for minimum requirements for hardware on both 32- and 64-bit systems.]

## PROS

1. Greater integration with MotionBuilder and Maya.
2. 64-bit system support; increased performance and stability for 32-bit.
3. MentalRay, Cloth, and Hair is easier than ever to use.

## CONS

1. Some features aren't new to those on subscription.
2. Lack of new jaw-dropping features leaves artists with fewer compelling reasons to convince the bean counters to buy the upgrade.
3. Why did it take so long to get fast and stable with big meshes?

increase in playback speed. The Point Cache data can also be applied to more than one object with adjustable variables, such as start time and strength. The net result is a more random-appearing version of the exact same animation.

Additionally, the .FBX file exchange format can leverage 3ds Max's Point Cache system and the new Mesh Caching system in Maya to transfer models with baked-in animation, allowing for the interchange of complex animated objects from Maya to 3ds Max and vice versa.

## HEIGHT O' FASHION

Major improvements to both Hair and Cloth now let cinematic artists fashion their characters directly in the Viewport and preview them fairly accurately without the need for a full render. Styling hair without popping into a separate module gives the greatest speed boosts. And hair can now be rendered with any type of light, not just hair lights.

Cloth also benefits from a performance and usage overhaul. It's now possible to change the fit of a cloth object using edit mesh modifiers even after the cloth has been simulated. These alterations can be

tailored into the actual cloth simulation without having to completely start over.

New to Max 9, the stretch and cling properties will also prove useful for simulating wet cloth or for any simulation in which cloth adhesion and drag would have otherwise been very difficult to pull off.

Mental Ray 3.5 has also been greatly improved in terms of speed and ease of use. There are several pre-built Mental Ray shaders and lighting solutions that can be deployed in just a couple of clicks.

With improved stability and performance, Max 9 is a worthy, but not sexy upgrade. Like it has for years now, Max continues to offer one of the strongest, out-of-the-box 3D solutions available and represents an incredible value for the money.

**RONNIE ASHLOCK** is an artist for Sony Online Entertainment's Seattle studio where he is currently working on an unannounced project. Email him at [rashlock@gdmag.com](mailto:rashlock@gdmag.com).

## PERFORCE SOFTWARE INC.'S PERFORCE VERSION 2006.1

By Tom Whittaker  
Perforce is quickly becoming the de facto product for source control or software configuration management (SCM) in the video game industry. It's so ubiquitous, in fact, that one may have a hard time finding software developers—small and large—who aren't using it. The reason is Perforce is fast, reliable, and evolving.

Version 2006.1 holds several new features, including Visual Studio 8.0 integration, RSS feeds through the web client, upgrades to its branching and merging system, and new plug-in extensions for digital content creation tools. What used to be the purview of software engineers and their source code is now being used for digital assets, development auditing, production management, and automating development tasks.

## SCM TOOLS

Perforce is based on a client/server model. The server software runs on most major systems including Unix/Linux and Windows. It contains the file repository with version and history information. A

single person can maintain the Perforce server even in a large development environment. Administrative tasks include user and client maintenance, permissions/protections, backup and recovery, and performance tuning.

The client software includes command line and graphical tools. The Perforce Visual Client, P4V, is an updated cross-platform GUI which replaces the Windows Client, P4Win. P4V provides a consistent graphical interface on Windows, Mac OS X, Linux, Solaris, and FreeBSD. It provides the controls for all client-side operations including check-in, check-out operations.

A new Time-lapse View tool lets you quickly flip through file revisions via a slider—an invaluable tool for tracking down code changes—and a custom tool interface allows new tools and scripts to be added easily to P4V.

P4Merge, the visual merge tool, gives the user the ability to resolve conflicts from concurrent changes in a file that can't be resolved automatically. Like other components, P4Merge is improved over previous versions, but as always you still have the option to use external merge tools.

Command line tools, while not as flashy as their GUI counterparts, provide the flexibility to script complicated operations. Major new additions to P4V are scheduled for early 2007. There is also a web-based client, P4Web, which provides convenient access to versioned files through popular web browsers.

Overall, Perforce shines in its ability to integrate with your development tools.

## PERFORCE FOR THE PIPELINE

Perforce provides plug-in integration with various content creation packages. The Perforce Plug-in for Graphical Tools, P4GT, gives artists access to version control from within Adobe Photoshop, 3ds Max, Maya, and Softimage XSI. A Microsoft Office plug-in works great for tracking production and design documentation. If the tools provided don't meet your needs, Perforce also has an API available for writing custom tools, which includes support for Perl, Ruby, Python, Java, and C/C++.

Perforce has the capability of appearing transparent to your team while still maintaining all the security and reliability

## PERFORCE



### STATS

#### PERFORCE SOFTWARE INC.

2320 Blanding Ave.  
Alameda, CA 94501  
510.864.7400  
<http://perforce.com>

### PRICE

\$800 per user, with discounts after 20 users

### PLATFORMS SUPPORTED

Apple Darwin PowerPC, Apple Darwin x86, Apple Mac OS X PowerPC, Apple Mac OS X x86, Cygwin x86, FreeBSD Alpha, FreeBSD x86, FreeBSD x86\_64, HP Open VMS Alpha, HP-UX IA64, HP-UX PA-RISC 2.0, IBM AIX PowerPC, Linux IA64, Linux PowerPC, Linux x86, Linux x86\_64, Microsoft Windows IA64, Microsoft Windows x64, Microsoft Windows x86, SGI IRIX MIPS, Sun Solaris x86\_64, Sun Solaris SPARC, Sun Solaris x86, Tru64 UNIX Alpha.

### FILETYPES SUPPORTED

Plain text, binary, RCS format for text, compressed data for binaries, symbolic link, Unicode, text with execute bit set, binary with execute bit set, text with keyword expansion, Macintosh resource fork. [See web site for additional information.]

### PROS

1. A fast, reliable, and proven technology that's integrated into many third-party applications.
2. Constantly evolving to support customers (auditing, time-lapse view, API).
3. No longer just a source code control system.

### CONS

1. Terminology can be confusing to new users.
2. VS8.0 integration has some minor issues.
3. Image viewer only shows one image.



## Made with Unreal® Engine 3

**Over 2,000,000 units sold world-wide in under six weeks!**

Official Xbox Magazine **10/10**      1Up.com **10/10**

GameSpy **5/5**      Game Informer **9.5/10**

GameSpot **9.6/10**      Xplay **5/5**

# What could your studio do with this technology?



For engine licensing inquiries please  
email: [licensing@epicgames.com](mailto:licensing@epicgames.com)

For Epic job information visit: [www.epicgames.com/epic\\_jobs.html](http://www.epicgames.com/epic_jobs.html)

[www.epicgames.com](http://www.epicgames.com)



of revision control. This includes triggered builds, automated systems, nightly builds, assets check, and support for software development methods. The Perforce web site hosts several papers and tools to help you integrate the system into your workflow; direct support is also available.

Perforce's Windows Explorer integration is a really useful tool—it enables the user to execute Perforce commands from a context menu. Gone are the days when you modified the read-only flag on a file, or lost a version of an art file, or an older version of your game. Perforce is fast and reliable, and once it's integrated, you hardly even notice it's there—though you'll never be able to work without it again.

Perforce easily maintains digital

assets revisions and can handle large binary files generated from content creation tools. Unlike source code, digital content cannot be easily merged or directly compared with previous versions, but there is thumbnail viewing in P4V. One missing feature is the ability to display two revisions in the thumbnail viewer, a very minor point since developers generally need to look at the asset in the content tool anyhow.

A Perforce Review Daemon can notify users when files have changed in the depot. This feature can facilitate communication or development processes such as task or bug tracking. Reporting support provides invaluable information for tracking development progress. P4Report supports Crystal Reports, Microsoft Access, and Excel. SQL

queries are supported through a client called P4SQL.

Combining Perforce's metrics with your current software development process can result in invaluable insights into your development process. The benefit of using these reports is they can help you more accurately target your development milestones.

### CORE CONTROL

Perforce is a proven product, with its value quickly outpacing its cost in almost all cases. It pays for itself in terms of reliability, performance and integration. There are free alternatives, but with the rich feature set of Perforce, you definitely get what you pay for.

If you're not currently using Perforce for source control I

recommend evaluating the tool through the company's free trial license, which includes access to customer support. Perforce also offers a completely free version for two users and five workspaces, so it's great for personal use, too.

As of press time, Perforce was preparing to release Perforce version 2006.2, which includes server enhancements, updates to several client tools, and integration between the Perforce jobs subsystem and the defect tracking component of Mercury Quality Center 9.0. See [www.perforce.com](http://www.perforce.com) for details.

**TOM WHITTAKER** is a programmer at Firaxis Games. You can reach him at [twhittaker@gdmag.com](mailto:twhittaker@gdmag.com).

## product news

### NATURALMOTION'S ENDORPHIN 2.7

[www.naturalmotion.com](http://www.naturalmotion.com)

This point release from NaturalMotion adds new features to the endorphin animation software, such as a Maya plug-in control panel and fluid effects, allowing characters to interact with liquids. Endorphin 2.7 costs \$9,495 for new customers, though existing ones can upgrade for free. The company also has a rental-based option for endorphin at \$1,195 per month.

### AUDIOKINETIC'S WWISE 2006.3

[www.audiokinetic.com](http://www.audiokinetic.com)

An updated version of the integrated audio pipeline solution Wwise now readies it for PlayStation 3 game development. The new release also supports the Perforce source control software via a plug-in and comes with an SDK that allows for source control. Additional enhancements include Compressor, Expander, and Peak Limiter features.

### REALVIZ'S STITCHER UNLIMITED 5.5 DS

[www.realviz.com](http://www.realviz.com)

Realviz, an image processing software developer, has released Stitcher Unlimited 5.5 DS, the latest in the company's line of panorama software. Stitcher allows artists to create wide-angle panoramas for the web, film, print, and 3D. Version 5.5 now includes the ability to automatically stitch two-shot fisheye photos, providing a specialized

solution for anyone working in immersive imaging. Also new to version 5.5 is the ability to create virtual tours and display them using QuickTime.

### ANARK CORPORATION'S GAMEFACE VERSION 3.7

[www.anark.com](http://www.anark.com)

An enhanced workflow for game artists and performance upgrades for game engineers marks the updated release of this UI authoring tool. The software also now supports the Collada file format, which allows for direct data transfer of animation from 3ds Max or Maya. Enhancements also were made for speed and increased memory management.

### ILLUMINATE LABS' TURTLE 3

[www.illuminate.com](http://www.illuminate.com)

Turtle 3 is a rendering and baking application designed for game developers that supports Maya 7 and 8 for Windows, Linux, and Mac OS X. Version 3 adds 64-bit support for Linux and Windows. Turtle 3 pricing starts at \$1,199 per license plus a \$499 maintenance fee, with discounts available for volume purchases. A free 30-day trial is available from Illuminate Labs' web site.

### SLICKEDIT'S SLICKEDIT GADGETS

[www.slickedit.com](http://www.slickedit.com)

SlickEdit, which makes software by the same name, has added free gadgets for Visual Studio 2005.

Editor tools—comprising a line ruler, indentation guide, auto-copy selection, and editor graphic—help programmers monitor, explore, and inspect the contents of their code. A Command Spy (which monitors executed commands), File Explorer, Data Object Analyzer, and SLOC Report, which counts the total lines of code, are also now available.

### SANDIO TECHNOLOGY CORPORATION'S 3DEASY

[www.sandiotech.com](http://www.sandiotech.com)

3DEasy is a new software development kit and 3D mouse from Sandio Technology that will let PC game developers create new game mechanics using three axes. The six-degrees-of-freedom mouse may be the first commercially available device of its kind targeted at consumers at a reasonably low price point of \$79.99.

### NVIDIA'S NVIDIA CUDA

[www.nvidia.com](http://www.nvidia.com)

Nvidia CUDA is a new architecture for computing on Nvidia GPUs and the industry's first C-compiler development environment for the GPU. Cuda uses a new approach to computing in which hundreds of on-chip processor cores simultaneously communicate and cooperate to solve complex computing problems. The technology is available on GeForce 8800 graphics card and will be available for future Nvidia Quadro Professional Graphics solutions. ❖

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Programming Tools



Game Innovation  
of the Year



Best of Show:  
Innovator of the Year



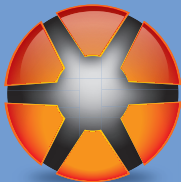
Game Studio Express  
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[msdn.com/xna](http://msdn.com/xna)



**“Checked in” tells you nothing.**  
 Your configuration management tool should tell you more.

**New Surround SCM 5 does.**



Seapine  
**Surround SCM<sup>®</sup> 5**  
 Software Configuration Management

New Surround SCM 5 with change automation and custom metadata gives you more control over your software change process and a clearer view of the state of files.

Know whether a file you are including in the build has been code reviewed. Ensure design documents have been through the review process. Control who can make changes to files after they have been approved.

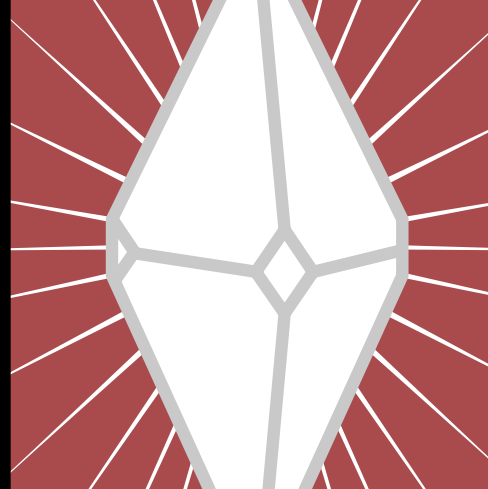
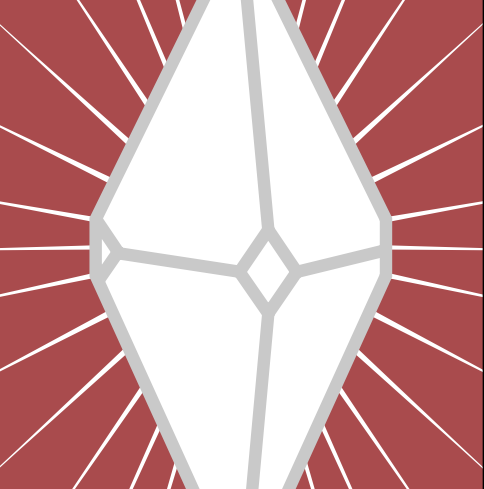
Surround SCM 5's virtual branches and collaboration features help streamline parallel development. There's never been a better time to change to Surround SCM—the next evolution in SCM.

- Create workflows to ensure changes to files follow your processes.
- See beyond “Checked in” to know the true status of files in the change process.
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# THE GAME DEVELOPER

# 2006

# FRONT LINE AWARDS

## ➤ BETWEEN THE WAVE OF PRODUCT ANNOUNCEMENTS THAT COME OUT OF GDC IN MARCH AND SIGGRAPH IN

August, January marks the annual *Game Developer* Front Line Awards, a time for reflection and meditation. Although making games is born first of love, it is, after all a job. And when there's work to be done, developers need the right tools to do it.

The Front Line Awards, which recognize excellence in gamemaking hardware and software, honor those tools. Five finalists are chosen over seven categories, and one product per category is given the esteemed award. Additionally, each year we induct one special product into our Hall of Fame, an honor that shows the product has stood the test of time and has been integral to developers' work for five years or more.

Nominations for the Front Line Awards were open to all new products and new versions of products related to game development released between September 1, 2005 and August 31, 2006. Finalists were selected by the editors, whose decisions were greatly influenced by previous reviews of products, comments from tools customers, and the opinions of the Front Line Award judges. Winners were selected by a panel of judges comprising professional game developers. Because some products (including engines and some middleware tools) are too immense to properly evaluate in a short time frame, feedback from users, licensees, and published reviews also informed the selection of winners.

The following criteria were used in the evaluation process: relevancy to current and next-generation game creation, ease of use, speed of output and/or responsiveness, value, and quality.

Congratulations to the finalists and winners.

—Jill Duffy

The Front Line Awards would not be possible without our panel of judges, whom we sincerely thank. We also thank Troy Humphreys for his contribution.

## JUDGES

Tom Carroll  
Bijan Forutanpour  
Ron Fosner  
Brad Kane  
Spencer Lindsay  
Noel Llopis  
Justin Lloyd  
Tom Long  
David March

*Game Developer* also thanks users and licensees of many of the products who submitted anonymous comments, which were integrated into the judging process.



## Hall of Fame

### VISUAL STUDIO

MICROSOFT

[WWW.MSDN/MICROSOFT.COM/VSTUDIO](http://WWW.MSDN/MICROSOFT.COM/VSTUDIO)



#### MICROSOFT VISUAL STUDIO HAS PROVEN

itself as indispensable to game development as the mouse or keyboard. Truly, Visual Studio is the go-to Swiss Army knife for developers who have relied on its debugging, build management, file editing, and other essential capabilities for years.

In 1997 Microsoft released version 5.0 of what was formerly called Microsoft Visual C++, renaming the product line "Visual Studio." They beefed up the compiler, over-hauled the IDE and editor, and combined many tools into a single, though still not integrated, development suite.

By 1998, with the decline of Symantec and Borland as the two dominant compiler developers on the Microsoft platform, version 6.0 of Visual Studio was released. It became the development environment of choice for almost all PC game development.

With the advent of Visual Studio .NET 2003/2005, the complete integration of all of Microsoft's development languages into a single integrated environment, a powerful editor coupled to a new scripting language, some of the best third-party extensions on the market, and some of the best compiler output available, it is the only sane, and certainly the easiest choice for most game development on any of Microsoft's platforms, be it XP, Vista, Xbox or Xbox 360.

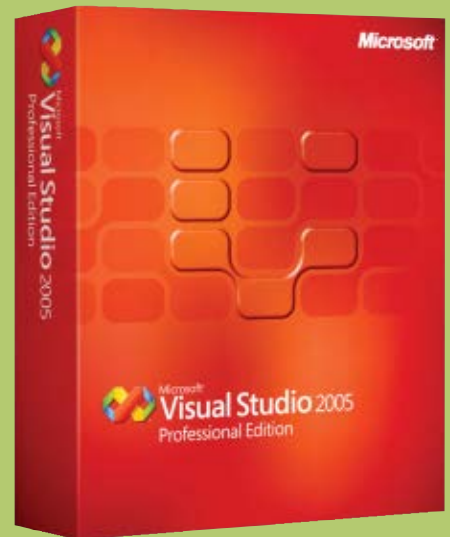
With the mature feature set of the current version, the introduction of Microsoft XNA, the future of Visual Studio (codenamed Orcas) appears to have a strong market position for game developers across all platforms for at least the next generational cycle.

#### TOP 5 REASONS GAME DEVELOPERS LOVE VISUAL STUDIO

**1 DEBUGGING.** Visual Studio's debugger has a simple interface and provides many powerful features for finding and following the trail of clues leading to the root cause of a bug. Fixed or conditional breakpoints may be set for stopping the flow of execution. The call stack window allows easy access to different stages of a calling sequence and automatically navigates to the appropriate file and function with the click of a button. The Watch and Locals windows are invaluable, providing an easy interface for viewing data values.

**2 BUILD MANAGEMENT.** Anyone who has ever had to create and maintain Makefiles in a Unix-like environment knows how quickly a nightmare can unfold. Visual Studio's Configuration Manager and Project Properties management are a godsend, providing a GUI for managing simple and complex build configurations. The value of build management quickly becomes evident, as games need to be built for different hardware platforms and different internationalization requirements.

**3 FILE EDITING.** While there are many commercial text editors available, none are designed for editing thousands of files that often cross-reference each other on a large scale. But games can grow to well over one million lines of code, spread over dozens of libraries and thousands of files.



**4 MEMORY LEAK REPORTING.** This relatively new feature was added in the past few versions of Visual Studio. Upon exiting the running application, Visual Studio prints out a report on potential memory leaks. Finding and fixing bugs is difficult enough, so every hint and tip Visual Studio can provide helps.

**5 GRAPHICAL USER INTERFACE DEVELOPMENT.** From Win32 Resource Editing, to Microsoft Foundation Classes, to Windows Forms in no less than three programming languages, Visual Studio is the tool to use for designing and building tools for game artists and designers. The UI is open enough to allow third-party developers to add new kinds of controls.

*Game Developer* hereby welcomes Microsoft Visual Studio into the Front Line Awards Hall of Fame.

—Bijan Forutanpour and Justin Lloyd





# Art Tools

## MODO 202

LUXOLOGY

[WWW.MODO3D.COM](http://WWW.MODO3D.COM)

**MODO 202 FROM LUXOLOGY STANDS OUT AS ONE** of the most impressive SDS modelers around the game development block. Since modo was first displayed at Siggraph in 2004, 3D artists have kept their eyes on this tool and the group of former LightWave 3D software developers who created it.

Version 202 gave graphic artists 42 percent faster rendering speeds than version 201. In the modeling box, modo 202 added a new SubDiv option to the Pen tool, as well as a tool that adds thickness to geometry. For modelers specifically in the game industry, Luxology tossed in “game” and “unitless” grids. And a new UV display mode highlights unwanted overlaps in the UV editor. Improvements were also made to painting abilities and workflow.

Luxology has also kept Mac users happy by offering modo on their platform of choice early on. Support for Intel-based Macs followed shortly thereafter.

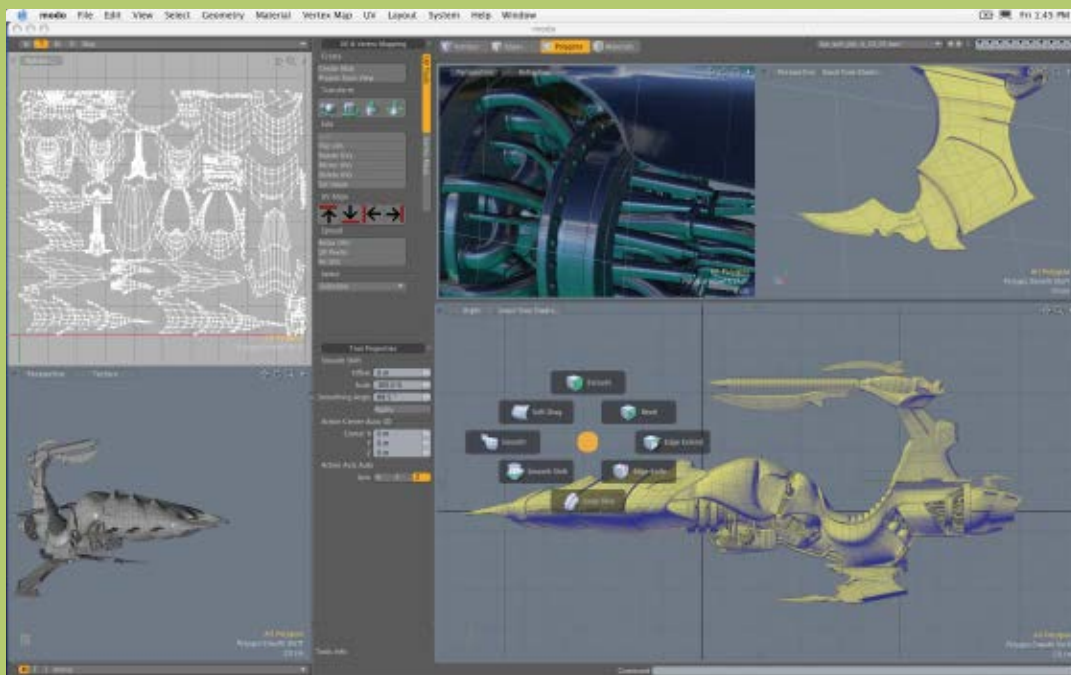
Modo is beloved by visual artists for its extensive collection of video tutorials, online help forums, and solid documentation. Having a very reasonable price tag [\$895 for new users] doesn't hurt either. Luxology offers a free 30-day trial of modo 202 on its web site; and while you're there, take a look at the gallery of posted work from artists of all walks of life, from video games to industrial design.

For a complete review, see the November 2006 issue of *Game Developer*.

—staff

### Art Tools Finalists

Maya 8, Autodesk  
Corel Painter IX.5, Corel  
Softimage FaceRobot, Softimage  
MotionBuilder 7.5, Autodesk



# THE 2006 FRONT LINE AWARDS



## Engine

### UNREAL ENGINE 3

EPIC GAMES

[WWW.UNREALTECHNOLOGY.COM](http://WWW.UNREALTECHNOLOGY.COM)

#### Engine Finalists

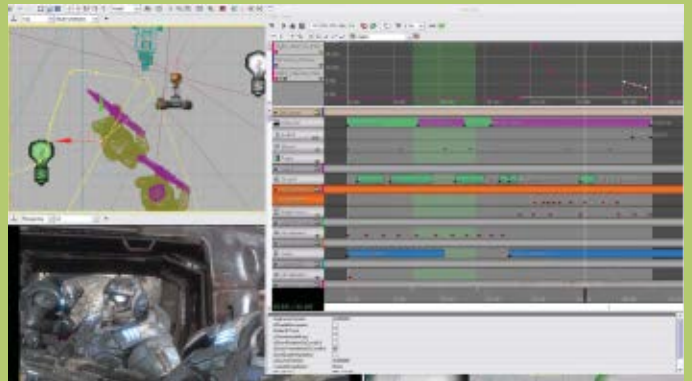
Torque Game Builder 1.1.1, GarageGames  
Valve Source Engine, Valve  
HeroEngine, Simutronics Corporation  
Gamebryo 2.2, Emergent

**UNREAL ENGINE 3 IS THE BEST ENGINE ON THE MARKET FOR MAKING** games on PC, Xbox 360, and PlayStation 3. **GEARS OF WAR**, already declared one of the best-looking games to date, stands as the showcase game for Epic's engine. Unreal Engine 3 is licensed widely, with everyone from Electronic Arts to Microsoft Game Studios to Midway on board.

Epic has been lauded in the past for its responsive support, and that trend continues today. Developers also appreciate the state-of-the-art graphics renderer, AI framework, and full source code.

While some still debate whether Unreal Engine 3 holds up 100 percent of the time in 100 percent of its facets, it's still heads above the competition.

—staff



## Programming Tool

### PERFORCE 2006.1

PERFORCE SOFTWARE

[WWW.PERFORCE.COM](http://WWW.PERFORCE.COM)

#### Programming Tools Finalists

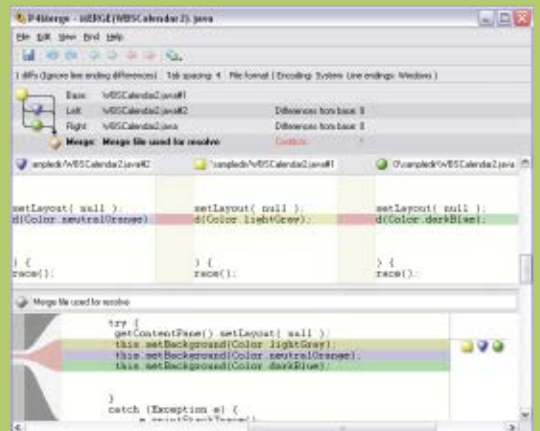
XNA Game Studio Express, Microsoft  
NVPPerfKit2, Nvidia  
IBM Rational Purity Plus v7.0, IBM  
DevTrack 6.0, TechExcel

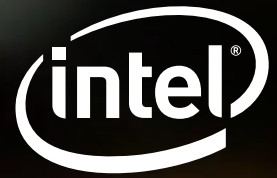
**PERFORCE REMAINS ONE OF THE BEST** version control systems around. It easily gobbles up gigabytes of files and handles them effortlessly. Perforce is just the ticket for developers who have multiple projects or multiple branches all under development. The tool makes it easy to keep track of versions and easily split off branches, then reintegrate them back into your main source trunk. It supports multiple operating systems and comes in GUI, web-client, and command line flavors, as well as an Explorer plug-in which makes it all the more accessible. It's easily integrated into Visual Studio, CodeWarrior, JBuilder, Eclipse, and other IDEs. Like most smart software configuration management systems, Perforce will

automatically attempt to merge changes made to the same file in an intelligent manner and will only require assistance when the same lines were edited. It's got a fairly good "diff" tool, and the merge tool is helpful for visually inspecting those files that have conflicts that Perforce can't figure out. Perforce can also be integrated into defect tracking systems, like SourceForge or Bugzilla. This allows you to automatically associate a check-in with a bug fix.

It's a client-server product—even on a single machine—but installation is straightforward. Solo developers (and free trial junkies) can download a single-user version gratis. For a complete review, see Skunk Works, page 7.

—Ron Fosner





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# THE 2006 FRONT LINE AWARDS

## Middleware

AI.IMPLANT  
ENGENUITY TECHNOLOGIES INC.  
WWW.AI-IMPLANT.COM

### Middleware Finalists

- SpeedTree 4.0, IDV
- Havok FX 4.0, Havok
- Euphoria, NaturalMotion
- Kynapse SDK 4, Kynogon SA



### AI.IMPLANT GIVES GAME DEVELOPERS

the option of using AI in their projects without having to create it themselves from scratch. There's a good selection of AI decision logic solutions included, and the feature tools are equally plentiful.

Engenuity has impressed its clients by providing clean, easy to follow, and well documented source code, a rarity among middleware providers and in code bases in general. The full accessibility to the code, alongside good documentation, allows programmers to solve problems quickly by simply digging into the source.

AI.implant's navigation is far better than that other pathfinding solutions

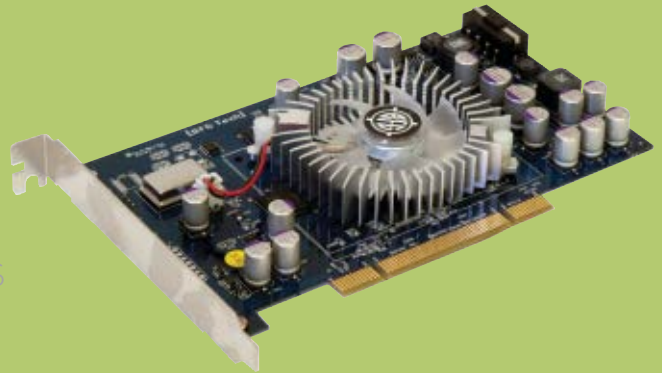
found in major licensed engines. AI.implant's API uses navigation meshes, which are just a better way to describe the walking surface with the least amount of cells (nodes) to process in pathfinding algorithms. The dynamic path refinement works pretty well, too.

Because it's relatively new to game development, AI.implant is still being tweaked, but Engenuity's support is thorough enough to mitigate the pain of being a new kid on the block.

—Troy Humphreys, contributor

## Hardware

PHYSX  
AGEIA AND BFG TECHNOLOGIES  
WWW.BFGTECH.COM/PHYSX



### Hardware Finalists

- FireGL V7300, ATI
- GEForce 7950GX2, Nvidia
- Alienware Mj12, Alienware
- Xbox 360 XMA Audio Decompression Hardware, Microsoft

### BEING THE FIRST OF ITS GENERATION ON THE MARKET, IT'S

difficult to predict how strong of an impact Ageia's PhysX physics processing unit (PPU) will have on game developers during the next couple of years—but the excitement to try it is palpable.

Looking back, I recall the 3Dfx Voodoo, the groundbreaking video card that set a new standard for manufacturers and developers. I remember arguing quite vehemently with another lead programmer around that time that 3D graphics cards would become the norm in desktop PCs within five years, while he maintained that general purpose CPUs would become faster and eventually out-perform dedicated 3D cards. 3Dfx's Voodoo was

released to too much acclaim and excitement in 1996 and as they say, the rest is history.

Will Ageia's offering stand up to the same market pressures? I cannot say whether Ageia will be around in 10 years time, but I do know with a certainty this: Physics processors in whatever form, will most certainly be the "next big thing" in terms of hardware development for computer games. If you are designing a typical next-generation game to be released in 2010, the game will make use of a dedicated PPU just as surely as it makes of a dedicated GPU.

—Justin Lloyd

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#### CONTACT AND INFORMATION

BRIAN MCNELIS | (310) 867-8044 | BMCNELIS@LAKESHOREENTERTAINMENT.COM  
[HTTP://WWW.LAKESHORE-RECORDS.COM/B2B/COMPANY\\_PROFILE/](http://www.lakeshore-records.com/B2B/COMPANY_PROFILE/)

## Books Finalists

*Better Game Characters By Design*, by Katherine Isbister,

Morgan Kaufmann, June 2006

*3D Game Textures: Create Professional Game Art Using Photoshop*,

by Luke Ahearn, Focal Press, February 2006

*Half-Real: Video Games between Real Rules and Fictional Worlds*,

by Jesper Juul, The MIT Press, December 2005

*Game Writing: Narrative Skills for Videogames*,

by Chris Bateman, Charles River Media, June 2006

## Books

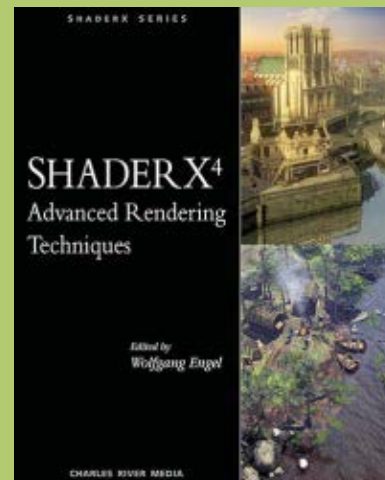
### SHADERX4: ADVANCED RENDERING TECHNIQUES

WOLFGANG ENGEL (ED.), CHARLES RIVER MEDIA, JANUARY 2006,

[WWW.CHARLESRIVER.COM](http://WWW.CHARLESRIVER.COM)

**SHADER X4 IS THE FOURTH IN THE POPULAR SERIES EDITED BY WOLFGANG ENGEL,** and without question it is the most comprehensive and accessible volume yet. A compendium of 43 articles by authors plucked from both the corporate world and academia, each article focuses on a particular aspect of real-time shading. Separately they offer the casual observer (if there is such a thing) a picking list of valuable information; together they provide an abundance of ideas for developing rendering engines and demo projects that will satisfy even the deepest of deep thinkers. In an industry that changes technology almost as quickly as Paris Hilton changes wardrobe, Engel's *Shader X4* will allow any professional thirsting for technical knowledge to slake that thirst before the information has become dated. The section on simulating cloth effects via the GPU is especially helpful for interactive developers who want to provide an audience with what was once exclusively the purview of high-end films. Other sections that center on effective shadowing, global illumination, real-time caustics, and weather and damage effects are loaded with easy to follow tips and time saving tricks.

—Tom Carroll



## Audio Tools

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documentation that's roughly 600-pages long, but is highly organized, completely browse-able, and supplemented with a downloadable video tutorials. And while programmers are still needed for some implementation, Wwise does a great job of more directly connecting audio developers right into the game being made.

—staff

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# SETTING THE BAR

## ESTABLISHING BUG CRITERIA TO SAVE TIME, MONEY, AND SANITY

**GAME BUGS ARE NOT CUT-AND-DRIED. THERE'S ALMOST ALWAYS** a gradation of severity, from "genuine defect" to "subjective opinion." Which bugs are worth your time and effort to fix and which should you not care about?

The typical approach is to enter all potential issues (however minor) into a database and allow the triage team to sort them out later. But this method can be a waste of time and money. It can frustrate the developers and often prevents the team from finding and fixing important issues in a timely manner.

We've examined the costs associated with tracking trivial bugs and propose an alternative: let the project leads establish solid bug criteria from the beginning of the project to minimize the number of unnecessary bug reports.

### COSTLY BUGS

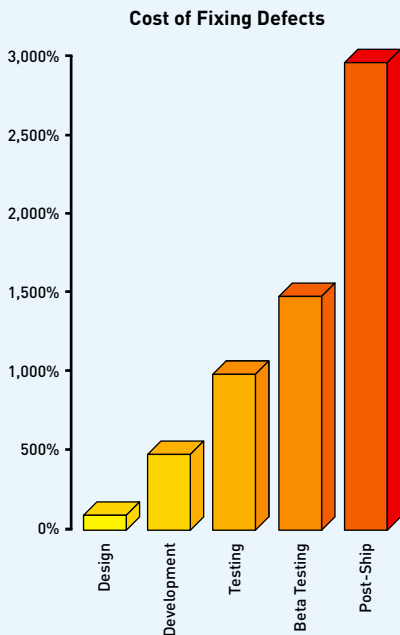
Most developers are familiar with the image in Figure 1 (page 24), which shows how the cost to fix a given bug increases over the project cycle. The premise is that fixing a bug early, or taking steps to prevent it in the first place, is less expensive than completely reworking a system during the polish phase, which in turn is less expensive than learning about it from the customer through product support or a hostile message board posting. We've seen this principle proven time and time again.

But perhaps this diagram represents only half the picture. It focuses on the cost of fixing a bug too late. Might there also be a cost associated with reporting a bug too early?

Every time someone on the project team interacts with a bug report, it costs time. Testers spend time carefully

---

**CHRIS HIND**  
and **DAN BELL**  
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**FIGURE 1** Revising game design is less expensive than rewriting code; finding and fixing bugs is less expensive than a product recall.

time from the team. Even when a bug is fast-tracked through the system (reported by the tester, reviewed by a developer, and closed by the tester) it takes a minimum of 30 minutes to resolve each bug report!

By the end of a project, many bugs share similar fates of waiting for a “won’t fix” or “by design” closure. By some accounts, the number of “won’t fix” bugs may be as high as 15 percent. For a complex and lengthy project, this translates to hundreds or even thousands of bug reports. If a project ends with 20,000 bugs, with 3,000 of them tagged as “won’t fix,” the total cost is 37 workweeks! Even on projects in which the total number of reported bugs tops out at about 5,000, that could still equate to nine workweeks.

### USING BUG CRITERIA

“Won’t fix” bugs often represent disconnects between the development team’s expectations and the test team’s assumptions. This is particularly common when a developer uses external testers, such as outsourcing to a contract test agency, leveraging the publisher’s testing resources, or running the game publicly in beta.

To reduce the number of “won’t fix” bugs, project leads need to breach this disconnect by identifying which bugs are worth the time and effort to flag, and which aren’t worth fixing.

The project leads need to establish solid bug criteria, or a “bug bar,” from the beginning. A bug bar is a threshold measure for common issues such as clipping, performance, lip-syncing, realism, audio quality, and so on. It guides the test team by telling them what’s most important; it prevents the triage team from slogging through hundreds or thousands of “won’t fix”

verifying the issue and writing the bug report. Producers review the bug and assign it to the appropriate developer. Developers review the bug each time they refresh their queues of bug-fixing tasks. If the bug remains active for long enough, the original tester may be asked to retest it to verify that it is still a valid issue.

In the last months of the project, a triage team (typically three or more project leads) evaluates each active bug and decides its final fate.

Figure 2 illustrates the lifecycle of a bug. “Don’t fix” includes the possibility of postponing the fix to a later milestone. If this happens, a bug may loop through the “don’t fix-retest-triage” cycle numerous times before it’s resolved.

Each interaction with a bug report costs between five and 20 minutes. The earlier a questionable bug is logged, the more often you have to interact with its bug report. By our estimates, each trivial bug can cost up to an hour of collective

bugs later on; and it can diminish frustration all around.

What does it mean to set bug criteria? Think of the bug bar as a “you must be this tall to ride” board at a theme park. Each bug should have to meet or exceed a bug bar before being allowed on the roller coaster that is the project cycle. Little bugs are turned away so that bigger bugs spend less time waiting in line.

Basically, the bug bar is a set of restrictions on the types of issues that the team will accept as real bugs. The test team can use these criteria to pre-triage their bugs before they ever report the issue. Instead of expecting someone else to ask, “Is this really a bug we should spend time fixing?” our process has the testers first ask “Should we invest time in investigating and writing this bug at all?”

Figure 3 shows how the bug cycle would change by adding two new steps: consider bug criteria and reject. For this process to work, the test team requires a list of clear-cut rules governing what counts as a bug. Having unequivocal and unambiguous bug criteria saves the team the time and effort of chasing bugs that have zero or minimal value to the health of the project as a whole.

### SETTING THE BAR

The project leads should work together in setting the bar for each feature. This includes the test lead (or the tester responsible for that feature), the producer, and at least one functional lead—whether that’s the dev lead, art director, or lead designer depends on the type of bug bar being set.

Each of these individuals has a stake in the bug fixing process. The test team will have to devote time to testing the product, writing up bug reports for each issue that meets the bug bar, and managing those bugs until the end of the project. The producer owns the schedule and knows how much time is available to fix bugs and polish features. On some projects, the producer also owns the overall vision and quality of the game. The functional teams will have to fix the bugs. The experience of a functional lead will help you understand what’s reasonable or even technically possible for a given feature.

Any major stakeholders also need to be in the loop, especially if they own the overall vision or are responsible for the quality of the project. For instance, Hironobu Sakaguchi and Peter Molyneux have certain expectations for their projects. It’s worth determining where their priorities lie so that the entire team can work toward that vision.

The team should work on setting the bar as soon as the test resources get assigned to the project. Bug-finding and reporting is integral to their roles, so it’s important to establish what’s expected of them. If the testing is outsourced, then your team should define the criteria before engaging with the group, providing this information as part of the first hand-off to them, possibly working it into the contract. If the team works internally, the test lead can help drive this effort.

Start by broadly sketching out bug criteria for each major system, as well as aspects of the game that have historically caused dissension in previous projects. The majority of the work will likely be related to content issues, as these are finalized late in the project and are the most vulnerable to subjective opinion.

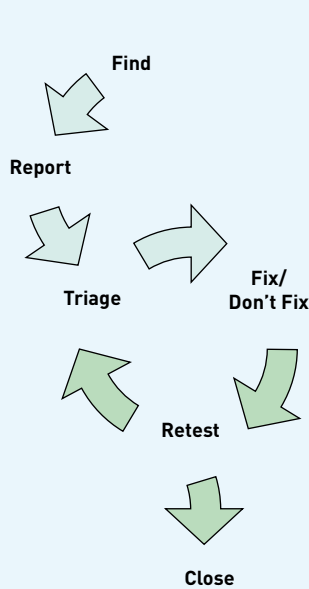
As new systems are implemented, pause long enough to define appropriate bug criteria. At the same time, when testers

encounter an aspect of the game that lacks bug criteria, they should invoke the ancient rite of the impromptu meeting to define some before starting to test that aspect.

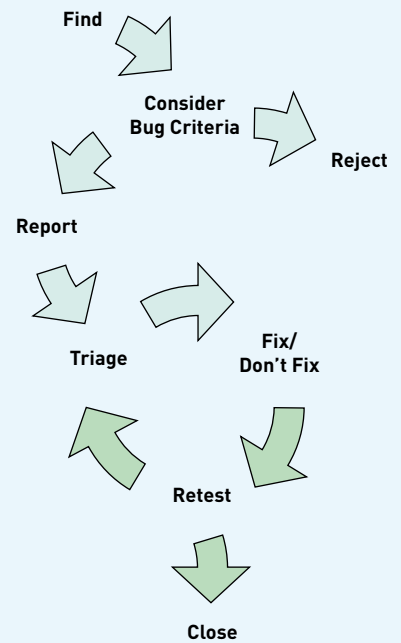
Once you've settled on bug criteria for a feature, document it. On smaller projects, the test lead should include this information in the project test plan. On larger projects, the testers themselves can define this bar (or set additional bars) when they write the test specifications, also known as area test plans. Most importantly, communicate the bug criteria with everyone responsible for the feature, developer and tester alike.

How do you decide what an appropriate bug bar is for a given feature? We suggest looking at three sources: current project requirements, previous project trends, and customer expectations.

Project requirements are the most obvious sources of bug criteria. In some cases, the requirements are set by the project team. For example, "The game will



**FIGURE 2** Your team will interact with a single bug report numerous times over the course of its life. Each interaction represents an expenditure of time.



**FIGURE 3** If you can reject a bug that doesn't meet your predetermined criteria, you save four of five costly interactions with a bug report—perhaps as much as 30 minutes.

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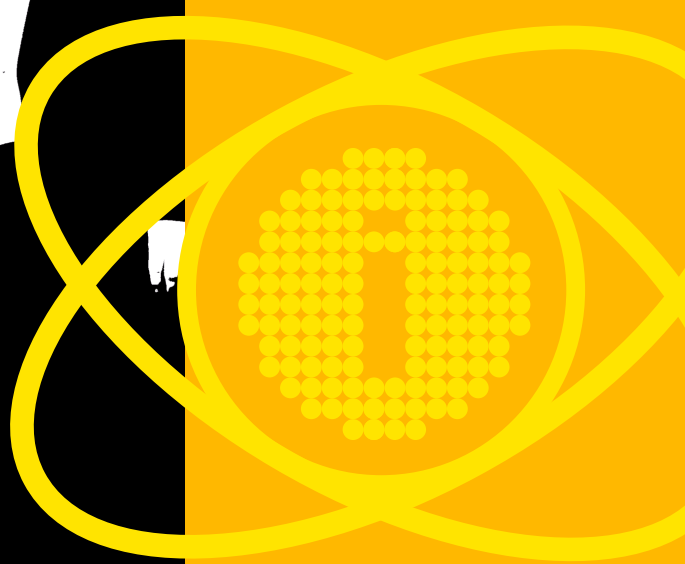
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support 64 players in online play.” In other cases, the requirements are set by an external agency, such as the restrictions for maintaining a T rating under the ESRB, or what it takes to earn the Games for Windows branding. The challenge for this kind of bug criteria is not in defining it, obviously, but rather in communicating it to the team (and sometimes in getting buy-off).

Past results are often the best predictors of future behavior. If you have access to the bug databases of previous projects, you can see what types of bugs were usually “postponed” or classified as “won’t fix.” Pay attention to bugs related to systems you plan to implement in your current project. Virtually all games have collision detection, physics, path-finding AI, character animation, camera control, and particle generation, so make use of the information you have about those systems.

The majority of unfixed bugs are probably related to content (models, texturing, rendering effects, sound effects, UI text, subtitles). These areas are much more open to interpretation and therefore benefit most from solid bug criteria.

The best quality bar is based on your average customer’s expectations. You might use support call logs or reviews about similar games. Once you determine what the average customer wants, set your sights one notch higher. Remember, that means setting your bug threshold lower so that slightly more bugs get reported and fixed, thereby exceeding the customer’s expectations. Note that we’re talking about an “average” customer, not those diehard fans who will fill bulletin boards with complaints, nor cynical reviewers. You’ll never satisfy these people, so don’t set your bug bar based on their unreasonable expectations.

## IN PRACTICE

Let’s look at five examples of this principle in practice, drawing upon some of our experiences with various projects. In each case we’ll suggest different heights at which you might set the bug bar.

**Realism.** The realism bar will depend on your game. Some games are simulations, some are imaginative fictions, and the rest lie somewhere in between. We’ve encountered testers on previous projects who were overly fixated on realism. A fantasy game, for instance, might use a “sching” sound effect when the character draws his sword. Does it matter if the same sound plays when the character draws a mace instead? What does drawing a mace sound like anyway? And could there be playability concerns by varying the audio queues for standard player actions? This sort of issue may be technically wrong, but it’s probably not the sort of bug you want to waste cycles on.

For a flight simulator game (not a training application), you might define realism bugs for aircraft based on legal ramifications or whether the problem is noticeable to an amateur pilot under casual observation. Under these parameters, the following is a bug:

- The texture for the American Airlines livery does not match the official livery.

This would not be considered a bug:

- The left navigation light on the Cessna 172 blinks too quickly (verified using a stopwatch).

**Audio.** Audio issues could be divided into four broad categories: missing audio, incorrect audio (such as a duplicate or a placeholder sound), corrupt audio (audio that cuts out or is full of static), and concerns about the audio content itself.

These categories suggest a gradation from obvious bug to subjective opinion. Where you set your bar depends on various factors, including the expectation of your audience and the ability of your audio tester. You can apply categories like these to almost any game content.

If you set the bar to include everything but subjective opinion, you would consider these to be bugs:

- No sound effect plays when the player breaks a wooden crate.
- When the player shoots the car window, the bullet sounds like it is ricocheting off metal.
- When the villain is defeated, the last few words of his dying speech are cut off.

You would not consider this a bug:

- The gunshot audio for the Browning 9mm sounds more like a Beretta 92FS.

**Clipping.** Clipping refers to a situation in which one game object intersects with another. It happens in virtually all games; Figure 4 shows that it can happen even in a game with great art direction and high visual polish—WORLD OF WARCRAFT.

At some point, you have to write off minor issues in order to get your product into the hands of adoring customers. In one project at the Microsoft Games Test Organization, we decided that so long as roughly seven-eighths of the character was visible, the remaining minor clipping issues were not worth reporting. So for example, we treated these issues as bugs:

- In one part of the level, the character sinks into the ground to his knees.
- When the character runs into the second hut, 1/4 of his body disappears into the wall.
- When the character jumps, half of his head clips into an overhanging branch.

These minor gripes were not considered bugs:

- In one part of the level, the character sinks into the ground, but the player can still see the tops of his feet.
- When the character attacks, his outstretched hand will often clip into the level geometry.

**Performance.** When testing performance, an obvious bug bar is frame rate, measured in frames per second. The test team needs to know if the development team is aiming for 30 or 60fps before deciding if a given frame rate is an acceptable.

Another fps metric is volatility—how much frame rate varies within a certain length of time. In this case, actual frame rate is not important so long as fps is consistent, but you would want the test team to report any situation in which the frame rate oscillated wildly.



**FIGURE 4** In this screenshot from WORLD OF WARCRAFT, notice how the character’s hair and warhammer clip through his cloak. Or maybe you don’t. Without bug criteria, these minor quirks will likely be written up as bug reports.



# BUG BAR

Assume you decide to define a three-part bug threshold for performance:

1. The frame rate varies by more than 5fps from the average for 10 seconds or longer.
2. The frame rate spikes or plummets by 10fps or more.
3. The frame rate drops below 15fps.

By this criteria, these would be valid bugs:

- The frame rate wavers between 22 and 34fps during a two minute stretch where the average frame rate is 28fps.
- The frame rate drops from 28 to 16fps.
- The frame rate drops to 14fps.

These would not be considered bugs:

- The frame rate wavers between 26 and 32fps during a five-second stretch in which the average is 28fps.
- The frame rate runs at an average of 16fps.

*Localization and lip-syncing.* When a game is localized, there are a number of ways you might handle the cutscene dialogue. You might re-record the audio and simply leave the facial animations how they were created for the original language. You might note the length of each audio file and match that when re-recording dialog. Taken a step further, you might employ automated dialogue replacement (ADR) and have the voice actors watch the existing facial animation and attempt to match it as closely as possible, a technique used in film dubbing. Finally, you might re-record the dialogue and then use lip-syncing technology to re-animate the facial expressions to match the new audio. Testers need to know which implementation you're using before they can effectively test the game's cutscenes.

For example, suppose your project uses ADR to record localized dialogue. You set a threshold of one second at the beginning and end of each line for the purposes of matching the audio to the facial animation (for a total variance of two seconds), but decide it would be too difficult to evaluate the voice actor's performance within a given sentence. The following issues would be considered valid bugs:

- An audio file plays dialogue in the original language.
- An audio file plays for 11 seconds whereas the character's lips move for only 8 seconds.
- An audio file is offset from the facial animation, starting and ending two seconds early.

These issues would not be considered bugs:

- The audio file plays for six seconds whereas the character's lips move for eight seconds.
- The character's lips make an "o" shape when the dialogue clearly contains an "ee" sound.

As you can see, the goal is to weed out bugs that will waste time traversing the entire bug lifecycle only to reach an inevitable "won't fix" resolution. Each functional system and content delivery should be broken out into specific bug criteria.

## RAISING OR LOWERING THE BAR

The preceding methodology works best when testing starts as features are nearing completion. So how do you apply this when the test team has access to unfinished features? For instance, in the Games Test Organization within Microsoft Game Studios, the test team becomes engaged much earlier—testing the most basic functionality as soon as a feature is implemented, then moving to deeper testing as it is refined, and finally polish testing when the feature is complete.

In this situation, you need to be able to set the bug bar to different heights based on the state of the feature. Early in the project, you will set the bar quite high, meaning that you will be quite strict regarding which bugs you will accept. As the feature becomes more refined, you will methodically lower the bar so that an increasing number of issues qualify as bugs that need to be fixed. By the time you reach the polish phase, your bar will be at its lowest setting, where many minor issues can still be addressed. But even at the lowest setting, you haven't removed the bar entirely. There are still many trivial quirks that everyone agrees should not prevent you from releasing your game to market.

Finally, there are some cases in which you might actually raise the bug bar again. This happens in a waterfall development process where a feature gets finalized and won't ever be revisited again. It also applies when you're trying to lock down your project in order to create release candidates and ship the game.

Let's revisit one of the five systems we set criteria for in the previous section: audio. When you set bug criteria during pre-production, you decide that no audio bugs will be logged before code complete. At code complete, testers may only log instances when no audio plays at all—that's because the team has dropped in placeholder "quack" sound effects for missing audio. After the project hits content complete, however, all these placeholders should be replaced with the correct audio. Now it's open season to log all incorrect audio as well as audio that is corrupt in some way.

Although this also marks the polishing phase, the team has decided that the test team will avoid subjective opinion bugs. Rather, they'll trust the judgment of the designers and sound engineers. The variable bug criteria might be summarized as shown in Table 1.

Bugs found before the appropriate milestone should not be "sandbagged"—a practice where a bug is tracked unofficially by an individual in anticipation of entering it into the bug database at a later time. The benefit of this process is to use the criteria to really focus the testing, triaging, and bug fixing efforts on the systems or content that is the highest priority.

## IF IT AIN'T BROKE, DON'T FIX IT

Not logging bugs that you would not have fixed anyway doesn't compromise the product quality in any way. Rather, by employing well-defined bug criteria, you will find that the test team reports better and more actionable bugs and that the coders and content creators fix a greater percentage of them. The net result will be improved efficiency, and very likely a more pleasant team environment. ❖

TABLE 1

PHASE	VALID BUGS
production	none
code complete	no audio plays (missing code reference to any audio file)
context complete	placeholder audio plays (code references non-existent audio file) incorrect audio plays (code references the wrong audio file) audio file is truncated audio file contains noticeable static
content freeze	tester may only re-activate existing bugs
release candidate(s)	none

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## NOT YOUR TYPICAL GRIND

### Tony Hawk's Downhill Jam for Wii

❖ **WHEN I WAS 13 YEARS OLD PLAYING A** pirated copy of ARCHON on my cherished Commodore 64, I never dreamed that I would one day work for ARCHON designer Paul Reiche.

Around the same time, I started skateboarding. Soon after, my dad took me in for a tetanus shot after an impressive downhill speed-wobble wipeout. At that point, I had no idea I'd one day demo a skateboarding video game to Tony Hawk himself.

Last September, I found myself doing both of these things simultaneously. I work for Toys for Bob, and last year, Activision asked us to create a new Tony Hawk downhill skateboard racing game. Needless to say, I was excited.

#### WHAT WENT RIGHT

**1 A HAPPY MARRIAGE OF GAMEPLAY FORMULAE.** Given the success of snowboarding games like SSX and 1080 SNOWBOARDING (the father of all downhill racing games), we were surprised that a downhill skateboard racer hadn't already been created. Those snowboarding games, as well as DOWNHILL DOMINATION, BURNOUT, ROAD RASH, JET MOTO, and MARIO KART all influenced the development of DOWNHILL JAM in many ways, but the one thing that ties them all together is that elusive component known as "feel."

These are not cerebral games and that's part of their appeal. Their quality comes down to visceral impact. The questions we constantly asked were: Does it feel like you're going fast? Does it feel good to punch the other skaters (and pedestrians)? Does it feel like gravity is pulling you downhill? Does it feel good to power-slide around a corner?

Until we could definitely say "yes" to all

these questions, we made step-by-step improvements toward these ends, which consumed a large chunk of the development process—and rightfully so.

We started with the TONY HAWK PRO SKATER (THPS) tricking system. Doing tricks in TONY HAWK games feels great, and to encourage tricking, players are rewarded with a speed boost for successfully filling up the Zone Bone (boost meter) by doing tricks, destroying things, and knocking people down. Grinding on rails was viscerally fun already, so we knew that combining that with the racing element—using THPS tricks to find shortcuts and win races—was going to win over our audience.

Most racing games only allow the player to interact with the horizontal terrain, but with the wall-rides, grinds, and foot-plants available in the tricking system, players can get up on the walls, grind on window sills, and plant off street signs for a quick change of direction. Fundamentally, this freedom of motion gives racers a whole new dimension to explore.

**2 NINTENDO'S WII.** A wave of excitement swept through Toys for Bob when we received our first Wii controllers. The programming team made them functional in a hurry and described to us the possible motions and movements that might be used as input. Our designers subsequently went on a no-holds-barred brainstorming binge. I won't divulge the best of our ideas (cough, cough, "chainsaw") because we're going to use them in our next game, but I will share the process of figuring out how to best utilize the new controllers for DOWNHILL JAM.

**TOBY SCHADT** is a lead designer at Toys for Bob in Novato, Calif. He's worked on their last six games and can beat studio head Paul Reiche at each of them. Send comments about this article to [tschadt@gdmag.com](mailto:tschadt@gdmag.com).







## GAME DATA

**DEVELOPER**

Toys for Bob

**PUBLISHER**

Activision

**RELEASE DATE**

November 19, 2006

**PLATFORM**

Nintendo Wii

**NUMBER OF DEVELOPERS**

40 on-site developers plus  
8 on-site testers

**PROGRAMMERS**

6

**ANIMATORS**

5

**LEVEL ARTISTS**

18

**CONCEPT ARTISTS**

1

**DESIGNERS**

11

**SINGLE-PLAYER EVENTS**

100

**LENGTH OF DEVELOPMENT**

18 months

**LINES OF CODE**

924,721

**LINES OF SCRIPT**

120,457

From the outset, our challenge was to figure out how to use the groundbreaking features of the Wii controllers without screwing up any of the magic that makes the TONY HAWK control system work so well. I can't overstate how crucial the controls have been to the overall success of the main Neversoft series. The first thing we investigated was how the player changes direction and whether we could use the Wii remote to introduce a new way of turning.

Tilting the controller to turn was the obvious solution, as it mimics the way skaters turn their boards. That's why the Wii is so compelling—the way you control your character in a game is a more realistic analog to what you would do in the real world, as opposed to pressing buttons.

Initial tests were successful, and we decided that holding the controller sideways (like the NES controller) was better than pointing it at the screen like a remote. Next we had to make sure that the amount of tilt needed to turn the character intuitively felt correct. This took some time, but we eventually achieved our goal of making turning easy enough for beginners, but responsive enough for experts. After playing the game this way for a reasonable length of time, none of our testers wanted to go back to button tapping.

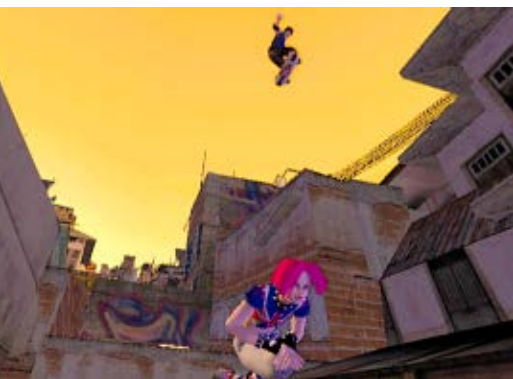
With the new turning controls implemented, we tackled tricking next. When held horizontally, the Wii Remote has only two buttons, accessible by the right thumb. To address this issue, we mapped all tricks to the two buttons, picking the appropriate trick based on context. Board-flip tricks, grinds, and wall-rides are triggered when the player presses the 1 button.

Grab tricks are triggered using the 2 button, but only when the player is in the air. We tried triggering grab tricks on the B button, and although it was somewhat analogous to what a skater actually does when grabbing the board, it proved too awkward for players.

We experimented heavily before configuring the final set of moves to be triggered by special Wii Remote gestures. In the end, we liked how it felt to do front and back flips by pulling or pushing the Wii controller. Lifting the remote during an ollie results in a no-comply or boneless based on magnitude of

lift. Tilting the controller forward while skating puts your player into a crouch for more speed, and tilting the controller left or right triggers an in-air spin.

One important lesson that we learned during development is that tuning gestures for the Wii requires a lot of different play-testers. I heard someone say Wii gestures are like handwriting. Handwriting recognition is a complex proposition, as is gesture recognition in a video game. If one person programs the gesture recognition code without testing it on a sufficient number of players, he or she will realize later that the code only recognizes one idiosyncratic set of movements. Lots of players need to play-test each move so that the programmer can find a code solution that correctly interprets the desires of the largest percentage of players.



A new tricking system was created to enhance the moves in DOWNHILL JAM.

**3 DESIGNER AS SCRIPTER (JUST ONE, THANK YOU).** The DOWNHILL JAM development environment featured a scripting language that enabled designers to create game content without digging into the C code. But while the language granted designers a great deal of power by removing programmers from the implementation loop, it required a good amount of technical understanding as well as a lot of attention to detail.

In the past, Toys for Bob has recognized that text-based scripting languages often give designers "just enough rope to hang themselves with." Now, the near-death of a designer would give technical director Fred Ford a maniacal chuckle—but on a previous project, he had to rescue us from the gallows by debugging hundreds of lines of so-called spaghetti code. Before the end of that project, we designers didn't really understand why programmers don't like spaghetti. But after seeing the dark shadows under Fred's eyes, we began to understand.

At the outset of DOWNHILL JAM, we decided that one and only one designer would be entrusted with the power of scripting. We picked someone who was very technically inclined, Dan Gerstein, and he brought a great deal of enthusiasm to the task. By the end of the project, his whiz-kid scripting earned him a junior programmer credit. We picked the right person for the job; we even prevented one particular end-of-project nightmare that had plagued us before from happening to the TONY HAWK team. The lesson learned is simple: Don't let 10 non-coders program a game unless you can provide them with a scripting environment that prevents them from getting into serious trouble. It will mean less pain and suffering at the end of the project for one of your valuable programmers.

**4 OPEN DESIGN ATMOSPHERE.** At Toys for Bob, we strive to make game design an open process. If a designer (or artist, or programmer, or producer) has an idea or a problem with something in the game, we listen to the input and if it makes sense and we have time, we make the change.

For example, in the name of making the game more accessible to a broader audience, we made it much more difficult to fall if you triggered a trick at the wrong time. Holding a grab while landing on the ground will trigger a bone crunching bail in the THPS games, but in DOWNHILL JAM we gave the players a friendlier outcome—no points and lose your "special," but no falling down.



Being a TONY HAWK player, I was resistant to these kinds of changes at first, but after watching less experienced people play both ways, I became a believer in the new philosophy. Don't take players out of the action for too long; don't make them feel bad about themselves; and get them moving toward the next exciting trick as quickly as possible. This philosophy is better suited to the

racing context: keep the player moving, in the action, and racing at high speeds as much as possible.

No one wants to wait to get off the ground and up to speed again. When players bail in DOWNHILL JAM (by losing balance on a grind or getting nailed by a cable car) they have the opportunity to get right back in the action by shaking the Wii Remote. The "shake to recover" feature was implemented in ten minutes, and it was an immediate success with all our players, including us, the design team.

It seems like every game has a small number of these big moments when a change that takes minutes to implement has a massive effect. You never know when, how, or why it will happen, but it only happens when developers have the freedom to experiment and the project leads keep an open mind to such breakthroughs. It can make all the difference.

**5 LOTS OF PLAYTESTING.** When a fellow designer says he or she doesn't like a particular setup or complains that something is too hard, it's pretty easy to write it off by saying, "Well, you're not in the target demographic, you 34-year old Generation X dude." But when you bring in kids that have bought and played games like the one being developed, and you sit them down with an energy drink and the Wii Remote, it's difficult to argue with what you see. Playtesting provides developers with instant and irrefutable feedback about their design choices.

About two months before the game was finalized, we had just implemented the screen that lets the player select a new game or a save game. Every single tester pointed the Wii Remote at the screen like a TV remote, which, with our controller setup, was horrifically problematic. We expected the player to hold it horizontally.

We remedied the situation by adding an image of two hands holding the Wii Remote properly at the bottom of the screen, a very obvious hint that seemed to get the point across in the next

session. During another focus test, one 12 year-old turned to me and said, "Thanks for making the girl skaters in this game really hot. I appreciate it." It's always good to get feedback from the target demographic about risky design choices like making female characters physically attractive.

For the first time, Toys for Bob hired an in-house test department. Extra Nintendo hardware was in short supply in Santa Monica where testing usually takes place for Activision games, so our producer brought in a motley octet of people to hammer on the game. The great thing about an in-house test department, aside from bug reporting, is that it serves as a sounding board for fresh opinions whenever design changes occur or new game elements are introduced.

Our in-house test department provided honest input on features and difficulty tuning, and also helped to create the jewel ghosts that you can play against when you're looking for a new challenge (try finishing under two minutes on the Alps "Top to Bottom" race).

After playing a game for innumerable hours, a player naturally starts to play the game the same way, time after time. It happens to developers and testers alike. Luckily, one tester started about six weeks after the others, which allowed us to see the game through fresh eyes. On our next product, I'd be interested in staggered hiring so new testers come in every few weeks.

## WHAT WENT WRONG

### 1 LATE ADDITIONS OF FEATURES AND CONTENT.

Due to our short development cycle and strong desire to make the game as cool as possible, we found ourselves adding features and making significant changes to the game as late as July and August (and even, gasp, September!). A strange new multiplayer mode was implemented one late night in August. And after the next build, I received an email from Studio Head Paul Reiche asking me "Okay, how worried should I be about this new 'Steal the Head' mode?"

Making changes so late in the game put our release date in jeopardy, but luckily, and thanks to some long hours put in by our testers, we still made it to the shelves for launch.

**2 CENSORSHIP AND LEGAL FEARS.** From the outset, Activision viewed DOWNHILL JAM as an opportunity to bring new players to the TONY HAWK franchise. The company wanted the game to receive an E10 rating, because everyone knows parents don't buy Teen rated games for their kids. At the proverbial last minute of development, Activision got feedback from the ESRB that a number of issues would have to be addressed if DOWNHILL JAM were to receive the coveted E10 label. Some of these issues were not surprising at all, as our writer Alex Ness did his best to intentionally push the E10 envelope.

CONTINUED ON PG 34

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CONTINUED FROM PG 33

I don't want to get into a philosophical argument about so-called "bad language" and whether or not it truly corrupts our children, or better yet, why I'm not supposed to use juicy four-letter words in polite conversations, but I take issue with the fact that to get an E10 rating, we had to change our beloved secret bonus character's name from Armondo Gnuetbahg to Armondo Ootbahg. Am I missing something here, or is Gnuetbahg a new curse word that the hip kids are using? Yes, in our tutorial we teach kids to "clobber 10 people before time expires" but we aren't allowed to say "Gnuetbahg."

We also had a number of changes to make due to a fear of potential lawsuits. This exchange is a prime example:

*Activision Legal:* "You'll have to change that restaurant's name."

*Development team:* "But it's called Dim Sum. That's, like, totally generic."

*Activision legal:* "But if you type Dim Sum into Google, you'll find many actual, real-life restaurants called 'Dim Sum.' It's safer just to change it."

I failed to realize how frightening the legal climate is at present. The fear of being sued is so pervasive that artistic freedom is being compromised ("Dammit! We're making a profound artistic statement by naming that restaurant 'Dim Sum!'"), and conservative, safe decisions are routinely made even when there is no legitimate legal infringement.



**3 LEVEL SIZE OVERLOADED OUR ART TEAM.** The bread-and-butter of a TONY HAWK racing game is tons of lines leading to shortcuts and alternate paths that players can reach using different skating styles. This formula makes for intriguing gameplay and is fundamentally fun to design around. What it means for artists, however, is months upon months of painstaking work.

DOWNHILL JAM needed incredibly dense mesh and loads of it. None of the levels in DOWNHILL JAM approach the insane length of some of the tracks in SSX3, but try building enough TONY HAWK terrain to entertain a player going 60mph for three minutes. Snowy mountain terrain is simply not as much work as dense urban terrain. The level art team at Toys for Bob has a perfectionist attitude, which benefits designers (they make our primitive placeholder mesh look incredible) but puts a strain on the artists. There are no quick shortcuts to creating incredibly dense and diverse level mesh. UV mapping takes time, blood, sweat, and tears (no wait, hold the blood, this is an E10 title). The real kicker is that often, an artist creates something that looks incredibly pretty, and then the level designer sees it and asks, "Didn't you realize that you can wall-ride up there to hit that secret grind over the ice caves?"

Thanks to our art team for not trying to strangle our design team more than three times. In the end we had to fortify our level art team halfway through the project with 10 additional artists in order to get the job done in a timely manner. Looking back, we can say that some of the massive levels that required the most sweat provide some of our most powerful visual moments. Did I remember to thank our level art team?

**4 NO TIME TO DO SOME FEATURES JUSTICE.** Focusing on getting all the fundamental racing elements in place—such as sense of speed, exciting track design, AI for enemy skaters, and combat with enemy skaters—in combination with getting the new control system polished meant we had to sacrifice some features that were on our to-do list.

Manuals are a critical piece in the TONY HAWK trick linking system. Initially, I felt like we certainly had to have them, but in THPS games, they decrease the player's speed. In fact, players had requested in the past that they not lose speed while performing manual tricks—but you can't imagine how silly it looked to see Tony pogo-ing down the track at 60mph. It was funny, but that's not what you want when you're trying to convey a dangerous sense of speed.

Gaps are another integral component of a classic THPS level. DOWNHILL JAM's levels have gaps, but we weren't able to give them enough love and attention because down the stretch we

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## POSTMORTEM



The goal of **DOWNHILL JAM** is to keep players moving, with no break in the action.

were most concerned with eliminating bonks (geometry that makes players stop in their tracks) as well as out-of-world bugs and other crucial fixes that made each level better for racing and going fast. We were satisfied with how the multiplayer mode turned out, but it would have been nice to spend some more time adding polish and features, like being able to handicap better players by giving them beginner boards.

**5 MUSIC LICENSING.** In further efforts to differentiate **DOWNHILL JAM** from the Neversoft line of **TONY HAWK** games, we created nine colorful, fictional characters for **DOWNHILL JAM**. Whereas previous titles featured an intimidating cadre of real-world skating talent, **DOWNHILL JAM** instead pushes the humor envelope with stylized personalities that sock it to Tony Hawk during interview segments. After all, what up-and-coming skate pro would be willing to give Tony a hard time? Writer and producer Alex Ness and our crack animation squad brought these personalities to life in the interview segments that you see at the start of each race.

To further differentiate the characters from each other, we created unique music playlists for each skater. Our gothic skater, Jynx, was to have all the songs you would expect from the '80s goth catalogue: Bauhaus, The Sisters of Mercy, and their ilk. Gunnar, the Norwegian muscle-bound import, has a taste for cheesy hip-hop that matches his in-game lingo. Budd, the mellow hippie soul-searcher, loves reggae. Ammon, the revolutionary, was to have tracks from Rage Against the Machine and The Clash.

In the end, we failed to get the music we requested from our licensing department. The music in the final version of the game is good, but it's just what you would expect from a **TONY HAWK** game, and we had hoped to do something more creative.

### SKATE OR DIE

At one point in development, we taped a Wii Remote to the underside of a skateboard and carved up the streets of our San Francisco level while standing on the board, leaning left and right to turn. It was tricky to balance and impossible to do tricks, but it got us fired up nonetheless. This is the spirit of experimentation that makes game development so rewarding, and we look forward to seeing how other developers explore this new frontier that is the Nintendo Wii. ❖



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MICK WEST

## » THE INNER PRODUCT

# MANAGED CODE IN GAMES

### “MANAGED CODE” WAS ONCE CONSIDERED

little more than a buzzword by many game developers. Synonymous with poor performance, uncertain memory usage, and unfamiliar languages, like C#, managed code had a bad reputation that many established programmers could not move past. Yet managed code is becoming increasingly relevant in game development.

What is managed code, how can it be used in games, and why is it important to game programmers?

### WHAT IS MANAGED CODE?

Managed code can best be explained by comparing it to “native” code. Native code is the executable file that results from compiling, say, a C++ program into the .EXE file that contains actual machine code that runs “natively” on the target platform.

Managed code, on the other hand, is code compiled into an intermediate language (IL) that is executed either on a virtual machine (like early Java) or semi-natively using “just in time” (JIT) compilation (like C#). At a more fundamental level, native code runs directly on the CPU and has direct access to system resources (particularly memory), whereas managed code has a layer insulating the code from the hardware, which “manages” the code operations and resource interactions.

Many games, especially big budget AAA games, already use some kind of homegrown managed code in the form of either an interpreted scripting language or a language that compiles into a byte code that runs on a virtual machine. Commercial game engines often have

their own scripting language, which is essentially managed code. Unreal Engine has a Java-like UnrealScript. The QUAKE engine has QuakeScript. But when people speak of managed code, they generally are not referring to these homegrown scripting languages, but rather to writing the actual game in managed code, which for the PC means using Managed DirectX.

Managed DirectX is not DirectX written using managed code. It’s simply an interface to DirectX that allows it to be used by managed code. This distinction is very important. The lower level DirectX layer is still the same and can still push polygons around just as fast as before—but now you can call it from managed code.

Managed code doesn’t always mean C# either. In Visual Studio, C++ can be compiled into IL simply by adding the CLR compile switch, which allows you to use managed DirectX.

### WHY MANAGED CODE?

When asked what advantages developers get from managed code, proponents will tell you the biggest one is productivity. Managed code, in theory, lets developers write programs faster for several reasons.

First, managed code is easier to write. Writing code in C# generally results in shorter and more readable code. You don’t need header files, and compilation times are reduced. With managed DirectX using C#, the DirectX initialization code is greatly simplified. In addition, the .NET framework supplies you with a lot of components you might otherwise have to write yourself.

Second, managed code removes the causes of many bugs. Variables are always initialized, so it’s impossible for bugs to spawn from uninitialized memory. Memory management is automated with garbage collection, so there should be no memory leaks and no dangling pointers.

Third, managed code is often touted for having interoperability, or the ability to mix and match languages, both managed

and unmanaged in developing an application. Regardless of which language a particular component is written in, it’s theoretically quite easy to interface it with other components written in different languages. This is of limited application to game developers, except as it pertains to the interface between managed and unmanaged code.

A final advantage of managed code is security. Managed code removes (or makes impossible) the potential security loopholes that often exist in native code, such as buffer overruns. In addition, managing the code controls its access to system resources, such as the file system and memory, in such a way that even if some nefarious code were introduced into the application, it would be unable to do much damage.

### WHY NOT MANAGED CODE?

Managed code is obviously not without its problems, and those problems (namely framerate and memory) strike fear into the hearts of many a battle-hardened game programmer.

Performance is nearly always going to be worse with managed code than it is with native code because JIT compilers are currently not very good at optimizing code and because the managing of code and the facilitation of that safety and memory management introduces a significant amount of overhead that drags down the speed of the code.

As well as pure code speed, the unpredictable nature of garbage collection means it’s difficult to predict CPU usage. If a lot of garbage collection happens at once, it might cause the framerate to drop.

Memory usage is another problem. Since the code is compiled into IL, the executable file can actually be smaller, which is a momentary advantage. But once the program is loaded into memory and JITed, the lack of optimization means the native footprint will be larger. The

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additional overhead of storing the CLR, boxing, and memory management also adds to the total memory usage.

As a practical example, I used a “blob” simulation I developed (see *Game Developer* June/July 2006) and recompiled it in Visual C++ with the CLR option. Three effects were apparent: 1) the size of the executable dropped from 140K to 116K, 2) the framerate dropped from 160FPS to 60FPS, and 3) the memory usage jumped from 29MB to 34MB.

Why was it so slow? Well, the blob code is highly CPU-intensive and involves a lot of iteration over arrays and STL vectors of atomic objects and performing fairly complex operations on them, like collision detection and Verlet integration. This is simply not something that the .NET CLR is very good at doing. The code that’s generated (and then JITed) ends up not being at all optimal, and since the CPU time is the bottleneck, it causes the precipitous drop in framerate.

## MANAGED CODE FOR VIDEO GAMES

If managed code causes this dreadful drop in framerate, why would any game programmer use it?

Not all games need all the CPU power or all the memory available to them. Consider the rapidly growing market for casual games such as *DINER DASH* or *LUXOR*. These games require very little in the way of processor resources and are necessarily small to facilitate quicker downloads. The faster development times are also a big plus, as casual games are generally developed on a low budget, with a schedule of just a few months.

The robustness provided by the automated memory management is a win again here, contributing to faster development and easing the process of debugging around release. C# hasn’t been too popular with casual games due to the likelihood of having to download the .NET framework, but that’s increasingly installed by default on PCs or deployed automatically via

Windows Update, so that objection is less relevant.

But what about high-end games such as *HALF-LIFE 2* or *NEVERWINTER NIGHTS 2*? Is it possible to use managed code to make them?

The simple answer is no, unless you want the game only playable with 2GB of memory and at half the framerate. The more complex answer is yes, as long as you use managed code for the right things.

## DIVISION OF LABOR

The key to successfully utilizing the benefits of managed code is to divide the code in such a way that the code that would have contributed most to performance degradation under managed code remains as unmanaged (native) code.

It’s often said that 90 percent of the processing time is spent in 10 percent of the code. That 10 percent (measured in lines of code) is code that performs large numbers of iterations, looping over data structures, performing repeated operations. These operations are things that are performed many times per frame, every frame—such as collision detection, physics simulations, and skeletal animations.

The remaining 90 percent of the lines of code (which takes only 10 percent of the processor time), is code that either is not executed every frame, contains very few iterations, or is only executed in cases in which framerate is not an issue. Examples include user interface display, network packet marshalling, or artificial intelligence.

Table 1 shows which types of code are suitable for managed code and which are not. You might notice that all the code tasks listed in the “unmanaged” column are jobs that are commonly performed by commercially available engine components or by a generic in-house engine. They are also typically components that are close to the metal, in that they may be hardware-dependent, utilizing target-specific resources. They are not game-specific.

In the “managed” column, on the other hand, we see higher-level code that’s

**TABLE 1: IDENTIFYING MANAGED VS. UNMANAGED OPERATIONS**

MANAGED	UNMANAGED
player control	collision detection
camera motion	physics
combat systems	pathfinding
user interface	skeletal animation
game flow	video processing
state transition AI	vertex processing
saving and loading	particle systems
data marshalling	visibility determination
compositing effects	fluid dynamics
in-game editors	

**Code can be divided as being suitable for either managed or unmanaged operation.**

generally platform-independent. This code is often highly game-specific, and can account for a very large portion of the actual code written for a particular game project, especially one that’s based on an existing game engine.

So it’s clear how the division of labor works: Low-level engine components that require speed and efficient memory usage can remain in unmanaged (native) code. Game-specific components that generally use less of the system resources can be written in managed code to gain the productivity benefits. If a game-specific component ends up being a bit too inefficient in managed code, it probably can be made into a core engine component down the road.

## RAISING A MANAGED CODE WORKFORCE

Since managed code is simpler to develop in than unmanaged code, it’s an ideal language platform to use to initially instruct game programming students. The easy accessibility of DirectX and XNA makes managed DirectX an obvious platform choice for students who are implementing their first game. Hence the

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modern student's first exposure to game programming may well be in a fully managed code environment. Certainly, courses in game development that are not structured along the lines of a traditional computer science degree will be more heavily oriented toward a managed environment.

In effect, there is a whole generation of game programmers nearing employment age who not only are experienced in programming for managed code languages and environments, but may actually be more experienced in writing managed code than unmanaged code. So in terms of future hiring, the more your engine utilizes (or allows for) managed code, the greater your talent pool of potential coders will be.

It's quite possible that managed code will grow in popularity in the educational and hobbyist front to such an extent that there will be shortages of programmers who can write and debug code effectively in unmanaged C++, much like you would be hard pressed to find many young programmers comfortable in programming games in ASM or even straight old-fashioned C.

## THE MICROSOFT EFFECT

Perhaps the biggest influence on the future of managed code in games will be Microsoft's popularization of the XNA framework for game development. Microsoft is aggressively pursuing the hobbyist game developer market to the extent of giving away the Express versions of XNA Game Studio for free, including C# and C++ Visual Studio, all of which are quite capable of being used to create professional games. Microsoft is also teaming up with the educational establishments to promote the XNA framework, with several universities adding courses based on this technology.

But perhaps the biggest driving factor in all this is Microsoft's decision to allow independent

game development for the Xbox 360 console, with one caveat: the games have to be written entirely in safe-managed code.

Why only managed code on the 360? For two simple reasons: to prevent viruses and malware, and most importantly, to prevent the development environment from being used to pirate games and other paid content.

The ramifications could be huge. Potentially, a whole generation of hobbyist and student programmers will get their first experience of console programming on the Xbox 360, using XNA and C#. On the one hand, it could be a great competitive advantage for Microsoft in a few years, as perhaps the majority of programmers will enter the game development industry with experience in Microsoft products. On the other hand, it could be viewed as a great push for managed code in general. Aside from the DirectX framework, the .NET framework is portable (via the Mono project), and C# is an open standard which runs on Linux as well as Windows.

## MANAGEMENT OPPORTUNITIES

Managed code can offer significant productivity gains, yet those gains come with equally significant speed and memory performance hits. For smaller games, it's quite reasonable to write the entire game in a managed language. In larger games, managed code is not appropriate for engine components but can work very well on a significant portion of the higher level code.

The popularity of managed code in education, and the easy availability of development tools means that the next generation of game programmers may feel most comfortable and productive programming in a managed language, and game developers would be wise to recognize this and incorporate managed code into their programming environment. ❖

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### ONE OF THE BIGGEST DIFFICULTIES

Cryptic Studios has had as we've grown is finding and hiring good game designers. Whenever we posted a job ad for a designer position, we would receive plenty of applications, but by the time we got through the interview, it became obvious that we weren't getting the right candidates.

The problem wasn't entirely in the applicants. And after implementing two key changes, we've been much more successful at finding people who can do the jobs we need them to do.

### DESIGNING FOR SUCCESS

Our first step to rectify the problem was to define the role of the game designer. The design discipline encompasses a lot of discrete responsibilities at Cryptic, such as mob design, zone design, mission writing, and system design. Not every position demands the same exact skills as another. I don't need my powers designers, who handle all the data behind player abilities and mobs, to be able to create a mission. Our zone designers need to write dialogue, but they don't write design documents.

Second, we constructed a series of questions—a design test—tailored to the particular position. I should note that this was a bottom-up process; I tried to figure out what my designers actually do on a day-to-day basis rather than simply use the job descriptions. The questions are, in fact, drawn from problems we actually faced. Take for example the following question:

**CITY OF HEROES is built upon the premise that three "minions" are a challenge to a single hero and that combat is fast and furious.**

**First: Every entity (player and minion) has six attributes:**

- endurance
- hit points
- damage
- regeneration rate (how fast hit points come back)
- recovery rate (how fast endurance comes back) and
- base percentage to hit.

**Second: Every power has a recharge time in seconds before it can be used again and an endurance cost.**

**Determine the attributes (endurance, hit points, damage, regeneration, recovery, base percentage to hit) for players and minions in order to satisfy the two premises. Please make all time estimates in full second intervals (for example, regeneration rate of two per second not two per 0.5 seconds). You may create any values for entities and powers.**

**Please show all your work.**

Solving this exact problem was one of the first things I ever did as a lead designer on CITY OF HEROES, as the design team is tasked with all things related to game balance.

### NOT JUST THE FACTS

What's most important about the response is not just the answer itself, but how it's answered. I specify "fast and furious" at the beginning of the question not just for filler. It's vital for the responder to include that in the answer. If the calculations show that a player doesn't finish the battle for five minutes, I know that the designer doesn't have a good sense of timing for a video game. Admittedly, I could easily specify a time limit so the applicant knows my expectations, but I'd lose an important point of the test.

The subtext of "fast and furious" is that frequently designers make dozens of calls in implementation every day. Because there's not a ruler that precisely defines what's considered "too hard" or "too easy," I need to be able to depend on my lead designers to work by a set of principles that I can trust on an every day basis.

### MARVEL AND WONDER

When we first rolled out these tests, I was fascinated by the responses. We were hiring for MARVEL UNIVERSE ONLINE, and I knew it was imperative to get top notch people. Almost immediately, I received a fantastic resume. A lead designer on another prominent MMORPG! Years of experience! I couldn't have been happier.

Then I read his test. Our first question was the one I just described. The applicant, believe it or not, gave a somewhat vague response and concluded that "this wasn't a design question, it was a math question." I couldn't believe that a lead designer wouldn't be conversant enough in algebra to perform some basic number crunching. This underscores how important a test is. Perhaps some game studios demand different skills from their lead designers. The resume alone wouldn't necessarily communicate the individual's skill set.

We've developed a set of core values for the design department that's helped us refine our hiring, such as clarity and succinctness in communication, and leadership. When asked, "How do you work on a team?" almost every candidate will give some sort of answer to the effect of "really, really well," but many times this has proven not to be true. So we've tried to put our candidates into a situation where they can demonstrate leadership. We give them a scenario to design in a MMORPG and some time to work on it. Then they present it to a group, who then tries to brainstorm some ways to improve the design. We look for people who are able to take criticism and recognize when someone else has developed something better. In short, key attributes as part of leadership.

Detailed designer tests can be painful, but ultimately they are quite rewarding. Our team has no common theme with regard to experience—some have many shipped titles under their belt, others have very few. But because of our testing, they're all now in sync. ❖

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## DO, DON'T SHOW

**IF YOU'VE EVER TAKEN A CREATIVE**

writing class, you've probably heard the maxim, "Show, don't tell." It's intended to advise budding writers to show their characters experiencing events instead of just describing those events to the reader. "Showing" is a fundamental way to enhance the dramatic tension. Mark Twain put it succinctly: "Don't say the old lady screamed. Bring her on and let her scream."

Why is this better? As social beings, people are used to watching each other's behavior closely for all sorts of cues, warnings, and opportunities. Having the chance to exercise those skills a bit is a fundamental reason we like to watch drama on TV or in movies, read novels, or attend plays. Too much exposition and explanation robs us of the very reason we watch.

**GAME DESIGN 101**

In games, we go a step farther. We don't play to watch, we play to participate. The interactivity in games allows us—in fact compels us—to actually experience the drama first-hand.

A game like TETRIS needs no story and yet is full of excitement for the player, with the tension increasing as the blocks fall ever-faster and the irregular columns grow closer and closer to the top, promising eventual disaster. There is no character growth, vivid prose, or profound insight into human nature, but because of the interaction, the experience is compelling and important to the person playing.

Games are primarily about doing, and so our maxim must be "Do, don't show." If the player cannot make choices, there is

no interaction. And games are all about interactivity and player choice.

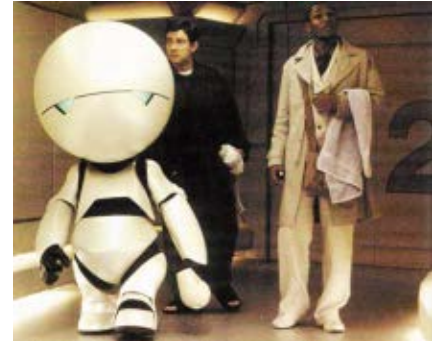
The proper role of traditional storytelling techniques in games can be deceptive. DOOM was held as the anti-story, thriving on a minimal rationale to just kill anything that moves. For a while, first-person shooters were completely centered around weapons, reflexes, and the purely tactical qualities of the enemies. But then HALF-LIFE and HALO came around to show that adding a layer of storytelling, plot, and character could greatly enhance the single-player experience and widen the audience.

**SCREENWRITING 101**

Unfortunately, we game designers are often subject to movie industry envy. As our audiovisual tools (and budgets) have increasingly allowed us to adopt the trappings of movies, sometimes we have adopted the underlying principles as well—and this is dangerous precisely because games are about doing, not showing.

As I've mentioned in previous columns, both these entertainment forms are fundamentally about learning survival skills. But passive forms like movies and novels show us "This is what someone else did to survive," while games let the players learn first-hand what they need to *do* to survive. Even though movies and games may cover the same ground, they do it from opposite points of view. This is precisely why some forms of emotion, like empathy, are often weak and hard to evoke in a first-person game experience compared to film, while others like the exultation of personal triumph are so strong.

There are exceptions, or at least qualifications. Storytelling techniques can provide some emotional hooks to help you understand and identify with the character you control or become in a



**Douglas Adams' character Marvin the Paranoid Android:** funny to watch him, not so funny to be him.

game. And they very certainly can help you care about NPCs that you do not control. It's no coincidence that our biggest successes in evoking sympathy in games come through characters you do not control, like the princess in ICO, or (how can I resist) Floyd in PLANETFALL.

**COMEDY 101**

*"Tragedy is when I cut my finger. Comedy is when you walk into an open sewer and die."* —Mel Brooks

One of the strongest illustrations of the difference between doing and showing is in comedy. Many great humorists have made their living showing us terrible things happening to their characters—Brooks, Woody Allen, and particularly the late Douglas Adams come to mind, where poor Arthur Dent suffers one humiliation and frustration after another. And in game adaptations of Adams' technique like THE HITCHHIKERS' GUIDE TO THE GALAXY, BUREAUCRACY, and STARSHIP TITANIC, the humor works best when you watch someone else suffer.

I don't mean to dissuade designers from aspiring to use some of the techniques of novelists and screenwriters—but I do ask that they take a moment to understand just what those techniques are intended to accomplish and consider whether games have different goals—and demand different means as well. ❖

**NOAH FALSTEIN** has been a professional game developer since 1980. His web site, [www.theinspiracy.com](http://www.theinspiracy.com), has a description of *The 400 Project*, the basis for these columns. Also at that site is a list of the game design rules collected so far and tips on how to use them. Email him at [nfalstein@gdmag.com](mailto:nfalstein@gdmag.com).



STEVE THEODORE

## PIXEL PUSHER

# INNER TIDINGS

## Seven resolutions for the artist's New Year

### GOOD OLD JANUARY. THE HOLIDAY

decorations are starting to come down, and the office no longer looks like it was hit by a neutron bomb. The New Year has arrived, loaded with the promise of renewal and the faint hope of hangover cures. Of course, this means it's also time for a little personal stock-taking. In the spirit of the season, your friendly Pixel Pusher humbly offers this list of New Years resolutions.

### 1. LOSE 25 POUNDS AND GO TO THE GYM

There's some kind of law about making this promise on January 1, so I thought I'd just get it out of the way. I only hope there's an exception passed before it's too late for Nicole Richie.

### 2. WORK ON SOME TRADITIONAL SKILLS

This one's always at the top of the list. It's the game artist's version of dieting: Everybody says it in January, and it's back to business as usual by President's Day.

This year, though, I've got hopes—don't snicker! I'm coming off a great traditional project and I want to keep that momentum going. This year's traditional masterpiece really expanded my artistic horizons. My magnum opus was a giant papier-mâché fish head for my kid's Halloween costume. Okay, so maybe "masterpiece"



Working in non-electronic mediums, even papier-mâché, can reinvigorate even the most digitally-biased artist.

is a bit strong. My last papier-mâché project was in, what, fourth grade? But here's the key: It was a blast.

Yep, fumbling around up to my elbows in wheat paste and paper strips was a huge psychological relief. Game art is a highly technical, totally uptight medium with a million niggling constraints. It's nice to just slosh around in the mess and have some fun for once. Sure, another figure drawing class would be good for bragging rights, and it's always important for that "of course I'm a real artist" credibility, but after a while, it can get to be almost as technical as perfecting your shoulder fix-up expressions, or your hot new HLSL Oren-Nayar shader. In 2007, I pledge to pass through my creative insecurities and just have a little fun.

### 3. WRITE IT DOWN

Maybe I'm just getting old, or maybe it's the demands of having a life outside of work and games, but I've hit the limit of my ability to keep every single detail of my current projects in my head. I'm tired of trying to reconstruct what exactly "texture-fix-03-final-final.psd" was supposed to be fixing, or what the variable \$goddammit means in my fixTheFarkingVertices.mel script.

From this day forward, nothing gets saved to disk without a file name or comment that will let me know what the heck it is two weeks from today when I come back to this folder and have to make sense of it all.

As part of my new mania for documentation, I'm also going to devote the last 15 minutes of every day to recording what I did that day.

Keeping a work blog is great discipline because it forces me to fess up about those days when I didn't get anything done. Being able to look back at what I was working on a few weeks or months back and see how well or poorly I grasped the real story is hugely useful. Nothing teaches time management skills better than re-reading a week's worth of entries devoted to working out some petty little detail that nobody else inside or outside the team has ever noticed. Plus, it's really handy to have verification of how long it takes to accomplish certain tasks. It might not make you happy, but it does wonders for your estimating skills.

### 4. PUT MYSELF INTO A RUT

The second big project for 2007 is to completely undermine my identity as a

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video game artist. I've spent the last 13 years avoiding the responsibilities and burdens of a real job—but the experience of being part of a startup has given me a bit of perspective. When the only person who can say “boo” if I show up at noon is me, then I'm forced to get in touch with my inner office drone. So I begin this year with an abject submission. Mom, Dad: You were right. All that stuff about putting away my socks and keeping track of my Legos was true.

Horrible and anti-artistic though it may sound, I hereby declare 2007 to be the International Year of the Dull Routine. Here's the drill, to be followed scrupulously every day.

1. Check all the work-related mail only, and make sure nothing important has happened since last night.
2. Synch up to source control. No more working on week-old assets.
3. Spend five minutes figuring out what to do for the rest of the day, and include a rough guess about how long each undertaking will take. Write it down!
4. At the end of the day, check the time estimates to see how close they were. All the findings go into the new work journal.
5. Turn mail client off. Mail is to be checked only in between items on my to-do list. And everything from the “fun” alias goes into its own folder, to be checked during lunch.

Combined with writing things down, this will be a year of ruthless efficiency. Honestly. Don't snicker.

## 5. PLAY GAMES

Looking back over those last couple of resolutions, this year is starting to sound pretty dull. Here's my remedy: I'll actually play some games!

It's humiliating to think that playing games needs to be a resolution, and I know in advance there are going to be some days when it's a struggle.

It's so easy to be jaded when you know all the industry gossip and critical backbiting before you've even seen the first screenshot from a new game. Add in work, family time, and (heaven forbid) an MMO addiction, and suddenly it's easy to

look back over the year and realize you spent less time with a controller in your hand than you spent looking at the “fatal error” dialog in Maya.

This year, I'm going to haul myself down to the video game store and actually buy some titles. More than that, I'm going to keep my hypercritical, I-coulda-done-that-better reflexes in check. Picking games apart instead of playing them

melancholy as unearthing a favorite old piece and thinking, “damn, I thought it was better than that.” It's tough to remind yourself that it was better back then, when you hadn't seen the latest sexy next-gen screenshots. But looking back is an unpleasant reminder that nobody—not even yourself—gives you credit for how hard it is to do this job; they only care how good things look.

## COMBINED WITH WRITING THINGS DOWN, THIS WILL BE A YEAR OF RUTHLESS EFFICIENCY. HONESTLY. DON'T SNICKER.

might soothe my ego, but it doesn't help me learn anything. In short: buy games and play them instead of just critiquing them. And actually have some fun.

## 6. GET OUT OF THE OFFICE

Here's another way to keep my new office drone routine from becoming too much like a day job. This year, I'm going to faithfully show up to all the developer beer nights and IGDA meetings in town. Maybe I'll pick up some good gossip or learn a useful trick or two. At the very least, I'll meet some folks that I may end up working with again in this incestuous little business.

Perhaps I'll even give a talk at a local art school or college. Who doesn't enjoy basking in newbie enthusiasm every so often to wash away a little bit of that grumpy old veteran's cynicism?

## 7. UPDATE MY PORTFOLIO

This item is another one that comes up every year, but for good reason. On the practical side, it's always good to have my best stuff handy in case some plum job opening drops into my lap. Keeping everything up to date in modern formats is a chore, but the longer it gets put off, the harder it is to correct.

Putting together or updating a portfolio is a prime opportunity for taking stock. Looking at your own work can be a little unsettling in a fast-paced business like games. There's no disappointment as

It once took a lot of artistic chops to turn out a convincing character with 1,500 polygons and an 8-bit, 256K texture sheet, but he still looks pretty frumpy next to a fresh screenshot from GEARS OF WAR or METAL GEAR SOLID 4. It's a sobering reminder of how hard it is to stay current in an ever-evolving medium.

On the other hand, looking over the old stuff does have a certain nostalgic charm. Crunch times, like wars, take on a hazy heroic aura when viewed in retrospect, no matter how miserable they were in the flesh. It's also good to be reminded of all the ridiculous technical obstacles we've had to overcome in the past, like animating at 12FPS, or texturing only with planar projections.

Nowadays it's facial animation, shading languages, or a new lighting model—but it's still the same game artist muscles that make it happen: ingenuity, adaptability, and high tolerance for the impossible.

And that's a good place to leave off my New Year's ramblings. After all, the classic New Year's song is “Auld Lang Syne,” which just means “for old times' sake.” So here's a nod to all the old comrades, to the vanished technologies, to the crunches long gone, and to all the challenges of the year to come. Drink up! ❖



JESSE HARLIN

## ❖ AURAL FIXATION

# iCAN TOO

**THE MUSIC REVOLUTION HAS ARRIVED,** and in its wake lie the bankrupt husks of once-mighty megaliths like Tower Records and Sam Goody. While Napster struck the first blow, the undisputed successor to the throne of legal music downloading is Apple's iTunes Music Store. By offering decent quality downloads at reasonable prices, iTunes is largely driving the changes reshaping media distribution channels in the 21st century.

While seemingly every film gets a soundtrack release these days, game soundtracks are still extreme rarities

outside Japan. This is largely attributed to the limited return game soundtracks bring in when compared to the costs of producing, distributing, and marketing the discs themselves. However, an online distribution model changes this dramatically, and already music by Chance Thomas (HALO), Jack Wall (MYST), and Marty O'Donnell (PETER JACKSON'S KING KONG)

sits under the iTunes "Soundtrack" category.

Convincing your publisher that a game soundtrack is a good idea is a topic all its own. This month, though, we're going to look at what it takes to get your music listed on iTunes. There are essentially two methods: directly through Apple or through a digital distributor.

### THE MACINTOSH WAY

iTunes is a great opportunity for independent artists and smaller labels to easily distribute their music worldwide. However, finding the online application

can be difficult as all the necessary links are in out-of-the-way places on Apple.com. Start at [www.apple.com/itunes](http://www.apple.com/itunes) and click on the light gray hypertext link at the bottom of the screen that reads "Working With iTunes: Labels & Artists." On the following "Labels & Artists" page, the application to apply is linked to in the first blue box on the right side of the screen, conveniently labeled "iTunes Music Store Online Application."

After complying with a brief "don't call us, we'll call you" and "you better own the rights to this stuff" warning from Apple, you're ready to apply. The application comes in two relatively short parts. The first section is about contact info and where globally you have the rights to distribute the music. The second part of the application is about the content—is it music? How many albums? How many tracks? Pretty simple stuff.

### NIBBLING AT THE CORE

Here's the snag with the Apple method. As Apple is fond of telling you, real people read and evaluate every application that comes through their site. As such, the word on the street is that Apple can take a very long time to get back to artists, if ever. Since the company doesn't approve every artist who applies and you already clicked on the "don't call us" button, the whole process can feel a bit like throwing a feather down a deep well and waiting to hear some sort of splash.

If you do hear back from Apple, you'll need to download their free iTunes Producer software to edit track metadata, attach album artwork, and convert tracks into the necessary AAC file format. As of press time, there is no fee to apply, but Apple will take 35 percent of all sales. The other 65 percent goes to the record label, which in this case might be the game's publisher, the artist, or an actual record label. How much you as the artist will see of that remaining 65 percent is completely dependent upon the specifics of your individual deal.

You will also need to set up your music with a UPC code for each album and ISRC

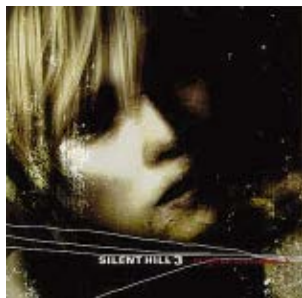
codes for each track. The UPC (barcode) is used to track individual albums sold and the ISRC functions as a digital fingerprint for every song in distribution. To create your own barcodes, you need to become a member of GS1 US and obtain a unique company prefix. This can cost as much as \$750. If you're going through your publisher or an established record label, you may be able to get a UPC code through them. ISRCs can be obtained for free from the Recording Industry Association of America ([www.riaa.com](http://www.riaa.com)).

### DIGITAL DIVERSITY

The other option is to contract with a digital distributor. A digital distributor works just like their real-world counterparts. You give them music and they work on getting it distributed to vendors. In this case, that means online music retail services such as iTunes, Napster, Rhapsody, etc. Digital distributors do the legwork for their artists and then take a small percentage of the return from sales as commission. Distributor legwork includes digitizing the music and converting it into all required file formats for the various retail outlets. Turnaround times range from about two weeks to four months, depending on the retailer.

The leading digital distributor right now is CD Baby, though others such as IRIS, indie911 and the IODA also exist. Artists are charged an initial "set-up" fee of \$35 and \$20 per UPC. For their part, though, CD Baby then handles all necessary file format conversions, acquisition of ISRC numbers, and then the actual distribution. Payment is then made a week after they receive the money from the retailers.

While primarily established to aid independent and unsigned bands, digital distributors can remove many of the hassles associated with the Apple method. Additionally, your music will find its way to more than just iTunes. The downside however is a smaller monetary return and the insertion of a middle-man between you and your music on iTunes. ❖



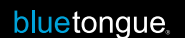
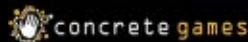
**Video game soundtracks are traditionally released on CD, though uncommon in this form in the West, but savvy composers can see greater returns and higher distribution from digital downloads.**

*JESSE HARLIN has been composing music for games since 1999. He is currently the staff composer for LucasArts. You can email him at [jharlin@gdmag.com](mailto:jharlin@gdmag.com).*

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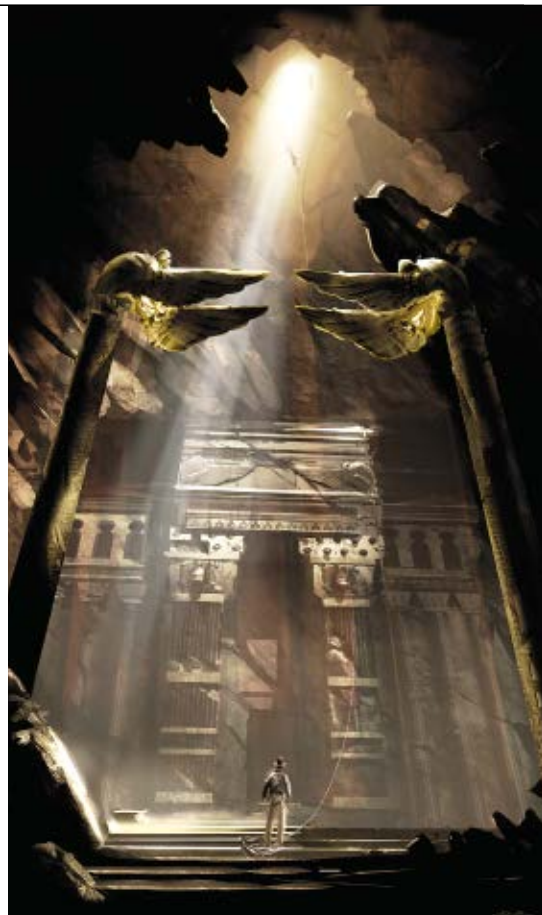
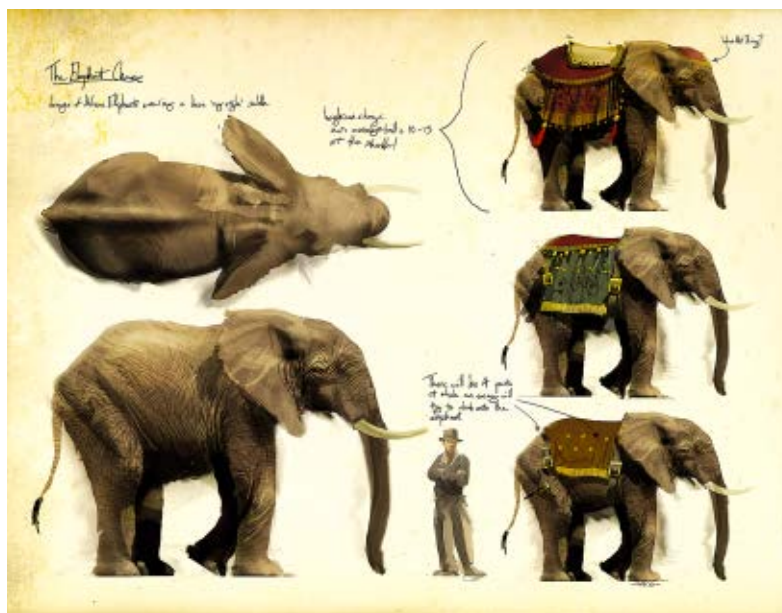




## » A THOUSAND WORDS

### NEXT-GEN INDIANA JONES PROJECT

This concept art for LucasArts' upcoming next-gen Indiana Jones title was created by senior concept artist Chris Voy. He used Photoshop and a Wacom tablet to create these images. The game is planned for PlayStation 3 and Xbox 360 and is the first collaboration between LucasArts and sister company Industrial Light and Magic. Its official title has yet to be announced.



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**GDC 2007 Preview Guide**

**DETAILS INSIDE**

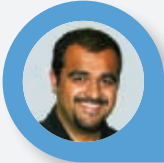




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# WELCOME



The game universe is expanding at an ever-increasing rate. Previously separate galaxies of PC, console, casual, online, and independent games are connecting with each other in unprecedented ways. New business models are redefining the physics of how developers and publishers orbit one another, and the next generation is finally clear of pre-release secrecy. With an entirely new set of possibilities to be on display at GDC 2007, you the game creator have the opportunity to take control of your own universe.

This year's GDC represents the most in-depth accumulation of knowledge and experience in the art of game making in our entire 21-year history. As the industry grapples with the challenges of next generation development, growing the market through innovative input and casual play, and reorganizing for online development and delivery, the GDC is there to provide depth and insight from each of these intersecting points. Given everything that's at stake today, this is the *one* GDC not to miss.

Over the next few pages, we describe some of the sessions appearing at GDC 2007, but we encourage you to keep [www.gdconf.com](http://www.gdconf.com) bookmarked for the latest visionaries, keynotes, and unveilings, as well as a new feature to organize your GDC experience, and make the GDC your own. Our goal is nothing more than to equip and empower you to bring your vision to life—the world is yours.

**Jamil Moledina**  
EXECUTIVE DIRECTOR, GDC

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For complete information on GDC 2007 sessions and speakers, go to [www.gdconf.com](http://www.gdconf.com)



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## GDC Returns to San Francisco!

Housed at the Moscone Convention Center in downtown San Francisco, the Game Developers Conference 2007 will turn one of the most cosmopolitan and international cities in the world into a game industry playground.

Be sure to register and book your travel arrangements early. GDC 2007 is already shaping up to be an impressive gathering with new industry-defining content. It's the place to connect with fellow colleagues in 2007.

### What's New This Year?

Here's just a sprinkling of items that are new to this year's conference.

- **INDEPENDENT GAMES SUMMIT & TWO NEW PASSES**

Get the IGS Classic or the IGS Expo Pass to access lectures, postmortems and roundtables from notable independent game creators.

- **EXPANDED CASUAL GAMES SUMMIT**

Two days of dedicated content for this critical and growing segment of the videogame industry.

- **GAME CAREER SEMINAR**

The Game Career Seminar is an intensive conference program that teaches techniques for advancing your career and, for those new to the industry, takes a look at how to get your foot in the door. Sessions are taught by your favorite game industry professionals and top educators.

- **EXPANDED SHOW FLOOR**

This year, GDC brings you not one... but two locations in which to explore the latest game development technologies.

**West And North Hall:** The must-see expo floors where new and established companies reveal the latest tools and technologies critical to game development.

## GDC Advisory Board

These seasoned industry professionals volunteer their time every year to help construct the 300+ GDC conference sessions. They work to ensure that the quality of the content provided to attendees is high-level, relevant, and timely. Their dedication is critical to the success of the conference.

### GDC Advisory Board

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To read more about the GDC Advisory Board, please visit: [www.gdconf.com/aboutus/advisoryboard.htm](http://www.gdconf.com/aboutus/advisoryboard.htm)

# AT A GLANCE

## GDC 2007 CONFERENCE AT A GLANCE SCHEDULE :: MARCH 5-9, 2007

	8:00 - 9:00 AM	9:00 - 10:00 AM	10:00 - 11:00 AM	11:00 - 12:00 PM	12:00 - 1:00 PM	1:00 - 2:00 PM	2:00 - 3:00 PM	3:00 - 4:00 PM	4:00 - 5:00 PM	5:00 - 6:00 PM	6:00 - 7:00 PM	7:00 - 8:00 PM	8:00 - 9:00 PM	9:00 - 10:00 PM
<b>M</b>	<b>Monday, March 5</b> Registration Open 8:30AM-4:30PM :: Moscone Convention Center													
	Continental Breakfast 8:30-10:00		Coffee Break 11:00-11:15		Lunch 12:30-2:00		Coffee Break 4:00-4:15							
	GDC MOBILE and SERIOUS GAMES SUMMIT 9:00-6:00										GDC MOBILE Reception 6:00-8:00			
	Tutorials, Casual Games Summit, Independent Games Summit 10:00-6:00										SERIOUS GAMES SUMMIT Reception 6:00-8:00			
	GAME CONNECTION 9:00-5:00										GAME CONNECTION Reception 5:00-7:00			
<b>T</b>	<b>Tuesday, March 6</b> Registration Open 8:30AM-7:00PM :: Moscone Convention Center													
	Continental Breakfast 8:30-10:00		Coffee Break 11:00-11:15		Lunch 12:30-2:00		Coffee Break 4:00-4:15							
	GDC MOBILE and SERIOUS GAMES SUMMIT 9:00-6:00										Japanese Orientation 7:00-7:30			
	Tutorials, Casual Games Summit, Independent Games Summit 10:00-6:00										East Meets West Reception (invitation only) 8:00-10:00			
	GAME CONNECTION 9:00-5:00													
<b>W</b>	<b>Wednesday, March 7</b> Registration Open 8:00AM-6:00PM :: Moscone Convention Center													
	Sessions 9:00-10:00	Keynote 10:30-11:30	Keynote & Sessions 12:00-1:00	Lunch 1:00-2:30	Sessions 2:30-3:30	Sessions 4:00-5:00								
	North Hall: 9:00-6:00 GDC EXPO West Hall: 10:00-6:00										Game Developers Choice & IGF Awards 6:30-8:30			
											IGF PAVILION 9:00-6:00			
	Expo Suites 9:00-6:00										Booth Crawl 4:30-6:00			
<b>TH</b>	<b>Thursday, March 8</b> Registration Open 8:00AM-6:00PM :: Moscone Convention Center													
	Sessions 9:00-10:00	Keynote 10:30-11:30	Keynote & Sessions 12:00-1:00	Lunch 1:00-2:30	Sessions 2:30-3:30	Sessions 4:00-5:00	Sessions 5:30-6:30							
	North Hall: 9:00-6:00 GDC EXPO West Hall: 10:00-6:00										SUITE NIGHT 8:00-10:00			
											IGF PAVILION 9:00-6:00		G.A.N.G. Awards 8:00-10:00	
											Expo Suites 9:00-6:00			
	GAME CONNECTION SERVICES 9:00-5:00													
	GAME CAREER SEMINAR 10:00-6:00													
<b>F</b>	<b>Friday, March 9</b> Registration Open 8:00AM-3:00PM :: Moscone Convention Center													
	Sessions 9:00-10:00	Sessions 10:30-11:30	Sessions 12:00-1:00	Lunch 1:00-2:30	Sessions 2:30-3:30	Sessions 4:00-5:00								
	North Hall: 9:00-3:00 GDC EXPO West Hall: 10:00-3:00													
											IGF PAVILION 9:00-3:00			
	Expo Suites 9:00-3:00													
	GAME CONNECTION SERVICES 9:00-5:00												Video Games Live 8:00-10:00	
	GAME CAREER SEMINAR 10:00-3:00													



CONFERENCE AT A GLANCE

# GDC 2007 EVENTS

## Must-Attend GDC 2007 Events

GDC 2007 is the epicenter of game industry networking. It's your chance to interact with contemporaries as well as industry luminaries, all in one spot.



### 7th Annual Game Developers Choice Awards

WEDNESDAY, MARCH 7 @ 6:30-8:30PM; ESPLANADE ROOM, MOSCONE CONVENTION CENTER, SOUTH HALL



The Game Developers Choice Awards are the premier accolades for peer-recognition in the game industry. Celebrating creativity, artistry and technological genius, the Game Developers Choice Awards honor the game creators from around the world who are truly worthy of recognition. The recipients are chosen by those who know games best—their creators.

Online nominations: **January 2-12**

To learn more, please visit [www.gamechoiceawards.com](http://www.gamechoiceawards.com)

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### 9th Annual Independent Games Festival

AWARDS: WEDNESDAY, MARCH 7 @ 6:30-8:30PM; ESPLANADE ROOM, MOSCONE CONVENTION CENTER, SOUTH HALL



Just as the Sundance Film Festival benefits the independent film community, the IGF creates a similar event for independent game developers as well as the student population of game developers. The IGF competition culminates at GDC, where winners are announced and awarded over \$50,000 in prizes.

PAVILION: WEDNESDAY-FRIDAY, MARCH 7-9, OPEN DURING NORTH HALL EXPO HOURS

Be one of the first to play the best independent games of the year at the IGF Pavilion.

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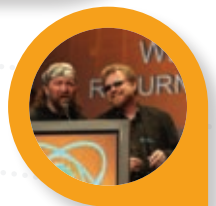


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### GDConnect

As a paid registered conference attendee of GDC 2007, you can connect with other attendees in advance of the conference and schedule meetings that will take place at GDC 2007. This easy-to-use matching, searching and visualization tool allows you to quickly identify other attendees with whom you would like to exchange knowledge, develop a business partnership or share best practices. You can also participate in engaging online forum discussions and collaborate with other attendees.

Learn more at [www.gdconf.com/events/gdconnect.htm](http://www.gdconf.com/events/gdconnect.htm)



# GDC 2007 EVENTS

## Game Connection at GDC

MONDAY & TUESDAY, MARCH 5-6; GATEWAY BALLROOM, MOSCONE NORTH HALL

Pitch your game and your studio! Game Connection is the place where leading developers, creators and game owners from the world over meet buyers, publishers and distributors. They are able to discuss the financing, publishing and licensing of game projects in confidential meetings behind closed doors. Both sellers and buyers choose the companies they wish to meet, based on their needs and objectives. The online meeting system helps to determine the right meetings and optimizes schedules.

## GDC Expo Booth Crawl

WEDNESDAY, MARCH 7 @ 4:30-6:00PM; WEST HALL & NORTH HALL

With drink in hand, explore the latest innovations in game development at GDC's North and West Halls. Talk with company experts in a relaxed atmosphere, and get your questions answered as you snack on happy hour goodies and enjoy catching up with technology — and friends.

See page 16 for the list of exhibitors.

## Suite Night @ GDC

THURSDAY, MARCH 8 @ 8:00-10:00PM; W HOTEL

Suite Night will take over the W Hotel in San Francisco, two blocks from the convention center, providing a truly unique venue for developers to mingle and discuss the latest technologies, games and career opportunities.

WORKROOM 1



WORKROOM 2



INDUSTRY ROOM



LUCASARTS

## East Meets West Reception

TUESDAY, MARCH 6 @ 8:00-10:00PM; BY INVITATION ONLY

The 4th annual East Meets West Reception brings Asian attendees, speakers, and VIPs together with their Western counterparts, to exchange ideas on the latest trends and innovations in the interactive entertainment industry.

## GDC Mobile Reception

MONDAY, MARCH 5 @ 6:00-8:00PM

THIRSTY BEAR BREWING COMPANY; 661 HOWARD ST (CROSS STREET: THIRD STREET)

Join mobile game developers, publishers, and network operators from around the globe for a networking reception directly following the opening day of the GDC Mobile conference.



## Serious Games Summit GDC Reception

MONDAY, MARCH 5 @ 6:00-8:00PM; MOSCONE NORTH HALL

Join serious game developers for hors d'oeuvres, cocktails, and networking directly following the opening day of the SGS GDC conference.

Reception Sponsor



## Gangs of GDC

MARCH 7-9; THROUGHOUT GDC'S WEST AND NORTH HALLS

Watch your back! And your friends.

In Gangs of GDC, roam the corridors of the Game Developers Conference hunting for enemies and allies. To help your gang rise to the top, you'll be given missions to assassinate members of other gangs. But at the same time, other players will be looking for you. The key to the game is safety in numbers: you can't be killed if you outnumber your enemy, so roll with your gang between sessions to stay alive.

Gangs of GDC is Gamelab's sixth annual massively multiplayer off-line game designed for the Game Developers Conference.



## Video Games Live

FRIDAY, MARCH 9, 2007 @ 8:00PM; LOCATION TBD

Back by popular demand! Video Games Live returns with a new show for 2007. Come celebrate the industry with an immersive concert event featuring music from the biggest videogames of all time. Top orchestras and choirs perform along with exclusive video footage, synchronized lighting, solo performers, live action and unique interactive segments to create an explosive one-of-a-kind multimedia entertainment experience.

## What's New at GDC 2007!

### i am 8-bit Art Gallery

MONDAY – FRIDAY, MARCH 5-9; NORTH HALL, STREET LEVEL

GDC is proud to welcome the award-winning *i am 8-bit* group art exhibition. Over 100 artists have applied their old-school '80s gaming memories to paint, ink, sculpture, plush, and other bizarre media, all in the name of pixels! It's an experiment in interpretation, shining a spotlight on an era when games were dominated by character. *i am 8-bit* is the voice of a generation that refuses to let the blips and bleeps fade away – and it's a GDC exclusive!

### Game Career Seminar

THURSDAY & FRIDAY, MARCH 8-9; WEST HALL, 2ND LEVEL

Get practical instruction on advancing your career and how to get a job in the game industry from working professionals and top educators.

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### MOTOLOUNGE@ GDC Mobile & Serious Games Summit

MONDAY & TUESDAY, MARCH 5-6, NORTH HALL, ROOM 123

### MOTOLOUNGE

WEDNESDAY – FRIDAY, MARCH 7-9; WEST HALL

Stop by the ultimate GDC destination for getting connected – and making connections! Sit down and relax in a comfortable atmosphere, get Wi-Fi, experience Motorola's "must-have" handsets, meet our team of mobile experts and learn about the limitless opportunities to develop for mobile.

### Game Connection Services

THURSDAY & FRIDAY, MARCH 8-9  
GATEWAY BALLROOM, MOSCONE NORTH HALL

Pitch your service company and its talent! Connection Services is an extension of Game Connection's successful formula for focused networking and matchmaking. This event allows game industry service providers (graphic and animation studios, testing, porting, motion capture...) to present their skills and know-how to developers and publishers in Game Connection's "one to one" meeting format.

# CAREER PAVILION / NETWORKING HOT SPOTS

## Career Pavilion

The largest and most prestigious career expo in the game industry provides publishers and studios the opportunity to meet, interact with, and recruit the industry's top developers on the show floor. This year the Career Pavilion has expanded to include the Career Networking Bar and Interactive Lounge.

### GDC 2007 Career Pavilion Exhibitors

1UP Network  
Activision, Inc.  
Amaze Entertainment  
BioWare Corp.  
Blue Fang Games  
BreakAway Ltd.  
Buena Vista Games/Disney  
Cryptic Studios  
Crystal Dynamics/Eidos Interactive  
Digital Artist Management  
Electronic Arts  
Epic Games Inc.  
Flagship Studios  
Foundation 9

Full Sail Real World Education  
Groove Games  
Hi-Rez Studios  
High Voltage Software  
Image Metrics  
Intel Corporation  
K2 Network  
LucasArts  
Microsoft Game Studios/Xbox  
Midway Amusement Games, LLC  
Monolith Productions  
Mova  
Nintendo of America  
NVIDIA

Perpetual Entertainment  
Premier Search, Inc  
Queensland Government  
Secret Level  
Sony Computer Entertainment of America  
Sony Online Entertainment  
Spark Unlimited  
THQ, Inc.  
Ubisoft  
Vicious Cycle Software, Inc.  
Video Gaming Technologies  
Visual Concepts  
Vivendi Universal Games  
Walt Disney Internet Group  
WMS Gaming

## Career Networking Bar

WEST HALL, 2ND FLOOR IN THE CAREER PAVILION

A new addition to the Career Pavilion, the Career Bar will provide a social networking area that includes couches and tables so developers can have drinks and relax while discussing career opportunities.

sponsored by



## Career Interactive Lounge

WEST HALL, 2ND FLOOR IN THE CAREER PAVILION

The Interactive Lounge will include PS3 demo stations and computers with internet access surrounded by tables and couches, making it the perfect spot to mix business with pleasure.

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## Jillian's - The Official GDC Bar

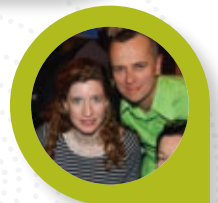
WEDNESDAY & THURSDAY, 5:00PM-CLOSING; 101 FOURTH ST., SAN FRANCISCO, CA 94103

Jillian's Bar, located in the Metreon, right across the street from Moscone Convention Center, West, is the place to meet up with old friends, forge new business relationships, and, of course, kick back and relax with a drink in hand. And there are pool tables, too!

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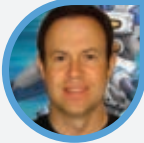


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# FEATURED SPEAKERS



Online Games: The Asian Flu

**Howard Marks**  
CEO, ACCLAIM



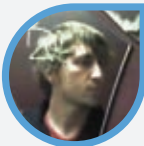
Outsiders in the Entertainment Industry

**David Braben**  
FOUNDER & CHAIRMAN,  
FRONTIER DEVELOPMENT



Simulated Characters:  
The Power of euphoria in  
LucasArts' Next-Gen Games

**Chris Williams**  
PRODUCER, LUCASARTS



The Imago Effect:  
Avatar Psychology

**Harvey Smith**  
STUDIO CREATIVE DIRECTOR,  
MIDWAY STUDIOS, AUSTIN



After the Party:  
Introversion Software  
One Year on from IGF 2006

**Tom Arundel**  
INTROVERSION SOFTWARE



SPoRE's Magic Crayons

**Chaim Gingold**  
DESIGNER, MAXIS/EA



Controlling an Entire Theatre of War:  
The Development of SUPREME COMMANDER

**Chris Taylor**  
FOUNDER, GAS POWERED GAMES



How Casual Games Will Kill the Console  
(And Why That's a Good Thing)

**John Welch**  
PRESIDENT & CEO, PLAYFIRST INC.



Physics on Next Gen Platforms

**David Wu**  
DIRECTOR OF TECHNOLOGY,  
PSEUDO INTERACTIVE INC.



Best Practices to Help You Take  
Control of Your Game Development

**Grady Booch**  
IBM FELLOW, IBM

Creating and Extending Original Franchises



**Samantha Ryan**  
CEO, MONOLITH PRODUCTIONS

**Matt Allen**  
LEAD ARTIST, MONOLITH PRODUCTIONS



FEATURED SPEAKERS

FEATURED SPEAKERS

# SERIOUS GAMES SUMMIT GDC 2007

March 5-6, Moscone Convention Center North, Room 135

SGS GDC



The Serious Games Summit spotlights the rapidly growing serious games industry that features the use of interactive game technology within non-entertainment sectors. The Summit provides a forum for game developers and industry professionals to examine the future course of serious games development in areas such as corporate training, education, first responders, government, health, military, science, and social change.

The goal of this year's SGS GDC is to create a mixture of tutorials, case studies, and interactive group workshops to help shape the agenda for the serious games field, widen our appreciation of what games and game technologies can accomplish, and send all attendees home with a better understanding of how to create successful serious games projects.

To attend the Serious Games Summit GDC, you will need to purchase a VIP, Giga, or Serious Games Summit Pass.

SGS GDC Reception Sponsor



## Serious Games Summit GDC Highlights

### WORKSHOPS & TUTORIALS

#### Serious Games Next-Gen

A look at what you can do with next-gen hardware and current top portable systems beyond entertainment. The possibilities are more than you know!

#### Lightweight MMOs

A tutorial focusing on providing you information on the many ways to develop MMO games and related serious game projects without having to assemble a massive budget or development team.

#### Serious Games for Less

A two-hour workshop focusing on tactics for serious game projects that cost \$100K or less; learn and share best practices for low-end serious game development.

#### What We Want from Industry

This interactive workshop creates a top 10 list of requests from the commercial entertainment industry that can help lead to further cooperation and progress in non-entertainment markets.

#### Beyond the Game

A workshop panel looks at the fundamentals of what a good serious game project has to do besides building a game.

### ADVERGAMING TRACK

The advergaming track explores both the business case and the cognitive case relevant to the role games, game culture, and game developers can play in how we market goods and services now and in the future.

### SERIOUS GAMES CASE STUDY BLASTS

This format makes it possible for participants to share with the audience a diverse field of projects and offer some useful thinking into the variety of ways games are being applied into new sectors.

### GROUP MEET-UPS

These meetings are held during breakfast and lunch to elicit discussions among key serious game industries including: education, health, social issue games, defense, and more.

## Serious Games Summit GDC Sponsored Session:

March 6, Room 131  
Tuesday 2:00-2:45PM

sponsored by



## Serious Games Summit Advisory Board

#### Ben Sawyer

CO-FOUNDER, DIGITALMILL, SGS GDC CONTENT CHAIR

#### Jerry Bush

PROGRAM MANAGER, CISCO SYSTEMS

#### Ian Bogost, PhD

FOUNDING PARTNER, PERSUASIVE GAMES

#### Jan Cannon-Bowers, PhD

ASSOCIATE PROFESSOR, UNIVERSITY OF CENTRAL FLORIDA,  
SCHOOL OF FILM AND DIGITAL MEDIA

#### Warren Currell

PRESIDENT, SHERPA GAMES INC.

#### Noah Falstein

PRESIDENT, THE INSPIRACY

#### James P. Gee, PhD

PROFESSOR, UNIVERSITY OF WISCONSIN-MADISON

#### Mark Long

CO-CEO AND EXECUTIVE PRODUCER, ZOMBIE

#### Elaine M. Raybourn, PhD

RESEARCH SCIENTIST, SANDIA NATIONAL LABORATORY



March 5-6, Moscone Convention Center North, Room 134

GDC Mobile 2007 is the premier conference for the creators of mobile games and for industry professional looking to expand their knowledge of, and contacts within, this exploding mobile entertainment sector. If you are currently developing interactive, entertainment applications for mobile handsets, GDC Mobile is the must-attend event of the year.

## GDC Mobile Offers:

- ADVANCED SEMINARS ON GAME DESIGN, PRODUCTION, AND AUDIO
- TECHNICAL TUTORIALS ON 3D AND PROGRAMMING FOR MOBILE
- NETWORKING OPPORTUNITIES AT THE GDC MOBILE RECEPTION
- 50+ SESSIONS, LECTURES, PANELS, AND ROUNDTABLE DISCUSSIONS
- ACCESS TO MORE THAN 900 ATTENDEES

To attend GDC Mobile, you will need a VIP, Mobile or Mobile Plus pass.

## Mobile Game Innovation Hunt

Hosted by Matthew Bellows & David Collier  
MONDAY, MARCH 5, 5:00-6:00PM, ROOM 134

sponsored by



Pitch your most innovative, interesting, and groundbreaking mobile game to a panel of expert judges and to the audience for a chance to win cool prizes.



GDC MOBILE

Platinum Sponsors



Gold Sponsor



Silver Sponsors



Reception Sponsor



GDC Mobile Media Sponsors



## GDC Mobile Sessions Highlights

### 3D & PROGRAMMING TUTORIALS

**Premium Phone Graphics:  
The New Generation of Mobile 3D Gaming**  
GARETH VAUGHAN, ARM LTD.

### AUDIO

**Guitar Hero Mobile: A Blockbuster  
Comes to the Little Screen**  
JENNIFER HRUSKA, SONIVOX

### PROGRAMMING

**Super J2ME Games: Size and Performance**  
STEPHEN CHENG & SIMON ROBINSON, INNAWORKS

### DEALS & DISTRIBUTION

**Mobile Games: A Strategic Review  
of the Sector**  
PAUL HEYDON, UNITY CAPITAL

### GAME DESIGN

**Putting the Fun in Functional II:  
Power to the Players**  
AMY JO KIM, SHUFFLEBRAIN

### PLANNING AHEAD

**Do Your Handset Ports in Minutes!**  
GUIDO HENKEL, G3 STUDIOS

### PRODUCTION

**Simultaneous Development  
Across Mobile and Handheld**  
THORSTEINN GUNNARSSON, IDEAWORKS3D

**Register today at [www.gdconf.com](http://www.gdconf.com)**

## GDC Mobile Sponsored Sessions:

March 5-6, Room 120

Monday 1:00-1:30PM  
2:00-2:45PM  
3:00-3:45PM  
Tuesday 11:45-12:30 PM

sponsored by



March 5-6, Room 120

Monday 11:45-12:30 PM  
Tuesday 10:30-11:30 AM

sponsored by



March 6, Room 120

Tuesday 1:00-1:30PM  
2:00-2:45PM

sponsored by



## GDC Mobile Advisory Board

**Robert Tercek**  
FOUNDING CHAIRMAN, GDC MOBILE

**Matthew Bellows**  
GENERAL MANAGER & VP MARKETING,  
FLOODGATE ENTERTAINMENT

**David "DC" Collier**  
PRESIDENT, PIKKLE KK

**Jason Ford**  
VICE PRESIDENT OF STRATEGY AND PLANNING,  
NAMCO NETWORKS AMERICA INC.

**Jani Karlsson**  
DIRECTOR OF STRATEGIC PLANNING, AMD

**Kyu C. Lee**  
PRESIDENT, GAMEVIL

**Chris Melissinos**  
CHIEF GAMING OFFICER, SUN MICROSYSTEMS

**Mark Ollila**  
DIRECTOR OF TECHNOLOGY & STRATEGY,  
GAMES, MULTIMEDIA, NOKIA

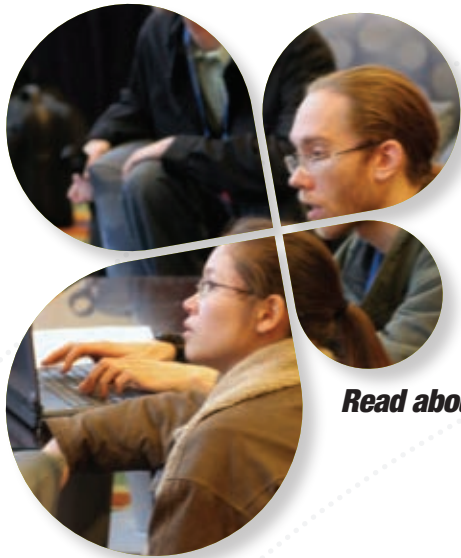
**Jyri "Jay" Ranki**  
PRODUCER, BUGBEAR ENTERTAINMENT

**Kristian Segerstråle**  
MANAGING DIRECTOR, EMEA, GLU MOBILE

**Lincoln Wallen**  
VICE PRESIDENT, CTO EA MOBILE, ELECTRONIC ARTS

**Mike Yuen**  
SENIOR DIRECTOR, GAMING GROUP, QUALCOMM

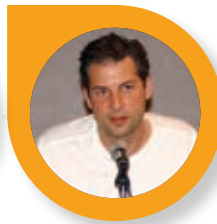
# VISUAL ARTS/GAME DESIGN TRACKS



GDC is committed to bringing you high-level, quality sessions. We want you to walk away feeling inspired and energized, knowing how to apply what you learned in your day-to-day work and with aspirations to improve your future and that of the game industry.

Sessions at the GDC are divided into tracks, generally according to the subject discipline such as visual arts or game design.

**Read about sessions as soon as they are announced at [www.gdconf.com](http://www.gdconf.com)**



## Visual Arts Track

The Visual Arts track is designed to provide specific, practical knowledge in taking game art in new directions. Go step-by-step through the latest tools and techniques in longer format classes.

VISUAL ARTS



### VISUAL ARTS SESSION HIGHLIGHTS:

**Art Direction Vision:  
Defining, Communicating, and Delivering It**

MOBY FRANCKE, VALVE SOFTWARE  
OCEAN QUIGLEY, MAXIS/ELECTRONIC ARTS  
JUSTIN THAVIRAT, BLIZZARD ENTERTAINMENT

**Athletic Performance—Intelligent Believable Characters**

HENRY LABOUNTA & ERIC ARMSTRONG, ELECTRONIC ARTS CANADA

**The Creation of SAINT'S ROW's Open World Cityscape: Stilwater**

JASON HAYES & KENNY THOMPSON, VOLITION, INC.

**Cross Application Asset Creation for LAIR:  
From Characters to Clouds**

MARK TEARE, FACTOR 5

**Evolve: Character Pipeline Advances for Next-Gen Titles**

CHRISTOPHER EVANS & HANNO HAGEDORN, CRYTEK GMBH

## Game Design Track

Game designers need to understand and exploit the possibilities of new technologies even as they continue to master the traditional disciplines of drama, gameplay, and psychology. The Game Design track explores the challenges and ramifications of the interaction between new technologies and established techniques.

GAME DESIGN



### GAME DESIGN SESSION HIGHLIGHTS:

**Exploration: From Systems to Spaces to Self**

CLINT HOCKING, UBISOFT

**How to Help Your Players Stop Saving All The Time**

RANDY SMITH, ELECTRONIC ARTS LOS ANGELES

**Magic Lessons: Designing and Balancing Game Objects**

ROBERT GUTSCHERA, WIZARDS OF THE COAST

**SPORE's Magic Crayons**

CHAIM GINGOLD, MAXIS/ELECTRONIC ARTS

**To Reward or Not to Reward?**

**How to Create a Positive Community in an MMO World**

JACK EMMERT, CRYPTIC STUDIOS

# PROGRAMMING/AUDIO TRACKS

## Programming Track

As new platforms emerge and existing platforms evolve, programmers face an ever-increasing challenge to produce games that capture the attention of the public and the media. The Programming track focuses on these challenges and the opportunities presented by next-and current generation development.

### PROGRAMMING SESSION HIGHLIGHTS:

#### Artificial Intelligence in Computer Games

NEIL KIRBY, BELL LABORATORIES  
STEVE RABIN, NINTENDO OF AMERICA

#### Designing Revolutionary Controls

MIKE CHRZANOWSKI & JESSE RAYMOND, VICARIOUS VISIONS

#### Dragged Kicking and Screaming: Source Multicore

TOM LEONARD, VALVE SOFTWARE

#### Physics on Next-Gen Platforms

DAVID WU, PSUEDO INTERACTIVE

#### Shared Technology at Rare: Good and Bad

TOM GROVE, RARE LTD/MICROSOFT GAME STUDIOS



PROGRAMMING

## Audio Track

Dialogue, orchestral scores, and sound effects significantly contribute to the immersive experience of today's games. The Audio track offers real world information on the unique fusion of craft and technology that is game audio production.

### AUDIO SESSION HIGHLIGHTS:

#### The Art of Orchestration, Part Deux!

SASCHA DIKICIYAN, SONIC MAYHEM  
LENNIE MOORE, SLENS MUSIC  
CRIS VELASCO, COMPOSER

#### Audio Production:

##### Ideas for the Next Generation...What Next?

DAN BARDINO, SONY COMPUTER ENTERTAINMENT EUROPE  
TIM LARKIN, CYAN WORLDS  
DAVE MURRANT, SONY COMPUTER ENTERTAINMENT AMERICA

#### Multichannel Audio: Techniques for a Hi-Def Experience

BRYAN PEARSON, TREYARCH

#### SCARFACE: Sound Design and Mixing Using a Post Production Audio Model

ROB BRIDGETT, RADICAL ENTERTAINMENT

#### Why "Work-for-Hire" Doesn't Work for Composers - Concrete Steps to Improve a Deal

JIM CHARNE, LAW OFFICES JAMES I. CHARNE



AUDIO



G.A.N.G.  
GAME AUDIO NETWORK GUILD  
www.audiogang.org

The Game Audio Network Guild focuses on the advancement of interactive audio and the community surrounding it. Established as a non-profit organization in 2002, G.A.N.G. now boasts over 1,200 members. It raises awareness of interactive audio by providing education, information, instruction, resources, publicity, guidance, community, recognition, and enlightenment not only to its members, but to the public. Its goal is to encourage and promote excellence in interactive audio which leads to more competitive and entertaining products. G.A.N.G. also supports career development and education for aspiring game audio professionals, publishers, developers, and students.

### G.A.N.G. Town Hall Meeting

THURSDAY, MARCH 8, 2007; LOCATION AND TIME TBA

G.A.N.G. holds a town hall meeting during GDC where its officers and board of directors discuss the organization's accomplishments in the past year and its upcoming projects. This meeting is open to anyone interested in promoting excellence in interactive audio. It's an opportunity to learn more about G.A.N.G. and its goals. A question-and-answer period concludes the town hall meeting.

### 2007 G.A.N.G. Awards

THURSDAY, MARCH 8, 2007; LOCATION AND TIME TBA

G.A.N.G.'s 5th annual awards show takes place during GDC 2007. The awards are presented to recognize excellence in interactive audio. Details are coming soon.

# BUSINESS & MANAGEMENT/ PRODUCTION/VISION TRACKS/ CASUAL GAMES SUMMIT

BUSINESS & MANAGEMENT

## Business & Management Track

The business of gaming requires sound strategies and outstanding tactical execution. The Business and Management track looks at these aspects of the game development process and offers proven strategies to understand complex game industry business issues.

### BUSINESS & MANAGEMENT SESSION HIGHLIGHTS:

#### 10 Steps to Success in Outsourcing Contracts

VINCENT SCHEURER, SARASSIN LLP

#### Developer/Publisher Wars

FREDERICK FIERST, FIERST, PUCCI AND KINDER LLP

KEITH BOESKY, BOESKY & COMPANY

BARRY SEATON, BARRY C. SEATON P.C.

#### How Casual Games Will Kill the Console (And Why That's a Good Thing)

JOHN WELCH, PLAYFIRST, INC.

#### MMOs, Past, Present and Future

MARK JACOBS, EA MYTHIC

DANIEL JAMES, THREE RINGS

RAPH KOSTER, AREA, INC.

GORDON WALTON, BIOWARE

#### Online Games: The Asian Flu

HOWARD MARKS, ACCLAIM



## Production Track

Today's producers manage expanding development teams, skyrocketing budgets, larger games, and a growing global market. The Production track continues to offer proven tools and techniques to take a project from pre-production to shipping, on time and on budget.

### PRODUCTION SESSION HIGHLIGHTS:

#### After the Party: Introversion Software One Year on from IGF 2006

TOM ARUNDEL, INTROVERSION SOFTWARE

#### Agile Game Development

CLINTON KEITH, HIGH MOON STUDIOS

#### From the Frontline of Outsourcing: The Lessons Never End

KRISTINE COCO, MIDWAY STUDIOS

#### Taking Control of Your Middleware

ROSS O'DWYER, HAVOK

#### The Ups and Downs of Downloadable Content: Developing Content for GRAW 360

CHRIS BRAY & RANDY GREENBACK, RED STORM ENTERTAINMENT



PRODUCTION

## Vision Track

The Vision track features creative artists from a range of cultural media, such as film, music, design, and games, who will discuss their visions of the future of interactive entertainment. The track is designed to provoke innovation among developers, and inspire you to create the breakthrough games that drive our industry forward.

### VISION SESSION HIGHLIGHTS:

#### Best Practices to Help You Take Control of Your Game Development

GRADY BOOCH, IBM

#### The Metagame: A Battle of Videogame Smarts

FRANK LANTZ, AREA/CODE

ERIC ZIMMERMAN, GAMELAB

#### Outsiders in the Entertainment Industry

DAVID BRABEN, FRONTIER

#### The Secret Garden: Mobile Games and The 4% Addressable Market Who Love Them

JOHN SZEDER, MOFACTOR

#### Superfriends: Establishing a Solid Working Relationship Between Licensor and Licensee

JOHN BLAKELY, SONY ONLINE ENTERTAINMENT

JIM LEE, DC COMICS



VISION

## Casual Games Summit 101 & 201

MONDAY AND TUESDAY, MARCH 5-6, MOSCONE CONVENTION CENTER

STEVE MERETZKY, BOFFO GAMES; DAVE ROHRL, POPCAP GAMES; JOHN WELCH, PLAYFIRST, INC.

The Casual Games Summit is THE one-stop place to learn everything about the casual games space. The first day, Summit 101, is for those new to this space and interested in learning all of the basics of the casual games sector, including material on business, marketing, design, production, and technology issues. The second day, Summit 201, includes more advanced topics for those who already have some experience in the casual game space.



# IGDA TRACK/THE INDEPENDENT GAME SUMMIT

## IGDA Track

As a reflection of the IGDA's mission to advance the careers and lives of game developers, the sessions in this track address the most relevant issues affecting the developer community today: quality of life and working conditions, creative freedom, credit standards and recognition, inclusiveness and accessibility, etc. The IGDA track offers a means by which you can get involved as nearly all sessions are directly linked to committee work and advocacy efforts. Attendees will come away from the IGDA sessions empowered to make a difference within the game development community.

### IGDA SESSION HIGHLIGHTS:

**(301) IGDA Education SIG Curriculum Workshop**  
SUSAN GOLD AND MEMBERS OF THE EDUCATION SIG

**Accessibility Idol: Season Finale!**  
ERNEST ADAMS; MICHELLE HINN, UNIVERSITY OF ILLINOIS  
RICHARD VAN TOL, UNIVERSITY OF PORTSMOUTH AT ENGLAND

**Burning Mad: Game Publishers Rant**  
ERIC ZIMMERMAN, GAMELAB; RANTERS TBA

**Producing Quality of Life: The Producer's Responsibility**  
HEATHER CHANDLER, MEDIA SUNSHINE

**Who's the Real BULLY?:  
Rights and Responsibilities in the Anti-Game Debate**  
DANIEL GREENBERG



## IGDA Annual Meeting

MARCH 8, 1:15-2:15PM; LOCATION TBD, BOXED LUNCHES WILL BE PROVIDED

The International Game Developers Association's Board of Directors and executive management will give developers a rundown of the Association's progress over the past year, as well as an indication of what's in store for 2007. There will be a Q&A period to get feedback and input from the community.



IGDA



## IGDA Members-Only Party

MARCH 6, 7:00PM-MIDNIGHT; ROE RESTAURANT & LOUNGE

Come join fellow developers in this exclusive social event just for IGDA members. Emphasis will be on casual networking and mellow chillout music.

## The Independent Games Summit

MONDAY & TUESDAY, MARCH 5-6; MOSCONE CONVENTION CENTER  
SIMON CARLESS, IGF CHAIRMAN

The Independent Games Summit features lectures, postmortems and roundtables from some of the most notable independent game creators, including many of the Independent Games Festival finalists of this year. The Independent Games Summit seeks to highlight the brightest and the best of indie development, with discussions ranging from indie game distribution methods through game design topics, guerrilla marketing concepts, student indie game discussions, and much more.

### INDEPENDENT GAMES SUMMIT SESSION HIGHLIGHTS:

**How Cloud Got Made**  
JENOVA CHEN & KELLE SANTIAGO, THATGAMECOMPANY

**The Indie MBA**  
JOHN BAEZ, THE BEHEMOTH

**Marketing for Indies**  
RUSSELL CARROLL, REFLEXIVE

**Our Journey From NARBACULAR DROP to Portal**  
KIM SWIFT, VALVE

To attend the Independent Games Summit, you will need a VIP, Giga, Independent Games Summit Classic, Independent Games Summit Expo, or Tutorials-Only Pass.



INDEPENDENT GAMES SUMMIT

# TUTORIALS

March 5-6, Moscone Convention Center

GDC offers one-and two-day, in-depth, classroom-style conference sessions.

TUTORIALS



## Two-Day Tutorials

MONDAY & TUESDAY, MARCH 5-6, 2007

### [302] Audio Boot Camp

SCOTT SELFON, MICROSOFT  
DAVE RANYARD, SONY COMPUTER ENTERTAINMENT EUROPE

### [305] Game Design Workshop

MARC LEBLANC

## Microsoft® Game Developer Day

TUESDAY, MARCH 6 @ TBD

sponsored by

Microsoft®

## One-Day Tutorials

MONDAY, MARCH 5, 2007

### [101] Interactive Storytelling Boot Camp

DAVID FREEMAN, THE FREEMAN GROUP  
HAL BARWOOD, FINITE ARTS  
E. DANIEL AREY, NAUGHTY DOG-SCEA  
RICHARD DANSKY, RED STORM ENTERTAINMENT  
MICHAEL MCCORMICK, BACKBONE ENTERTAINMENT  
DANIEL ERIKSON, BIOWARE

### [102] Creativity Boot Camp '07

PAUL SCHUYTEMA, EDUCATIONAL TECHNOLOGY

### [103] Advanced Visual Effects with Direct3D

RICHARD HUDDY, ATI  
CEM CEBENOYAN, NVIDIA

### [104] Know Your Players: An In-Depth Look at Player Behavior and Consumer Demographics

ERIC ZIMMERMAN, GAMELAB

### [105] Core Techniques and Algorithms in Shader Programming

WOLFGANG ENGEL  
TOM FORSYTH, RAD GAME TOOLS  
MATTHIAS WLOKA, TAKETWO INC.  
KENNETH HURLEY, SIGNATURE DEVICES, INC.  
MARTIN MITTRING, CRYTEK GMBH  
LUTZ LATTA, ELECTRONIC ARTS LOS ANGELES  
VLAD STAMATE, SONY COMPUTER ENTERTAINMENT AMERICA  
CARSTEN DACHSBACHER

### [107] Maya: Large Data Set Handling and Data Re-use for Next-Generation Pipelines

ROB ORMOND, AUTODESK

### [108] Do-It-Yourself Usability: How to Use User Research to Improve Your Game

KEVIN GOEBEL, USER-RESEARCH ENGINEER, MICROSOFT GAME STUDIOS

TUESDAY, MARCH 6, 2007

### [201] "...And Make It Snappier!" Learn Better Game Writing in a Day

EVAN SKOLNICK, VICARIOUS VISIONS/ACTIVISION

### [202] Dealmaking for Developers 2007: Challenges for Growing an Independent Studio

JIM CHARNE, LAW OFFICES JAMES I CHARNE  
DAN O'CONNELL OFFNER, OFFNER & ANDERSON  
DAVID S. ROSENBAUM, LAW OFFICES OF DAVID S. ROSENBAUM  
GARRY KITCHEN, SKYWORKS TECHNOLOGIES, INC.  
ROBERT WALSH, KROME STUDIOS PTY, LTD.  
JOSH RESNICK, PANDEMIC STUDIOS

### [203] Physics for Games Programmers

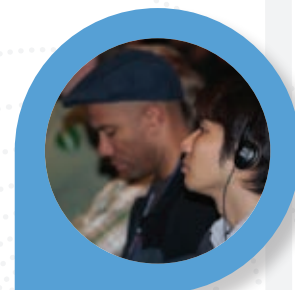
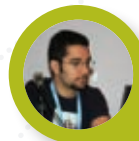
JIM VAN VERTH, RED STORM ENTERTAINMENT, INC.  
CHRISTER ERICSON, SONY COMPUTER ENTERTAINMENT  
SQUIRREL EISERLOH, RITUAL ENTERTAINMENT  
ERIN CATTO, BLIZZARD ENTERTAINMENT  
MARQ SINGER, RED STORM ENTERTAINMENT, INC.  
GINO VAN DEN BERGEN, PLAYLOGIC GAME FACTORY

### [205] Large-scale Engineering for Online and Offline Games

LARRY MELLON, EMERGENT GAME TECHNOLOGIES  
NEIL KIRBY, BELL LABORATORIES  
GORDON WALTON, BIOWARE  
BILL DALTON, SONY ONLINE ENTERTAINMENT

### [206] 3ds Max 9: Advanced Techniques for Next-Gen Pipelines

LAURENT M. ABECASSIS, EMMY-AWARD WINNER



**Register today  
at [www.gdconf.com](http://www.gdconf.com)**



# SPONSORED SESSIONS

## March 7-9, Moscone Convention Center

Sponsored sessions are dynamic, one to two hour classes where GDC exhibitors present hands-on information about products that drive the game development process. This is a valuable opportunity for game developers to prospect a new solution to their day-to-day challenges, or if the product is already used in-house, gain further insight into the latest iteration of the tool or technology. Don't miss this chance to identify ways to better enable next-gen development!



## GDC 2007 SPONSORED SESSION SCHEDULE :: MARCH 7-9, 2007

The following companies will be presenting sponsored sessions at GDC. Content to be announced shortly.

SPONSORED SESSIONS

Wednesday March 7							
Room and Floor Location							
Time	3002 3rd Floor	3018 2nd Floor	3004 3rd Floor	2011 3rd Floor	3011 2nd Floor	2012 3rd Floor	2010 2nd Floor
9:00-10:00AM	AMD			Microsoft	Image Metrix	Audiokinetic	Gamespot
10:30-11:30AM	AMD	Sony	Wild Tangent	Microsoft	Havok	Macrovision Trymedia Games	Dolby
12:00-1:00PM	AMD	Sony	Microsoft Xbox	Microsoft	Emergent	Macrovision Trymedia Games	Microsoft Casual Games
2:30-3:30PM	AMD	Sony	Xbox Live Arcade	Microsoft	Microsoft Xbox	Intel	IGN
4:00-5:00PM	AMD			Microsoft		Intel	IBM

Thursday March 8							
Room and Floor Location							
Time	3002 3rd Floor	3018 2nd Floor	3004 3rd Floor	2011 3rd Floor	3011 2nd Floor	2012 3rd Floor	2010 2nd Floor
9:00-10:00AM		NVIDIA		Microsoft	Novint	Nabrana, Inc	AMD
10:30-11:30AM	Microsoft Xbox	NVIDIA	IBM	Microsoft	Havok	Intel	Dolby
12:00-1:00PM	Microsoft Xbox	NVIDIA	Wild Tangent	Microsoft	AGEIA		Microsoft Casual Games
2:30-3:30PM	Autodesk	NVIDIA	Microsoft Xbox	Microsoft	AGEIA	Intel	IGN
4:00-5:00PM	Autodesk	NVIDIA		Microsoft	Intel	Intel	Qualcomm

Friday March 9							
Room and Floor Location							
Time	3002 3rd Floor	3018 2nd Floor	3004 3rd Floor	2011 3rd Floor	3011 2nd Floor	2012 3rd Floor	2010 2nd Floor
9:00-10:00AM				Microsoft			Gamespot
10:30-11:30AM			Microsoft Xbox	Microsoft		Autodesk	VMC Game Labs
12:00-1:00PM				Microsoft		Autodesk	IBM
2:30-3:30PM				Microsoft		Autodesk	Microsoft Casual Games
4:00-5:00PM				Microsoft			



Autodesk

audiokinetic



ma@rovision

Microsoft



# GDC 2007 EXPO

Wednesday–Friday, March 7-9

At GDC, the most innovative companies from around the world demonstrate emerging technologies critical to creating an immersive gameplay experience. This is a game developer's one chance in the year to interact with the most companies in one venue. From the latest in laser technology to engines, you'll find it all on the GDC Expo floor.

## West & North Hall

### West Hall

WEDNESDAY–THURSDAY, MARCH 7 & 8, 10:00AM-6:00PM; FRIDAY, MARCH 9, 10:00AM-3:00PM

### North Hall

WEDNESDAY–THURSDAY, MARCH 7 & 8, 9:00AM-6:00PM; FRIDAY, MARCH 9, 9:00AM-3:00PM

The must-see expo floors where new and established companies reveal the latest tools and technologies critical to game development.

**GDC 2007 EXHIBITORS** [as of 11.30.06] Learn about each exhibitor at [www.gdconf.com/expo/exhibitors.htm](http://www.gdconf.com/expo/exhibitors.htm)

+7 Systems	eMagin Corporation	Logitech	Rochester Institute of Technology
3Dconnexion	Emergent Game Technologies	Macrovision's Trymedia Games	Rolta
Absolute Quality, Inc.	Emotiv Systems	Mary-Margaret.com Inc.	S3 Graphics, Inc.
Academy of Art University	Empower Technologies	MAXON Computer	Sandio Technology
Adobe Systems	Enjmin/Conservatoire National des Arts et Métiers	Megatrax Production Music	Scaleform Corporation
AGEIA Technologies, Inc.	Enzyme Labs	Meta Motion	Seagate
Al.Implant	Epic Games Inc.	Microsoft Corporation	Seapine Software
Alseek, Ltd.	ETRI (Electronics and Telecommunications Research Institute)	Minnetonka	Serbin Communications/Play!
AMD	Ex'pression College for Digital Arts	MOGware	Silicon Studio Corporation
Anark Corporation	Eyetrionics	Morgan Kaufmann/Focal Press	Simutronics
APM - Associated Production Music	Firelight Technologies	Motion Analysis Corporation	SlickEdit
Art Institute of California - San Francisco	Fonix Corporation	Multiverse	SN Systems Ltd.
ATI Technologies Inc.	Fork Particle	MumboJumbo	Solid State Networks
Audiokinetic, Inc.	Freedom of Teach	N-Gage Nokia	Sony Computer Entertainment of America
Autodesk	Game Instinct/Testing Testing 1-2-3	Nabrana	Speedtree/IDV
AVID	GarageGames	Natural Point	Sun Microsystems Inc.
BGIIn	Gekido Design Group Inc	NaturalMotion Ltd.	SV Corporation
BigWorld	Gentle Giant Studios	NeoEdge Networks	Sylien Entertainment
Black Point Studios	German Pavilion	Nintendo of America Inc.	TechExcel
Bug Tracker	GestureTek, Inc.	Nordic Game Recourses	Technicolor Interactive Services
Cerro Coso College Game Design Program	Giquila	Noren Products, Inc.	Testronic Labs
Cogswell Polytechnical College	Google	Novint Technologies, Inc.	Thomson Course Technology PTR/Charles River Media
Collins College-A School of Design & Technology	Havok	NVIDIA	UK Trade and Investment
Columbia College Chicago	Hewlett Packard	OC3 Entertainment, Inc.	University of California
Conservatory of Recording Arts	iBeta Quality Assurance	Oelli	Valve
Corel Corporation	IBM	Peer 1 Network	Vancouver Film School
Creative Labs	IGN/Gamespy Industries	Perforce Software	Vicious Cycle Software, Inc./Vicious Engine
CRI Middleware Co., Ltd.	Intel Corporation	Philips amBX	Vicon Peak
Crowd Control Productions	Interactive Studio Management	Polygon Magic	Virtools
Cyberware	International Game Developers Association	Power Up Gaming	Visual Concepts
DemonWare	ITT Tech	Prime Sense	Vivox
DeVry University	Khronos Group, Inc.	QUALCOMM Incorporated	VMC Game Labs
DeWolfe Music	Killer Tracks	Quazal	Wacom Technology
DigiPen Institute of Technology	Kynogon	RAD Game Tools, Inc.	Waves
Dolby Laboratories		RealNetworks, Inc.	Wild Tangent
DRM Networks		Replay Solutions LLC	
ECD Systems		Right Hemisphere	
Elsevier			



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# GDC 2007

## PASS OPTIONS

	MAIN CONFERENCE + KEYNOTES: Over 300 lectures, panels, & roundtables including the most anticipated keynote sessions (Wed.-Fri.)	Audio Lectures & Audio Boot Camp (Mon.-Fri.)	GDC Mobile (Mon. & Tues.)	Serious Games Summit GDC (Mon. & Tues.)	The Independent Games Summit (Mon. & Tues.)	IGDA Education SIG Curriculum Workshop (Mon. & Tues.)	Tutorials (Mon. & Tues.)	GD Connect (Mon. - Fri.)	Conference Proceedings	GDC Expo Booth Crawl (Wed.)	GDC Expo & Career Pavilion (Wed. - Fri.)	Game Career Seminar (Thurs. - Fri.)	Breakfast & Lunch (Mon.)	Breakfast & Lunch (Tues.)	Breakfast & Lunch (Wed.)	Breakfast & Lunch (Thur.)	Breakfast & Lunch (Fri.)	Early Registration by January 31, 2007	On or after 1/31/07
VIP Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$1675 SAVE \$425!	\$2,100
Giga Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$1375 SAVE \$475	\$1,850
Mobile-Plus Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$1195 SAVE \$500!	\$1,695
<b>NEW!</b> Independent Games Summit Classic Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$995 SAVE \$555	\$1,550
Classic Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$945 SAVE \$505	\$1,450
Mobile Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$845 SAVE \$200	\$1,045
Audio Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$700 SAVE \$100	\$800
Serious Games Summit Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$625 SAVE \$125	\$750
Tutorials-Only Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$600 SAVE \$125	\$725
<b>New!</b> Independent Games Summit Expo Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$275 SAVE \$20	\$295
Expo Pass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	\$175 SAVE \$20	\$195
Friday Student Pass*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		\$75

\*Registration for the Student Pass is only available on-site on Friday, March 9, 2007 at GDC 2007 at the Moscone Center in San Francisco, CA. You must be at least 18 years old and provide proof of current enrollment (i.e. a valid student ID) to be eligible for this pass.