



United Business Media

» PRODUCT REVIEWS MOTIONBUILDER 6 » IMAGEMODELER 4.0 FOR MAC

MARCH 2005

# game**developer**

THE LEADING GAME INDUSTRY MAGAZINE

» DEVELOPERS UNITE


ORGANIZED LABOR:  
CURSE OR BLESSING?

» DOUBLE INTERVIEW ISSUE

BUENA VISTA GAMES &  
INTROVERSION SOFTWARE

» MOMENT OF IMPACT

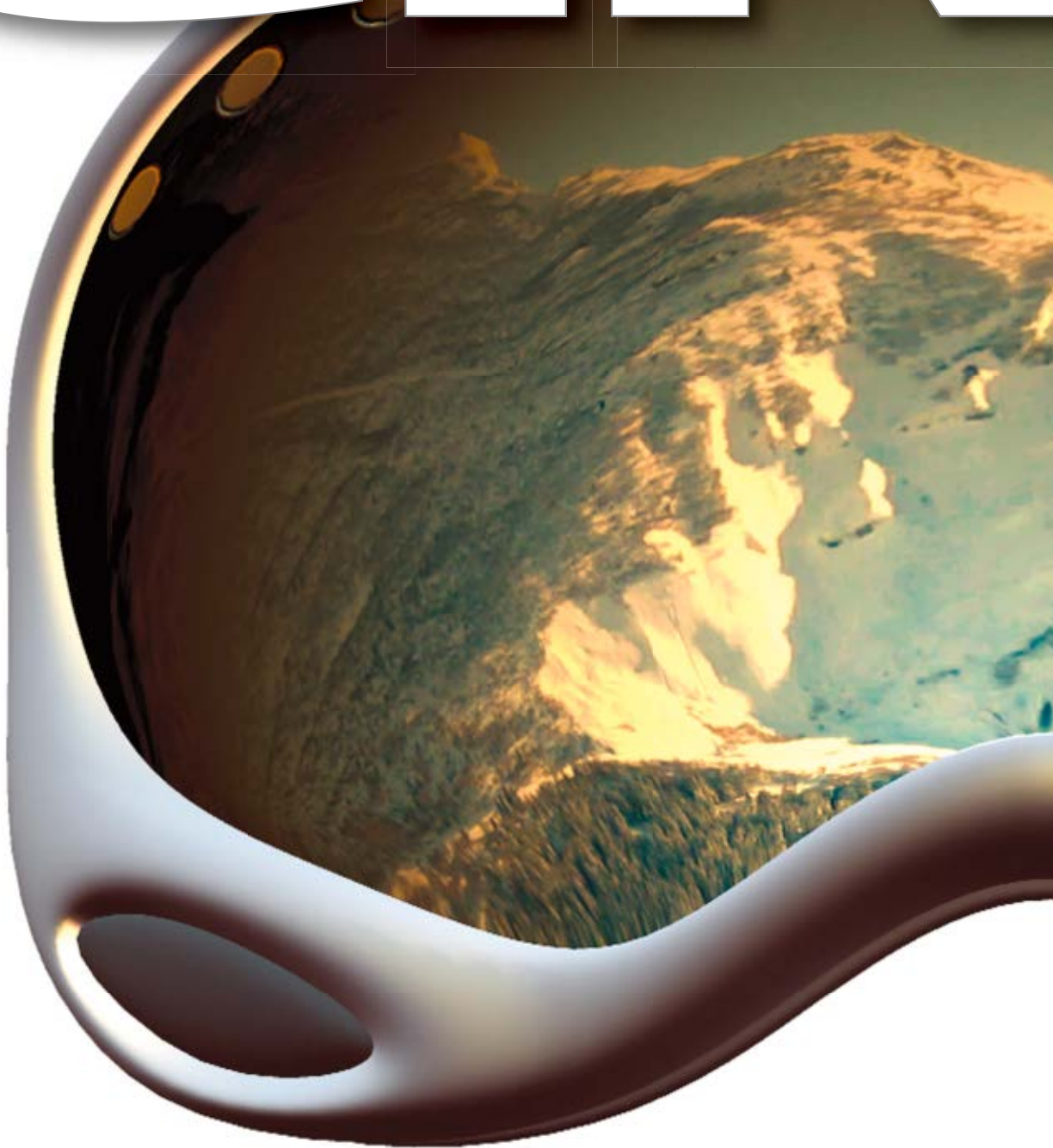
SUCCESSFUL TIPS FOR  
AN EFFECTS SYSTEM



**POSTMORTEM:**  
WHAT'S INSIDE  
**THE ROOM?**  
THE HORROR OF  
**SILENT HILL 4**  
INVESTIGATED

# GINN

RT/shader™



Maya® & 3ds max® CONNECTION



Render-to-texture SCRIPTING

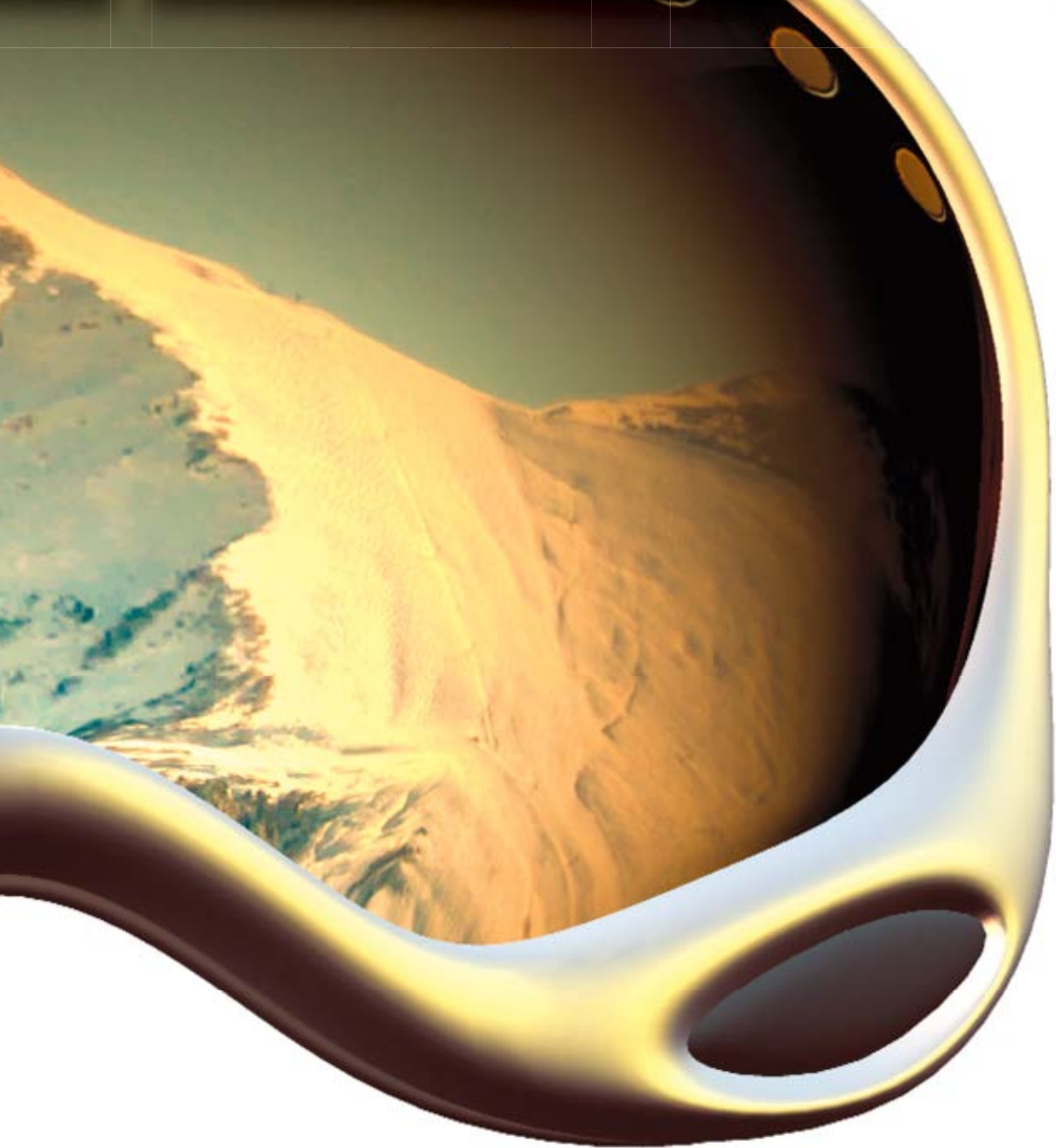
[www.rtzen.com](http://www.rtzen.com)

**rtzen**®

**800-73-RTZEN**  
(north american toll-free)

© 2005 RTzen, Inc. All rights reserved. RT/shader and the RTzen logo are trademarks RTzen, Inc. All other trademarks are the property of the respective owners.

# ZZAA 2



REAL-TIME GOGGLES COURTESY FRED MOREAU

## Run-time INTEGRATION



## Visual Real-time Shader CREATION



NORTH AMERICA

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



JAPAN / 日本

[www.borndigital.co.jp/software/](http://www.borndigital.co.jp/software/)  
[sales@borndigital.co.jp](mailto:sales@borndigital.co.jp)



EUROPE

**AB COLOROD MEDIA**  
We care for your performance, team, content and engine wise  
[www.abcmmedia.se](http://www.abcmmedia.se)  
[info@abcmmedia.se](mailto:info@abcmmedia.se)



456,500GBs  
daily\*

25 of the top 30 media & entertainment companies trust Akamai to deliver hundreds of thousands of GBs daily.

They trust Akamai to deliver more than content. To deliver billions of downloads daily and give users what they want when they want it. Why? Because Akamai provides instant scalability to handle spikes in traffic, delivering positive user experiences and increased customer loyalty.

**Start** learning more and get your copy of  
*Online Games: 10 Tips to Increase Play and Profitability.*  
Call 888-340-4252 or visit [www.akamai.com/gaming](http://www.akamai.com/gaming)



\*Akamai delivers an average of 456,500 GBs per day, this is equivalent to approximately 702,307 CDs.  
(based on Akamai Platform data collected from the 12/1/04 to 12/20/05)

© 2005 Akamai Technologies, Inc. All Rights Reserved. Akamai and the Akamai logo are registered trademarks.

## FEATURES

### 14 UNIONIZE NOW?

Truckers, janitors, nurses, and teachers did it. Then Microsoft contract employees did it. And most of the film industry did it quite some time ago. Game developers, faced in their places of business with major quality of life issues, have realized that forming a union is an option. But would it be the best solution?

*By Paul Hyman*

### 21 MOMENT OF IMPACT: DESIGNING AN IN-GAME EFFECTS SYSTEM

Irrational Games, creator of *TRIBES: VENGEANCE* and *SWAT 4*, describes a flexible approach to managing effects within a framework, showing how developers from all disciplines can trigger complex effect events without needing to constantly rely on programmers for support.

*By Terrance Cohen*

### 31 INTERVIEW: BUENA VISTA'S GOOD VIEW

In the last 10 years, movie production houses that were once making games fled the interactive side of entertainment. But Graham Hopper has helped Buena Vista Games chart a new course. Hopper talks about Disney's role in allowing Buena Vista to focus on a core gamer audience.

*By Brandon Sheffield*

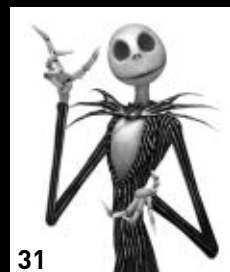
### 43 INTERVIEW: FROM UPLINK TO DARWINIA

Chris Delay and Andrew Bainbridge are self-proclaimed bedroom programmers who say they are the last of a dying breed. Working as part of Introversion Software, they completed a cult PC hacking simulation called *UPLINK* for their debut, and are now finishing their second title, *DARWINIA*—a name that aptly describes their own search for survival in an evolving business.

*By Kieron Gillen*



14



31



43



34

## POSTMORTEM

### 34 WHAT'S INSIDE THE ROOM? THE HORROR OF SILENT HILL 4 INVESTIGATED

They say it's more *Psycho*, less *Nightmare on Elm Street*. More disturbing, less shocking. What makes *SILENT HILL 4* so scary is its deep focus on psychological terror. In *THE ROOM*, textures, camera angles, lighting, characters, a mysterious story line, and alternate realities all push the player further down that dark tunnel of fear. Yes, what is inside the room? And how do I get out?

*By Akihiro Imamura and Akira Yamaoka*

## DEPARTMENTS

### 4 GAME PLAN

Enjoy the Silence

### 6 HEADS UP DISPLAY

EA bites Take-Two, Xbox sales figures, Stardock's software, and more.

### 8 SKUNK WORKS *By James Alguire and Tom Carroll*

ImageModeler 4.0 for Mac and MotionBuilder 6

### 96 A THOUSAND WORDS

The Behemoth's *ALIEN HOMINID*

## COLUMNS

### 49 INNER PRODUCT *By Sean Barrett*

Optimizing Pathfinding III: Inadmissible Heuristics

[PROGRAMMING]

### 55 PIXEL PUSHER *By Steve Theodore*

Let There Be Light: Colored Light

[ART]

### 61 NECESSARY EVIL *By Hal Halpin*

Ratings Matter

[BUSINESS]

### 62 AURAL FIXATION *By Alexander Brandon*

The Line of Quality Part II: Licensing

[SOUND]

### 64 GAME SHUI *By Noah Falstein*

In the Beginning

[DESIGN]

YOU CAN REACH US AT [EDITORS@GDMAG.COM](mailto:EDITORS@GDMAG.COM)



## ENJOY THE SILENCE

### IT'S ONE THING TO WREST A CONFESSORIAL

postmortem from the callused hands of a local Western developer, as we often do, but another thing altogether to get one from a Japanese creator who explains both the triumphs and mistakes of creating a particular game. We managed it for our postmortem on Namco's *KATAMARI DAMACY*, and luckily, we've now conspired to get another of the biggest Japanese developers, Konami, to contribute to this issue. The in-depth postmortem of Konami's latest, deeply unnerving psychological horror title, *SILENT HILL 4: THE ROOM*, begins on page 34. *SILENT HILL 4* is both unsettling and daring, and the creators and article authors Akihiro Imamura and Akira Yamaoka explain the reasoning behind this paradigm shift from previous games in the franchise, now that the genre and mood are established with obstacles like dueling realities, unkillable ghosts, and a new third-person/first-person shifting perspective.

### GRAND UNION FAILSAFE

Ever since the current controversy over "quality of life" in the game industry barreled into view, there's been a call to do something, anything. As a result, the concept of organized labor for game professionals has been raised, perhaps sometimes without full understanding what that really means. Fortunately, Paul Hyman has helped us out. As the game industry journalist for the *Hollywood Reporter*, Hyman neatly straddles the line between our industry (where unionization is currently just a concept) and the movie business, (where it's a long-time reality). In his feature article on unionization (page 14), he draws some piquant views from a multitude of parties, including EA Spouse, high-tech union chiefs, the IGDA, and Electronic Arts itself.

### DISNEYWERTED

The expanded size of this issue of *Game Developer* has allowed us to slip in not one, but two interviews. On the one hand, we have Buena Vista Interactive, the core gaming division of Disney. The company is expanding from its partner role in games, such as Square Enix's *KINGDOM HEARTS*, to more tightly control its game properties and move into the console gaming space. We spoke with Graham Hopper (page 31) to find out how the Mouse's strategy is being accomplished.

On the other, we have Chris Delay and Andrew Bainbridge of Introversion Software, effectively

"bedroom programmers" from the U.K., but creators of two fascinating PC titles, *UPLINK* and the forthcoming *DARWINIA*. Although operating on a micro-budget, largely from the proceeds of their last game, *Delay and Bainbridge* have been using organic experimentation to brainstorm *DARWINIA*'s game design, a process frowned upon at most larger companies, but offering some unique opportunities.

### BIGGER, BETTER, FASTER

Luckily, that's not all the pleasantries we have to exchange this month. Check out the feature on designing effects systems (page 21) by Irrational Games, creators of *TRIBES: VENGEANCE* and *SWAT 4*. We also have a news section particularly focused on EA and Take-Two's battle for the sports licensing market; a special business column from Hal Halpin of the Interactive Entertainment Merchants Association, discussing the issues that retailers face in defending the voluntary ratings system for games; and the conventional columns from our standing columnists.

### INDIE, SCHMINDIE?

The other day, we received a particularly "refreshing" letter to the editor, the subject line of which was "Dear *CORPORATE Game Developer* magazine." Once the red mist had cleared and we read the rest, we realized that the correspondent had underlined a good point. Although sister web site *Gamasutra.com* has been covering independent games in greater depth and frequency lately (take a look at the postmortems of selected Independent Games Festival entries), we sometimes find it difficult to talk about the less well-funded but altogether more free indie market, due to the space constraints of the magazine format. But, after featuring the IGF in our Game Developers Conference preview last month and *Introversion Software* and *ALIEN HOMINID* in this issue, we've already been making a conscious effort to cover the more innovative end of gaming, no matter how high or low on the food chain it stands.

S!

Simon Carless  
Editor

www.gdmag.com

CMP Media, 600 Harrison St., 6th Fl., San Francisco, CA 94107 • 415.947.6000 • 415.947.6990

#### EDITORIAL

##### EDITOR

Simon Carless [scarless@gdmag.com](mailto:scarless@gdmag.com)

##### MANAGING EDITOR

Jill Duffy [jduffy@gdmag.com](mailto:jduffy@gdmag.com)

##### ASSISTANT EDITOR

Brandon Sheffield [bsheffield@gdmag.com](mailto:bsheffield@gdmag.com)

##### ART DIRECTOR

Cliff Scorsio [cscorso@gdmag.com](mailto:cscorso@gdmag.com)

##### CONTRIBUTING EDITORS

Sean Barrett [sbarrett@gdmag.com](mailto:sbarrett@gdmag.com)  
Alexander Brandon [abrandon@gdmag.com](mailto:abrandon@gdmag.com)  
Noah Falstein [nfalstein@gdmag.com](mailto:nfalstein@gdmag.com)  
Steve Theodore [stheodore@gdmag.com](mailto:stheodore@gdmag.com)

##### ADVISORY BOARD

Hal Barwood Designer-at-Large  
Ellen Guon Beeman Monolith  
Andy Gavin Naughty Dog  
Joby Otero Luxoflux  
Dave Pottinger Ensemble Studios  
George Sanger Big Fat Inc.  
Harvey Smith Midway  
Paul Steed Microsoft

##### ADVERTISING SALES

###### NATIONAL SALES MANAGER

Afton Thatcher [athatcher@cmp.com](mailto:athatcher@cmp.com) t: 415.9476217

###### SENIOR ACCOUNT MANAGER, EASTERN REGION & EUROPE

Ayrien Machiran [amachiran@cmp.com](mailto:amachiran@cmp.com) t: 415.9476224

###### ACCOUNT MANAGER, NORTHERN CALIFORNIA & MIDWEST

Susan Kirby [skirby@cmp.com](mailto:skirby@cmp.com) t: 415.9476226

###### ACCOUNT MANAGER, WESTERN REGION & ASIA

Nick Geist [ngeist@cmp.com](mailto:ngeist@cmp.com) t: 415.9476223

###### ACCOUNT MANAGER, GLOBAL EDUCATION/RECRUITMENT & TEXAS

Aaron Murawski [amurawski@cmp.com](mailto:amurawski@cmp.com) t: 415.9476227

##### ADVERTISING PRODUCTION

ADVERTISING PRODUCTION COORDINATOR Kevin Chanel

REPRINTS Julie Rapp [jarapp@cmp.com](mailto:jarapp@cmp.com) t: 510.834.4752

##### GAME GROUP MARKETING

DIRECTOR OF BUSINESS STRATEGY Michele Maguire

DIRECTOR OF MARKETING Tara C. Gibb

MARKETING COORDINATOR Yukiko Grov

##### CMP GAME GROUP

VP, GROUP PUBLISHER APPLIED TECHNOLOGIES Philip Chapman

CONFERENCE DIRECTOR, GDC Jamil Moledina

ASSOCIATE CONFERENCE DIRECTOR, GDC Susan Marshall

EDITOR, GAMASUTRA.COM Simon Carless

##### CIRCULATION

CIRCULATION DIRECTOR Kevin Regan [kregan@cmp.com](mailto:kregan@cmp.com)

CIRCULATION MANAGER Peter Birmingham [pbirmingham@cmp.com](mailto:pbirmingham@cmp.com)

CIRCULATION COORDINATOR Jessica Ward [jward@cmp.com](mailto:jward@cmp.com)

##### SUBSCRIPTION SERVICES

FOR INFORMATION, ORDER QUESTIONS, AND ADDRESS CHANGES

t: 800.250.2429 f: 847.763.9606

[gamedeveloper@halldata.com](mailto:gamedeveloper@halldata.com)

##### INTERNATIONAL LICENSING INFORMATION

Mario Salinas

[msalinas@cmp.com](mailto:msalinas@cmp.com) t: 650.513.4234 f: 650.513.4482

##### EDITORIAL FEEDBACK

[editors@gdmag.com](mailto:editors@gdmag.com)

##### CMP MEDIA MANAGEMENT

PRESIDENT & CEO Gary Marshall

EXECUTIVE VICE PRESIDENT & CFO John Day

EXECUTIVE VICE PRESIDENT & COO Steve Weitzner

EXECUTIVE VICE PRESIDENT, CORPORATE SALES & MARKETING Jeff Patterson

CHIEF INFORMATION OFFICER Mike Mikos

SENIOR VICE PRESIDENT, OPERATIONS Bill Amstutz

SENIOR VICE PRESIDENT, HUMAN RESOURCES Leah Landro

VP/GROUP DIRECTOR INTERNET BUSINESS Mike Azzara

VP & GENERAL COUNSEL Sandra Grayson

VP, COMMUNICATIONS Alexandra Raine

PRESIDENT, CHANNEL GROUP Robert Faletta

PRESIDENT, CMP HEALTHCARE MEDIA Vicki Masseria

VP, GROUP PUBLISHER INFORMATIONWEEK MEDIA NETWORK Michael Friedenberg

VP, GROUP PUBLISHER ELECTRONICS Paul Miller

VP, GROUP PUBLISHER NETWORK COMPUTING ENTERPRISE ARCHITECTURE GROUP Fritz Nelson

VP, GROUP PUBLISHER SOFTWARE DEVELOPMENT MEDIA Peter Westerman

VP, DIRECTOR OF CUSTOM INTEGRATED MARKETING SOLUTIONS Joseph Braue

CORPORATE DIRECTOR, AUDIENCE DEVELOPMENT Shannon Aronson

CORPORATE DIRECTOR, AUDIENCE DEVELOPMENT Michael Zane

CORPORATE DIRECTOR, PUBLISHING SERVICES Marie Myers



**RenderWare presents at GDC 2005**

# The Making of...



**Call of Duty: Finest Hour**  
Craig Allen, CEO - Spark Unlimited



**Death Jr. (PSP)**  
Chris Charla, Snr. Producer - Backbone



**Commandos: Strike Force**  
Max De Vries, Producer - Pyro Studios



**Cold Fear**  
Antoine Villette, CEO - Darkworks

**More titles to be announced**

**For information please visit**

**[www.renderware.com/gdc05](http://www.renderware.com/gdc05)**

**RenderWare**

**GDC 2005 | March 9-11 | Booth 422**

© 2004 Criterion Software Limited. All rights reserved. RenderWare is a registered trademark.

All other trademarks mentioned herein are the property of their respective companies.



## THE BATTLE FOR SPORTS



**IN THE LATEST ROUND OF CONFLICT IN THE** sports video game market, publisher Electronic Arts has secured an exclusive license to use the NFL brand as well as player's names and their stats. EA, whose recent expansionary moves include taking a controlling interest in BATTLEFIELD 1942 developer Digital Illusions CE and purchasing a large quantity of Ubisoft stock, has also acquired a license for the smaller Arena Football League.

EA capped off its round of sports-related license purchases by acquiring exclusive gaming rights to the ESPN name, which previously appeared in titles by EA's only major competitor in the football simulation field—publisher Take-Two and developer Visual Concepts.

This combination of deals has left many

analysts stunned. Take-Two, which recently acquired Visual Concepts from Sega, made major gains in sales last year by retailing its football and other sports games at \$20 apiece, boosting its market share significantly; this move in particular tipped EA's hand.

The ESPN deal takes effect in 2006, but interestingly, Take-Two has already announced that it will drop the ESPN branding from its 2005 football game, as any success the title would have under the ESPN license would only serve to strengthen EA's future ventures with the brand.

In apparent retaliation, Take-Two has tightened its grip on the Major League Baseball license, and affiliated groups: Major League Baseball Properties, Major League Baseball Players Association, and

Major League Baseball Advanced Media. Beginning in spring 2006, Take-Two's deal will grant the company exclusive rights to create baseball video games with official players, teams, and stats, shutting out EA's licensed baseball titles.

It could be argued that Take-Two has the short end of the stick here, with football games traditionally performing much better than baseball games in retail, although it's unclear exactly how much each company paid for the licenses—estimates are into the hundreds of millions of dollars. But with EA and Take-Two currently the only developers able to operate in the licensed football and baseball video game arenas, the short end, at least in terms of choice, may well be held by the consumer.

*Brandon Sheffield*

## IGF WINNERS SAVE SEALAB 2021

**AT THE 2004 INDEPENDENT GAMES FESTIVAL** (part of the CMP Game Group, as is *Game Developer*), Cartoon Network and AOL launched the Project Goldmaster competition, a kind of gaming industry variation on Project Greenlight. Flashbang Studios, makers of BEESLY'S BUZZWORDS, took home the trophy.

The real prize? The lucky developer was granted the opportunity to make a Cartoon Network-sponsored PC game. The title in question? SEALAB

2021: SWEET MAYHEM. The game based on the cult Adult Swim cartoon, has just been released in downloadable form, available for \$9.95 through the official Adult Swim web site. Through a deal with Trymedia, interested parties can experiment with the game for 20 minutes before buying it.

Flashbang Studios, the winning developer, recently spoke to *Game Developer* on its experience creating the game, illuminating the

CONTINUED ON PG 95



## MICROSOFT DISCUSSES XBOX SALES



**AS PART OF ITS** regular financial results, Microsoft has released further information on worldwide sales of the Xbox. The new figures reveal that the company has sold 19.9 million copies of the console worldwide since its 2001 launch. In North America, 13.2 million consoles were

bought, 5 million in Europe, and 1.7 million in the Japan and Asia Pacific region.

In addition, Microsoft's European Xbox division has released statistics indicating that the European Xbox market share for 2004 was 29.5 percent, a 7 percent increase from the 2003 calendar year.

The company claims that Xbox was the only platform to see year-to-year growth during the fourth quarter of 2004, as well as the full calendar year.

In concert with recently bullish news on the Xbox Live service, Microsoft is portraying its machine as gaining

ground on its competitors. In terms of installed base, however, the PlayStation 2 continues to dominate the current generation console hardware—worldwide shipments of Sony's console reached the 80 million mark in December 2004.

—Simon Carless



## 2004 NPD GAME SALES STATISTICS

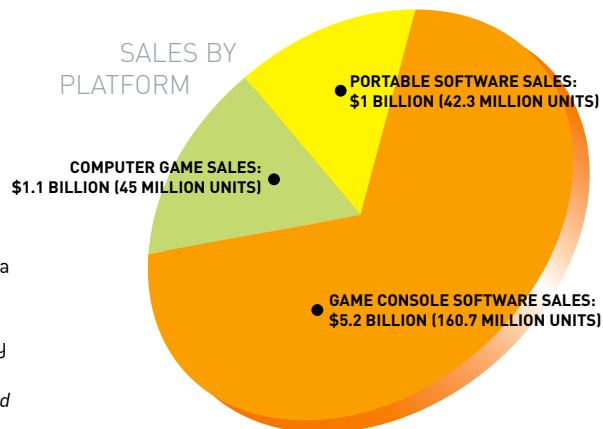
ACCORDING TO THE NPD GROUP, VIDEO GAME and computer software sales set a new record for 2004: \$7.3 billion. There were a record 12 games to sell over one million units, 50 which sold over 500,000 units, and 197 over 250,000 units. This compares favorably to last year's stats—10, 57, and 163 games in each respective category.

In contrast to recent criticisms of widespread M-rated titles, only 16 percent of games sold last year were rated mature. Fifty-three percent were rated E for everyone

and 30 percent were rated T for teen.

PC and console gamers continued to exhibit different tastes, as the latter purchased more action and sports games, whereas computer gamers bought more strategy games, family-oriented titles, and shooter games. With a total of 248 million computer and video games sold in 2004, up from 239.3 million in 2003, that long-feared industry slump may be a bit of a way off.

—Brandon Sheffield



## WIDGET TOOLS IN SECONDS FLAT

IN THE GAME DEVELOPMENT WORLD, Stardock might be best known for making the PC tycoon/simulator THE POLITICAL MACHINE, although that's hardly what keeps the company afloat. As an indie gamemaker (GALACTIC CIVILIZATIONS is in its portfolio as well), Stardock maintains a level-headed business model by devoting a good deal of its time to software development, which is more likely to turn a steady profit than selling niche games alone.

On the software side, its newest product is DesktopX 3 Pro. It's a tool that quickly lets you build widgets—a term Stardock uses for objects exported as programs that run standalone as .EXEs. So you can customize your Windows desktop by building sleek tickers and calendars, and also swiftly design and tweak game UI screens.

"DesktopX allows us to go from prototype to production level UI

CONTINUED ON PG 95



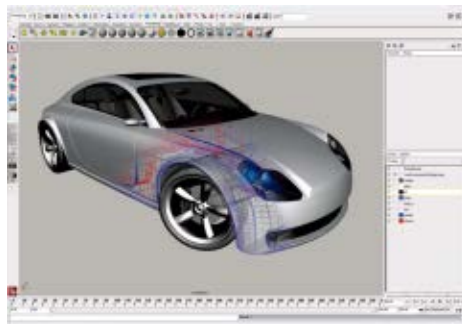
DesktopX lets you make custom widgets and gadgets quickly, like this personalized Gamasutra.com RSS feeder, which was created in less than five minutes.

## ALIAS RELEASES MAYA 6.5

INCREASING ITS PERFORMANCE POWER AND speed—as any respectable point release should—Alias focused on these areas in releasing version 6.5 of its 3D graphics application: modeling, UV manipulation, deformations, and 3D painting.

Maya 6.5 also has added a new CAD import feature, called a STEP translator, which creates images and animations out of the large data sets created in most CAD packages. Another new attribute is a set of scene segmentation tools, such as reference locking, reference editing, and proxies to give artists more control over managing enormous data sets, scene load times, workflows, and overall scene performance.

Alias is offering Maya 6.5 in two packages, Complete and Unlimited. The former includes all the basic upgrades in the tool's interface,



modeling, animation, visual effects, brush-based technologies, rendering, Maya API/SDK and MEL (scripting language), and tutorials. The Unlimited version adds to this all the new toys you've heard Alias tout as of late: Maya's Fluid Effects, Maya Cloth, Fur, and Hair, and Maya Live.

Maya 6.5 costs about \$2,000 for Complete, \$7,000 for Unlimited, \$900 to upgrade to Complete, and \$1,250 for an Unlimited upgrade.

—Jill Duffy

### heads up display

#### KRI CONFERENCE (RUSSIAN GAME DEVELOPERS CONFERENCE)

Kosmos Hotel  
Moscow, Russia  
April 1–3, 2005  
Cost: 2,250–3,000 rubles  
[www.rgdconf.com](http://www.rgdconf.com)

#### IEEE SYMPOSIUM ON COMPUTATIONAL INTELLIGENCE AND GAMES

Essex University  
Colchester, Essex, U.K.  
April 4–6, 2005  
Cost: £140–£315  
<http://cscourse.essex.ac.uk/cig>

## IMAGEMODELER 4.0 FOR MAC

### JAMES ALGUIRE

#### IMAGEMODELER 4.0 FOR MAC



#### STATS

**REALVIZ Corp.**  
350 Townsend St.,  
Suite 409  
San Francisco, CA 94107  
415-615-9800  
www.realviz.com

#### PRICE

\$1,380 full version for new users; \$520 upgrade; \$690 for trade-up from version 3.5 or earlier.

#### SYSTEM REQUIREMENTS

Macintosh OS X, version 10.2 or later; or Power PC G4. (Note: This review evaluates the ImageModeler for Macintosh only.) 1024x768 24-bit minimum display resolution; OpenGL compatible; 256MB RAM (512MB recommended); 50MB free disk space.

#### PROS

1. Step-by-step processes are simple.
2. Automatic texture mapping.
3. Can calculate accurate measurement of any distance or angle from a single reference measurement.

#### CONS

1. Out of price range for some developers.
2. Tutorials don't feel complete.
3. Window arrangement options could be improved.

#### CREATING PHOTOREALISTIC 3D MODELS

of real-world objects and scenes normally involves teams of artists who are masters of tools like Maya, 3DS Max, LightWave 3D, and Photoshop. The process is time-consuming and often relies on photographs of objects or scenes as references for creating the models and their textures. But what if 3D models and textures could be created directly from those same reference photos instead?

ImageModeler 4.0 for Mac from Realviz is a terrific tool for quickly creating photorealistic 3D models from 2D photographs. The tool was introduced in 2000 and was released for Macintosh in 2002. This review specifically evaluates the Macintosh version of ImageModeler 4.0.

Creating, editing, and texturing 3D models in ImageModeler is a simple six-step process:

1. Load the digital images.
2. Calibrate the images to define the 3D space.
3. Establish a real world reference measurement.
4. Create the actual 3D geometry.
5. Extract and apply textures.
6. Export the resulting model.

#### KEEPING IT CLEAN

ImageModeler's Mac OS X interface is clean and uncluttered (when compared to other 3D tools), consisting of an integrated tabbed Workflow Toolbar and 3D Workspace window, a Scene Browser palette for managing scene elements and changing their properties, a View Toolbar for adjusting the display of objects in the 3D Workspace, a Tool Properties palette for modifying tool behavior, and a Tool Assistant palette providing information on active tools, mouse operations, and tool tips. The palettes can be toggled on or off from the Window Menu and can be docked to each other and to the 3D Workspace window to be moved as a single unit. What's missing is a way to create and manage window layouts that lets users jump to their customized layouts for different tasks. This would be more efficient than constantly moving and resizing palettes.

#### SAY, "CHEESE!"

Each step of the modeling workflow (load images, calibration, measuring, modeling, texturing, and export) is represented by a tab in the Workflow Toolbar containing tools specific to that step:

**Load Images.** Import images of the objects or scenes to be converted to 3D models. You need at least two images, but having more improves the quality of the modeling process and texture extraction. All images should be taken using the same focal length, shot from several different angles for perspective, and showing the complete object or scene. Some images work better for the calibration step while others are better suited for texture extraction. You'll get best results for texture by using the highest quality images you can. ImageModeler lets you import photos from a digital camera or the Mac's hard drive. The software's documentation provides excellent tips for capturing images that will yield the best results. Realviz should consider integrating with Apple's iPhoto to improve management and importing of images.

**Calibration.** For ImageModeler to perform its magic, you've got to help it find features that appear in each photo, such as identifying identical windows in a photo of a room. You use the Place Marker tool to identify the common features by clicking within those features wherever they appear, so the more pictures used, the longer and more tedious the process. A mini zoom feature facilitates accurate placement of markers (called "locators" in the Scene Browser). Once at least eight different features are identified in each image, ImageModeler will automatically calibrate characteristics of the camera used to create the images—focal length, distortion, position, and orientation—and from that extrapolate the 3D information needed to create the models. Adding additional locators or constraints enhances calibration. The final steps



Regular geometric structures, like buildings, can be modeled and textured quickly in ImageModeler 4.0.

include defining the WorldSpace and setting a real world reference distance measurement: You can actually measure some part of the object or scene when shooting the photos and then plug that number into ImageModeler.

**Measuring.** The reference measurement applied in the Calibration step sets the scale for the calculated 3D space. Once set, ImageModeler can generate accurate measurements of any distance and angle in the project—a great tool for architects or set designers. Game developers will also find this handy for maintaining the scale between 3D objects.

**Modeling.** Realviz put several tools in ImageModeler (many that should be familiar to experienced 3D artists) for creating polygon-based, 3D mesh geometry, including Primitives (cubes, spheres, and other geometric shapes), Faces, and Point Cloud Mesh. There are also tools to modify the mesh (Scale, Rotate, Translate, Split Face, and Extrude Face) to more accurately represent the object or scene. The Primitive and Face tools are suited to regular geometric shapes while the Point Cloud Mesh works best for organic shapes.

**Texturing.** ImageModeler can automatically extract textures from photographs and apply them to the model's polygon faces, creating a photorealistic appearance. Careful selection of the images used for the texture extraction will yield the best results. Textures created in other

CONTINUED ON PG 11



## Singapore – Your Digital Exchange Partner in Asia

Singapore is well-positioned as the regional hub for processing, management and distribution of online games and game services to the rest of Asia. Be a partner in IDA's Digital Exchange for Games to expand your business opportunities in Asia!

### Global Connectivity

- World class infrastructure backed by 26 Tbps submarine cable capacity
- International and regional telecoms connectivity to more than 100 countries
- Over 1 million square feet of data center space
- Home to over 7,000 MNCs including Electronic Arts & Lucasfilm
- Singapore is one of the Top Seven Intelligent Communities in the World

[The Intelligent Community Forum (ICF) 2005]

### Ready pool of Skilled Manpower

- Ranked 5th out of 29 countries (after Iceland, Austria, Israel, Finland) for its pool of readily available skilled labour

[Institute for Management Development World Competitiveness Yearbook 2003]

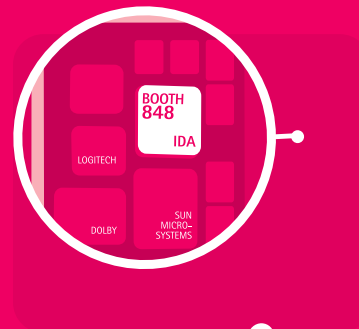
### Trusted Business Hub

- Ranked 1st in Asia for best intellectual property rights protection

[Political and Economic Risk Consultancy 2004 & Global Corruption Report 2003]

- Ranked lowest risk country in Asia Pacific

[2002 Country Risk (Political) Global survey by Business Economic Risk Intelligence and Institute for Management Development]



Visit the Singapore Pavilion at booth 848 now!

**iDA** INFOCOMM DEVELOPMENT AUTHORITY OF SINGAPORE

The Infocomm Development Authority of Singapore (IDA) is committed to growing Singapore into a dynamic global infocomm hub. IDA uses an integrated approach to developing info-communications in Singapore. This involves nurturing a competitive telecoms market as well as a conducive business environment with programmes and schemes for both local and international companies.

Email: [info@ida.gov.sg](mailto:info@ida.gov.sg) Website: [www.ida.gov.sg](http://www.ida.gov.sg)

Our Offices: SINGAPORE • CHINA • INDIA • USA

# Genemation

The Face Creators



at GDC 05  
Booth 859  
March 7-11 2005  
Showcasing:  
GenHead v2.0 & GenCrowd v1.0

## GenHead v2.0

Convert 2D images to 3D  
animated heads

## GenCrowd v1.0

Generate thousands of synthetic  
photo-realistic animated 3D  
heads by age and ethnic group

## Contact

Incubator Building  
Grafton Street  
Manchester  
M13 9XX

+44 (0) 161 275 5139

[john@genemation.com](mailto:john@genemation.com)  
[www.genemation.com](http://www.genemation.com)

CONTINUED FROM PG 8

applications can be loaded from the hard drive and applied to the model, too. And ImageModeler allows for editing textures: You can change the UV mappings from directly within ImageModeler or more precisely tweak them in another program, such as Photoshop. 3D texture artists may find textures extracted by ImageModeler unsuited for final rendering of objects for games. Be prepared to create your own.

**Exporting.** Once a model is generated, you can export it to another 3D program for further editing or for integrating into games, animations, or videos. ImageModeler supports most common 3D file formats and also generates QuickTime VR movies. 3D artists may need to rework ImageModeler geometry for it to function properly in their projects when importing it into their 3D tool of choice, especially Point Cloud Mesh.

New in ImageModeler 4.0 is the ability to incorporate 3D objects created in other programs within its projects, making it great for matching 3D elements to an existing photo.

### GETTING UP TO SPEED

It's important to learn to use a new program as quickly as possible, especially in today's fast-paced production environments. ImageModeler's help system is more than adequate, explaining the various concepts, features, and tools. Tutorials are also provided with the installation, and more can be downloaded from the Realviz web site. Tutorial materials start off well, but lack continuity. They just don't feel complete. A few steps are confusing—particularly the section on using the Define WorldSpace Tool—and the videos don't have any audio. While the videos are instructive, an audio narrative would have added significantly more to the experience. The additional online support materials delve into more complex modeling projects, but there's little in the way of explanation for the examples; the approach is "look at the files and figure it out," which is probably tolerable for experienced 3D artists but can be frustrating for novices.

Realviz offers limited free technical support through the company's web site, and you can purchase an annual technical support contract for \$150 per year.

### TALE OF THE TAPE

Complementing existing 3D programs, ImageModeler 4.0 for the Mac is a great tool for architects, industrial designers, and game developers who need to create photorealistic 3D models quickly without having to spend a year learning new software. The \$1,380 price tag puts it out of reach for many people who might otherwise take advantage of it. Upgrades from recent, previous versions are \$520. You can always download the trial version, which has limited save and export capabilities, from Realviz's web site to see how it fits in your workflow.

**JAMES ALGUIRE** is a Mac professional and Apple Certified Trainer with more than 20 years experience in the computer industry. You can email him at [jalguire@gdmag.com](mailto:jalguire@gdmag.com).

### MOTIONBUILDER 6 By Tom Carroll

#### RALPH WALDO EMERSON ONCE SAID,

"What lies behind us and what lies before us are tiny matters compared to what lies within us."

How does this lofty quote relate to MotionBuilder 6? Until last summer, MotionBuilder was the flagship product of Kaydara, which was acquired by Alias. So, the Kaydara days are behind us. What lies before us is whether MotionBuilder someday becomes part of Maya, Alias's flagship 3D modeling package. Only time will tell. Right now, what Alias hopes will lie within us (and motivate us to dish out roughly \$1,000 for MotionBuilder Standard) is the latest version of the premiere, standalone animation package on the market.

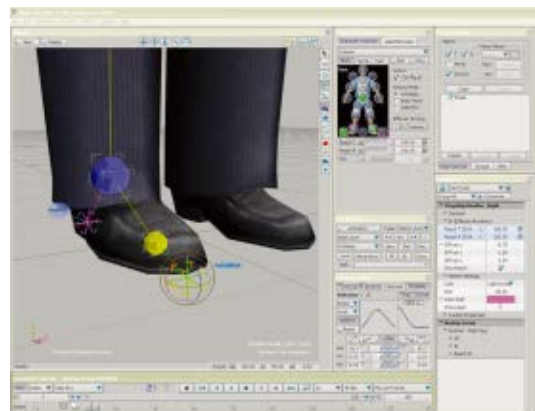
In a nutshell, MotionBuilder 6 brings a more intuitive environment with a high-level animation editor, an updated properties viewer, and the ability to make the hotkeys match your 3D flavor of choice. More important, the transform manipulator has been redesigned (for the better), and a new tool (Handles) provides more complete control over the selection and manipulation of objects in a scene. The new version's camera controls are also much simpler, especially when working with repetitive creation and navigation tasks.

### A WYMIWYG WORLD

Fans of MotionBuilder know that what you *move* is what you get. It's the tool for rigging and animating characters in real time, working with motion capture (mocap) data and animation libraries, and creating previsualizations (or previs) and game-style animation—but that's about it. Modeling? Not on your life. Soft-and/or hard-body dynamics? Forget about it! But 3D character animators, especially ones that resist embracing all the technical underpinnings of what they are called to do, are perfect for MotionBuilder, and version 6 is simply the most intuitive release yet.

Take the animation interface: It's very clean and easy to work with. In other words, keyframing your own animation is a snap using the basic rig within your character. However, if you need to extend the capabilities of that basic rig, MotionBuilder 6 lets you add auxiliary pivot points (also known as auxiliary effectors) and Handles. The easiest way to understand auxiliary pivot points is to think of the foot. The basic rig lets you rotate the foot at the ankle, but not from the heel. By creating a new pivot point at the heel, you create new controls that can amplify the ankle motion. You can quickly add multiple pivot points for each toe, too.

Handles extend what you can do with the rig you create. Handles take several selected control points and group them



CREATED BY CURTIS GARTON  
COPYRIGHT 2005 ALIAS SYSTEMS CORP.

**Auxiliary pivots let animators quickly define and animate multiple rotation pivot points.**

## MOTIONBUILDER 6



### Alias

210 King St. East  
Toronto, Ontario, Canada  
M5A 1J7  
800-447-2542  
www.alias.com

### PRICE

MotionBuilder Standard  
\$995; MotionBuilder Pro  
\$4,195

### SYSTEM REQUIREMENTS

**Software.** Microsoft Windows XP Professional or Apple Mac OS X 10.3 or higher; Microsoft Internet Explorer, Netscape, or Safari.

### Hardware.

Intel Pentium III or higher, AMD Athlon processor, Macintosh G4 or G5; 256MB RAM; CD-ROM drive; OpenGL graphics card with 16MB RAM; 300MB hard disk space.

### PROS

1. Absolutely *the* tool for repurposing existing animations.
2. Non-linear cameras and edits make previsualization snappy.
3. A 30-day non-commercial trial-only version of MotionBuilder 6 is free to download.

### CONS

1. Weighting tools could be friendlier.
2. Game developers moonlighting in film pine for higher-end spline and cloth animation tools.
3. The nervousness felt by non-Maya users as they ponder Alias's ability to assimilate their favorite standalone tool into its own 3D modeling package.

### MotionBuilder 6 includes previs capabilities.



so that they can be manipulated more easily. They can also keep various parts of a character in contact with other objects in the scene, as in a sea lion balancing atop a rolling ball.

MotionBuilder 6 also includes various "floor contact systems," which prevent a character's feet from passing through a ground plane, or its fingers and palms from interpenetrating a surface. After taking on an acceptably low learning curve (if you've used MotionBuilder previously, that is), you can produce fluid animations much faster than you could have even a year or two ago.

Last, but certainly not least, MotionBuilder 6 contains "pose controls" and "move keys" commands. Pose controls let animators quickly build complex animations (such as a walk cycle) by combining simple poses. Parts of each pose can be assigned as IK or FK (inverse or forward kinematic) to help them work best together. Move keys allow you to copy the new animation, in this case a walk cycle, in its entirety and then "move" it forward in space so it extends the animation.

In truth, MotionBuilder 6 contains so many new features for creation and control of animation, it's simply silly. To see for yourself, access the nine demo movies Alias provides on the MotionBuilder site. If a picture says a thousand words, these movies will leave you speechless.

### LESS THAN SKIN DEEP?

It's been said that whatever good things we build, end up building us. Despite whether this is true, MotionBuilder doesn't demand that you build a rig inside the package. While Alias recommends setting up the skeleton and skin weights in your individual 3D modeling package, MotionBuilder lets you rig any character from scratch. Anyone using one of several standard naming conventions can stand back and watch MotionBuilder generate a complete IK/FK rig while adding in extra in-scene effectors that can help the operation of joints, specifically. Non-standard rigs become standard through manual assignment of bones to the software's standard rigging outputs; the time

commitment it takes, however, is simply the price you pay for individuality.

Nearly any other modeling package, such as Maya, 3DS Max, and Softimage XSI, have much better tools for painting skin weights, which is why Alias recommends that it be done elsewhere. Again, can you do it in MotionBuilder? Sure. In fact, animators getting their models from commercial libraries will probably be overjoyed with MotionBuilder's tools, but it's an area that Alias will hopefully improve as time goes by.

### MO CAP, LESS TIME

Where MotionBuilder (and version 6 in particular) really shines is in reusing or repurposing animation data from a widely divergent number of sources. For example, most animations from modeling packages are made once and used once—case closed. MotionBuilder, however, thinks of each animation as a separate motion that can be reused, modified, or applied to any other character. For example, outside of MotionBuilder, it would be nigh impossible to apply the mocap data from a mining gnome to a seven-foot alien, though various walk and jump animations would find common ground going from one to the other. With MotionBuilder, it's a snap. Within minutes, it's possible to add the motions from small characters to large ones and then, because of MotionBuilder's system of animation layers, selectively change the mocap animations to better fit the taller, slimmer alien figure.

Additionally, you can translate motion data on the fly to effectively mimic what's happening in real life. For instance, what if your mining gnome has to leap from a cliff onto a passing mine cart? The cart's motion vector can be added to the gnome's position data as he intersects the cart's position, making it seem as though he's carried off by the cart. "Seamless," as they say.

### PREVIS WIZ

For feature film directors, previsualization is rapidly becoming one of the most valuable tools because they can use it to

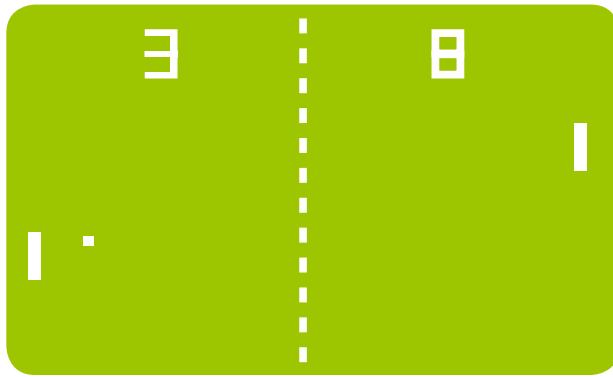
analyze each scene of a movie prior to filming even one frame. This saves time and huge amounts of money when filming on location. Video games are also adopting the technique for cut scenes that are as complex as scenes from feature films. It's important to be able to create and use multiple cameras within each animation. MotionBuilder does this and has an interface that make creating and using the cameras quite intuitive.

### THE WRAP UP

Add it up: easy animation tool sets, rapid re-use of existing animation, and previs techniques utilizing multiple cameras and non-linear editing techniques. The positive aspects of MotionBuilder 6 would seem on the surface to justify the price, making it the universal choice for everyone. But this isn't so. For instance, take film animators who are interested in creating ultra-realistic scenes. They're going to use it only as a stepping stone to other packages that allow for lattice, spline, and wrap deformations, as well as hair and cloth simulations. Also, users who see that MotionBuilder 6 allows for fading out a scene may also demand more sophisticated wipes, white-out fades, or even—gasp!—an iris. While incorporating such capabilities into MotionBuilder would certainly make it much more robust, it would also become much less affordable for Alias's mainstream clientele.

And for the vast majority of game developers, such capabilities are very much part of what Emerson referred to as "what lies ahead." ❖

**TOM CARROLL** is a 3D environment artist with Rockstar San Diego. He also reviews anime and other DVDs for [www.gamevortex.com](http://www.gamevortex.com). Contact him at [tcarroll@gdmag.com](mailto:tcarroll@gdmag.com).



## Time to move on?

### Java 3D. A new dimension in mobile gaming

Java 3D doesn't just have the power to move the mobile gaming experience up a level. It also has the power to move your business up one too. Because once a consumer has had a taste of what it's all about, there's no turning back. With the exception of an occasional visit to the nostalgic games of yesteryear. No matter, Java 3D promises to be one of the fastest growing business opportunities in mobile gaming.

And no one is more committed than Sony Ericsson Developer World to get you moving on the fast track from mind to market. And that's not just because we've got an unparalleled line of Java 3D phones on the market, but because we've got everything you need to get into the development of mobile Java 3D games. From great tools and responsive tech support to exciting go-to-market opportunities.

You'll find us at booth number 130 at the Game Developers Conference (GDC) 2005 in San Francisco where Sony Ericsson is Platinum Sponsor of GDC Mobile. You can also learn more about mobile game development with Java 3D at a sponsored seminar session on March 11th. Go to [www.SonyEricsson.com/developer](http://www.SonyEricsson.com/developer) or visit us at GDC 2005 to move into a new dimension in mobile gaming.



Sony Ericsson

[www.SonyEricsson.com/developer](http://www.SonyEricsson.com/developer)



# UNIONIZE NOW?

**Hollywood does it—but should game developers organize, too?**

» **WHEN EA SPOUSE POSTED HER NOW-FAMOUS OPEN** letter regarding working conditions at Electronic Arts, it wasn't as if no one had ever complained before about the quality-of-life issues plaguing the game development community.

But she brought the discussions into the open, notes Rusty Rueff, EA's executive vice president of human resources, and that, he says, is a good thing. "Maybe I'm

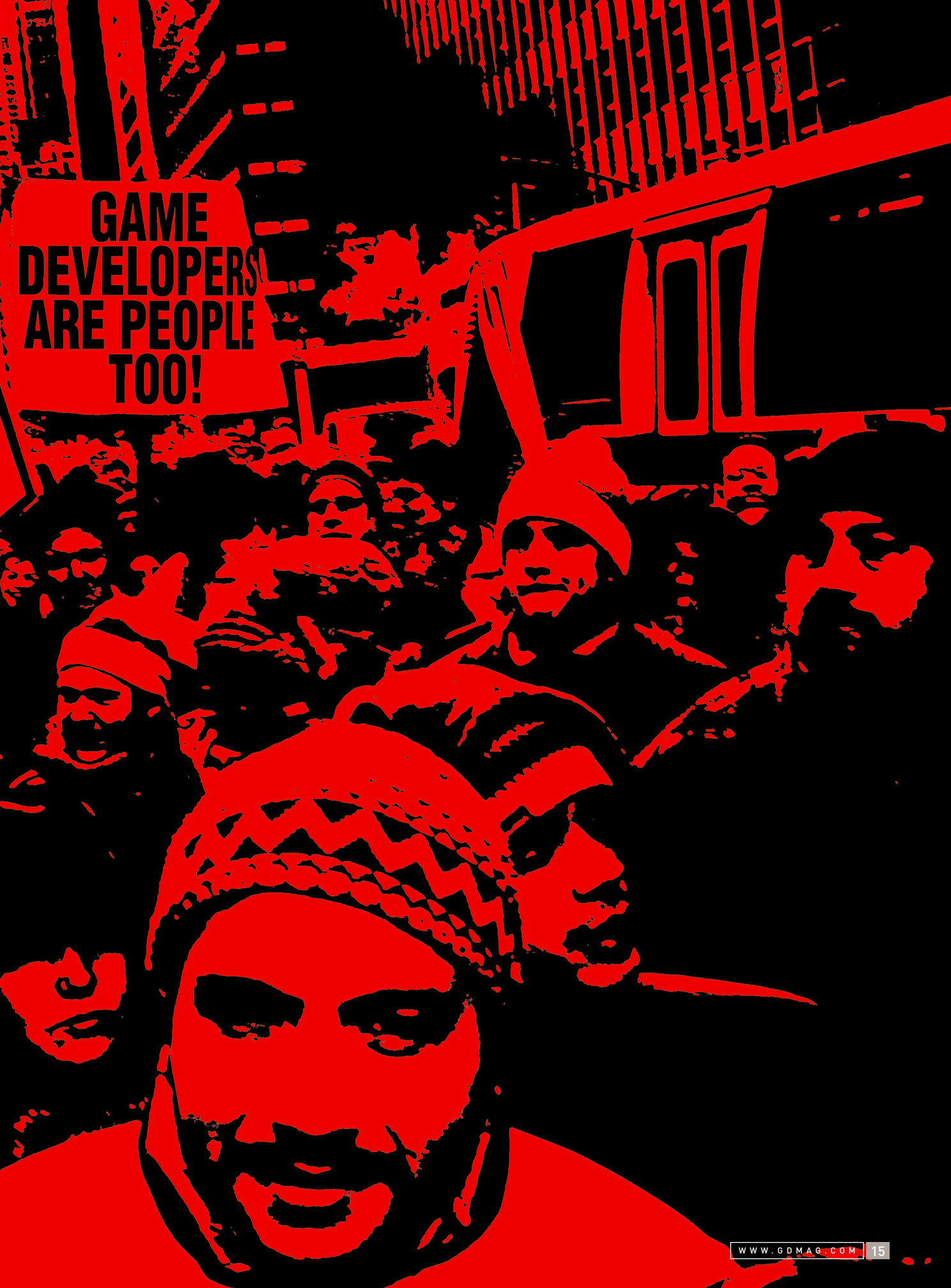
old-fashioned," he told *Game Developer*, "but I think it's cathartic when people have a chance to get something off their chest. And obviously, in our industry, how we work is something that people need to talk about."

Indeed, EA Spouse says her goal was to break the ice, to get developers talking. They are, however, talking about

---

**PAUL HYMAN** writes a weekly column on the game industry for *The Hollywood Reporter*. He's covered gaming for more than a dozen years. You can reach him at [phyman@gdmag.com](mailto:phyman@gdmag.com).





**GAME  
DEVELOPERS  
ARE PEOPLE  
TOO!**

# UNIONIZE NOW?

more than just convincing management that conditions need to improve. There's now a buzz in the industry about unionizing—and it's getting louder.

Many industry observers see close parallels between the gripes of today's game developers and those of workers in the movie industry in the 1930s and '40s, particularly in the animation segment. The difference is that Hollywood unionized, and the game industry is still only talking about it.

## WHO CONTROLS HOLLYWOOD?

"What you saw in Hollywood's studio era was a lot of independent producers who slowly consolidated into a few key players—we call them the Five Majors—who gained a monopolistic control over distribution," describes Tara McPherson, chair of the University of Southern California Cinema School, Critical Studies division.

"They pretty much set the policy within the industry, decided what kind of product would be made, the rates that would be paid, and whether you'd have the opportunity to get your movie distributed to theaters," she says. "I see that being replayed pretty dramatically in the game industry. In just the last few years, the number of small, independent game production companies in Los Angeles alone has plummeted. The possibility of distributing an independently-produced game without connection to some bigger player is almost nil."

As time went on, Hollywood workers found themselves powerless to bargain with managers on the amount of pay they received and the hours they worked, and turned to unions like the Screen Actors Guild and the Writers Guild of America to represent them in negotiations. But it was a slow transition, says McPherson, because white-collar workers, like screen writers and editors—and game programmers and artists—see themselves as different from factory workers and are often reluctant to consider unionization.

"Oddly enough, the Hollywood managers and studio executives made very much the same arguments as the Electronic Arts executives are making right now: that unions are for people who do dirty work and that they result in a kind of group-think that destroys individual creativity and the ability to negotiate your own wages," McPherson says. "But I would argue that the Hollywood unions were absolutely essential to the workers having decent jobs."

McPherson believes the same is true of the game industry—that the big game publishers aren't going to "benevolently change today's abysmal work conditions without pressure. They

Tara McPherson, chair of the University of Southern California Cinema School, Critical Studies division



will make small changes, but not much else, if the threat of unionization seems real."

## AND MICROSOFT BEGAT WASHTECH ...

Unions are, in fact, eyeing the game development community, and the Seattle-based Washington Alliance of Technology Workers makes no bones about it. WashTech, as it is known, is a local of the Communications Workers of America, having been formed seven years ago by contract workers hired by Microsoft through temp agencies, who at the time comprised more than 50 percent of the software giant's local workforce.

One of those workers was Marcus Courtney, a contract test engineer, now president of WashTech.

"You could work for years without being converted to full-time employee status," says Courtney, "which meant you'd never have any job security or decent benefits. And, in the mid-'90s, Microsoft was pretty much the only game in town for tech workers."

When Microsoft lobbied for changes in overtime standards—employees who made at least \$27.63 per hour were ineligible for time-and-a-half—it sparked a spontaneous email protest to the state government and, ultimately, the launch of WashTech.

Now, seven years later, Courtney claims that the big game companies are trying to limit their employees' conversations about wages and working conditions. He's reaching out to them via online forums and job boards "to tell them the advantages of joining a union and what we have to offer because not a lot of white-collar workers understand the union process." He claims that while his is the first union dedicated to representing high-tech employees, he wouldn't be surprised if other unions, like the Screen Actors Guild, the American Federation of Television and Radio Artists, and the International Federation of Professional and Technical Engineers, started making similar efforts.

## COMPLICATIONS AND CONSEQUENCES

But there are those who argue that unions may not achieve the goals of game developers, and one of those people is Adam Levin, an attorney who practices labor law at the Los

Angeles-based firm of Mitchell, Silberberg, and Knupp. He most often represents employers in the movie industry.

"While there are perceived benefits to unionization, it's very important for employees to recognize the tangible consequences of bringing in a labor union," he warns. "They may include the rejection of union proposals by employers, the possibility of strikes, increased production costs that may lead to runaway production work—which could mean layoffs—plus the expense of union dues and initiation fees."

Levin calls EA Spouse's open letter to the industry a wakeup call to employers to re-examine working conditions, particularly crunch times, "which used to be sporadic and

## 'what do we want?'

**REMEMBER THOSE OLD NEWSREELS** from the 1930s? Ford Motor Company goons with baseball bats chasing down auto workers in old Detroit? Most of the violence in our business takes place in our imaginations, but overturning the current work practices of studios and publishers will jolt us all, so get ready for reality—struggle and strife.

In my conversations, I hear developers yearning for three things:

- strict limits on time worked
- pay for time worked
- production organized well enough to eliminate "crunch time."

Unions may help, but they hardly guarantee a life of ease. A business that vaguely resembles our own—making movies—is heavily unionized, but that doesn't mean cushy jobs.

Everyone in Hollywood works hard. Typically, craftsmen on a movie set sign up for 12-hour days. The difference is they get paid overtime for four of those hours and we don't. Some of us believe that superior organization will contain the extra costs of fair compensation. Are we right? Unless employees are willing to duke it out, we'll never know.

—Hal Barwood, *Finite Arts*

# TAMING THE COMPLEXITY OF GAME DEVELOPMENT

by Allan McNaughton

**While ad hoc asset management** solutions have been used by game developers and artists for many years, runaway complexity has created a strong need for better tools. The stakes are high. Quality and productivity are seriously impacted by recurring problems, such as files getting mysteriously dropped from the game image, or even more damaging, mismatched versions of assets appearing in the image.

As with most things in software development, good tools can make the difference between success and failure. The challenge is finding the right tool for the job. This paper discusses what you should look for in an asset management system and one solution that may meet your needs.

## ASSET CONTROL

An unmanaged asset is an accident waiting to happen. The most effective way to mitigate risk is to store each and every asset in a central repository. While it is quite possible to use a shared folder on a network drive for this purpose, this approach is likely to cause more harm than good.

A better solution is to use an asset management system such as Surround SCM™ from Seapine Software. Surround intelligently implements asset management, with full version control, for all of a game's digital assets including source code, 3D models, textures, images, sounds, music, and more (see Figure 1).

Assets under Surround's control are safely stored in one or more server-based repositories. Repositories can conveniently be arranged in most any hierarchy desired. In a first person shooter-

type game, for example, you could create distinct repositories for assets of similar types such as levels, characters, weapons, or buildings. Another option would be to create a single repository with a sub-repository for each level which contains the assets for that level.

## CHANGE TRACKING

The code developers write depends on the assets artists create and vice versa. The challenge is making sure everyone has the right version of the assets they need. Surround helps solve this problem by versioning every asset it manages. Versioning ensures no change can occur without everyone knowing about it (or at least there being a history of the change). Specific versions of assets can be grouped together so you only need to retrieve the contents of the branch to obtain a working image of the game.

While branches are used less in game development than they are in more traditional development environments (maintenance releases of games are

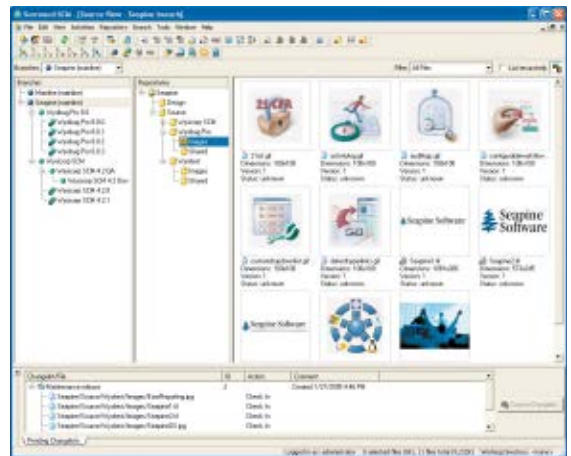


Figure 1 Surround SCM in thumbnail mode

not common), they still serve to clearly denote a related set of assets. Snapshot branches are used for this purpose and correspond to important milestones such as the first testable version, a beta release, or gold master of the game.

Surround also offers far more sophisticated features than just snapshot branches. Developers can set up private workspaces that allow work to continue in isolation. This is useful during major infrastructure changes, such as reworking the game engine. When work is completed it can be pushed forward (promoted) to the main branch for integration with ongoing changes.

Because many fixes involve changing more than one asset, it is often useful to check them in as a single unit. This helps minimize inconsistencies as it is easier to add the assets to a changelist rather than checking each file in individually. Assets in a Surround changelist are kept pending until the group is committed (see Figure 2).

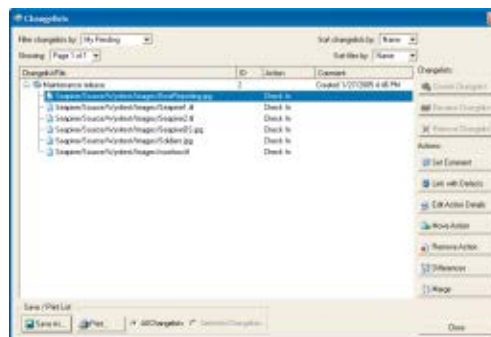


Figure 2 Changelist window

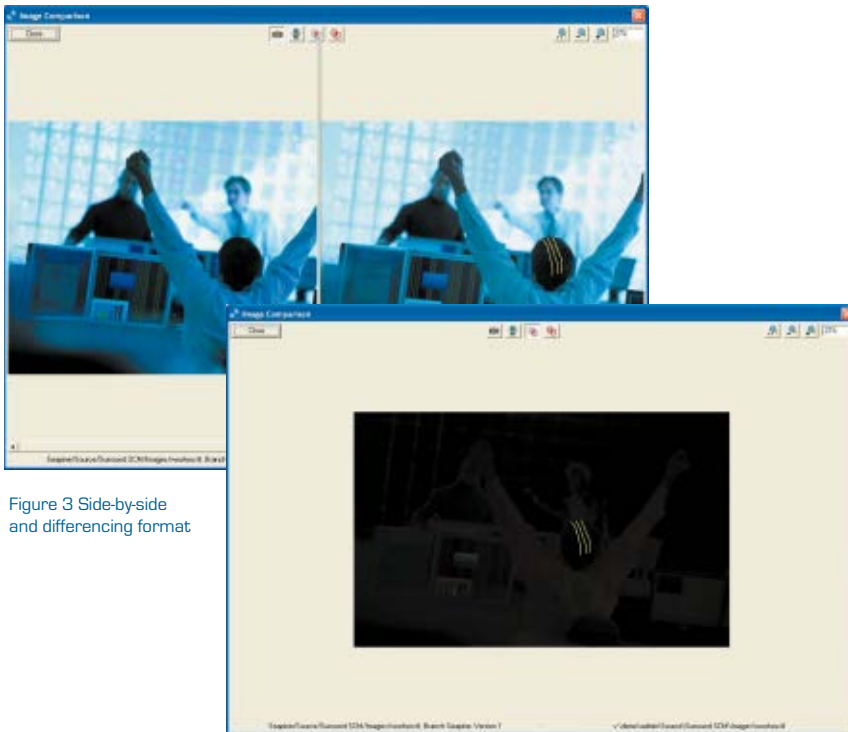


Figure 3 Side-by-side and differencing format

## IMAGE SUPPORT

Artists and developers live in different worlds. They often use tools unfamiliar to one another. While there is little need for the artist to see exactly what the developer is up to, it is frequently useful for the developer to see how the artist's work is progressing—after all, the code has to support it.

The developer is commonly stymied in this task by the binary objects an artist produces. Unfortunately, many asset management systems simply present a lengthy list of file names, and it's up to the developer to view the asset by retrieving it and opening the file with an appropriate tool. Surround makes this task easier because it displays image files directly within the asset manager (more than 25 file formats are supported).

Surround lets you compare different versions of checked-in images in two ways: a convenient side-by-side format or a view showing the images combined differences. This brings to light even the smallest change by subtracting the pixels of one image from the other. In addition, Surround can help identify subtle color

differences by showing the high contrast result of pixel subtraction (see Figure 3).

The value of previewing images within the asset manager is even applicable to tools that do not generate images such as a 3D modeler. In this case, the asset processing script can be modified to capture a snapshot of the model as it is displayed in the modeling tool. This snapshot is then checked in along with the corresponding model. While the image may not fully illustrate all the changes made to the model, it is a useful way to quickly identify major differences without using the modeling tool.

## ASSET PIPELINE INTEGRATION

Although the versioning of assets is a key part of an asset management system, it is not the only part. It is critical that the tool can be easily integrated within the asset processing pipeline.

Consider, for example, a game that retrieves its entire set of models, textures, and bitmaps from a single resource file. The resource file is typically built by a script that glues a large array of assets together. What happens when a new model is checked in? Well, you

would typically need to run a script that updates the resource file with the new model. Not only is this time consuming, it is also error prone.

If you are using Surround, and take advantage of triggers, the job is done for you. A trigger is an action that occurs when a certain asset management operation takes place (e.g., check in, promotion, deletion). You could create a trigger that fires when new textures are checked in. This trigger could call a script that updates the resource file with the modified asset. This way, if an artist updates a texture map, seconds later the game engine picks up the change.

Triggers are remarkably flexible because they use the operating system to execute scripts. This means you can write your script in any language supported by your platform. Trigger specifics such as why and how the trigger was fired are communicated to the script through environment variables.

An additional benefit of triggers is that they also form the basis of Surround's email notification system. Instead of calling an external script, a trigger can fire off emails to interested parties when certain actions occur. It is simple to customize messages because email templates can be edited directly within Surround.

Shadow folders offer another way to keep the game image current. A shadow folder is a user-specified directory that always contains the latest read-only contents of a specified branch. It is easy to configure Surround so that when an asset is checked in, the content is automatically copied to the shadow folder, which just so happens to be a directory mapped to the game image folder.

## ACCESS FROM ANYWHERE

While much game development work is done in-house, it is not unusual for parts of the project to be farmed out to an especially talented freelance AI wizard, or even handled by the studio's publishing partner. This requires an asset management system to provide secure access to assets from anywhere.

Surround is based on true client/server architecture so it is equally adept

at meeting the needs of both local and remote users. The Surround client communicates with its server through a TCP/IP connection with optional 512-bit encryption. Surround does not provide a Web interface, nor does it need one because it provides a highly capable rich client that supports Windows, Mac OS X, and Linux users.

Since you may not want that freelance AI wizard to romp through the rest of your source code, Surround lets you limit access at the repository and branch levels. You can also modify the default role-based security model so that only certain groups of users have access to specific commands.

#### QA FRIENDLY

It takes a Herculean effort to test a game these days. Finding and eradicating bugs is extremely important to the success of the game. Testing is often done concurrently by the game developers and by the publishing partner. It can cause much confusion if the results of these efforts are not properly tracked by a capable tool.

Although bug tracking tools are certainly commonplace, you should consider looking at Seapine's TestTrack Pro [see Figure 4]. Aside from its seamless integration with Surround, TestTrack Pro has many features that appeal to game developers. First and foremost, it is so easy to use that people actually don't mind using it. TestTrack Pro offers both a robust client interface and an equally capable Web interface that external parties, such as a publishing partner, can use without requiring a finicky virtual private network.

You can even link changes to assets with the bug request that initiated the change. With this information it is possible to quickly assess the full impact of modifications required to implement a change. An additional benefit of using TestTrack Pro is that over time a complete historical record of all development activities is created.

#### GET GOING

The importance of having a sound asset management strategy will only increase as games become more complex.

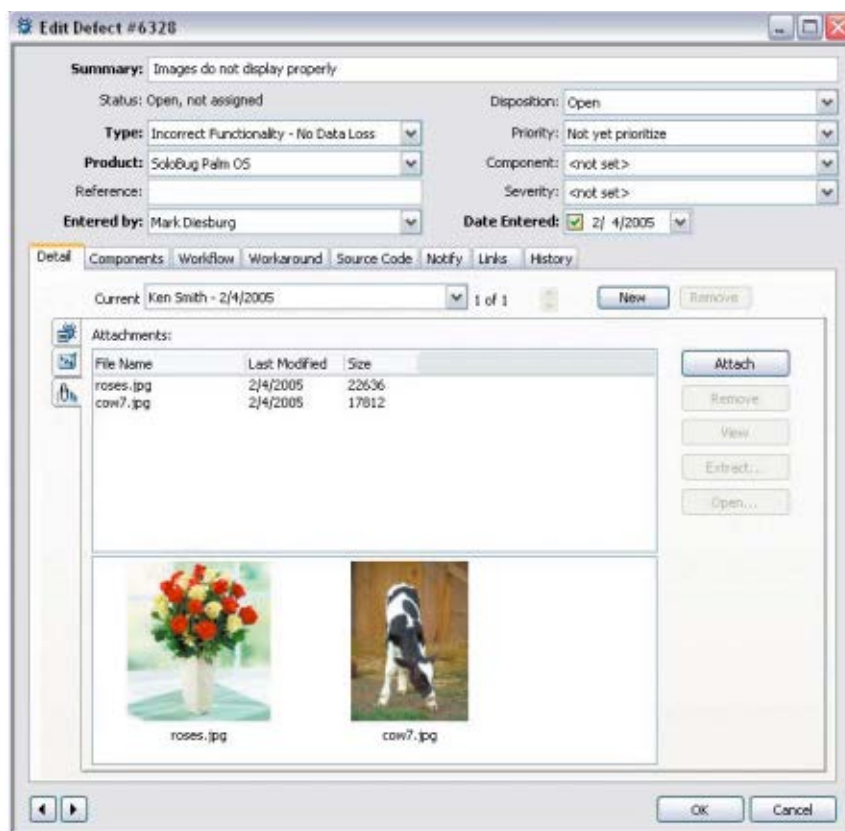


Figure 4 TestTrack Pro image thumbnail support

Teams that implement proper asset management will likely benefit from shorter release cycles and increased productivity. Seapine Software's Surround SCM and TestTrack Pro provide a solid foundation for managing all of a game's digital assets and tracking the continually changing environment they exist within.

#### AUTHOR

Allan McNaughton (allan@technical-insight.com) is a patent-holding technologist and veteran writer. He is the principal at Technical Insight LLC, a firm specializing in the composition of high-technology white papers.

#### ABOUT SEAPINE

Seapine Software, Inc., is a market-leading provider of adaptable application lifecycle management (AALM) solutions for enterprise-level software development. Seapine's products are designed to help customers streamline

complex business and development processes, so they can focus on developing quality software in less time. All Seapine products seamlessly integrate with each other as well as most popular software development tools. Seapine's AALM solutions adapt to the way development teams work, giving them the freedom to choose the tools and processes they like. Over 6,400 companies worldwide use Seapine tools to manage their development processes, improve performance, and deliver higher quality solutions.

IN GAME DEVELOPMENT THERE ARE  
**NO SECOND CHANCES.**  
MISS A DEADLINE OR SHIP A BUGGY PRODUCT AND IT'S  
**GAME OVER.**



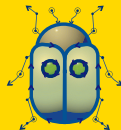
**DELIVER QUALITY. DELIVER ON TIME. USE SEAPINE.**

Powerful, cross-platform TestTrack Pro and Surround SCM help you manage game development from start to finish—spend less time chasing problems and more time creating quality games.

### TestTrack Pro

Advanced Issue Management

- Defect linking
- Robust reporting
- Fast, secure remote access
- Beta site feedback
- Easy to use and administer



### Surround SCM

Flexible Change Management

- Advanced code branching
- Changelists and atomic transactions
- Email notifications
- Fast, secure remote access
- **NEW!** Image browsing and thumbnail support



### TRUSTED BY LEADING GAME DEVELOPERS

ION STORM, ATARI, CLIMAX, SPORTS INTERACTIVE, KUJU ENTERTAINMENT,  
and other top game development companies trust Seapine products to help them deliver  
bug-free games. Is your company the next Seapine success story?

Visit [www.seapine.com/gamedev](http://www.seapine.com/gamedev) to learn more  
about TestTrack Pro and Surround SCM and  
download evaluation copies.

 **Seapine Software**™

more recently have extended to a kind of crunching throughout the year.”

“It’s always my advice to employers that they should have an open door with their employees to [let them air their] grievances and to always try to address those grievances,” he recommends. “The wise manager will recognize that working out an amicable resolution with employees is the preferred route to either litigation or unionization.”

Levin cautions that unionization frequently means increased labor costs, which does no one any good. “If a publisher’s labor costs go up in such a way that it can no longer make a profit, it will have great difficulties with its shareholders. If it needs to pass those costs along to, say, Wal-Mart [as a retail channel] and, in turn, to the consumer, I suggest that neither one will accept those increases. As a result, game makers may end up going out of business or moving work to Canada or Europe where unions are less of a factor, and then there will certainly be layoffs. So everyone needs to be aware that, with increased labor costs, which are inevitable when you have a union, there are going to be consequences.”

## ‘INEVITABLE’ PROPONENTS

But Tom Buscaglia, who calls himself “The Game Attorney,” begs to differ. The only thing he believes is “inevitable” is the unionization of the games industry.

“I’m just not sure there’s a way around it,” admits Buscaglia, a principal at Miami-based T.H. Buscaglia and Associates, who once specialized in labor law but now represents independent game developers. “The problem is that the crunch scenario has been built into the equation; in a real sense, the publishers’ backs are against the wall. If they currently need their people to work 60 or 80 or 100 hours a week in order to build a game that sells for *X* number of dollars, there’s no way they can now tell everybody, ‘It’s okay, we’re only going to have you work 40 hours a week,’ because then their production costs will double. They can’t be magnanimous because they ultimately have to answer to their shareholders. And so, in a way, having a union come in might take the heat off of them. It might be a win-win situation.”

It’s difficult to pinpoint exactly when crunch “got built into the equation.” Certainly, it hasn’t always been so. At one time, the game industry consisted of small groups of game enthusiasts working together feverishly and endlessly to build a title they believed in. They worked long hours because they were driven by passion. But over the last 10 years, that model has pretty much changed to a commercially-driven industry inhabited by big, publicly-traded companies.

“What you’ve got now aren’t games emerging from the passion of individual developers but repetitive products driven by economic considerations,” notes Buscaglia. “We’ve got an assembly line of people working on the fifth iteration of a football game that comes out every year like clockwork and the passion is gone. They may like what they’re doing, but it’s culturally inappropriate to continue the same model.”

## ONE SPOUSE HAS HER SAY

That’s what EA Spouse was referring to when she posted her open letter regarding her fiancé’s working conditions. Speaking to *Game Developer* (anonymously still, at her request), she reiterated how game-building needs to be fixed from both process and management standpoints so that deadlines can be met without extended crunch periods.

“We’ve followed a Hollywood model and it’s become a train wreck,” she says. “When a publisher takes a proposal from a

[development studio], there needs to be specifics—what that developer is going to do and how, and how [the developer] is going to meet a certain deadline because it has such-and-such resources. That’s not what happens now, and I know that because I’ve written proposals. Now, a developer just says it wants to make such-and-such a game, and the publisher basically plays Russian roulette with whether that team can meet its commitments.”

Since her letter was posted, EA Spouse reports that there has been a change of tone at EA. When someone suggests that a design team needs to go to a six-day week, the idea is immediately dismissed with a comment like “No, we can’t do that, not with all the publicity that’s going on.”

“But I don’t think that will be very long-lived,” she says. “In my opinion, the only thing that will get publishers to budge is unionization, which I believe to be the best solution.”

EA Spouse’s immediate plans are to launch GameWatch.org, a web site where game developers can share information about their companies.

“There are some development houses, like BioWare and Cyberlore, that are the good guys, who work hard to do right by their people and still create good products,” she notes. “I think other developers need to know that. And so we’re creating GameWatch.org, which will be like a movie review site, only instead of critiquing movies, we’ll critique game studios. Our goal is to have it up by June.”

## PURVEYOR OF CONTINUOUS IMPROVEMENT

In Montreal, a man with the enviable title “VP of continuous improvement” says he agrees with EA Spouse when informed that she is in favor of fixing the game-building process. He’s Ubisoft’s Michel Allard, and he says that, without a doubt, the solution to the quality-of-life issues is changing the way games are made.

“We’ve formed an internal committee that’s going through every type of documentation on project management in all types of industries, trying to learn from them to see what can be done in our business,” he explains.

## >> first person

### EA’S INDUSTRY

leadership and the critical and commercial success of our games is a reflection on the high caliber of people we hire in every job. They are simply the best talent in the business, period. To keep our people motivated, we need to constantly ensure that their creativity, hard work and dedication is supported and rewarded.

To succeed at this, we are committed to working with teams and individuals to identify both

strengths and weakness in our processes.

That said, we recognize there are legitimate concerns about work-life balance in this industry. The game industry is going through some significant growing pains, and as the industry leader, EA is in the forefront of addressing these issues.

We’ve got an ambitious goal: to set new industry standards for management and recognition. At EA, we’re listening and communicating directly



to our people and building a model for the best culture and work environment in the entertainment industry, a place where the best and most creative people can build and sustain long-term careers making the world’s best games.

*Rusty Rueff, executive vice president of human resources for EA*

# UNIONIZE NOW?

As a result, Ubisoft has put into place a project management office that supplies project coordinators for every team and that has developed methods to better schedule and estimate tasks.

"We've gained ground, but that doesn't necessarily manage all the types of ambitions that are out there," he says. "Sometimes the impetus to work long hours comes more from a certain bravado or peer pressure than from management. So this is a multifaceted problem, and it's our biggest challenge—to protect creativity while gaining better control over our projects."

Specifically, Allard says Ubisoft is paying more attention to the concept and pre-production phases of the development process. There needs to be someone, he notes, who says that the game will be just as good without an expensive feature or a time-consuming addition.

"I think the marketing people would say that, yes, we need all the extras," he adds. "But whether we really need them is not an easy answer to come by. I think we have a lot of good minds getting together on this problem and, over time, we'll gain control of it."

Allard wants to believe that unionization won't take place at Ubisoft, adding that unions are very capable of hurting creativity. "Whether they will come is difficult to say," he concludes. "I don't think any industry is totally protected from it."

## SYMPTOMS OF AN INDUSTRY AT LARGE

At EA, there's no doubt whatsoever that unions represent the dark side.

According to Rusty Rueff, the executive VP of human resources, "There will always be people who want to step in and take a piece of the pie or get in the middle of things without contributing to the growth of the business. I personally don't believe that our people are the type who actually want to have a third party representing them and determining their wages, hours, or working conditions. And so it's my job and the job of the leaders inside the company to ensure that we're doing the right things so that those kinds of things aren't necessary."

Rueff believes that the working conditions and challenges at EA are symptomatic of the entire industry, not just his company.

"We're all trying to squeeze that last 10 percent out of the current technology, which is a little bit less exciting than it will be a year from now when we're working on the PlayStation 3," he says. "But I do believe that getting better at project management, scheduling, discipline, and pre-production—those are all things we all need to become smarter at. Those are the things we aren't doing as well as we want to."

To that end, EA says it has recommitted to what it calls its X Process, a production practice that has the team focus on the features of a game prior to going full-speed ahead on a project. The process also dictates that the team build one level of a game prior to the studio committing to the project entirely in order to make certain everyone understands what the game involves.

"We've taken every studio person in every EA location around the world through the process these last few months, and I think everyone is convinced that we're serious about it," says Rueff. "In my mind, it's like running a marathon. You want to make sure that you have a kick left in you at the end, and you don't mind having to kick if you don't have to start the kick too early. So we're being very open with everyone and discussing when we think the crunch is going to come, how we're minimizing the crunch, how we're working together to determine what that crunch will be. Everybody at EA has been communicated to and now understands this."

## I WANT TO MAKE GAMES WHEN I GROW UP

In a soon-to-be-published study by the University of Texas at Austin's Digital Media Collaboratory, 310 middle school students in Texas were asked what they wanted to be when they grew up. Of the 124 male respondents, the favorite occupation [out of 40 choices] was professional athlete; the runner-up was video game designer.

Jason Della Rocca, executive director of the International Game Developers Association (IGDA), wonders whether those students will change their minds when they catch wind of what a game designer's work schedule and wages are like.

"This is not just an EA thing," he says. "As word slowly gets out that regardless where you work, the conditions are all miserable, how easy do you think it's going to be for our industry to attract new talent? When people start avoiding us because they believe us to be a bunch of slave drivers, that's got long-term, industry-wide implications. That's why the IGDA sees this as a very serious issue."

Last year, the association did an informal survey of game designers which revealed that about 30 percent of the respondents didn't intend to be in the industry within five years; more than 50 percent said they will be gone in 10.

"That is a huge number," says Della Rocca. "Imagine if half the people in Hollywood left every 10 years. What kind of experience would remain? Where would the talent come from?"

In terms of solutions, Della Rocca believes the industry has to enlighten the rank and file as well as management.

"Although they have the passion, developers need to put their own brakes on, and they want to have a life outside of the game industry because that will make them better game developers. We need to educate the middle managers, the project managers, and the producers—or bring in outside management [to] deal with the chaos and the fires and the pressures of managing large-scale, big-budget projects."

As for unionization, the IGDA is what Della Rocca calls "union neutral." He says it isn't the IGDA's role to condemn or condone the creation of a union. "It's really the choice of the workers to decide whether they want to unionize," he says.

Indeed, it's likely the discussions will continue, the unions will pursue educating about the benefits of organizing, and management will try to convince game developers that conditions will get better without unions. And some of those who are talking now credit EA Spouse for accelerating the conversations.

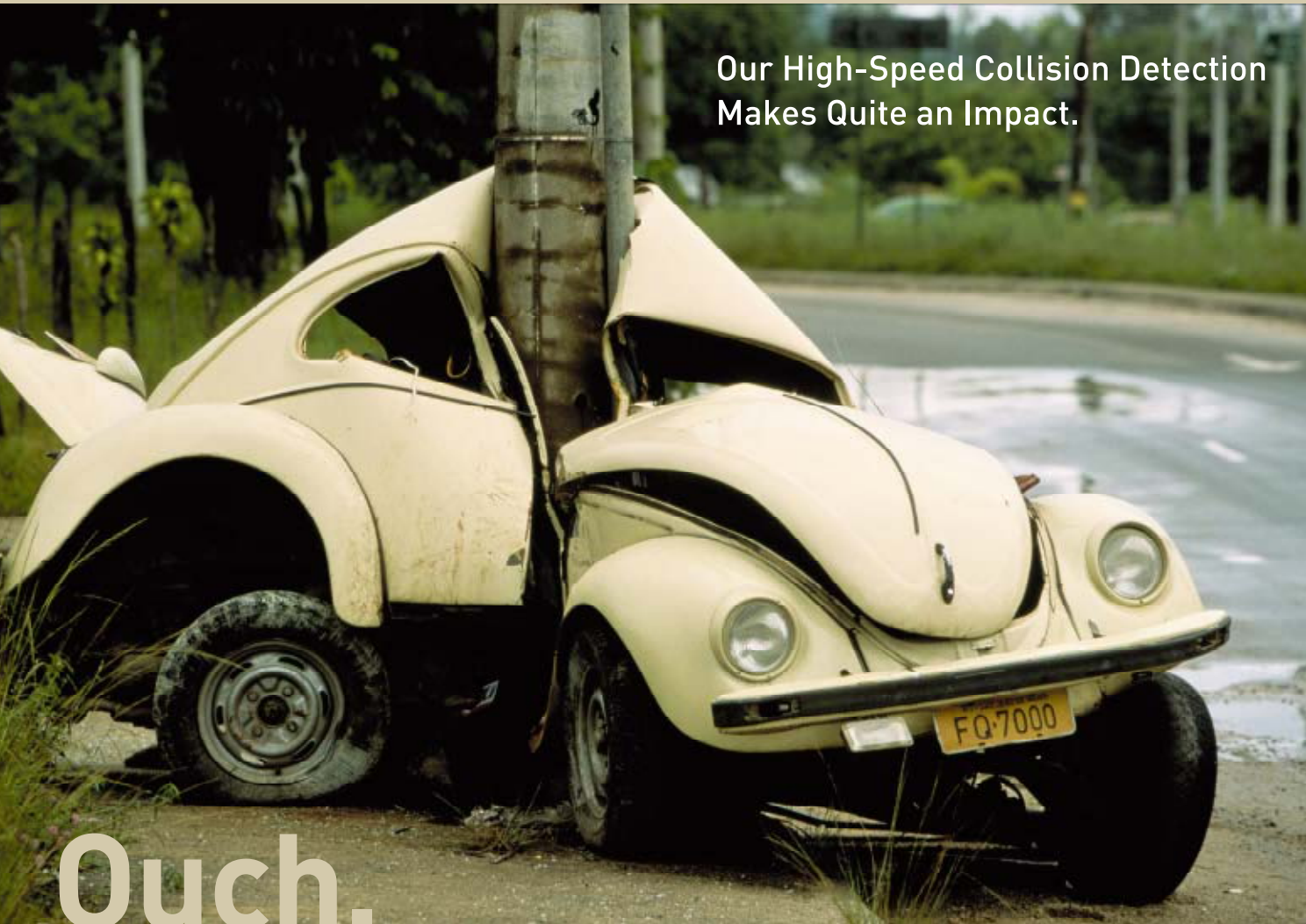
"EA Spouse just wants her man home at night," Buscaglia says, "and I think there are a lot of people who feel the same way." ❖



Adam Levin of the law firm Mitchell, Silberberg, and Knupp



Our High-Speed Collision Detection  
Makes Quite an Impact.



# Ouch.

**When the bodies start flying, you need a solution that holds it all together.**

The NovodeX Physics SDK provides the most powerful and advanced toolset for creating dynamic physical environments on multiple platforms. With its unmatched collision detection system and advanced multi-threading support for parallel processor architectures, your next generation games can feature advanced behavior effects and immersive game play like never before.

And, at NovodeX we've got you covered for today's software physics effects and tomorrow's more powerful hardware-based physics rendering. Learn why more than 60 game development studios, companies, and research institutes use NovodeX technologies, type [www.ageia.com](http://www.ageia.com), e-mail [info@novodex.com](mailto:info@novodex.com) or visit us at the **Game Developer Conference in ExpoSuite 30.**

NovodeX



High-Speed  
Collision Detection



Multi-Threading



Cross-Platform

an Ageia Company

# the evolution of 3D continues

Selected for performance. Adapted for next generation productions.



Image by Kenneth A. Huff / www.itgoesboing.com © Copyright 2004-2005 Alias Systems Corp.

Maya®6.5 software delivers the tools you need to work efficiently with massive datasets. Key optimizations in areas such as file transferring and interactivity – plus the addition of mental ray® for Maya network rendering (Satellite) and new scene segmentation tools – let you meet the demands of your next generation productions.

Rated **P** for **PLAY**

Don't miss the last stop on our P4Play Tour.  
Check out [www.alias.com/p4play](http://www.alias.com/p4play) for details!

**Maya**™ **6.5**  
CAN YOU IMAGINE®

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

Come visit Alias in Booth 230 at GDC 2005

© Copyright 2005 Alias Systems Corp. All rights reserved. Alias, the swirl logo, Maya and Can You Imagine are registered trademarks and the Maya logo is a trademark of Alias Systems Corp. in the United States and/or other countries. mental ray is a registered trademark of mental images GmbH in the United States and/or other countries. All other trademarks mentioned herein are the property of their respective owners.

For more information: [www.alias.com/maya](http://www.alias.com/maya)

# MOMENT OF IMPACT

## DESIGNING AN IN-GAME EFFECTS SYSTEM

**TERRANCE COHEN** is a senior software engineer at Irrational Games. His game credits include *MEDAL OF HONOR* and *SWAT 4*. He enjoys spending time with his wife Rena and his daughter Rebecca. You can reach him at [tcohen@gdmag.com](mailto:tcohen@gdmag.com).

❖ **A WEAPON FIRES A BULLET. THE MUZZLE FLASHES. A SHOT RINGS OUT. A HOLE APPEARS IN THE wall.** Better yet: An M4A1 fires a jacketed hollow point bullet. The signature five-point star appears at the end of the barrel and momentarily illuminates all nearby objects. There's a loud "crack." Chunks of wood explode from the point of impact and leave a gash in the wall's paneling. An empty shell ejects from a port on the rifle.

This effect event and its specialization were created with a system that provides a flexible approach to managing effects within a framework that supports rapid prototyping, smooth workflow, and immediate feedback.

# MOMENT OF IMPACT

**FIGURE 1** Typical effect events and responses during heavy combat: The door shows responses to the `C2ChargeDetonated` and `DoorBreached` effect events. Responses to `BulletHit` can be seen on the pipes, on the walls, and on the sand bag. The muzzle flash and dynamic light are the result of a `WeaponFired` event. And the utility light's corona is the result of `LightAlive`. Sound effects are associated with many of these events as well.



The effects system we use at Irrational Games is a component of the *VENGEANCE* game engine that receives notification of an event during gameplay. It determines which effects, if any, should be played in response to those events. We used this system to manage visual and sound effects, both at design time and at run time for *TRIBES: VENGEANCE* and *SWAT 4*. Using the system, game developers of all sorts—programmers, designers, animators, and others—can trigger “effect events” from code, animations, or gameplay scripts. These effect events represent opportunities to play effects, which can be visual, audible, or something else entirely, such as tactile feedback or vibration, and they contain information about the context of the event. [See Figure 1 for an example.] Game developers specify what we call the “event responses,” the responses to effect events that specify which effects to play.

Irrational's effects system is shaped by three central aspects:

1. Unification of configuration for different kinds of effects, for example, visual and audio effects.
2. Data-driven configuration of effects at design-time and event-driven effects during gameplay that allow non-programmers to independently incorporate new effects into the game.
3. Layering and specialization that supports rapid prototyping and gradual introduction of effects.

**UNIFICATION OF CONFIGURATION.** The advantage of a unified effects system is that it provides a simple way to coordinate different kinds of effects. For example, every explosion is likely to cause a sound, provided that the listener is close enough to hear it. When the same system is used to coordinate effects, for example, a sound designer can see when a new explosion has been added to the system and can then create a sound effect to match it.

**DATA-DRIVEN CONFIGURATION OF EVENT-DRIVEN EFFECTS.** Effect events provide a convenient layer of abstraction from playing effects, divorcing the work of the game designer from the work of the effects designer, meaning that both can work effectively without spending too much time thinking about what the other needs. Through this separation of responsibility, the tasks of invoking effects and building them become independent. Programmers, naturally, may trigger events from code. But the primary goal of using an effects system is to empower level designers, artists, animators, and the like to be able to integrate new effects without the help of a programmer. The key to taking advantage of this separation of programmer and effects-maker is to give the effects-makers various means of triggering events. To this end, we provide a “trigger effect event” action that level designers can generate from scripted gameplay events. Our reactive world objects can also be configured to trigger events, and we provide an animation key-frame action to trigger an event that animators can apply to frames of animation. By triggering effect events and by configuring responses to them, developers can incorporate new

effects by themselves and without any need to recompile the code, which makes for a simpler workflow compared to systems that always require code modification to introduce new effects.

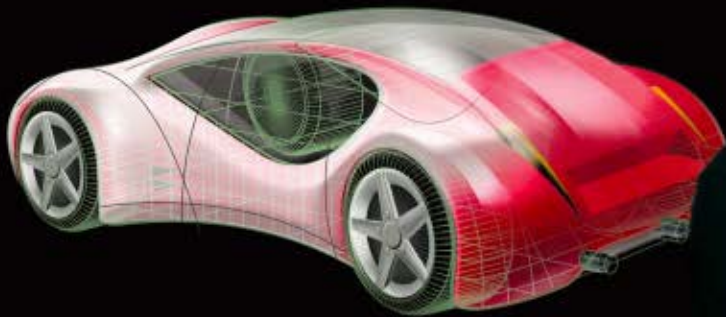
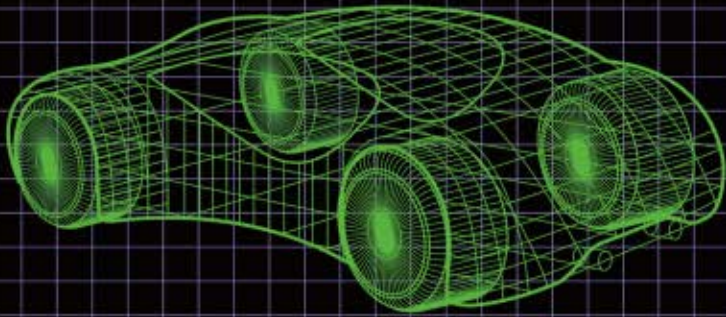
**LAYERING AND SPECIALIZATION OF EFFECTS.** Because the effects system is a component of the game engine, it's aware of the game's class hierarchy. With this knowledge, the effects system can select the most specific response to an effect event. To take advantage of this capability, we set a generic detonated event response, which is applied when any object triggers it. Later, when a special sound is created for a gas grenade, a specialized `GasGrenadeDetonated` event response could be created, which would apply only when a gas grenade triggers the Detonated effect event. Whenever anything else detonates, such as a C2 charge, the effects system would continue to select the generic Detonated event response, because no more specific event response matches the effect event that occurred.

This ability to specialize—or layer—effects is a powerful feature that supports rapid prototyping early in a project, and allows game developers to gradually specialize effects as new art and sound assets become available. Notice that specializing the `GasGrenadeDetonated` event response from the generic detonated event response did not require any code or script changes. Rather, this change only requires the addition of the `GasGrenadeDetonated` event response, which specifies that it is a response to the detonated effect event when it is triggered by a `GasGrenade` class of object. This kind of change can be made to a configuration file, or even better, with a GUI tool (which will be discussed later). Programmers will note that the detonated effect event can be triggered in a base class of `Grenade`, so specializing detonation effects for different `Grenade` subclasses does not imply any additional code. Again, keep in mind that a unified effects system means that different event responses may specify effects of different types. So the detonated effect event triggered by a grenade is likely to have an event response in both a sound and visual effects subsystem.

By taking advantage of these four central aspects of the effects system, developers can become more expressive in configuring effects and benefit from improved workflow compared to other common techniques.

**EXAMPLE 1.** Characters make sounds when their feet hit the ground. The `FootFell` effect event type is triggered from key-frames in animation, not from code. (In fact, the name `FootFell` is





IT WORKS FOR ME



*"...the performance and quality of  
ATI's FireGL™ graphics and the  
HP nw8000 Mobile Workstation  
enable great artists and designers  
to be that much greater."*

When world renowned Savannah College of Art and Design (SCAD) chose ATI's FireGL™ graphics and HP's nw8000 Mobile Workstation it gave faculty and students the ability to maintain their competitive edge while developing award-winning digital content. **MARK THOMASSON**, DIRECTOR OF DIGITAL MEDIA TECHNOLOGY, SCAD said, *"...this is where ATI's FireGL™ technology proved itself."*

FireGL™ graphics accelerators are certified and optimized for professional CAD and DCC applications. ATI delivers a top to bottom range of trusted graphics solutions for mobile and desktop workstations with support for dual monitors, both Windows® and Linux platforms and native PCI Express™ x16 lane support.

Find out how ATI's FireGL™ graphics can **WORK FOR YOU** at: [ATI.com/firegl](http://ATI.com/firegl).

**ATI™ FIREGL™**



# MOMENT OF IMPACT

added to a dynamic string table from the key-frame action, and is not mentioned anywhere in code.) Because the animation keyframe action is able to include the material below a specified bone of the skeletal mesh when triggering the effect event, responses can be specialized for different materials. The result is that stepping in water sounds and looks different from stepping on leaves. You could further specialize the event responses such that they apply only to particular characters, so that bar-hoppers' shoes sound different from SWAT officers' boots when stepping

on concrete—all achieved without any special-purpose code.

**EXAMPLE 2.** When SWAT officers exhale in the cold, their breath is visible. As a character moves from one zone of the world to another, we untrigger and then retrigger the InZone effect event type in code. Any contexts associated with the zone in which an object is located are considered part of that object's context. Our level designers can add arbitrary contexts to zones, such as a Cold context to areas that are both outside and have snow. Then, our visual effects designer is able to create a response to an InZone effect event specialized for the Cold context. This event response specifies an effect that periodically (with a randomized interval) emits a visible puff of breath from the officer, attached to his mouth.

**EXAMPLE 3.** A radio initially plays content from one radio station; a response to its Used effect event causes it to select a different sound to play. A reactive world object can change its appearance in reaction to being damaged. When a radio is adequately damaged, it untriggers the Alive event, changes its appearance, and then triggers an AppearanceChanged event. When Alive is untriggered, the station content is interrupted, since it was played in response to the Alive event. And “electrical sparks” visual and sound effects are played in response to the AppearanceChanged event on a radio with a broken appearance. The ‘AppearanceChanged’ effect event is specialized for a radio that has a broken appearance so that a

## LISTING 1

```
void EffectsSubsystem::OnEffectEvent(
    EffectEvent& effect_event,
    IEffectObserver* effect_observer)
{
    bool anything_matched = false;
    for ( Class* current_class = effect_event.source.GetClass();
          current_class;
          current_class = current_class->GetSuperClass())
    {
        Array<EventResponse*> response_set;
        Name event_response_key = effect_event.type + current_class->GetName();
        event_responses.MultiFind(event_response_key, &response_set);

        if (response_set.Num() == 0)
            continue; //no responses to this event on the current class

        Array<EventResponse*> qualified_responses;
        Array<int> qualified_response_scores;
        int qualified_high_score = 0;

        for (int i=0; i<response_set.Num(); ++i)
        {
            int current_score = 0;
            EventResponse* current_response = response_set.Get(i);

            if (
                current_response->source_class_name != current_class->GetName()
                || current_response->effect_event_type != effect_event.type
            )
                return; //disqualified: wrong class or event altogether

            if (!EventResponseMatchesEffectEvent(
                effect_event,
                current_response,
                current_score))
                continue;
            else
                qualified_high_score = Max(qualified_high_score, current_score);

            //current_response is qualified
            qualified_responses.AddItem(current_response);
            qualified_response_scores.AddItem(current_score);
        }
        anything_matched = true;
    }

    if (anything_matched)
    {
        for (int i=0; i<qualified_responses.Num(); ++i)
            if (qualified_response_scores.Get(i) == qualified_high_score)
                PlayEffects(
                    qualified_responses.Get(i),
                    effect_event, effect_observer);

        //something matched, so we're done traversing the hierarchy
        break;
    }
} //for each class in source's inheritance hierarchy
```

## LISTING 2

```
bool EffectsSubsystem::EventResponseMatchesEffectEvent(
    EffectEvent& event,
    EventResponse* response,
    int& score)
{
    if (response->label)
    {
        if (event.source.label == response->label)
            //add constant value to response's score
            score += matches_label_score;
        else
            //disqualified: label doesn't match
            return false;
    }

    // ... perform a similar tests for additional properties of the
    // source and event, such as source.mesh, event.target_class,
    // and event.target_material ...

    if (response->contexts.Num() > 0)
    {
        int current_context_count = response->contexts.Num();

        if (current_context_count > GetNumContexts(event.source))
            //disqualified: the response has at least one context that
            // doesn't match the current contexts
            return false;

        //give the response one point per matching context,
        // or disqualify it for a non-matching context
        for (int i=0; i < current_context_count; ++i)
            if (!HasContext(event.source, response->contexts.Get(i)))
                //disqualified: the response specifies a context that
                // doesn't match the current contexts
                return false;

        score += current_context_count;
    }

    return true;
}
```



# SUPER HEROES WANTED.

- Executive Producers • Sr Producers • Producers • Game Designers • Level Designers • Software Engineers
- Technical Directors • Art Directors • Interface Designers • Modelers • Texture Painters • Character Animators



**contact: [manofsteel@tiburon.com](mailto:manofsteel@tiburon.com)**  
**[www.tiburon.com](http://www.tiburon.com)**

SUPERMAN and all related characters and elements are trademarks of and © DC Comics.  
(s06)

# MOMENT OF IMPACT

radio can even play different effects at different stages of destruction, if the designer so chooses. Note that the effects configuration refers to the radio class, so there's no per-instance cost for effects.

A discussion of our reactive world objects system is beyond the scope of this article. But suffice it to say, when gameplay events act upon an object, such as when it is used or damaged, reactive world objects can trigger effect events. For a radio, a response to its Alive effect event plays music.

## IMPLEMENTATION

The algorithm that Irrational's effects system uses for selecting responses to events is based on a score; each event response (appropriate to the given event) is scored against others. The

highest-scoring responses are the ones that most closely match the effect event that was triggered.

For purposes of this discussion, an Actor is an object with a location in the game world, and a Name is an index into a dynamic string table.

Table 1 compares the EffectEvent structure with the EventResponse structure. Note that these two structures share several properties—the properties that are compared when matching responses to events.

In our system, an effect event is generally triggered by calling Actor::TriggerEffectEvent(event). This Actor member function forwards the call to EffectsSystem::OnEffectEvent(self, event). (Depending on your game engine, you may be able to use your existing messaging or event system for this purpose.) The EffectsSystem dispatches this call to each of its EffectsSubsystems, such as the SoundEffectsSubsystem and the VisualEffectsSubsystem. EffectsSubsystem::OnEffectEvent() is shown in Listing 1. Each effects subsystem executes the selection algorithm on its own collection of event responses, which it maintains in a hash-map.

The most significant parameter in selecting winning event responses is the class of the source of the event. If any event response specifies a class lower in the inheritance hierarchy than another qualified response, then any responses that specify a class higher in the hierarchy can be rejected because they are less specific than others. For example, if a gas grenade detonates, then the more general GrenadeDetonated event response can be rejected because the GasGrenadeDetonated

## C++ Runtime Reflection

THE ABILITY TO TRAVERSE THE SOURCE ACTOR'S class hierarchy described in Listing 1 requires support for runtime reflection of the inheritance hierarchy. Runtime type identification (RTTI) is not sufficient for this purpose. Languages like Java, C#, and UnrealScript support runtime hierarchy reflection, but support must be added to any C++ implementation. For an easy-to-use

C++ reflection library, see Resources. Alternatively, there is an implementation of a similar system in which designers configure a virtual hierarchy. Although this implies greater overhead on the part of programmers and designers, it does provide an extra level of customization, and avoids the requirement of runtime hierarchy reflection.



## Are you Certified by ATI Graphics?

- Optimal compatibility and performance on all ATI platforms and CATALYST™ driver releases
- Cutting edge development of today's HD games with next generation technology
- Superior customer game experience

To ensure your games work better, become part of the Certified by ATI program.

Contact us @  
[devrel@ati.com](mailto:devrel@ati.com)

ATI - The World's  
Leading Graphics Supplier.



© 2005 ATI Technologies Inc. All rights reserved. ATI is a registered trademark of ATI Technologies Inc. © 2004 Atari Interactive, Inc. RollerCoaster Tycoon 3 game © 2004 Chris Sawyer. Programming © 2004 Frontier Developments Ltd. All Rights Reserved. All other company and product names are trademarks and/or registered trademarks of their respective owners.



**TABLE 1: Effects System Structures**

EFFECT EVENT PROPERTIES		EVENT RESPONSE PROPERTIES	
Property Type	Property Name	Property Type	Property Name
Name	type	Name	type
Actor&	source	Class&	source_class
		Array<EffectSpecification>	specifications
		Array<int>	chances
/* optional properties (default value = NULL) */			
Mesh*	mesh	Mesh*	mesh
Name*	label	Name*	label
Class*	target_class	Class*	target_class
Material*	target_material	Material*	target_material
		Array<Name>	contexts

event response is specific to a class lower in the inheritance hierarchy. Take a look at Listing 1, line 6. The selection algorithm traverses the inheritance hierarchy of the source of the effect event until one or more matching event responses are found, or until the hierarchy is exhausted.

For each class in the source Actor's inheritance hierarchy (until a matching response is found), the algorithm creates a subset of its collection of event responses, which are responses to the event type on the current class (lines 10–12). This subset is created by performing a lookup on the subsystem's hash-map. The key for this hash-map (and for the lookup) is the concatenation of the name of the current class with the effect event type, for example, GrenadeDetonated. (We create a Name with this key on line 11 to avoid any other string manipulations in the selection algorithm.) If this lookup produces no responses, then the algorithm continues searching the source

Actor's hierarchy, looking for any matching responses. Otherwise, for each matching event response, all properties contained in it are compared with the properties of the effect event and the source Actor.

EffectsSubsystem::EventResponseMatchesEffectEvent() is called from line 32 and is shown in Listing 2. For each property that the event response specifies and which matches the event that occurred, the response's score is incremented, indicating that the response is a better match for the event. If the response

specifies any contextual details that do not match the event that was triggered, then the response is rejected. Once each event response is compared against the effect event, they are scored. Their scores are recorded in the qualified\_response\_scores array.

In OnEffectEvent(), lines 49–51, if any event response matches the effect event that occurred, then the effects system plays the effects specified by all responses with the qualified\_high\_score.

### DATABASE CONFIGURATION

We considered implementing the effects system configuration with a database. This would have the advantage of simplifying the selection algorithm by replacing it with a database query. But we concluded that the penalty for performing database queries (potentially several per effect event) would be too significant, even if an embedded database were to be used. Still, a GUI database front-end could have been used to configure the

## RESOURCES

Adams, Arne. "Reflecting Attributes and Base Classes." *C/C++ Users Journal*. Volume 22, Number 9, September 2004. Pages 14–22.

Burke, Shawn. "Make Your Components Really RAD with Visual Studio .NET Property Browser." MSDN Library. <http://msdn.microsoft.com/library>, February, 2002.

# GAME BOOKS THAT DELIVER

SEE US AT GDC BOOTH 731

 <p>1-58450-390-4 \$49.95</p>	 <p>1-58450-352-1 \$69.95</p>	 <p>1-58450-354-8 \$49.95</p>
 <p>1-58450-369-6 \$49.95</p>	 <p>1-58450-395-5 \$49.95</p>	 <p>1-58450-308-4 \$49.95</p>

**20% Discount at [www.charlesriver.com](http://www.charlesriver.com)**  
 (800) 382-8505  
 Also Available at Amazon, Borders, and Barnes & Noble.

# NIKITOVA

## THE GAME OF CREATION

**Custom Programming**  
 RenderWare, PS2,  
 XBOX, PC, PSX  
 Symbian, J2ME,  
 Brew, SMS

**Character & Object Modeling**  
 Character Animation,  
 Level Design, FMV & VFX  
 Game Content & IP Creation

Meet us at :

 <p>E3 EXPO 2005 May 18-20 Los Angeles, CA, USA</p>	 <p>FUTURE VISION GAME DEVELOPERS CONFERENCE 2005 March 07-11, San Francisco, CA, USA</p>	 <p>GAME CONNECTION @ GDC March 07-08 2005 San Francisco, CA, USA</p>
--	---	--

**Game Development Outsourcing Leader**  
 info@nikitova.com +1(773)913.8015 www.nikitova.com



**Evel Knievel**  
Superscape/GWE

Extreme sports/stunts game starring Evel Knievel, famous daredevil and true American icon.

Jumps recreate the great moments of his stunt entertainer career!

**get your game on**

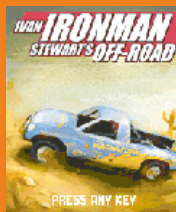
**Harlem Globetrotters**  
Superscape/GWE

Learn new tricks... work your way up the ladder and see if you have what it takes to be a legend...



**Ivan "Ironman" Stewart Off-road**  
Superscape/GWE

9 off-road tracks peppered with obstacles, jumps & power-ups, including nitro cans for speed bursts without wrecking your truck!



These mobile applications have been produced and published by Superscape Inc. and Global Wireless Entertainment, Inc.

© 2005 Superscape, Global Wireless Entertainment. All rights reserved.



# MOMENT OF IMPACT

effects system data, which would have been exported into a format that could have been read-in and manipulated at runtime.

While using an off-the-shelf database GUI is arguably the best approach, I chose to write a GUI front-end for our system, which I dubbed the Effects Configurator. I'm always cautious of systems that try to reinvent the wheel, as it were, and tend to lean toward using existing tools if there are ones that are right for the job. However, there were some aspects of the system that called for a specialized GUI. If the tool was cumbersome to use, then my goal of improving workflow would remain a dream. In addition, I kept modders in mind, and wanted a complete solution that could be distributed with any finished product.

For purposes of building the Configurator, I found C# and the .NET libraries to be an excellent combination, which allowed me to reach my design goals. The PropertyGrid control was particularly handy for presenting the user with a GUI for editing properties of an object (see Resources, page 27). And with .NET support for reflection and serialization, implementing loading and saving of configuration data was a painless process.

## CONSIDERATIONS

Performance was a primary concern when designing the technical architecture of our effects system. With all the matching of effect events to event responses, it's easy to worry that the simple management of effects could consume too much time. We were able to keep the overhead of the effects system's selection algorithm to an acceptable level. In practice, when events are triggered at a furious rate, such as in a firefight, many effects play. At those times, the overhead of the algorithm is small when compared to the time spent actually simulating and rendering the effects.

One thing that tripped-up the TRIBES: VENGEANCE team was the practice of triggering many different types of effect events that had no associated event responses. Despite the fact that there were no responses to these events, the effects system still needed to consider each one. This excess overhead caused a significant decline in performance. Therefore, it was important to balance the desire to provide many effects hooks with the careful consideration of which types of events were likely to deserve responses. After discovering that many of the team's event types were going completely unhandled, they cut back on the number of triggered events, which improved the performance.

We discovered that triggering effect events isn't a convenient model for invoking effects for all purposes. For example, we found that playing



Animation keyframe actions can trigger different sounds for footfalls on different material.

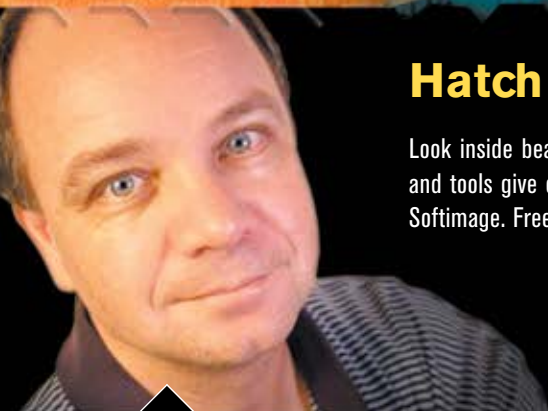
lines of dialog during scripted sequences did not lend well to an event model. Effect events would have been a cumbersome abstraction for this application because the particular resulting sound effects were always known. For this case, the conversation manager, which was responsible for managing the lines of dialog among characters, would play sound effects directly. It wasn't necessary to create a separate system for this. Rather, the conversation manager simply obtained a reference to the effects system's sound effects subsystem and called PlayEffects() directly on it, just as the selection algorithm would have done. So for specific instances in which the effect event model was not an asset, the system still supported our effects needs, albeit at a more basic level.

## FUTURE DIRECTIONS

While developing and using the Irrational Games Effects System, I've considered ways to enhance and extend its feature set, particularly through additional effects subsystems. For platforms that support vibration, a tactile effects subsystem is an obvious extension of the effects system's design. A caption subsystem would provide an integrated way of providing textual feedback to the player. And I can also imagine an animation effects subsystem in which effect event responses would cause the source of the event to blend skeletal animations into its animation channels, for example, in response to being hit by a bullet in a given limb.

## CAUSE AND EFFECT

If you're happy with your existing methodology, an effects system may not be necessary—not every studio needs one. But if you want to streamline your workflow, allow designers and effects creators to work remotely, prototype quickly and organize your effects management, you should consider building a similar effects system. With the growing complexity of games, increasingly sophisticated systems for managing effects will continue to play an important role in game development. ❖



## Hatch your inner swashbuckler.

Look inside beautiful games like *Sid Meier's Pirates!* and you'll discover Gamebryo. Our 3D graphics engine and tools give developers the freedom they need to create great games – whether they use max, Maya or Softimage. Free your mind. And the game will follow.

SID MEIER, CREATOR OF *PIRATES!*  
FIRAXIS GAMES



[gamebryo.com](http://gamebryo.com)

“Gamebryo gives our engineers and artists the flexibility to bring our vision to life.”

# ANARK GAMEFACE

Build great UIs in half the time



Anark Gameface, the first professional solution for creating 3D game user interfaces and front ends. Cut your development time in half by building a bullet proof UI pipeline.

#### Who wins?

- **Programmers:** Code the pipeline once and never touch the UI again.
- **Artist:** Use a professional authoring tool with real workflow.
- **Producers:** Save money and reduce schedule risk.

#### Anark Gameface Bundle Includes

- **Anark Studio:** Proven interactive 3D authoring tool
- **Anark Format SDK:** All the tools you need to import Anark UI projects into your existing game engine.

For more information go to [www.anark.com/gameface](http://www.anark.com/gameface) and visit us at the Game Developers Conference booth #944.



Revolutionize Communication with Interactive 3D

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



# BUENA VISTA'S GOOD VIEW

## GRAHAM HOPPER ON DISNEY'S PLANS FOR WINNING HEARTS

❖ **IN THE MID 1990s, MOST OF THE MOVIE PRODUCTION HOUSES** that were publishing or developing games made a semi-graceful exit from the industry. Buena Vista, as Disney's game publishing arm, was one of the few that stuck around. Now in its eleventh year, the company has made another shift, changing the name to Buena Vista Games, and changing the focus to the more core gamer. With the power of Disney behind them, and the acquisition of a few key individuals from established development houses, Buena Vista Games hopes to be a major industry player in both the short and long term. Senior vice president and general manager Graham Hopper spoke to *Game Developer* about Buena Vista's new initiatives in the core-gamer space.

**Brandon Sheffield:** *How has Buena Vista evolved over the years, and what has prompted this renewed interest in the console gaming space?*

**Graham Hopper:** Our business started about 10 years ago; in fact it was 10 years ago [as of December 2004] that Disney Interactive was formed, and it was predominantly a PC publisher for a long period of time. We did achieve a great deal of success on the PC platform, right throughout the 1990s. However, we have not been known as a significant console

developer; we tended to license all that out, so we had sort of a dual model where we published certain things ourselves, mainly on the PC, and we licensed out the rest. Of course what we realized is that as the console market has become bigger and more valuable, there was a real opportunity for us to expand our business by starting to publish on console as well. So that was stage one of the evolution of our business, which went into motion in 2002 and 2003.

We started looking at different genres of products, as opposed to just the traditional Disney branded products. So for example, we worked with Monolith Studios on *TRON 2.0*, and we also started work with Capcom on developing a, shall we say, sequel to Tim Burton's *Nightmare Before Christmas*. And again, we've started thinking about developing original properties. I think what we realized pretty quickly is that as powerful a brand as Disney Interactive is, it does of course limit what we're able to do in the gaming space. And the key evolution for us was realizing that the game business has changed from something that kids did, which would be true of 10 years ago, to something that is now an entertainment medium which everybody enjoys. You come home from work, and you can decide what you want to do to entertain yourself, you can switch on the TV and watch ABC, owned by Disney—yes, please watch it [laughs]—or you



---

**BRANDON SHEFFIELD**

*is the assistant editor of Game Developer. E-mail him at [bsheffield@gdmag.com](mailto:bsheffield@gdmag.com).*

# BUENA VISTA GAMES

can play a game, and it makes sense for us to be able to offer entertainment that crosses whatever different choices [consumers] want to make.

So we changed the name of the company to Buena Vista Games, or BVG. Underneath that, we have two labels. Label one is Disney Interactive, which used to be the company name but now is just a label of ours, in which we do all Disney-branded product. I don't like to call that kids products, because the Disney products appeal to a very broad audience, like for example KINGDOM HEARTS. Our second label, our newer label, is Buena Vista Interactive. And Buena Vista Interactive is, much like we use Touchstone and Miramax within the company to distinguish between Disney-branded products and non-Disney-branded products [for movies], Buena Vista Interactive allows us to do the same thing.

One of the things we've been quite involved in over the years was developing the games themselves. However, we often handed them off to third parties to publish. So we had deals with the likes of Sony, who publishes games, but in many cases we were the ones who secured the developers, worked to develop the game, then handed a finished product over to a publisher. And we realized that our capabilities in publishing could easily expand to cover the console products. Disney as a company is a top-ten vendor at Wal-Mart, for example. And so those retail skills that we have give us a size and heft in the marketplace that is much larger than our actual size, and much larger than any other company in the game space, that's for sure.

**BS:** Publishing aside, will you be incorporating development as well?

**GH:** Yes, one of the things we did is we repositioned the business. Just to give you a sense of the extent of the changeover—PC was a large portion of our business, close to 60 percent three years ago. And today throughout North America it's about 10 percent of our business. Before, we'd been invested in PC development studios. So what we did was spin those studios off, but we will get back into development; ownership of development studios and development capacities will support our console strategy going forward.

**BS:** Will you be making developer or publisher acquisitions to that end?

**GH:** Yes, to the extent that they make financial sense.

**BS:** So what will happen to those developers that previously worked on your licensed titles?

**GH:** We plan to continue operating as a license business in addition to our publishing capacity. In other words, we have an open mind about how to approach publishing a game. If the right way to develop a game happens to be to secure the unique expertise of a particular company that requires us to take a licensed approach, we'll want to do that. I think KINGDOM HEARTS is a great example of that, where they have brought the FINAL FANTASY characters together with ours. So there will be a licensing component to what we do. We have licensing arrangements with THQ which run forward into the future, and those will continue as they are. But I think you can expect that with properties like



Buena Vista's  
Graham Hopper.

**THOMSON**  
★  
**COURSE TECHNOLOGY**<sup>TM</sup>

Professional ■ Trade ■ Reference

## You're not the only one who wants your game to blow away the competition.

**Character Development and Storytelling for Games**  
ISBN: 1-59200-353-2 ■ \$39.99

**Beginning Game Level Design**  
ISBN: 1-59200-434-2 ■ \$29.99

**3D Game Programming All in One**  
ISBN: 1-59200-136-X ■ \$49.99

**The Game Producer's Handbook**  
ISBN: 1-59200-617-5 ■ \$39.99

**Visit us at Booth # 631 at GDC 2005 for special show discounts on Game Development books!**

**Call 1.800.354.9706 to order**  
**Order online at [www.courseptr.com](http://www.courseptr.com)**



business. We understand the differences. There are significant convergences, but we understand the difference in that we are trying to build a gaming company, not a company that does a bit of games on the side.

**BS:** How are you different from other companies, then?

**GH:** Well let's think about what this means for the development community—thing is, as we enter the core gaming space, we have pretty much a blank sheet of paper. And one of the problems that developers have is getting publishers to pay attention to new intellectual property ideas. In many cases that's because the publisher may already have a number of driving games or shooters, and then when somebody comes up with a new twist on these. As a publisher you have to say "is this cannibalistic, or is this something that I should be publishing as well?" We as an organization have very few of those sorts of potential conflicts. And we're actively looking for new intellectual properties to develop. Disney's very renowned as a marketing company—also renowned for developing and managing franchises. I mean we've built some of the biggest franchises in the world, I think out of the top five, three of them are owned by Disney. And these are things that we've either nurtured over the years, or simply developed in a relatively short period of time. Our ownership of media, like television channels and so on, allows us to evolve and grow franchises in a unique way. We're essentially throwing open the doors to the development community to come to us with great ideas. ❖



CHICKEN LITTLE which come out of feature animation, we'll be more likely to publish those ourselves than we would be to automatically license them out like we would have before.

**BS:** What do you think about other film companies, such as Warner Brothers, getting back into game development?

**GH:** I think they see the same strategic value in the business that we do—but I think the difference is that different companies have different starting points. So the fact is that we've stayed around for 10 years, and we have a profitable business, and we have the right kind of talent, having brought people on board like Mike Ryder who used to head up Sierra, people like Ed Bainbridge out of Eidos. We view our investment in talent out of the gaming industry as being the critical differentiator between us and other companies. The big lesson that we learned in that mid-'90s period where everyone got out of the business is that this is not the film

# WE HEARD

**BE INSPIRED** with music in the styles, moods, textures, tempos and rhythms you need.

**BE IN HARMONY** with access to our entire 600+ CD Music Library on a portable 500-gig hard drive.

**BE REAL** with pure authentic hip-hop from respected producers for Fat Joe, Big Pun, the Beatnuts and more.

**BE AN ALL-TIME HIGH SCORER** with DeWolfe Music – visit us at booth 860 at the Game Developer Conference in San Francisco 3/9 -3/11.

**BELIEVE YOU CAN HAVE IT ALL**  
212.382.0220 [www.dewolfemusic.com](http://www.dewolfemusic.com)

*DeWolfe music*

# WHAT'S INSIDE THE ROOM? THE HORROR OF SILENT HILL 4 INVESTIGATED

---

**AKIHIRO IMAMURA** *joined Konami in 1994. His first project was INTERNATIONAL TRACK & FIELD; he worked as a programmer. Since, he has been involved in the SILENT HILL series as the main programmer, director, and sub-producer, as his role has differed in each title.*

**AKIRA YAMAOKA** *also joined Konami in 1994. Since SILENT HILL 3, he is the producer of the series and created, directed, and performed all sounds (music and effects, but not vocals) in the games.*

TO UNDERSTAND THE PROCESS OF CHANGE IN SILENT HILL 4: THE ROOM,

we should first review the SILENT HILL series, in case you aren't familiar with the franchise. The concept for the original SILENT HILL was simply a full 3D action game with a horror theme. We wanted to do something within that genre for the PlayStation, which was still new hardware at the time. Given the limitations of the console, we could not render objects too far off in the distance, since it would be too taxing for the system. But to capture the feel of a true 3D experience, we limited the field of visibility using fog and darkness, which worked really well for a horror game and has become a trademark for the series.

By restricting visibility with fog and darkness, we were able to instill a true sense of dread in people, something they instinctively feel when encountering an unknown environment. Then of course we added some lurking creatures, and some cool audio effects, and we wound up with something that was very scary. Of course creating the





## GAME DATA



**PUBLISHER:**  
Konami

**PLATFORM:**  
PlayStation 2 and Xbox

**RELEASE DATE:**  
Japan: July 2004  
U.S.: September 2004  
Europe: October 2004

**NUMBER OF DEVELOPERS:**  
70, full-time

**DEVELOPMENT TIME:**  
2.5 years

**LINES OF CODE:**  
500,000

**NOTABLE TECHNOLOGIES:**  
Motion-capture

Transitioning between a "normal" reality and a horrific one heightens the sense of dread in *THE ROOM*.

game was not as easy as that implies, but these were the basic building blocks.

To amplify this feeling of dread, we created an alternate world that was permeated with blood and rust. This visual style accentuated the horrific nature of that world by contrasting it with the standard game world. In essence, a dual world was created, in which one side was normal and the other was filled with every imaginable horror.

*SILENT HILL* was a work that ended up using the hardware's limitations to advance the horror of the game, and one that managed to come from a different perspective, when compared to other games released at the time. Even today, people still mention that *SILENT HILL* for the PlayStation was a favorite game of theirs. That makes us feel great—it's very refreshing for other people to offer their views of our games, since everyone seems to like different aspects of them. We're so close to our projects that sometimes it's difficult to see what's meaningful to other people.

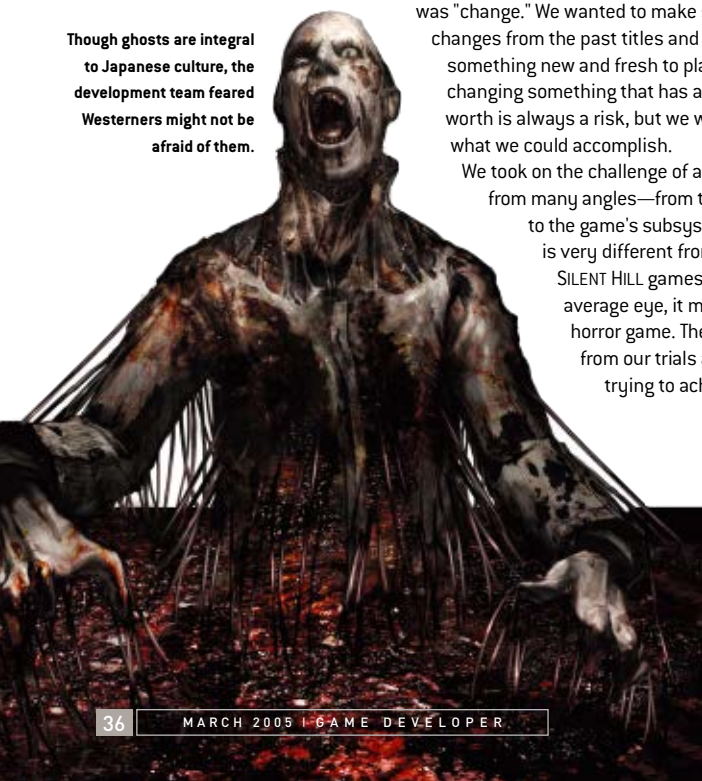
*SILENT HILL 2* made the leap from PlayStation to PlayStation 2 while retaining the horror concept in the original game. This was a big endeavor because of the new hardware platform, and it required much more time and effort to develop, given the capabilities of the system. We followed up that game with *SILENT HILL 3*, which further refined the graphics and sound, but there were no major changes to the game mechanics. As the creators of the series, we started to feel as though the gameplay was becoming stale. With that in mind, we undertook *SILENT HILL 4: THE ROOM*, for which pre-production began in fall 2001 and full production in spring 2002.

Even though the *SILENT HILL 4* project was a proper sequel to the *SILENT HILL* series, our top objective for the game was "change." We wanted to make sweeping changes from the past titles and give players something new and fresh to play. Of course, changing something that has already proved its worth is always a risk, but we wanted to see what we could accomplish.

We took on the challenge of affecting change from many angles—from the horror concept to the game's subsystems. *SILENT HILL 4* is very different from the previous *SILENT HILL* games, although to the average eye, it may still be just a horror game. The title emerged from our trials and errors while trying to achieve this change.



Though ghosts are integral to Japanese culture, the development team feared Westerners might not be afraid of them.



## WHAT WENT RIGHT

**1 THE HORROR CONCEPT.** While the *SILENT HILL* series lies firmly in the horror/action adventure genre, the root of the terror is not a fear of being attacked and killed by horrific creatures. Rather, it is a psychological terror of being slowly stalked and cornered by unknown beings. It's not really about the shock value, but much more of a deeper sense of foreboding; you know something is coming, but you don't know when, and you can't stop it.

Comparing the game to movies, the *SILENT HILL* series is closer to *The Exorcist* than *Friday the 13th* or *A Nightmare on Elm Street*.

In thinking about how it might be possible to realize a new type of horror in *SILENT HILL 4* without destroying the foundations of the series, we arrived at the idea of the horror of being trapped within one's own room.

A person's room should be a place of refuge and comfort. We felt that it would really be terrifying to become trapped in that sanctuary and to have that space gradually eroded through a succession of disturbing events. This was our main concept during *SILENT HILL 4*'s development. We hoped that it could become a new type of horror game that people had not seen before.

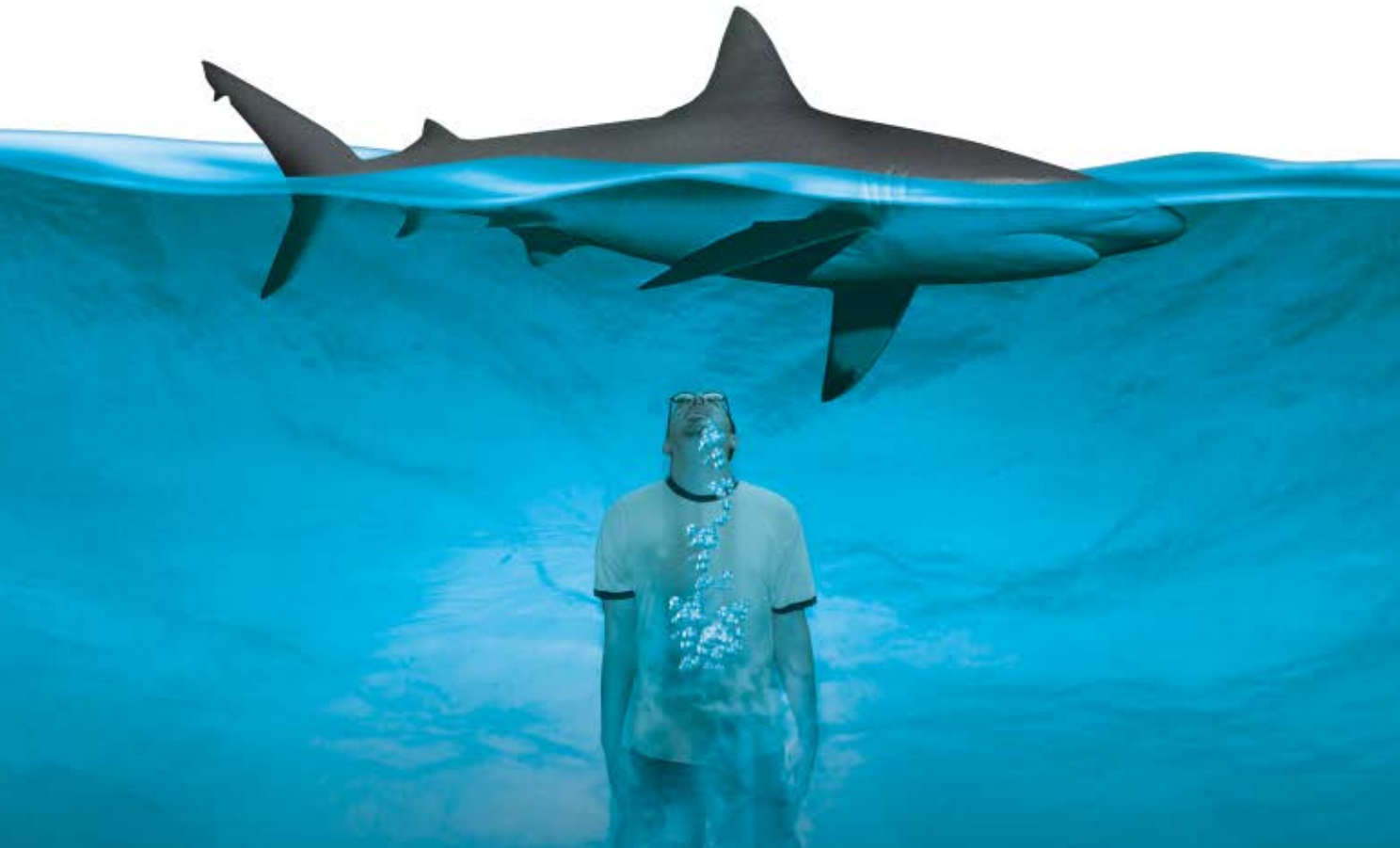
**2 A NEW TYPE OF ENEMY.** Once we established the horror concept, we wanted to add innovation in how we projected it. If we wanted supernatural phenomena to happen in one's own room, we also wanted spiritual presences to appear as enemies. We therefore created ghosts, a new type of enemy that inflicts damage on the player just by being nearby. Worse than that, they can come through walls, and even when knocked down, they rise again to relentlessly pursue the player.

CONTINUED ON PG 39

Microsoft



# DEVS



A deadly combination of power, intelligence and killer opportunities.

Microsoft  
Game Developer Day

Tuesday, March 8  
10:00 AM - 6:00 PM

Microsoft  
Hands-On Workshops

Wednesday, March 9  
Thursday, March 10  
Friday, March 11

Microsoft  
Sponsored Session

PIX Demonstration  
Wednesday, March 9  
2:30 PM - 3:30 PM

Microsoft  
Conference Session

Advanced Real-Time Rendering:  
Beyond Reflectance  
Thursday, March 10  
4:00 PM - 6:00 PM

Microsoft Keynote • Wednesday, March 9 • 10:30 AM - 11:30 AM



Microsoft @ GDC 2005  
[www.gdconf.com](http://www.gdconf.com)



# Getting hacked is wack!

The next installment of Hack U will be at GDC

Come visit us on Thursday, March 10th at 10:30 a.m. Moscone Center, San Francisco

Gosh Ted... next time we should protect our software with SafeDisc Advanced!

Voyeuristic elements are used to make the players feel uneasy.

CONTINUED FROM PG 36

For Japanese people, the horror of ghosts is deeply entrenched in our culture. However, we weren't confident that they would be frightening for people overseas, in America and Europe, for instance. In the end we agreed that the more general sensation of horror is shared by people worldwide, so we adopted our ghost as an enemy type after all. We believed that this enemy—an indefatigable being that ceaselessly pursues the player—is a very frightening presence to all, regardless of culture.

**3 FIRST-PERSON VIEW.** In developing any game, we hope to make the experience as real and immediate as possible for the player. One effective technique for doing so is using first-person perspective. This technique is one that we have long wanted to adopt for the SILENT HILL series, but using the first-person view for the entire series proved to be impractical. In terms of weaponry, the SILENT HILL games primarily featured objects used for clubbing enemies, which are very difficult to incorporate into a first-person mode.

With SILENT HILL 4's room setting, though, we felt that it would be possible to use the first-person view to good effect. In practice, we believe that the technique sufficiently heightened the sense of being there, especially when supernatural phenomena occur. For the action sequences in the other world, the view shifts back to a third-person perspective, since it would be way too hard to fight enemies in first-person mode.

**4 REAL-TIME ITEM MENU.** In past SILENT HILL games, whenever players needed to use an item or change weapons during battle, they could pause the action by opening the item menu, then leisurely select the needed items and weapons. We changed that with SILENT HILL 4. Item icons appear



at the bottom part of the game screen to let the player use the items and switch weapons without pausing.

This system of putting the icons at the bottom of the screen was inspired by a similar feature found in many online games. The fact that the game time doesn't stop when selecting items was an improvement because it made for smoother gameplay and helped sustain the tension of the scenario. Of course, SILENT HILL 4 is not an online game, so we still made it possible for the player to interrupt gameplay with the pause button to avoid needlessly distressing the player.

**5 PLAYABLE MOVIE SEQUENCES.** In many games, movie-like demo scenes are incorporated in key story junctures, and SILENT HILL 4 is no exception. We decided to add playable movie scenes, in which the hero could be freely moved. In those instances, there are no clear transitions to the scenes—we made the trigger an automatic one, in which the scene is set into motion when the hero approaches certain non-playable characters (NPC), who then begin conversing. In actual play, there are instances when the NPCs seem to be talking to themselves. Even so, we felt that this approach heightened the player's immersion. We thought that these sequences worked very well and brought a different feeling to the series.



## WHAT WENT WRONG

**1 ABSENCE OF MID-LEVEL BOSSES.** It was disappointing that we couldn't add any mid-level bosses simply because we didn't have enough staff. We felt that the game stood well enough without them, but as we feared, it became a game that lacked catharsis. It has to be said—mid-level bosses are an important element of any action game.

By fighting mid-level bosses, the player experiences a sense of achievement and exhilaration at key points in the game. That tension compels players to keep moving forward. It's really unfortunate that we weren't able to budget the time for our programming staff to make even one mid-level boss. I think this hurt the game, as players wander through it without enough challenging fights at strategic points. It makes it difficult for the player to see what he or she has accomplished.

Dank interiors and terrifying vistas characterize SILENT HILL 4.



**2 GHOSTS WERE TOO OBTRUSIVE.** We wanted to introduce a new type of enemy by including ghosts, but many players said that rather than being frightening, the ghosts were merely exasperating obstacles. Even when knocked

down, ghosts rise up immediately to resume their pursuit of the player. Players were irritated at constantly being on the run from them and as a result, were incapable of fully appreciating the beautifully rendered game environments.

In the latter half of the game, there are swords that can stun downed ghosts. While these swords allow the player to counter the indefatigable ghosts, there aren't enough of them.

The concept of invincible enemies wasn't a bad one, but in the case of the ghosts, we made them too strong. In the retail version, the ghost becomes "unstunned" in 3–10 seconds. If we could change it, we would make the stunned time between 15 and 60 seconds, depending on which mode (easy, normal, or hard) the player is in, to give the player some respite. It also might have been nice to allow players to kill ghosts, but at a high cost. In any case, the ghosts turned out more annoying than scary for most people.

**3 TOO MUCH DEPENDENCE ON MELEE WEAPONS.** At the start of the project, we planned to make the main character use club-like weapons for almost all the fighting. We also planned to make guns and ammunition very rare and special. We did so because we felt that one of the SILENT HILL series' more horrifying aspects is the brutal sensation of physically clubbing enemies. So we increased the variety of battering weapons, introduced a new system of charge attacks, and limited the availability of guns to only handguns.

However, when we developed the game with those weaponry changes in mind, ammunition was too rare, making players hoard it for the final boss, thus rendering the gun a largely wasted weapon. We also discovered that battering weapons alone made fighting too difficult, which made it tough for the player to progress through the game. We quickly added more ammunition so the handgun could be used more regularly. For players of SILENT HILL 3, this was a big departure; that game had various guns and other types of weapons too.

**4 PLACEMENT OF GAUGES AND ICONS.** With the SILENT HILL series, we had the policy of not displaying any gauges or icons on the game screen to enable players to become immersed in the world of horror. But we wanted to change the item selection process, so when we first started on the project, we clipped the top and bottom of the screen to make the playing field wide, and placed gauges and icons on the clipped black strips at the top and bottom. However, with the top and bottom clipped, the game screen didn't actually feel wide, just short. It made the screen feel cramped when controlling the character. Rather than adhering to policy, we gave priority to ease of play and decided to allow the placement of gauges and icons on the game screen. If we had gone with the widescreen mode, I think people would have complained that we weren't using the entire screen!

**5 ABSENCE OF A UFO ENDING.** From the beginning, the SILENT HILL series has always featured so-called UFO endings that were intended for laughs. I think a lot of fans were looking

forward to some kind of silly ending with SILENT HILL 4, but we were unable to put one in. The UFO endings had been added to the past titles as jokes by staff who thought up something particularly funny and had the time to add it. However, no one came up with an amusing idea, and eventually we didn't have enough time to include anything. I think that fans of the series were probably a little disappointed, although we did include a few different endings depending on how people played. When making a sequel, developers usually try to include as many fresh ideas as possible; but fans of the titles will want the signature elements of the original game to reappear in the sequels.

## ROOM WITH A VIEW

In making SILENT HILL 4, we attempted to implement quite a few changes. As with all things, we had some successes, and we had some elements that in hind-sight, we could have improved. Also, some areas demanded more trial and error because the project was a new challenge, for example, having the player go back and forth between the room and the horrific world, and having the room gradually infected by the "other" world. This approach was one that perfectly suited a representation of horror. But it lacked depth as an actual building block of the gameplay. We added problem-solving challenges, such as having to figure out that you need to use items brought back from the other world to the real world to complete a task. We tried to make various adjustments of that type to make it more satisfying for players to travel between the two worlds. Before implementing this, it was just boring to go between the real world and the horror world, because it seemed too much like a chore instead of being fun. While we were faced with many challenges, developing SILENT HILL 4 was definitely gratifying to tackle.

No matter what the title, franchises are faced with the constant need to evolve. Otherwise, developers run the risk of turning people away from their games, due to the lack of innovation. (However, we also know that you need to identify and maintain certain sustaining elements of the original game when making a sequel.)

In the future, we will have to consider the possibilities of network gameplay for the SILENT HILL series, among other improvements. What that will entail we don't know yet, but hopefully it will be something people want to try. Ultimately, we hope to keep providing the world with new entertainment by adopting new ideas for future games. Please look forward to what's coming next! ❖



Akihiro Imamura (left) and Akira Yamaoka.



Zombie dogs are enemies in the early stages of SILENT HILL 4.





SOFTIMAGE® | XSI®

Do more for less.

“For the production of **METAL GEAR SOLID® 3**, we needed to produce more high quality data in a shorter time frame compared to **MGS 2**. **XSI** helped us achieve this by providing our creators with a better environment in which to concentrate on our production work. **XSI** is a superior tool for sure...”

**METAL GEAR SOLID 3:  
SNAKE EATER**  
Design Unit General Manager  
**Yutaka Negishi**

Starting at \$495<sup>USMSRP</sup>, **SOFTIMAGE | XSI** includes innovative character creation tools, unique real-time shaders, the fastest Subdivision Surfaces in the industry and integrations for core pipeline tools.

See **SOFTIMAGE | XSI** in action at GDC 2005:  
Avid Computer Graphics Booth 413.  
For more details, visit [softimage.com/GDC05](http://softimage.com/GDC05).

**I am 4.** the future of animation.

© 2005 Avid Technology, Inc. All rights reserved. All prices are USMSRP for the U.S. and Canada only and are subject to change without notice. Contact your local Avid office or reseller for prices outside the U.S. and Canada. SOFTIMAGE, Avid and XSI are either registered trademarks or trademarks of Avid Technology Inc. in the United States and/or other countries. All other trademarks contained herein are the property of their respective owners.

© 2005 ACTIVEMARK, TRYMEDIA AND THE TRYMEDIA LOGO ARE THE PROPERTY OF TRYMEDIA SYSTEMS INC.

Smooth  
operator.

Game protection should be effective and effortless. That's why **leading developers trust Trymedia's ActiveMARK** for secure digital distribution — on disc and via download. In addition to ease of integration, ActiveMARK is consumer-friendly at every point of contact.

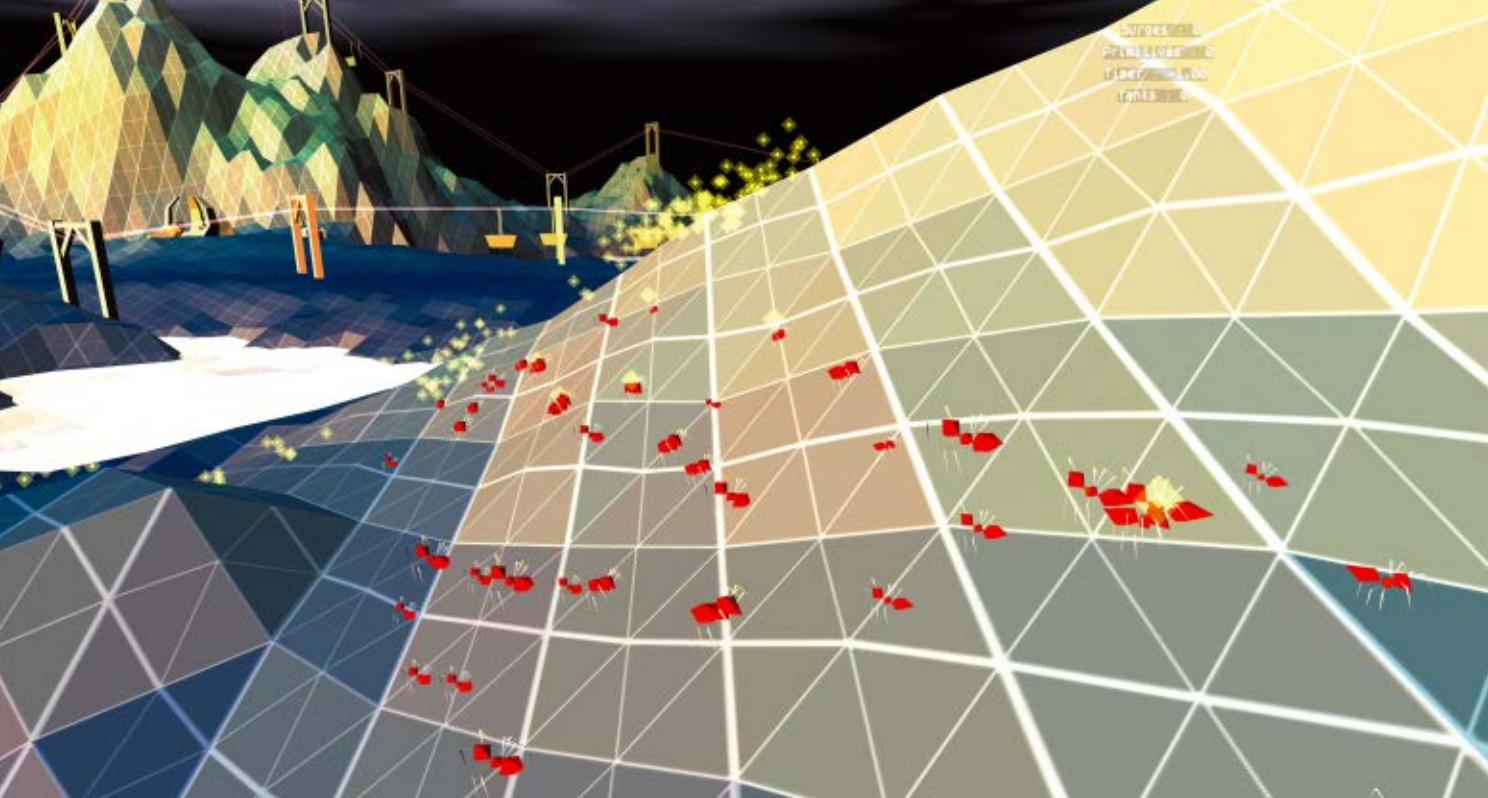
Learn all about ActiveMARK at **GDC 2005, Booth 224**. And don't miss "Inside The Hacker Mind" and other Trymedia sponsored sessions.

[trymedia.com/gdc05](http://trymedia.com/gdc05) for info.

THE SOLUTION FOR SECURE DISTRIBUTION







# FROM UPLINK TO DARWINIA

## Introversion Software's Chris Delay and Andrew Bainbridge on indie games and why programmers can't be squatters

### »» THE GUYS BEHIND GLASTONBURY, U.K.-BASED INTROVERSION

Software say they are the last of the bedroom programmers. That statement is, in the current market and depending upon your inclination, either a glorious anomaly or a curious anachronism. But where are they coming from?

We spoke with Chris Delay, the driving force of the company's creative machine, and Andrew Bainbridge, the latest recruit—a designer/coder with a perfectly complementary skill-set for the company's vision (he rearranges source code “to make it prettier”). They're not the triumphalist pro-underground coders you may expect.

The company's first game, UPLINK, debuted in 2001 for the PC. A minimalist and austere hacking title, UPLINK gathered impressive reviews and became something of a cause celebre in the British games press. Originally sold direct online via the company's web site ([www.uplink.co.uk](http://www.uplink.co.uk)), the game “allows you to perform various acts of high-tech computer crime” through an iconic interface and simulated (read: fake) online connectivity. The hacker's delight found its way onto the gaming retail shelves and was a considerable hit for an indie game, spawning Mac and Linux versions along the way.

UPLINK was enough of a hit to keep Introversion afloat and working on its second game, DARWINIA, a 3D action-strategy PC title. While DARWINIA and UPLINK differ as much as any two games can, the former is a genuinely fascinating example of a video game. Rather than the stark strategy atmosphere of UPLINK, there's a fantasia of retro-flavored imagery and a form of play that defies easy description. If you imagine Sensible Software's CANNON FODDER versus David Braben's pre-ELITE game VIRUS, with

influences from modern real-time strategy titles and the DMA classic LEMMINGS, you'll grasp something of it.

With DARWINIA finished and on its way to online and retail release in the U.K., Delay and Bainbridge were free to talk about the reality of independent development, as well as how to accomplish innovative results while using extremely limited resources.

**Kieron Gillen:** *You playfully describe yourselves as the last of the bedroom coders—and the first of the children. When do you think we'll be seeing the rest of the family? More games built on the bedroom coder model?*

**Chris Delay:** I don't think you can do games like this anymore.

**KG:** *But you did.*

**CD:** We did, but we haven't had any money for ages. And there's no real sign that we'll have any more money after DARWINIA.

**Andrew Bainbridge:** It's been more effort than we'd have really been happy with, if we knew about it at the start.

**CD:** Part of the problem is that it's taken so long. UPLINK came out in October 2001. It's too long, and the reason is that the game came out of us experimenting for ages. We probably spent a year trying out ideas. We had game prototypes, and they were all fairly substandard. They sort of looked a bit like DARWINIA, but that's it. It took us so long to find something that actually worked—and that definitely doesn't happen anymore.

»» kieron  
gillen

---

### KIERON GILLEN

*is an award-winning British games journalist and alumni of PC Gamer UK, best known for writing “The New Games Journalism” manifesto. He can be contacted at [kgillen@gdmag.com](mailto:kgillen@gdmag.com).*

# UPLINK TO DARWINIA



Chris Delay (top) and Andrew Bainbridge.

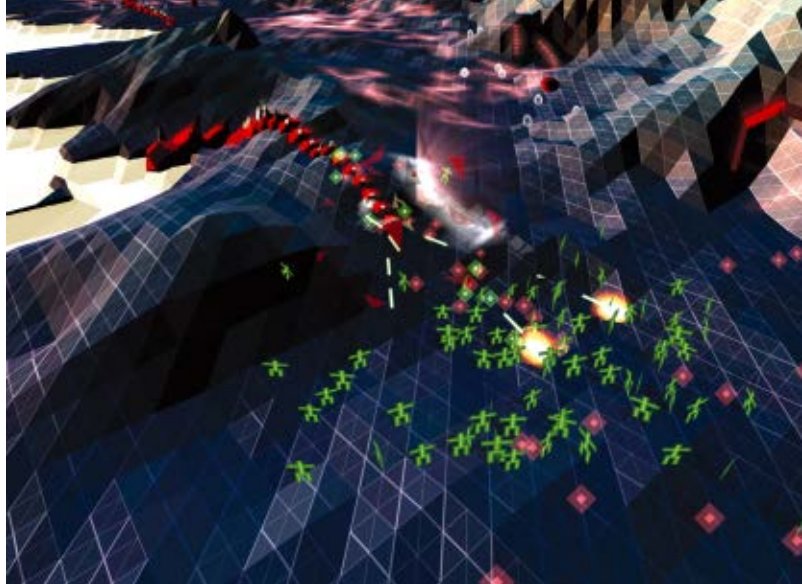
**AB:** There's something that bedroom programming can achieve that commercial titles don't—but I don't think there's going to be a spate of people trying to do this.

**CD:** Though, while we spent a lot of time on the game, it wasn't actually a great deal more than a lot of games.

**KG:** *Two people spending less than three years on a title—I suppose you only spent five man years. Compare that to a top-end Electronic Arts title that requires upward of 500 man years.*

**CD:** Yes, but the problem is that EA can afford to spend 500 man years to make a game. We can't. UPLINK came out. It did pretty well for an indie game. But it didn't make enough money for us to keep going indefinitely. If we had done it in two years, it would have been fine. Three years is stretching it.

**KG:** *Here's a weird, cross-cultural form*



*tangent: I know bands who, at some point in their career, were essentially living in a squat to keep going. Why don't we see coders do that?*

**AB:** Chris would.

**CD:** And Andy probably wouldn't. Mark and Tom definitely wouldn't [Mark Morris and Tom Arundel, who handle Introversion's business side]. They're far too sensible.

But the thing with those bands is they know that they've got Glastonbury, the NME, and the gig circuit in their local town. There's an established route that most big bands went through [before they became big]. But that's not true about big companies. They start massive. That's the difference between games and music: Two guys sitting in their bedroom don't really have any reason to believe that their game might be successful.

DARWINIA isn't even on sale yet. We can hope, but there's a tendency at the moment to go for realism, as realistic as possible, each generation a little further toward it. And we'd like to think there's a market for people who wanted to see something that was creative in a different way. DARWINIA isn't realistic in any way, but it does look creative.

**KG:** *Not that it looks unprofessional, and neither did UPLINK, for that matter.*

**CD:** We knew even with Uplink that we had to carefully pick our battles. We couldn't have made something like DARWINIA then. We didn't have the skill or the knowledge, but we knew that the

most we could hope for was a consistent, minimalist look for the game. Right from the very start—with FUTURE WAR, which became DARWINIA—we knew we had to go for procedurally generated content, all landscapes generated mathematically and using sprites for all the characters. The models only came in later. We knew we just didn't have the resources. The hardest thing in the world to do is real people.

**KG:** *So you haven't tried to get real people? DARWINIA has some excellent AI—the ant nests for example—but isn't it about trying to simulate something that can't be simulated?*

**CD:** Yes, it's got realistic AI that's aimed lower.

**AB:** The key is to transform the problem into one that we can solve.

**CD:** There are quite a few things in DARWINIA that throw away the idea of solving the problem and give the user a bit more responsibility.

**AB:** There were plenty of times during the course of making the game when we thought, "Can't do that." Then we thought, "We're not going to."

**KG:** *Did necessity make you prioritize differently than most developers?*

**CD:** The result is that we end up with something very unusual because we've made lots of decisions that any other company would never have made. We've ended up with ant colonies and other random things, which all have very simple rules inside, and all behave very reliably—and die in reliable ways. It's a game in which you learn, much like classic arcade shooters where the enemies come in

**Slow C/C++ Builds?**

**IncrediBuild** accelerates C/C++ builds by distributing compilation tasks across the network, cutting down build time by 90% and more!

Download FREE, Fully Functional 30-Day Trial!

Simple setup, requires no changes in code or settings  
Fully integrated with Visual Studio 6.0 and .NET IDE  
Supports Win32 and Xbox builds

**XOREAX**

www.xoreax.com

Evolve<sup>7</sup> > Your work. Your way. Introducing **3ds max 7.5**.

"Why do we use **3ds max**? Simply put: Productivity. **3ds max** represents a key element in our production pipelines for the multiple games and SKUs we have at any given time. We are able to customize every production pipeline for every game and then leverage our efforts by sharing tools and production methods between projects. With **3ds max**, we are able to efficiently produce the highly detailed and high quality games we're known for in record time."

# 3ds max /Sébastien

**Technology Director**  
Sébastien Lavier

**Studio**  
Ubisoft's Montreal Studio

**Games**  
Tom Clancy's Splinter Cell® Chaos Theory™  
Prince of Persia® Warrior Within  
Tom Clancy's Rainbow Six® Black Arrow  
Myst IV® Revelation  
Far Cry® Instincts

**3ds max® 7.5**  
**discreet®**

For more information, visit [www.discreet.com/3dsmax](http://www.discreet.com/3dsmax)

# UPLINK TO DARWINIA

Z-shapes. But it's a much simpler approach than trying to get Alex in *HALF-LIFE 2* to kiss her dad on the cheek.

**KG:** You said you experimented for a year. How much of a plan did you have during that time?

**CD:** We didn't know what we were making at the start. We knew what we were aiming for: a retro game, with old values. Rather than right clicking on the menu and sitting back, you have to actually fight.

**AB:** I think a lot of the visual style is a product of wanting to look different. We had the visual style a lot earlier than the actual game.

**KG:** The visual style is a key, I think. It seems like you chose something relatively achievable.

**CD:** We already have regrets. If we were going to do a postmortem, we'd say that making a level-based game is suicide with a small team. Even those few that we have made took months and months to make the game work. But even that—those levels don't look particularly heavily designed, but even that was far too much for us.

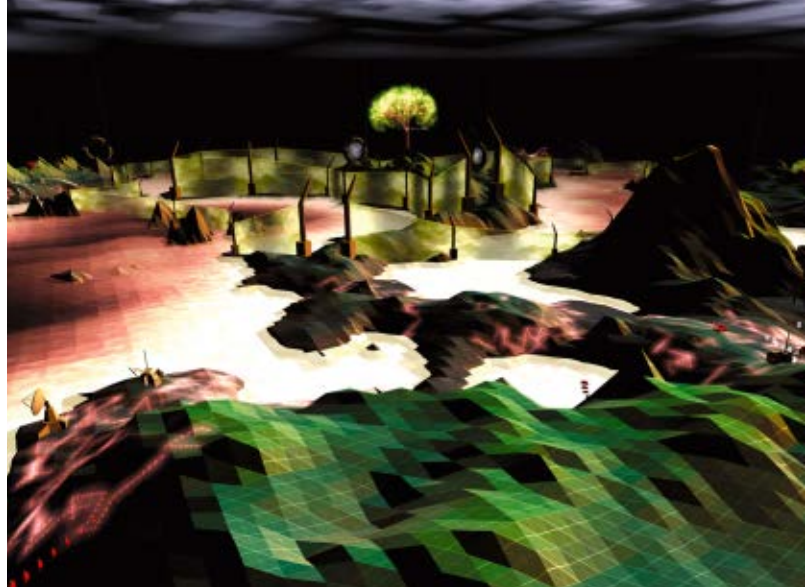
**AB:** I think our advantage is that having worked in game development before, we knew roughly what we were doing when we started. The traditional bedroom programmers really didn't. They were just kids leaving school and deciding to program.

**CD:** There doesn't seem to be any real reason why other small groups couldn't bandy together and start making their own games. It doesn't seem to happen very much. You get a lot of break-away companies forming from bigger companies when people decide they can do it better elsewhere—but they always seem to sign to a publisher a month later. And then a year later, they get laid off.

**KG:** They never learn?

**CD:** That sounds awfully smug, doesn't it?

**AB:** The temptation of a salary really is quite great.



**CD:** [Sighs.] Yes, it is. Oh, I don't know. It happens again and again. I think that's the only reason why we do what we do. I know for a fact that *FUTURE WAR*, long before it became *DARWINIA*, would have been canned. Because we genuinely didn't know what we were doing.

**AB:** Someone could have asked us when it will be finished, but we still would have been wondering what it actually is.

**CD:** We didn't have anything for ages. It was so scary. At the end of the first year, we didn't have a game. We had a landscape generator.

**KG:** Which is about as far away as you can be from the design document approach most teams use.

**CD:** That was definitely a deliberate thing before we started. Those design docs aren't the way to make games.

**AB:** They're the way to make some games.

**CD:** They're the way to make well understood existing games, definitely. But it's not the way to make good games, because you can't know. How can you do it? You've got this huge document which tells you the plot of the game, and one paragraph that tells you the controls—but the game comes out of the controls. Even now, how would you write the design doc for *DARWINIA*?

**KG:** What is *Introversion's* place in the future of games?

**CD:** We really don't know what we're doing. That's the trouble. How can we tell you? We don't know what we're doing next. There's no indication that *DARWINIA* will even sell as well as *UPLINK*—there's a real risk

factor. So far, we've got one game in 2001 and one game in 2005. That requires each game to pay four or five people for two or three years. That's like bands releasing one terrible album and it being over—oh, we sound so negative. [Laughs.]

**KG:** Are you worried?

**CD:** We're not really worried. We'll make something next. We don't know what that's going to be. We don't know if we'll hire three people to help us next time, or whether it'll be a game with just us two. I'd certainly like to think that *DARWINIA* would make enough to let us launch another game. But we certainly aren't interested in doing sequels. It seems such a waste to spend two years making a game that you've already made.

Put that simply, it sounds obvious. Why spend thousands of man years creating the same game, but featuring a lead character with four extra polygons on her nose. Why bother? *DARWINIA* is, of course, a harder sell than *UPLINK*. The concept of "you're a hacker" is easy to understand—selling something which people, abstractly, want already is relatively easy. But it's much trickier to sell something that no one knows they want. There's every possibility of *DARWINIA* joining brave, semi-art games marked "critical success/commercial failure." But it's not quite that simple; commercial success for a team of four is very different from commercial success for a major development team. For anyone working like *Introversion*, the bottom line is making enough to have a living, working wage.

Small, smart, and running around the legs of dinosaurs to find enough food to survive, bedroom programmers aren't extinct after all. ❖



Introversion's first title was the hacker simulation *UPLINK*.



# When you're #1 in the world,\* what do you do for an encore?



Register at [www.HaspHL.com/Events](http://www.HaspHL.com/Events)  
to attend a SW DRM Briefing and  
Roundtable coming to a city near you!

## HASP<sup>®</sup> HL

REINVENTING SOFTWARE PROTECTION & LICENSING.

Introducing HASP HL—the next generation in hardware-based security to protect your software revenues and intellectual property. Implement the strongest security from the undisputed leader, Aladdin. Secure it once. Secure it right.

See for yourself with "Software Protection: 1-2-3" the online demo, or get your FREE developer's kit at [HaspHL.com/Encore](http://HaspHL.com/Encore).

- Strong software protection based on AES & RSA algorithms
- Innovative licensing models implemented independently of protection
- Single and multi-user license management
- Intuitive, easy-to-use tools and API integration
- Highly reliable, compact, cross-platform key

\* Aladdin is the #1 vendor in the software licensing authentication tokens market for 2002 and 2003.

— IDC Bulletin #31432, 2004

North America: 1-800-562-2543, 847-818-3800 or [HASP.us@eAladdin.com](mailto:HASP.us@eAladdin.com) International: +972-3-636-2222 or [HASP@eAladdin.com](mailto:HASP@eAladdin.com)  
UK: [HASP.uk@eAladdin.com](mailto:HASP.uk@eAladdin.com) Germany: [HASP.de@eAladdin.com](mailto:HASP.de@eAladdin.com) Benelux: [HASP.nl@eAladdin.com](mailto:HASP.nl@eAladdin.com) France: [HASP.fr@eAladdin.com](mailto:HASP.fr@eAladdin.com)  
Spain: [HASP.es@Aladdin.com](mailto:HASP.es@Aladdin.com) Asia Pacific: [HASP.as@Aladdin.com](mailto:HASP.as@Aladdin.com) Japan: [HASP.jp@Aladdin.com](mailto:HASP.jp@Aladdin.com)

©2005 Aladdin Knowledge Systems, Ltd. All rights reserved. Aladdin and HASP are registered trademarks of Aladdin Knowledge Systems, Ltd.

**Aladdin**<sup>®</sup>  
SECURING THE GLOBAL VILLAGE



VISIT US AT

**GDC 2005** BOOTH #722



**3D Game Engine Architecture:**  
Engineering Real-Time Applications with Wild Magic  
by David H. Eberly



**Real-Time Collision Detection**  
by Christer Ericson



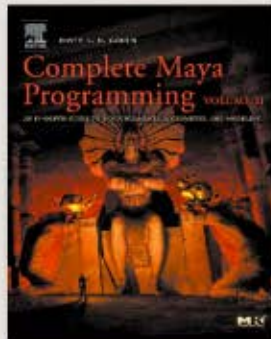
**Physically Based Rendering:**  
From Theory to Implementation  
by Matt Pharr and Greg Humphreys



**Advanced Graphics Programming Using OpenGL**  
by Tom McReynolds and David Blythe



**Game Physics**  
by David H. Eberly



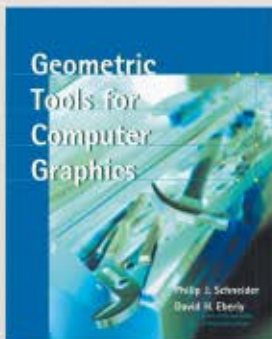
**Complete Maya Programming, Volume II:** An In-depth Guide to 3D Fundamentals, Geometry, and Modeling  
by David A.D. Gould



**Collision Detection in Interactive 3D Environments**  
by Gino van den Bergen



**Essential Mathematics for Games and Interactive Applications**  
by James M. Van Verth and Lars M. Bishop



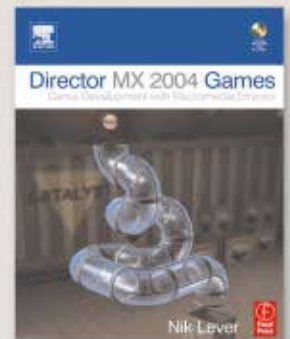
**Geometric Tools for Computer Graphics**  
by Philip J. Schneider and David H. Eberly



**3ds max 7 Fundamentals and Beyond Courseware**  
by Discreet



**FlashMX 2004 Games: Art to ActionScript**  
by Nik Lever



**Director MX 2004 Games: Game Development with Director**  
by Nik Lever

**ORDER FROM ELSEVIER AND RECEIVE A 15% DISCOUNT AND FREE SHIPPING!**

Refer to offer code #80491

**Mail:** Elsevier, Order Fulfillment Department, 11830 Westline Drive, St. Louis, MO 63146

**Phone:** (800) 545-2522 / (314) 453-7010 [Intl.] **Fax:** (800) 535-9935 / (314) 453-7095 [Intl.]

**Web:** [www.mkp.com](http://www.mkp.com) / [www.focalpress.com](http://www.focalpress.com) **Email:** [usbkinfo@elsevier.com](mailto:usbkinfo@elsevier.com)



# THE INNER PRODUCT

## OPTIMIZING PATHFINDING III: INADMISSIBLE HEURISTICS

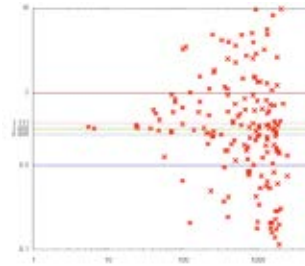
**A\*, A GENERAL-PURPOSE AI SEARCH ALGORITHM,** has become the standard solution to pathfinding in games. Enough has been written about the subject that it's generally assumed to be a solved problem, with nothing more to say. In this series of articles, I'm taking a closer look at the pathfinding problem and the A\* algorithm, and performing a critical analysis of the mechanisms, hopefully exposing flaws in the general industry wisdom and even in published articles on the subject. I'm driving this analysis by trying to solve a practical problem: how to create a pathfinding engine that can process a large number of units (say, 10,000) on a very large map (say, 1,024x1,024 tiles).

In part II of this series (see the January 2005 Inner Product), I began examining inadmissible heuristics in A\* searching. A\* tries to prefer exploration in the direction of the goal using a heuristic estimate of the distance to the goal. If the heuristic does not overestimate the true cost to the goal, A\* is guaranteed to find the optimal solution. If the heuristic is inadmissible, overestimating the true cost, then A\* will visit fewer nodes but may not find the optimal solution.

The risk is that we might end up with path-following agents that look stupid, even if the path length is within some small bounds of optimal. I distinguished two kinds of suboptimality, local and global. Local errors are obvious but we can post-process the path to clean it up; global errors we just have to live with.

### AN INADMISSIBLE SURPRISE

That's where things stood at the end of the January column; I hadn't measured performance and just assumed inadmissible



**FIGURE 1** The ratio of performance between two different path-finding approaches, admissible A\* versus inadmissible A\*, shows huge variation depending on the particular path. The x axis is the total path length for the optimal path.

searches were faster. I figured I needed to implement the post-processing and account for that to keep things fair, especially since naive post-processing is at risk for taking  $O(n^3)$  time, so making it fast might be difficult. When I finally got around to measuring non-post-processed inadmissible A\*, I was quite surprised by the results.

Figure 1 shows the ratio of two implementations' performance for various paths: admissible search time divided by inadmissible search time. For some of the longest paths, the

inadmissible search is 10 times faster than the admissible; but for other equally long paths, it's 10 times slower. The scatter plot indicates some kind of erratic behavior that would be hidden if we examined averages.

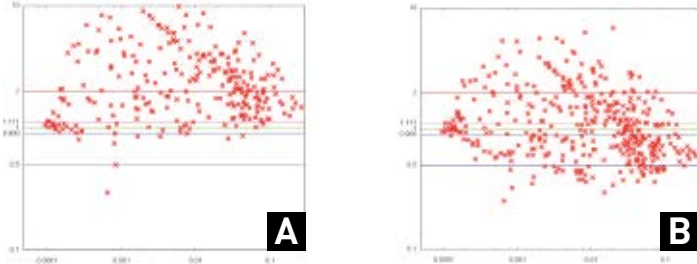
Figure 2 shows one of the paths that performs poorly for an inadmissible search; as the heuristic multiplier increases from  $k=2$  to  $k=3$ , you can see that the search goes even further "the wrong way," and actually ends up exploring more nodes even though the heuristic is "more wrong." The real failure is revealed by the value of  $n$ , which will take some setting up.

Dijkstra's shortest-path algorithm is essentially breadth-first-search extended to allow different edge weights. It relies on a priority queue that gets updated: Sometimes it "adds" a node to the priority queue that's already there and is simply changing its priority, which is its distance from the start node. However, once Dijkstra's algorithm "serves" a node from the queue and investigates its neighbors, that node will never be revisited; Dijkstra's algorithm serves the nodes in the order of their true distance from the start. Thus, it cannot miss shorter paths to them.

A\* search with a heuristic of 0 is identical to Dijkstra's shortest-path algorithm. With any other heuristic, however, A\* will not visit nodes in the order of their true distance from the



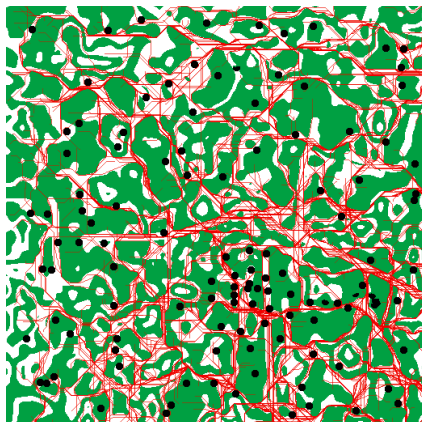
**FIGURE 2** In these three pathfinding solutions to the same problem from a point near the bottom to a point at the top left, each uses the normal admissible heuristic multiplied by some constant  $k$ , and ends up expanding  $n$  nodes. Figure 2A is admissible, where  $k=1$  and  $n=160,000$ . Figure 2B is inadmissible, where  $k=2$  and  $n=80,000$ . Figure 2C is inadmissible, where  $k=3$  and  $n=1,300,000$ .



**FIGURE 3** Performance ratios after fixing inadmissible A\* as described in the text, with a heuristic multiplier of 3 are shown, all using log-log scales. Figure 3A shows performance for inadmissible A\* versus admissible A\*, using the same underlying data structures and algorithms. And Figure 3B shows performance for inadmissible A\* versus admissible A\*, using separately optimized data structures and algorithms. The x axis is seconds.

start. This is a good thing when it results in A\* exploring toward the goal, avoiding exploration of a huge and unnecessary space. But it has a consequence. Sometimes A\* will have to revisit a node that was already served from the priority queue because it eventually found a shorter path to it; in A\* parlance, nodes must sometimes be moved from the Closed list to the Open list. It turns out this will never occur if the heuristic has a certain property (it is “monotonic”). Although my admissible heuristic has this property, I wanted to keep the system general, so I made sure to implement it anyway.

When an inadmissible heuristic is used, A\* is over-encouraged to first search those nodes that are closer (according to the heuristic) to the goal. However, if the chosen route turns out to be entirely blocked, A\* is forced to retreat and expand earlier nodes. It may then find new, shorter paths to the same nodes it explored before, at which point it will revisit them all, finding slightly shorter distances (from the start location), even though they're all blocked in. It may then find them again



**FIGURE 4** One quarter of a new 1,024x1,024 test map and sample paths show green areas that are four times as expensive as white areas.

with slightly smaller weights if it finds yet another slightly faster path. That's what's happening in Figure 2C, which explores 70,000 unique nodes but takes 1,300,000 exploration steps to do so!

My testing reveals that this anomaly occurs regardless of how large the heuristic multiplier is or whether the terrain has varying costs.

### CHANGE A\* FOR INADMISSIBILITY

The problem I described arises because nodes on the Closed list are moved to the Open list. If we simply disallow that case, the problem goes away. Of course, we also lose the improved paths we might find with this mechanism, but this matters little once we're already inadmissible.

Figure 3 shows the results of applying this fix, using an inadmissible weight of  $k=3$  (other weights are similar). Figure 3A shows the ratio of the performance of the inadmissible search to that of the original admissible one, using the same implementation for both. The inadmissible one is almost always better and by a significant amount (more than half the data points are twice as fast). Figure 3B shows the ratio of the performance of the inadmissible search to that of the admissible one, in which each uses an implementation optimized for that approach. The inadmissible heuristic produces priorities that are not monotonically increasing and don't have a predictable range, so it requires the heap implementation. This implementation is about twice as slow for large queues, hence long searches. The result is that the inadmissible heuristic probably speeds up about as many searches as it slows down, but the speed-ups are larger than the slow-downs. However, the worst-case searches (the data points to the right in Figure 3), which take the most time, get slower much more often they get faster.

It appears that inadmissible heuristics aren't helpful for this map, but that doesn't mean they're generally useless. They're stymied by large-scale obstacles with “maze-like” dead ends. However, for a map like that in Figure 4,

with only local obstacles, inadmissible heuristics are much more effective. Using the fixed A\* algorithm (never re-Opening Closed nodes), Figure 5 shows the performance of the inadmissible algorithm for three weights. The  $k=3$  case produces significantly inefficient paths by cutting across “slow” terrain; the  $k=1.5$  seems to offer a better trade-off of quality for time. Table 1 demonstrates this by examining the performance and length of a “canonical” path (from top left to bottom right—the same end points as the canonical path in the November 2004 column) for various degrees of admissibility.

As a final experiment in this direction, I used the map from Figure 4 but let green and white terrain have the same cost. I again allowed putting nodes in the Open list that were already in the Closed list, and I was able to use inadmissible heuristics with no ill consequences. The inadmissible search was usually faster and never slower by more than a factor of two (explainable by the use of the different priority queue implementations). This demonstrates that the two techniques—the correct A\* implementation and the use of

**TABLE 1**

k	REFINEMENT	LENGTH	TIME (ms)
1.0	-	1,686	167
1.5	slow	1,779	36
1.5	fast	1,780	24
1.5	none	1,827	24
3.0	slow	2,416	21
3.0	fast	2,442	10
3.0	none	2,508	9

The table shows the length of the path and time taken to find it for admissible A\* ( $k=1.0$ ) and inadmissible A\* (other  $k$  values) when searching for the canonical path in Figure 4, using various postprocessing refinements. The primary goal of the refinements is not to reduce the total length, but to remove obvious local flaws.



# Perforce SCM.

Piece your global development team together.



Perforce Software Configuration Management brings you and your team together - wherever you happen to work.

[Fast]

You've got developers in Tokyo, Denver and London collaborating on your project. Your UI designer is in Austin and your QA team is in Cupertino. SCM nightmare? No. Just another day's work for Perforce.

[Scalable]

Perforce Proxy, part of Perforce's multi-site solution, brings files to remote users on demand and caches them locally for other users at the same location. Local caching guarantees quick response times for remote users while maintaining real-time access to project activity and status information.

[Distributed]

Unlike replication solutions with their inherent administrative overhead, a Perforce multi-site solution recovers files automatically, reduces the load on the Perforce Server, and requires no remote backups.

Fully integrated into Perforce's client/server architecture, Perforce Proxy requires only TCP/IP connectivity. A single Perforce Server can support any number of Perforce Proxy sites, allowing developers all over the world to collaborate.

**PERFORCE**  
SOFTWARE

Download a free copy of Perforce, no questions asked, from [www.perforce.com](http://www.perforce.com). Free technical support is available throughout your evaluation.

All trademarks used herein are either the trademarks or registered trademarks of their respective owners.

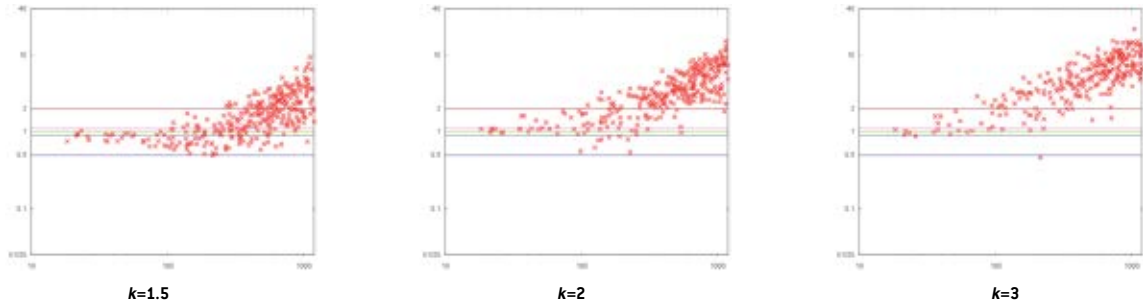


FIGURE 5 Performance ratio of inadmissible A\* to admissible A\* for the paths in Figure 4, for various inadmissibility weights  $k$ .

inadmissible heuristics—are not always incompatible. It depends on the map.

PATH POST-PROCESSING

To prevent agents looking stupid, I want to clean up the local suboptimalities introduced by the inadmissible heuristics. Although use of inadmissible heuristics is frequently mentioned in game programming literature, there is little detailed discussion of this sort of refinement. However, it is closely related to the idea of improving a path made from discrete nodes that approximate a more continuous space. The solution to that problem is to use a “pathcaster”—a routine which scans whether a given straight line “raycast” can be successively traversed by

the pathfinding agent (it must both be open and offer walking support)—and to then test various pairs of nodes in that path and see if they allow a “shortcut” via pathcasting.

Applying this technique literally would require  $O(n^3)$  time. The code would need to consider all  $O(n^2)$  (non-adjacent) pairs of points on the path and then try an  $O(n)$  pathcast between them. But optimal pathfinding is only  $O(n^2)$ ! In fact, for working on our discrete tiles, pathcasting isn’t even an  $O(n)$  operation, as any two points which aren’t in a straight line have multiple straightest paths between them. We could just try one, the Bresenham one, or one which does all diagonal movement before all straight movement, but it would be rather arbitrary.

Fortunately, this complication suggests a way out of the  $O(n^3)$  mess. My algorithm only looks for a shortcut if the two points have a perfectly straight path between them—they must be axially or diagonally aligned. If connecting any two nodes would require an intermediate turn, some other pair of nodes with a straight path between them hopefully will be an equally effective shortcut instead. The code still has to check  $O(n^2)$  pairs, but

most of those pairs won’t be in a straight line from one another and will only consume  $O(1)$  time. I believe that if there are no shortcuts to be found, the pathcaster will visit no more than  $O(n^2)$  nodes total, although I haven’t proved this.

I implemented two variations of this algorithm. The first one is a brute force implementation, referred to as “slow” in Table 1. The initial pathfind builds an array with one entry for each point in the path. A doubly-nested loop compares every point on the path against every other point on the path to see if they’re in a straight line, and if so, pathcasts and checks if the straight-line cost is cheaper. Deleting points from the middle of the path (when creating shortcuts) will be slow since deleting from an array is slow, and the length of the array is the length of the path. Even if a better data structure were available that allowed efficient deletions, it’s also necessary after every refinement to update the costs of all the following nodes in the path, which would still take  $O(n)$  time.

To attempt to avoid the brute force  $O(n^2)$  search and the expensive array updates, I also implemented a method which compresses the paths into a run of steps that are all in the same

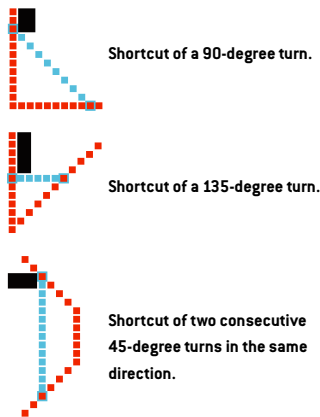


FIGURE 6 The post-processor for compressed paths searches for simple shortcuts that extend across only one or two turns, replacing a section of the original red path with blue. All pairs of points are tested; the best ones are shown.

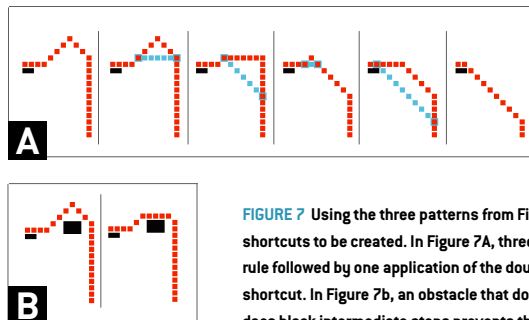


FIGURE 7 Using the three patterns from Figure 6 multiple times allows larger-scale shortcuts to be created. In Figure 7A, three consecutive applications of the 90-degree rule followed by one application of the double-45-degree rule produces the obvious best shortcut. In Figure 7b, an obstacle that doesn’t block the obvious best shortcut but does block intermediate steps prevents this algorithm from finding the best shortcut.

The background of the advertisement is a photograph of an office cubicle. It shows a desk with a computer monitor, keyboard, mouse, and a telephone. A brown office chair is positioned in front of the desk. The cubicle walls are a light beige color, and there are fluorescent lights on the ceiling. An "EXIT" sign is visible on the wall above the desk.

**We loved our homegrown  
defect tracking system...  
until Steve left.**

## **DevTrack 5.6**

**All the power, flexibility, and customization you would design for yourself,  
without the headaches of a homegrown system.**

### **Powerful**

Sophisticated workflow engine  
Auto routing and escalation  
Beta customer Web portal

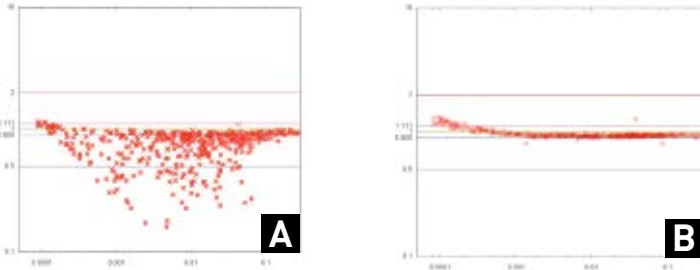
### **Affordable**

Fast deployment  
Customization without reprogramming  
Low cost of ownership

### **Easy to use**

Intuitive user interface  
Point-n-click administration  
Windows and Web client

## THE INNER PRODUCT



**FIGURE 8** Performance ratios of inadmissible searches with post-processed paths versus the inadmissible search without. In 8A, the naive implementation slows down significantly. In 8B, the run-length compressed scheme shown in Figure 6 introduces only a tiny slowdown.

direction (into a set of line segments). Then I used a set of local turning patterns to find places where there might be a shortcut, for example, on either side of a 90-degree turn (see Figure 6). I generated candidate pairs on either side of the turn or turns, and pathcast to see if they are valid shortcuts. Series of such shortcuts will produce more complex shortcuts, as shown in Figure 7. The results are similar to the ones in the non-compressed method, but the candidate pairs are generated directly instead of via an  $O(n^2)$  search, and the array is

much shorter so deletions and cost-updates are much faster. However, this approach can miss some larger scale optimizations, as shown in Figure 7B. This method is labeled “fast” in Table 1.

Figure 8 shows the slowdown from applying each of these refinements to the original (more maze-like) map with inadmissible  $k=3$ . The slowdown from the method using an array element for every path node is large enough to be a bother. The slowdown from the method using run-length compressed paths is quite tolerable—

about 10 percent. Unfortunately, this method still leaves some obvious local errors like those shown in Figure 7B, whereas the slower one doesn't. You might see an improvement if you use the run-length-compressed storage scheme but implement the full-scale all-pairs search on it.

Next month, I'm going to throw a spanner into the works and challenge the idea that A\* is really the right algorithm for 2D pathfinding, and hopefully start laying the groundwork for hierarchical pathfinding. ❖

**Softwrap™**

**Don't Gamble Your Business Away  
Piracy Is Not A Game**

Softwrap offers the complete end-to-end digital rights management solution. Whether you are distributing online or through retail outlets, maximize your revenues by ensuring that your intellectual property remains secure at all times.

- SOFTWRAP™ GO!** - LICENSE THE COMPLETE END-TO-END DIGITAL SALES SOLUTION
- SOFTWRAP™ LIVE!** - SECURE PC SOFTWARE AND GAMES FOR DIGITAL DISTRIBUTION
- SOFTWRAP™ ACTIVE!** - PRODUCT ACTIVATION OF RETAIL TITLES ENSURES MAXIMUM PROTECTION FROM PIRACY

**www.softwrap.com**

Contact Us  
 United States Office: +1 310 258 9480  
 European Office: +44 207 089 4111  
 Email: info@softwrap.com



STEVE THEODORE

## PIXEL PUSHER

# LET THERE BE LIGHT: COLORED LIGHT

### BUZZWORDS LIKE “FRAGMENT

shading” and “per-pixel attenuation” might sound like pure geekery, but they’re going to be critical to effective game art over the next five years. The most important advance in next-generation graphics quality will be a huge leap in quality of lighting. In most contemporary games, lighting is utilitarian at best: It helps players perceive the structure of 3D spaces, provides directional cues, and indicates places of concealment. In far too many games, the lighting doesn’t even reach that basic level. In film and theater, though, it’s universally recognized that lighting isn’t simply about making things visible. Lighting is the instrument that controls the emotional pitch of a scene. For character and environment designs to engage the player’s intellect, the lighting (much like music) must bypass the analytical, and works directly on emotions. If that sounds extreme, play a little game of mental mix-and-match with some familiar visual icons. Try to imagine *Blade Runner* shot under the florescent glaze of a *Star Trek: The Next Generation* set and you’ll start to get the idea.

Now that our lighting technology is finally starting to catch up to other media, it’s time to revisit the fundamentals. A lot of us haven’t worked with sophisticated lighting since we toyed idly with the MentalRay tutorials, so it’s definitely a good idea to look back at the basics. With

so many software packages and game engines to consider, we’ll have to leave the mechanical aspects for another time; this discussion will focus on strategy rather than tactics. If terms like key light and kicker make you scratch your head, you might want to look at Jeremy Birn’s book *Digital Lighting and Rendering* (New Riders Press, 2000). Although Birn’s book has lots of technical detail that’s irrelevant to real-time artists, it’s also well stocked with useful insights into the universals of good lighting. In the meantime, let’s look at how lighting can help establish moods in two ways: through control of color and contrast.

### NEON GENESIS

Obviously, color choice is the most straightforward way to manipulate a player’s emotions with lighting. Colored lights can provoke some emotions among artists too—we all know games that outshine even Las Vegas in their tackiness. The reaction? Some artists swear off colored lights altogether. Neither extreme position is tenable. Subtlety and caution are certainly important, but in the end all light is colored light. Even direct natural sunlight has a distinctive color cast, which can vary a great deal based on the time of day, time of year, location, and weather. Likewise, every kind of artificial light, from a welcoming candle to a sickly fluorescent tube, has a signature tinge. If you own a digital camera, you know how complex and arbitrary the process of white balancing can be. The question, therefore, isn’t whether to use color—it’s how.

The simplest kind of lighting designs work like a kind of coloring book. With strong key lights and appropriate fills, you can “paint” a scene to set a mood. We all know the basics of color association: red for danger, blue for peace, green for life, and so on. It can be very tempting to fall back on these old standbys as a shortcut to an emotion. This approach can work well—deep red emergency lights and inky shadows in the underground bunker might be just what you need to create tension and set the player’s



**FIGURE 1** The cold, clinical lighting aboard the *Death Star* (bottom) creates an understated atmosphere of menace, but the heroes of *Star Wars* are usually lit with warm, approachable tones.

**STEVE THEODORE** started animating on a text-only mainframe renderer and then moved on to work on games such as *HALF-LIFE* and *COUNTER-STRIKE*. He can be reached at [stheodore@gdmag.com](mailto:stheodore@gdmag.com).



**FIGURE 2** In *HALF-LIFE 2*, warm lighting often connotes danger rather than safety and comfort.

nerves tingling. Often, though, dominating color schemes can backfire. One of the important practical functions of good lighting, after all, is to help the characters pop off the screen and capture the player's attention. Your need for contrast between character and environment can easily work against your attempt to set an emotional tone. If your villain is clad in typically villainous purple and green, he's not going to stand out particularly well if the same sickly colors are washing the walls of his lair. Some textures won't stand up to strong colored lighting either. Without careful planning, you might find a colored light reveals an annoying repeat pattern you never noticed in one of your textures, rather like a color-blindness test. So how do you set a mood with color when you also have to provide visual clarity?

## THE KICKER

When theatrical lighting designers need to pop a character out of the "canvas" of the screen or stage, they'll add a complementary rim light or kicker to provide a strong edge highlight. This separates the character from the backdrop without undercutting the color theme.

Many games shy away from overtly theatrical lighting, fearing that players will wonder where that helpful little light is coming from. Audiences rarely notice or care, as long as the final effect makes a positive contribution to the scene. Lighting designers in film and theater seldom, if ever, rely on the actual physical lights on a set to create ambience. Only rarely is the pool of light below the reading lamp or the wash of daylight from the window actually produced by the prop or fixture. Usually there's a battery of theatrical lights just out of sight, providing a carefully stylized suggestion of "real" lighting. You can see

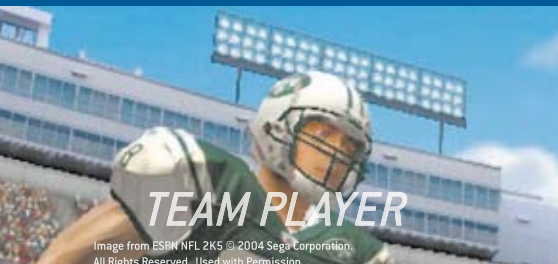
the difference by comparing a typical Hollywood blockbuster with an arthouse film that relies exclusively on real-world lighting. In short, don't be afraid to get the look you need by using whatever collection of hacks and fakes will deliver the goods.

This doesn't mean that there are no rules. You do need to remember that players are free to wander and can easily roam into areas where they can unveil our clever impostures. When lighting an environment, try not to place strong lights that don't have a possible physical source. Softer lights will usually escape scrutiny, particularly if they are colored to simulate radiosity bounces. However, the basic principle remains: Light for the effect you need, and to hell with physics.

## BLOWING HOT AND COLD

Sometimes the overall ambience of your game can be undone by lighting that's

# WHERE BUSINESS GETS FUN



THERE'S **NO BETTER PLACE** TO EXPERIENCE  
THE LATEST PC, ONLINE AND VIDEO GAME PRODUCTS

Conference: **May 17-19**

Exposition: **May 18-20**

Los Angeles Convention Center

E<sup>3</sup> is a trade event - only qualified industry professionals may attend. No one under 18 will be admitted, including infants. This policy is strictly enforced. Visit [www.e3expo.com](http://www.e3expo.com) for registration guidelines.

# SECUREPLAY

## Network Game Development Toolkit

READER'S ONLY COUPON!

**20% Off Our Reg. Price**

COUPON CODE: GAMEDEV0411

20% off Year One Commercial License Prices. Learn more at:

[www.secureplay.com/promos/gamedev.htm](http://www.secureplay.com/promos/gamedev.htm)



One coupon per buyer, single use only. Does not apply to support pricing. Valid through 6/30/05.

FOR ALL TYPES OF GAMES!

## HAVE ANY HOLES



## IN YOUR GAMES?

### SourceCode Libraries

With building blocks for all basic game transactions to speed development.

- C++, Flash, Java & J2ME sold via CD and download with Full Documentation
- Built-In Game Security
- For all types of games, from role-playing & FPS games, to bingo, casual games, lotteries
- Network and Platform independent



1.202.332.5878

Email: [sales\\_team@secureplay.com](mailto:sales_team@secureplay.com)

# STOPS CHEATS

## PIXEL PUSHER

too nakedly theatrical. Many of the best lighting designs are so subtle that you never catch the lighting designer at work. Rather than create strong color washes that hose the scene with a single dominant emotion, you can use the lighting to more subtly underscore the meaning of a scene. Working on a more subliminal level gives you great power over your audience's perceptions and still leaves you free to build a prosaic and realistic look.

The lighting design of the original *Star Wars* is a particularly brilliant example of this. In conventional color terms, you'd expect the imperial sets to be drenched in reds and pooled with ominous shadows.

But instead, the Death Star is lit up like a cross between a dentist's office and a meat locker. It's dominated by fluorescent haze and cool blue accent lights (see Figure 1). The cool colors reflect off the spotless plastic of the stormtroopers and the black vacuum of Darth Vader do perfectly embody the Empire's impersonal, bureaucratic brand of evil.

By contrast, the rebels are always lit warmly; the classic shot that really

establishes Luke Skywalker's character, as he watches the twin suns set on Tatooine, is as pink as the Barbie aisle in your local toy store. The warm/cool opposition is an extremely simple design, but it's absolutely critical for establishing the emotional underpinnings of the story.

The opening levels of *HALF-LIFE 2* use the play of color temperature the opposite way: The player quickly learns to associate the warm colors of sunlight and open space with danger, while the blues and greens of murky sewers and tunnels become indicators of safety and concealment. The very consistent correlation between natural lighting and danger reinforces the player's paranoia and sense of powerlessness. By allowing the bad guys to "own" the daylight, the lighting subliminally underlines the overwhelming menace of the pursuing Combine forces in the early part of the game. (See Figure 2.)

## ILLUMINATING CONTRASTS

Obviously, color choice is only the very beginning of good lighting design. Next month we'll take a look at contrast—the roles that light fall-off, color blending, and shadow definition play in creating an effective lighting scheme. In the meantime, try playing with some of the fancy lighting tools that real-time artists have been denied for the last decade. We game developers like to think of ourselves as fearless pioneers, relentlessly pushing the boundaries of our medium. In fact, though, the last six or seven years have been a very conservative period in the evolution of 3D graphics. The basic feature list for a standard real-time rendering engine—Gouraud shading, colored lighting, light mapping, and so forth—hasn't changed that much since the days of *QUAKE 3* and *HALF-LIFE*.

Our cozy little interlude of technological stability is just about over. It's exciting, but it's also going to be professionally challenging. We'll be handed a bunch of great new toys—pixel shading, dynamic lights, high dynamic range images, to name a few—which inevitably will mean a lot of time spent learning and experimenting with new technologies. But to really get the most out of the new tools, we have to stay focused on the timeless basics: making emotional connections with our audience. All the technology in the world won't ever provide that critical window into the player's subconscious. ❖

## GLOSSARY

**KEY LIGHT.** In a conventional lighting setup, the key light is the major source of light. Typically, the key light stands for the sun, the moon, or the main room lighting. Key lights are frequently positioned at about a 45 degree elevation and 45 degrees to one side of the main subject.

**FILL LIGHT.** Typically, the fill light is positioned about 90 degrees away from the key light, and generally is a complementary color. The fill light is not as strong as the key and is intended to bring the major forms of the subject into relief.

**KICKER OR RIMLIGHT.** In theatrical lighting, a kicker is a positioned behind the subject so that a glancing reflection forms a highlight around the subject's outline. Kickers are usually placed opposite from and lower than the fill light.



# MARK YOUR CALENDAR

SAN  
JOSE  
CA

MAR  
20-24

GDC  
>06

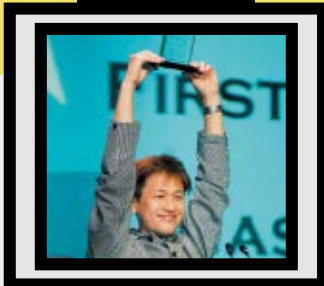
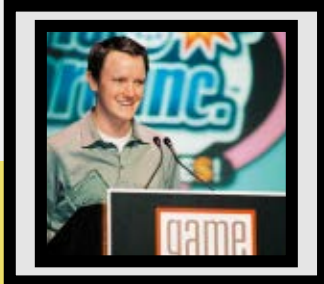
[gdconf.com](http://gdconf.com)

**Game**Developers  
Conference

CONFERENCE: MARCH 20-24, 2006

EXPO: MARCH 22-24, 2006

SAN JOSE, CA • SAN JOSE CONVENTION CENTER



Wednesday,  
March 9, 2005, 6:30 pm  
Moscone West Convention Center  
San Francisco, CA  
All GDC attendees are welcome.

## *You're invited to attend the* 5th Annual Game Developers Choice Awards

*"We've gotten a lot of awards for The Sims but  
THIS AWARD, voted on by the game community,  
IS EASILY THE MOST IMPORTANT IN MY MIND."  
- Will Wright, Maxis*

Transcending consumer fads, the Game Developers Choice Awards feature games and developers that are truly worthy of recognition. The recipients are chosen by those who know the games best—their creators. They honor the industry's most innovative games, and serve as a community voice for the work that developers respect most.

Join us at the 5th Annual Game Developers Choice Awards to celebrate the industry's greatest achievements.

Visit [www.igda.org/awards](http://www.igda.org/awards) to learn more.

Platinum Sponsor:



Gold Sponsor:



Presented by  International game  
developers association



HAL HALPIN

## NECESSARY EVIL

# RATINGS MATTER

### THE WORDS "VIOLENT VIDEO GAMES"

evoke strong emotions both within the industry and among the general public. But understanding the issue is as important to a soccer mom as it is to any professional with a stake in the business. The political pendulum has swung from a content-driven discussion to a ratings-enforcement debate. The matter of violent games is as relevant today as it was eight years ago when the Interactive Entertainment Merchants Association (IEMA) was established. Despite all this discussion, how is it possible that awareness of the facts—the undisputable facts—remains so low? My personal take: We are doing a far better job of explaining the lengths to which we have collectively gone to the general public than we have within our own business.

### INFLUENTIAL MEDIA

The heart of the matter boils neatly down to this: Games are entertainment. They are art. They are science. They are interactive. And they are a new medium.

As entertainment, video and computer games have penetrated the household, the mind share, and the market share of consumers. Games are mass market and relevant. As a profitable enterprise, we have taken what was once viewed with little potential and regarded with substantially-similar reverence as any toy, and turned it into a burgeoning multi-billion business with music and movie tie-ins, licensing, and marketing to boot. It represents a full third of the packaged goods entertainment business, and everyone from Wall Street to Main Street has taken notice.

One of the reasons that we have such extended debates with members of congress, special interest groups, the media, and of late the governor of Illinois is that games are interactive. Players experience things, and they are controlling a character onto which they could, theoretically, project themselves. Like any intelligent discussion involving human anatomy and physiology, this one involves psychologists, psychiatrists, educators, analysts, and a host of other specialists who cumulatively can do little more than agree to disagree. No wonder politicians like this topic so much.

### ADULTS ONLY

Until December 2003, the majority of our members, the leading retailers of games, did not have strong policies and procedures intended to inhibit the sale of Mature-rated games to minors. A few had some procedures, but only a handful of them enforced them well. Retailers who hadn't yet committed to the idea were concerned about preventing customers from buying these products because the customer has a First Amendment right to buy M-rated games. It wasn't, and isn't, illegal to sell them—therefore choosing not to sell them indiscriminately could lead to law suits of several varieties.

In December of 2003 the IEMA retailers announced that they would all, unilaterally, institute carding policies intending to inhibit the sale of violent games to minors. They recognized that they had a social obligation and met that duty head-on, stating that by December 2004 they would double their efforts or institute new policies from scratch. They spent 12 months training staff, changing procedures, moving product assortment, re-labeling displays, and putting up ESRB signs where otherwise there would have been revenue-generating merchandise

displays. The effort was comprehensive, daunting, and significant.

Sting operations performed two full months before our self-imposed deadline showed a dramatic year-on-year reduction, from 50 to 30 percent, in children being able to purchase M-rated games—a statistically significant number because it is the inverse of the DVD business, substantially better than the music industry, and is on-par with movie theatre owners, lauded as the gold standard in the field.

2005 will undoubtedly be a make-or-break year for this issue, as IEMA members continue to improve and the data begins to show that industry self-regulation is working. The problem for developers lies in what may occur before the end of the year. Why should this issue be of concern now more than ever? If retailers can't easily sell your games, they won't. Plain and simple. If some states pass laws that could send their employees off to jail and paying criminal fines in the same way that alcohol, tobacco, and firearms are legislated, it will surely affect all game sales. Washington state tried and failed to pass a law that was so volatile that it might have made some E, many T, and almost all M-rated games illegal to sell to minors.

### RALLYING POINT

Retailers have now done and will continue to do the right thing. Publishers clearly understand the ramifications to their shareholders and companies. Developers need to go forward with their eyes open on this matter. It can no longer be a subject of intra-industry debate. It must now be a rallying point around which we collectively stand together to protect our cumulative rights, businesses, and careers, because the alternative would be disastrous for our industry. ❖

**HAL HALPIN** is the founder and president of the Interactive Entertainment Merchants Association, the electronic game industry's non-profit retail trade association. He resides in Connecticut with his wife and three children. He can be reached at [hhalpin@gdmag.com](mailto:hhalpin@gdmag.com).



ALEXANDER BRANDON

## ✦ AURAL FIXATION

# THE LINE OF QUALITY PART II: LICENSING

### LET'S START WITH WHAT WE KNOW. GAMES

are more than fun one-day projects in this era. There's a lot of work involved in games that's responsible and earnest and absolutely dull. In some cases, the work being done is very controversial within our developmental sanctum, and licensing of game soundtracks is one of them. Many large publishers are incorporating popular music from hundreds of groups into games. Some publishers are also hiring well-known film composers for game soundtracks. The game industry has gone "public," so to speak, along with film and television, and the public expects a certain level of quality outside the circle of hardcore game geeks that take comfort in the beeps and boops of yesteryear.



SSX TRICKY shows that soundtracks can be adaptive, innovative, and still licensed.

### TOO MUCH QUALITY?

Now let's move on to what some of you might not have thought of. Those beeps and boops of yesteryear's arcade games were perfectly aligned with the ancient pixelated 2D images of PAC-MAN and DONKEY KONG. Games were simple pastimes; five minute diversions from reality. These days, does a game score that perfectly matches Howard Shore's *The Lord of the Rings* film soundtrack align with facsimiles of the characters from the film that are only 80 percent accurate?

### THE PROBLEM

What has all this got to do with licensing? When I think of the idea, at times my nostalgic side screams in opposition to licensing in classic partisan style, wanting

all game music to be original, written by game composers that play games and understand games thoroughly, and to be as adaptive and forward-thinking as the games themselves. But wait, how forward thinking is a game based on a movie or a sports title? Then the light bulb clicks on. The reasoning is clear. The plan is brilliant, and the business model a thing of beauty in its simplicity.

### THE LOGIC

Any publisher or game team, big or small, is a shark. It needs to keep moving forward to stay alive. That's a grim metaphor, but it's true, and the game industry is no sheep anymore. It's fierce and competitive. Therefore, the licensed soundtracks we hear in games are, in a way, the best thing that ever happened when it comes to maintaining popularity and profit. Games don't fundamentally change from year to year, except in such cases as KATAMARI DAMACY. What does change is their music, and with the introduction of licensing, the music and soundtrack make up for the lack of progress in other areas. Licensing generates market interest that can roughly be measured, and this measure adds to the profit pot at the end of the day. Let's take a look at some hypothetical techniques that a marketing department might take.

A publisher has a soundtrack for a fighting game containing 20 tracks. The publisher looks at the potential buyers of the game based on other similar titles and any prequels. They then identify bands and groups that have songs that have sold to a minimum number of people, usually in the millions, and then spend anywhere from \$100K to over a million dollars to license these tracks. Once that is done, press releases and interviews reveal the names of the bands and songs in conjunction with the game, generating marginal interest in those

people who might not have even bought the game in the first place. Is this interest measured? It can be in polls, but usually the measure is better taken in response to magazines, online announcements, and most importantly, television. The result is usually a minimum of 10 percent more sales because of the soundtrack, and when the numbers are tallied in development against this 10 percent, in the case of a big EA or Take-Two release, that 10 percent is easily the higher number.

### THE LESSON

Now that we've seen that licensed soundtracks can generate a buzz and higher sales, let's answer this column's main question: What about quality? Do licensed soundtracks enhance the quality of a title? How do we tell? I can tell you that based on initial research on forums and discussion with casual gamers, I have talked to two groups—one that hates licensed music and one that likes it, depending on the music, and the latter group commands a big majority. This is an era in which licensed music is a tool the way an orchestra or a synthesizer is a tool. Use the right tool for the right job. Take SSX TRICKY. Not only did it use licensed soundtracks, but it also used them adaptively and yielded the best example of pop music being woven into game design ever.

I'll end this column by saying SSX TRICKY set an example that isn't being done enough. Being able to select licensed music in a game might as well be an MP3 player sitting at your side. It isn't part of the game, but publishers can make it part of the game. They can make soundtracks go from radio airplay into something that radio listeners would rather hear. "I liked the NFL 2006 version of that Korn song better 'cause it went BAM! when I tackled McNabb." ✦

ALEXANDER BRANDON has been involved with game audio since 1994 and is currently the audio manager at Midway in San Diego, Calif. You can e-mail him at [abrandon@gdmag.com](mailto:abrandon@gdmag.com).



INDEPENDENT  
GAMES FESTIVAL

Rewarding Innovation in Independent Games

# Play the Best

## Independent Games of the Year

# at the 7th Annual Independent Game Festival!

March 9-11, 2005 • Moscone West Convention Center • San Francisco, CA



**Visit the IGF Pavilion on the 2nd floor**

**Attend the IGF Awards on  
Wednesday, March 9th at 6:30 pm**

**All GDC Attendees Welcome**

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



Platinum Sponsor:



Gold Sponsors:



Media Sponsors:





NOAH FALSTEIN

## GAME SHUI

# IN THE BEGINNING

### IT HAS BEEN NEARLY 150 YEARS SINCE

Charles Darwin first published *The Origin of Species*, sparking a revolution in the way people look at the development of all living things. Evolution is a great framework to use literally when thinking about basic game design rules and metaphorically in understanding business principles in this ever-changing industry. As a veritable game industry dinosaur myself, I can vouch for the usefulness of the evolutionary perspective in understanding games.

For a game designer, it pays off to understand the motivations and psychology of game players. All the most popular games relate directly to our drives for survival and reproduction, and often are easily linked to our hunter-gatherer ancestors and their social interactions. A sound understanding of why people evolved to enjoy games is as useful to a game designer as music theory is to a composer.

### GENES TO CODE TO MEMES

The basic principles of evolution apply to any medium with replicating information, including computers. That's one reason we have computer viruses and mutations (bugs) getting into the genome (game program). Designers like Shigeru Miyamoto, Will Wright, and Dani Bunten have found that convincing AI for characters can be modeled by using the evolutionary biology concept of a fitness landscape, giving them simple behaviors, and letting emergent complexity make them seem realistic.

Even more intriguing is the surprising

link between ideas and genes. An idea can be copied from mind to mind, spreading by word of mouth or the media, and mutating—and evolving—as it spreads. Understanding these “ideas as genes” (termed “memes” by noted biologist Richard Dawkins), can shed light on the way popular interface choices in games spread among game developers. The principles of evolution from nature don't work exactly the same way in the computer or the brain, but they're a good place to start.

### EVOLUTION OF AN INDUSTRY

Evolutionary principles also help us understand ways that games change over time. The coin-op arcade business in the 1980s may have been the most fiercely Darwinian game environment in history. New games appeared and thrived, or died in a matter of months if they didn't have ample sustenance (quarters). After great early diversity, arcade games converged on a few successful formulas that ate up all those quarters and starved later games that didn't follow the formulas. It's particularly enlightening to look at specific lineages, as when the basic qualities of *SPACE INVADERS* were improved and expanded in *GALAXIAN*, which in turn gave way to *GALAGA*. Namco's shooter was such an efficient and fun implementation of the “shoot descending aliens” family that it survives in some arcades today, 20 years later, an alligator remaining essentially unchanged since the time of dinosaurs.

A modern example of a similarly turbulent environment for games is the mobile phone market, fragmented by country, mobile carrier, network technology, and the individual phone capabilities. In nature, this corresponds to the challenges of species survival in a fragmented and rapidly changing ecological niche. Such conditions favor small, adaptable species that can migrate rapidly from dying or stagnant areas to better climes. The more successful



Even digitized apes evolve eventually—Nintendo's *DONKEY KONG 64*.

games on phones also exhibit such portability and relative lack of complexity. Contrast that with the huge games on the more stable ecologies of an established platform like the PC, where a game like *GRAND THEFT AUTO* or *FINAL FANTASY* can evolve over multiple generations and build on a large installed base of machines. In natural evolution, successful adaptations like eyes have appeared independently many different times—spider eyes, squid eyes, and human eyes for example. We see this in a more purposeful and intentional way in that a successful game innovation like the sandbox play of *GRAND THEFT AUTO* gets replicated throughout the game industry.

Finally, the game industry itself is often a metaphor for the evolutionary process. Companies grow and swallow other companies; newer and smaller offspring find their own path to success or fade into history, and only the ones who adapt survive.

If I have succeeded in tempting you to learn more about evolutionary principles and brain function, there are many sources of more information to pursue. I would recommend reading *The Selfish Gene* by Richard Dawkins (Oxford University Press, 1976) as a starting point, followed by *How the Mind Works* by Steven Pinker (W.W. Norton & Co., 1997). They might even help you survive the game industry's next extinction event. ❖

For a related article by Noah Falstein, read “Natural Funativity” on [Gamasutra.com](http://Gamasutra.com) at [www.gamasutra.com/features/20041110/falstein\\_01.shtml](http://www.gamasutra.com/features/20041110/falstein_01.shtml).

**NOAH FALSTEIN** is a 25-year veteran of the game industry. 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).

*The next movement in games,  
from Tokyo to the world*

World's Largest Game and Entertainment Event

# TOKYO **GAME SHOW** 2005

September 16 (Friday) ▶ 18 (Sunday), 2005

Business Day \_\_\_ Sept. 16    Open to the Public \_\_\_ Sept. 17, 18

Venue \_\_\_ Nippon Convention Center (Makuhari Messe)

TGS 2005 will attract not only Japanese game business-related people and the press but also many visitors from other Asian and Western countries. In addition to game consoles and packaged software, various platforms will be exhibited, including online games and mobile-phone games.

---

## *Join and visit the "Development Tools and Middleware Area" at Tokyo Game Show 2005!*

This special area is for the vendors of development tools and middleware to address the growing need for information on these products. Please visit our website for information.

---



For further information please visit <http://tgs.cesa.or.jp/english/>  
E-mail: [tgs@asia-ad.com](mailto:tgs@asia-ad.com)





# LOOKING FOR A GREAT JOB?

## LET THE GAMES BEGIN.

Are you an artist? Designer? Producer? Activision has an incredible array of opportunities available for virtually every creative discipline. So whether you like to animate, produce or sell (and anything in between), we're ready to talk to you about some of the most sought after jobs in the marketplace – Activision jobs.

- Animators
- 2D/3D Artists
- Art Directors
- Game Designers
- Modelers
- Producers
- Programmers
- Scripters
- Sound Engineers
- Creative Services
- Finance
- IT
- Legal/Business Affairs
- Licensing/Business Development
- Marketing
- Sales

TO APPLY FOR ANY POSITION, VISIT  
WWW.ACTIVISION.COM (GO TO: "CAREERS")

VISIT US AT THE GDC  
BOOTH 460



# CARDS

» NOW HIRING PEOPLE WITH TECHNICAL AND ARTISTIC VISION

[rainbowstudios.com](http://rainbowstudios.com)

[relic.com](http://relic.com)

[volition-inc.com](http://volition-inc.com)

[crankypantsgames.com](http://crankypantsgames.com)

[heavy-iron.com](http://heavy-iron.com)

[helix.com](http://helix.com)

[pcpandl.com](http://pcpandl.com)

[concretegames.com](http://concretegames.com)

[thq.com](http://thq.com)

[bluetongue.com](http://bluetongue.com)



rainbow  
STUDIOS



volition inc.



HEAVY IRON  
STUDIOS



studio australia

bluetongue.



THQ, Rainbow Studios, Relic, Entertainment, Volition, Inc., Cranky Pants Games, Heavy Iron Studios, Helix, Pacific Coast Power & Light Co., Concrete Games, THQ Studio Australia, Blue Tongue and their respective logos are trademarks and/or registered trademarks of THQ Inc. and/or their respective owners. All rights reserved.



# WELCOME TO THE FUTURE

*Factor 5, developers of the multi-million selling Star Wars®: Rogue Squadron™ series, the classic Turricon® games, and award winning MusyX™ technology are looking for top core team talent. Come join us in sunny San Rafael, California as we develop our next-generation technologies and original games for the leading console manufacturer.*

**Engine Programmer**  
**Tools Programmer**  
**Senior Game Programmer**  
**Game Programmer**  
**Runtime Audio Programmer**

**Art Technical Director**  
**Character Setup Artist**

# FACTOR

[jobs@factor5.com](mailto:jobs@factor5.com)

<http://www.factor5.com>



## KEEP IT UNDER WRAPS!!

Iron Lore Entertainment, founded by Brian Sullivan (co-creator of the award winning and best selling Age of Empires® series of games), is developing blockbuster games that expertly blend the best of action, RPG and adventure genres.

We are a premier studio with a fun and focused environment, committed to developing highly successful, next generation games.

We are actively pursuing a Senior Artist, Texture Artist, Senior Designer, Designer, Engine Programmer, Tools Programmer, and an Associate Producer.

[jobs@ironlore.com](mailto:jobs@ironlore.com)

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

# IRONLORE™



**Rockstar Games is actively seeking experts in the following fields:**



■ **Rockstar Vancouver**

Art Director  
Sr. AI Programmer  
Sr. Character Artist

■ **Rockstar San Diego**

Sr. 3D Graphics Programmer  
Sr. Network Programmer  
Sr. Character Artist  
Sr. Maya Technical Artist

■ **Rockstar Vienna**

Sr. PS2 Programmer  
Sr. 3D Graphics Programmer  
Sr. AI Programmer  
Sr. 3DS Max Technical Artist

■ **Rockstar Toronto**

no current openings

■ **Rockstar Leeds**

no current openings

■ **Rockstar NYC**

no current openings

**Rockstar Games**

622 Broadway, New York, NY 10012

Att: Recruiting

Email: [resumes@rockstargames.com](mailto:resumes@rockstargames.com)

Fax: 212-334-6644

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

Please indicate the studio and position you are applying for in the subject heading.





Get in on something **BIG!**  
 We are going to revolutionize  
 the home entertainment market.



The PlayStation®2 computer entertainment system and the soon to be released PlayStation®Portable (PSP™), a three-dimensional-CG game is set to revolutionize the home entertainment market, offering the most compelling interactive content and the capability to be used as a network terminal in the coming broadband era.

To ensure that we meet that goal, we are currently looking for talented, seasoned, and experienced professionals for the following areas:

**R&D • Tools/Technology • Game Development  
 Sales/Marketing • Merchandising**

At SCEA, we offer exceptional employee benefits, an open and creative working environment, and the opportunity to be part of something **BIG!**

We want to help you understand all the reasons why joining us is not only the right choice, it's the smartest decision you could make.

Visit us at GDC in the Career Pavillion, Booth # 448 and see for yourself why it is hard to beat **SCEA's** innovative philosophies.

**Sony Computer Entertainment America Inc.**  
 Foster City • San Diego • Santa Monica  
 Bend, Oregon • Salt Lake City, Utah  
 hr\_staffing@playstation.sony.com



We are an equal opportunity employer.

\*PlayStation® and the "PS" Family logo and "UMD" are registered trademarks of Sony Computer Entertainment Inc. \*PSP™ is a trademark of Sony Computer Entertainment Inc.

Recognized as the undisputed industry leader, Sony Computer Entertainment America Inc. (SCEA) markets the PlayStation® family of products and develops, publishes, markets, and distributes software for the PlayStation®2 computer entertainment system for the North American market.

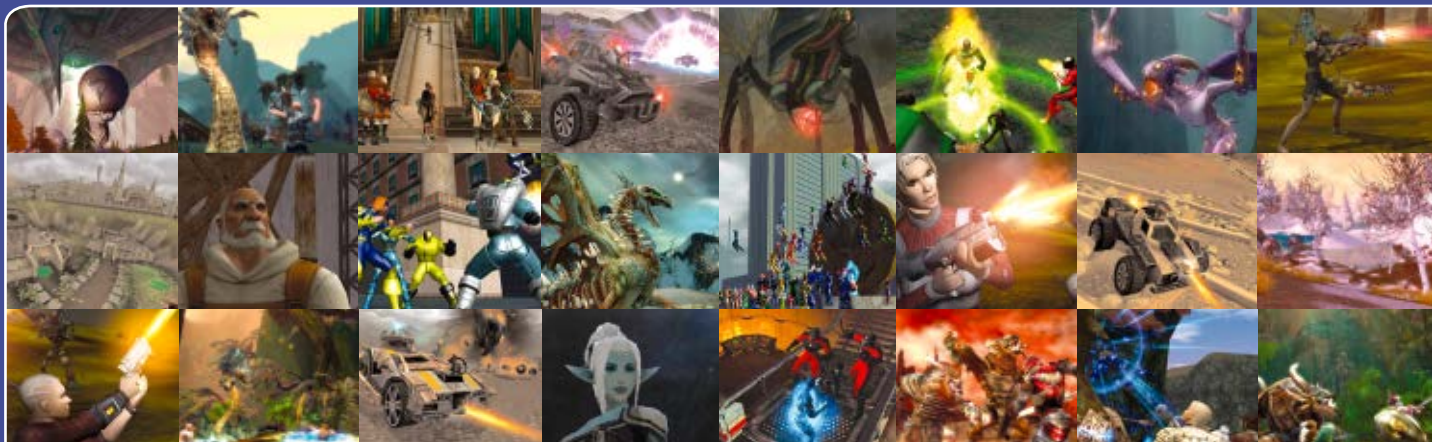


Dragons, road rage and intergalactic warfare.  
 Just another day at the office.

Be a part of the MMO action, see our current openings at [www.PlayNC.com](http://www.PlayNC.com)



**NCSOFT®**





**WE ARE LOOKING FOR  
EXCEPTIONAL ARTISTS,  
DESIGNERS, PROGRAMMERS  
AND PRODUCERS!**

**We Have Studios In:  
Seattle • Los Angeles  
San Diego • Austin • Chicago**

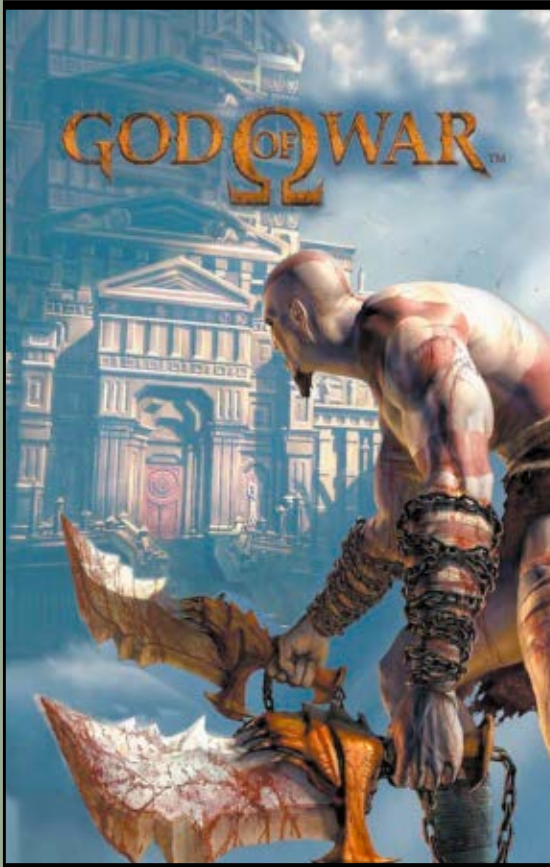
*Midway Games Inc. is a leading developer, publisher and marketer of interactive entertainment software. Midway videogames are available for play on all major videogame platforms.*

*Midway has designed some of the most popular videogames of all time. Since the beginning of the video game revolution, many of the most notable, best-selling videogames for both the arcade and home game systems have come from Midway.*

**For more information  
or to apply online go to:**

**[www.midway.com](http://www.midway.com)**

*Visit us in Booth CP359 During GDC*



WE ARE  
HUNTING FOR THE NEXT  
FOR THE GAME GODS



**SCEA Santa Monica Studios**, developer of *God of War™* is looking for Full-time and Contract professionals to work on it's next console game.

- Associate Producer • Lead Programmer**
- Environment Artists • Game Designers**
- Level Designers • Design Manager**
- Lead Artists • Character Artists**
- Cinematic Animators/Artists**
- Camera Designer/Implementer**

All positions require candidates to have working experience in developing games for the **PlayStation®**, **GameCube®**, **Xbox®** or **PC**.

At **SCEA Santa Monica Studios**, we offer exceptional benefits including **medical, 401(k) with match of up to 4%**, an **annual bonus program** as well as an open and creative working environment.

To learn more about these exciting positions, visit us at **GDC in the Career Pavillion, Booth 448**

Email resume, indicating position of interest, to:  
**JoinGOW@playstation.sony.com**  
Submit "SCEA-SM" in the subject line.



[www.godofwar-thegame.com](http://www.godofwar-thegame.com)

God of War™ 2005 SCEA Santa Monica Studios. "PlayStation" and the "PS" Family logo are registered trademarks of Sony Computer Entertainment Inc. "GameCube" is a registered trademark of Nintendo. "Xbox" is a registered trademark of Microsoft Corporation.

EQUAL OPPORTUNITY EMPLOYER



## Get into the game—teach.

The Savannah College of Art and Design is currently seeking candidates for full-time faculty positions in the School of Film and Digital Media in the areas of game programming and game art.

To learn more about the positions, requirements and the college, please visit our Web site at [www.scad.edu](http://www.scad.edu).

Also visit us at the 2005 Game Developers Conference.

The Savannah College of Art and Design exists to prepare talented students for careers in the visual and performing arts, design, the building arts, and the history of art and architecture. The college emphasizes learning through individual attention in a positively oriented environment.

Car: Visen Brnicevic, Umag, Croatia; Beast: Matt Browning, Tallahassee, Fla.; Character: Aaron Adams, Collegedale, Tenn.; Background image: Stephanie Waugh, Batesville, Ark. Students in the School of Film and Digital Media

## Savannah College of Art and Design

ATLANTA · LACOSTE · SAVANNAH

[www.scad.edu](http://www.scad.edu)

912.525.5532 · [scadhr@scad.edu](mailto:scadhr@scad.edu)



# GET IN THE GAME™

ELECTRONIC ARTS IS LOOKING FOR CREATIVE TALENT TO **JOIN OUR AWARD-WINNING TEAM!**

**THE WORLD'S NUMBER ONE INTERACTIVE ENTERTAINMENT COMPANY** is hiring for a wide range of positions. Electronic Arts (EA) develops, publishes, and distributes software worldwide for video game systems, personal computers, and the Internet. Our world-class studios create massively popular products that we market under the EA SPORTS, EA GAMES, and EA SPORTS BIG brands. EA remains committed to hiring and retaining the industry's best talent. Get in the game, and help us shape the future of entertainment.

**POSITIONS AVAILABLE IN:**

- Art
- Audio
- Distribution
- Engineering
- Finance
- Game Design
- Game Testing
- Human Resources
- IT
- Marketing
- Production
- Sales

**LOCATIONS:**

- Asia
- Chicago
- Japan
- Los Angeles
- Louisville
- Orlando
- San Francisco Bay Area
- Montreal
- UK
- Vancouver

**Great People Make Great Games!**

VISIT US AT:

**jobs.ea.com**





Programmers ♦ Artists ♦ Designers ♦ Producers  
Apply Today at: [www.neversoft.com](http://www.neversoft.com), or check us out at GDC 2005

NEVERSOFT



# ATARI

Are you the team's *most valuable player*?  
Are you at the *top of your field*?  
Do you yearn to make games *that the world will pay attention to*?

If you've got the *drive*, the *passion* and *world-class skills*  
- you need to be at **ATARI**.

Atari, Inc., has been at the forefront of video game development since Day One, with a recipe for success that relies on gifted, motivated, veteran leadership.

Atari is searching for top-notch developers looking to contribute their unique skills to the gaming world's next blockbuster projects. Atari has open positions in offices worldwide, in the following disciplines:

- Special FX Artists
- Environment/Level Artists
- Level Designers
- Sr. Programmers
- AI Programmer
- Physics Programmer
- Graphics Programmer
- Producers (all levels)
- Test Plan Coordinator
- QA Testers (temporary)

Atari offers an unparalleled, creative environment that will challenge you and push your talents to the limit. You'll enjoy a competitive salary, bonus plans and plush, custom-designed offices in vibrant communities.

For complete information and confidential inquiries, visit [www.atari.com](http://www.atari.com).

**ATARI**™

UP YOUR GAME...

the collective

JOIN OUR TEAM.

PASSION  
EXPERTISE  
TALENT  
VISION

www.collectivestudios.com  
jobs@collectivestudios.com  
The Collective, Inc.  
1900 Quail Street  
Newport Beach, CA 92660 USA  
Equal Opportunity Employer

## Join the crew at Flagship Studios



As a creator of innovative entertainment software with developers renowned within the gaming industry, Flagship Studios is focused on crafting games that set new standards. Located in San Francisco's South Beach neighborhood, we offer a creative and rewarding working environment that is dedicated to making the best games possible.

Current positions open within the company include:  
Network Programmer      Game Programmer  
Character Modeler        Character Animator  
Texture/Concept/UI Artist    Director of Worldwide Marketing



For details on submitting resumes and portfolios, please visit the JOBS section of our website at [www.flagshipstudios.com](http://www.flagshipstudios.com) or email us at [jobs@flagshipstudios.com](mailto:jobs@flagshipstudios.com)

# HEROES WANTED!

3D ARTISTS  
LEVEL DESIGNERS  
FX ARTISTS  
ANIMATORS



PROGRAMMERS  
I.T. TECHNICIANS  
STORY WRITERS

FOR DETAILS GO TO  
[WWW.CRYPTICSTUDIOS.COM](http://WWW.CRYPTICSTUDIOS.COM)

WANT TO MAKE AAA GAMES  
AND LIVE IN ASIA'S "HOTTEST" CITY?

**UBISOFT SHANGHAI STUDIO**   
IS LOOKING FOR

**Sr Level Designer**  
**Sr Online Game Designer**  
**Sr AI Engineer**  
**Sr Sound Engineer**  
**Sr 2D Artist**  
**Sr Animator**

**Chic, edgy, and futuristic,**

Shanghai is home to trend-setters and visionaries, shaping the future in Asia's hottest city.

We're looking for highly talented, passionate, adventurous, driven and creative professionals to work hard and have fun making original creations for next generation consoles. Competitive compensation, bonus plan, relocation package, travel allowance and housing allowance offered to qualified candidates.

We provide all necessary travel and visa documentation and services.

**Ubisoft Shanghai Studio**

- Since June 1997, we've produced over 20 games on nearly every platform.
- Games developed for Ubisoft's leading franchises, including Ghost Recon, Splinter Cell, Rainbow Six, Rayman, and more.
- Over 270 talents and growing.
- Now working on next generation consoles: next Splinter Cell and creating a new brand for Ubisoft.

For more info please visit  
[www.ubisoftgroup.com](http://www.ubisoftgroup.com)  
Please send your resume to  
[recruitment@ubisoft.com.cn](mailto:recruitment@ubisoft.com.cn)

COME TO SEE US ON BOOTH CP247 AT GDC



**UBISOFT™**

# MAJOR PLAYERS WANTED

Blizzard Entertainment is growing and we have more openings than ever before! Check out these new positions:\*

## BLIZZARD NORTH

*San Mateo, CA*

Lead Game Designer  
2D Interface Artist  
3D Character Animator  
3D Character Artist  
3D Background Artist  
Game Programmer  
Environmental Technical Artist

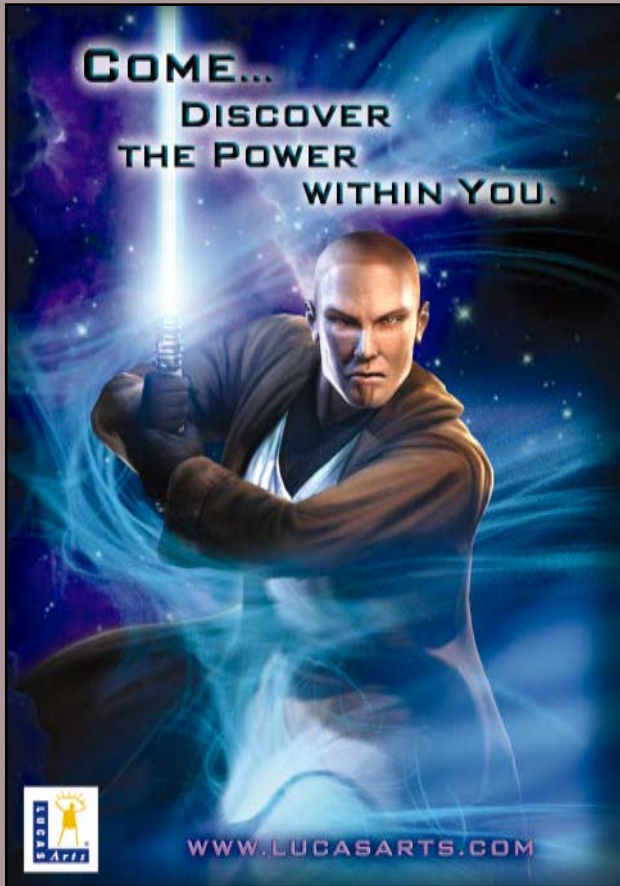
## BLIZZARD ENTERTAINMENT

*Irvine, CA*

Audio Manager  
Senior Producer  
Network Operations Manager  
Oracle Database Administrator  
Senior Server Programmer  
Senior Tools Programmer  
International In-game Support Lead  
Cinematic Animator  
Cinematic Modeler  
Cinematic Tools Programmer  
Business Development Associate  
Web Designer  
Game Designer  
BONS Technician  
Network Administrator  
Public Relations Assistant  
Server Programmer  
Audio Programmer  
Game Programmer  
Tools Programmer  
Senior Graphics Programmer  
Technical Support Representative  
Account Services Representative  
Lead Game Master  
Game Master  
Quality Assurance Assistant Manager  
Compatibility Assistant Manager  
Foreign Language Game Tester  
Game Tester

For more information and how to apply,  
please see <http://www.blizzard.com/jobopp>

\*Reps from Blizzard Entertainment Irvine and Blizzard North  
will be recruiting at the GDC Career Pavilion in booth #CP 466.



The Award-Winning Developers  
of Metroid Prime and  
Metroid Prime 2: Echoes

**RETRO**  
STUDIOS

Recruiting Professional Talent  
Skilled In The Areas Of:

**Storyboarding**  
(Cinematic Experience Required)

**Level Design**  
(3+ Years Experience Required)

**Animation**  
(Cinematic Experience Required)

For More Information:  
[www.retrostudios.com](http://www.retrostudios.com)  
[www.nintendo.com](http://www.nintendo.com)

The Galactic Federation Wants You

SCANNING FOR  
NEW TALENT

SOFTWARE ENGINEERS  
NETWORK TOOLS

ARTISTS  
ENVIRONMENT  
CHARACTER

GAME DESIGNERS

LEAD DESIGNER

AUDIO LEAD

REPORT IMMEDIATELY TO:  
[JOBS@DAY1STUDIOS.COM](mailto:JOBS@DAY1STUDIOS.COM)  
[DAY1STUDIOS.COM](http://DAY1STUDIOS.COM)

DAY 1 STUDIOS

3D Model By Ex'pression Student Paul Nguyen



# SOME PEOPLE WERE BORN FOR THIS.

## THE DIGITAL VISUAL MEDIA DEGREE FROM EX'PRESSION

**Ex'pression College  
For Digital Arts**  
Emeryville, CA  
(San Francisco Bay)  
**877.833.8800**

Some are slaves to tradition. But you? You see things a little, well, differently. Maybe you ought to check out the Digital Visual Media degree program from Ex'pression College for Digital Arts. You'll have 24/7 access to professional grade equipment. You'll learn 3D animation and visual effects for TV and movies, film and video games. And you can earn a Bachelor's degree in about 2 1/2 years. Curious? Visit [expression.edu](http://expression.edu) for more details.

## BUILD THE NEXT ELDER SCROLLS® AND FALLOUT® GAMES

Game Programmer

Producer

World Artist

Character Artist

Sound Engineer

Special FX Artist

Concept Artist

Public Relations/  
Marketing Manager

For more info or to apply online  
visit [www.bethsoft.com](http://www.bethsoft.com) or e-mail your  
resume to [advjobs@bethsoft.com](mailto:advjobs@bethsoft.com)





**GRAPHIC DESIGN '04 GRADUATE - TREVOR DAWSON**  
**GRAPHIC DESIGNER | LEVI STRAUSS & CO.**

**"SOME SCHOOLS ARE PURELY TECHNICAL AND SOME ARE PURELY CONCEPTUAL. I LIKE TO THINK OF THE ART INSTITUTE OF CALIFORNIA-SAN FRANCISCO AS THE HYBRID OF BOTH AREAS."**



**MEDIA ARTS & ANIMATION '03 GRADUATE - HUY DINH**  
**BACKGROUND ARTIST | ELECTRONIC ARTS**

**"AT THE ART INSTITUTE, I LEARNED NOT ONLY TO REFINE MY SKILL, BUT I ALSO LEARNED A LOT ABOUT MYSELF, MY WEAKNESSES, AND MY STRENGTHS AS A PERSON."**

# EVOLVE



**The Art Institute  
of California™ - Los Angeles**  
2900 31st Street  
Santa Monica, CA 90405



**The Art Institute  
of California™ - Orange County**  
3601 W Sunflower Avenue  
Santa Ana, CA 92704

**Media Arts & Animation (BS) | Game Art & Design**  
For more information on hiring our graduates, contact Donna Dessart, Director of Career Services  
[www.aica.artinstitutes.edu](http://www.aica.artinstitutes.edu)

BS=Bachelor of Science. Not all programs offered at all locations. Financial aid available to those who qualify. Individualized job search assistance. Student artwork- Chrome Lady: Shiew Yeu Loh. The Art Institute of California-Orange County | Evolve ad layout by: Kellie LaForest. The Art Institute of Phoenix - 2005





**ADVERTISING '01 GRADUATE - AMAR JOSEPH**  
**ART DIRECTOR | MACROMEDIA**  
 "ARTISTS MUST TAKE CRITICISM WELL,  
 LEAVE YOUR ATTITUDE AT THE DOOR AND  
 ADMIT THAT YOU DON'T KNOW EVERYTHING."



**MULTIMEDIA & WEB DESIGN '03 GRADUATE - MARIANA RAMIREZ**  
**GRAPHIC ARTIST | WARNER BROTHERS TELEPICTURES**  
 "THE ENTERTAINMENT INDUSTRY IS VERY FAST-PACED  
 AND THE MORE FLEXIBLE YOU ARE THE BETTER CHANCES  
 YOU HAVE. HAVE CONFIDENCE IN YOURSELF & IN YOUR  
 WORK AND NEVER GIVE UP."



**Stop by and visit us at our booth #823**



**The Art Institute  
of California™ - San Diego**

7650 Mission Valley Road  
San Diego, CA 92108



**The Art Institute  
of California™ - San Francisco**

1170 Market Street  
San Francisco, CA 94102

**Design (BS) | Visual & Game Programming (BS)**

Career Services, at The Art Institute of California-San Francisco at 1-888-493-3261  
**1-800-617-7581**

The Art Institute of California-San Francisco | Warrior: Matthew Lee, The Art Institute of California-Orange County | Release: Wayne Yeh, The Art Institute of California-Orange County | Happy: Ryan Deslier.

# create YOUR WORLD

CERTIFICATE PROGRAMS IN:

Game Art & Design

3-D Animation

Visual Effects

Intensive nine-month programs for the skills and tools you need to turn your ideas into reality. Financial assistance and career services available. **Apply now.**

[ Contact us at 800.802.2342 or [www.digitalimagingarts.com](http://www.digitalimagingarts.com) ]

dia

BOSTON  
UNIVERSITY

The Center for Digital Imaging Arts  
at Boston University

How bad do you wanna  
get good?



Depends on your game plan.

 Collins College > A School of Design & Technology  
Main Campus - Tempe, Arizona > West Campus - Phoenix, Arizona

Add a new dimension to your life. >> Earn a B.A. in Game Design

Your education can take you from game research and planning to content development, character development and storytelling – all the way through level design, modeling, programming and project management. After exploring game essentials like C++®, Java™, 3ds max® and AI (artificial intelligence), you could be prepared to make your quest-driven concept a game reality. And you can have a reel to prove it.

CALL NOW FOR INFORMATION **1-888-356-7777**  
[www.CollinsCollege.edu](http://www.CollinsCollege.edu)

Find out more about us at the Game Developer's Conference and Expo, March 9 - 11th, booth #665.

Collins College is accredited by the Accrediting Commission of Career Schools and Colleges of Technology (ACCSC). Financial Aid is available for those who qualify. Career Placement Assistance. Collins College West is a satellite campus of Collins College. Not all programs available at all locations.

by Rick O'Connor





ACADEMY *of* ART UNIVERSITY

FOUNDED IN SAN FRANCISCO 1929



## SCHOOL OF ANIMATION & VISUAL EFFECTS

Courses offered in: 2D & 3D ANIMATION | 3D MODELING | COMPUTER GRAPHICS  
FILMMAKING | GAME DESIGN | NEW MEDIA | VISUAL EFFECTS | WEB DESIGN

**REGISTER NOW FOR SUMMER & FALL SEMESTERS**

AA | BFA | MFA DEGREES | PERSONAL ENRICHMENT | ONLINE COURSES

80% OVERALL | JOB PLACEMENT UPON GRADUATION

**1.800.544.ARTS | WWW.ACADEMYART.EDU**

79 NEW MONTGOMERY ST., SAN FRANCISCO, CA 94105

NATIONALLY ACCREDITED BY ACICS, NASAD & FIDER (BFA-IAD)

ARTWORK BY KAMPOL LEELAPORN, AAU STUDENT

# TAKE CONTROL OF THE GAME

## *Computer and Video Game Developer Certificate*

Learn to develop and manage game environments and visualization applications. Marist College's 100% online Computer and Video Game Developer Certificate teaches the techniques and engineering principles behind today's high-end videogame technology



### *Learn :*

- > C/C++ Programming for Games
- > Mathematics for Game Developers
- > 3D Graphics Programming with DirectX and OpenGL
- > 3D Engine Programming
- > Artificial Intelligence

# MARIST

[www.marist.edu/gce/gaming](http://www.marist.edu/gce/gaming) | 888-877-7900 | [gaming@marist.edu](mailto:gaming@marist.edu)

**“Without  
guys like me,  
you’d still be  
playing Pong.”**

—Mark Hartlieb  
*B.A. in Game Design  
Class of 2005*



*Available online  
or on-campus.*

**GAME DESIGN**

VIDEO PRODUCTION

DIGITAL ANIMATION

NETWORK SECURITY

ARTIFICIAL LIFE

SOFTWARE ENGINEERING

MULTIMEDIA

TECHNOLOGY MANAGEMENT

WEB DESIGN

GAME PROGRAMMING



[www.uat.edu](http://www.uat.edu) or 800.658.5744

# Carnegie Mellon

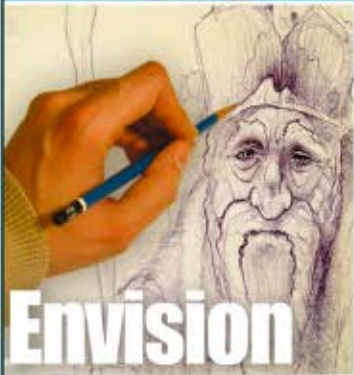
## Entertainment Technology Center

Founded in 1999

The Master of Entertainment Technology Degree (MET)  
prepares students to be leaders in the Entertainment Industry.

[www.etc.cmu.edu/joinus](http://www.etc.cmu.edu/joinus)

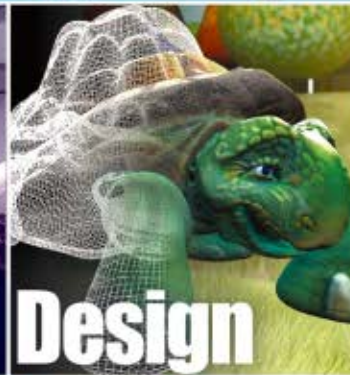
### Bringing Artists & Technologists Together To...



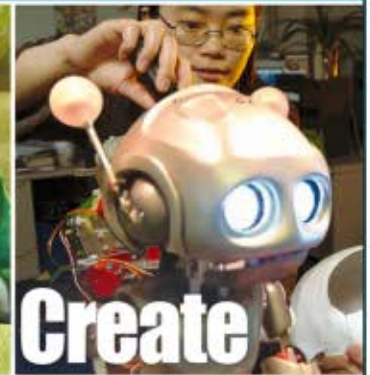
**Envision**



**Explore**



**Design**



**Create**

## A Masters Program for the Left and Right Brain

Carnegie Mellon's ETC Masters Program seeks students from disciplines including:

- TRADITIONAL ART - Painters, Sculptors, Illustrators, Animators, Musicians
- TECHNICAL ART - 3D Modelers, Sound Designers, Filmmakers, Architects
- COMPUTER SCIENCE
- THEATER & DRAMA
- ENGINEERING
- ANY OTHER CREATIVE FIELD

Artists and Technologists from the ETC have gone on to the following companies:

- |                    |                     |
|--------------------|---------------------|
| • Disney           | • Microsoft         |
| • Electronic Arts* | • Pixar             |
| • ILM              | • Rockstar Studios  |
| • IMAX             | • Rhythm & Hues     |
| • LeapFrog         | • Universal Studios |
| • Lucas Arts       |                     |

\* EA guarantees ten internships per ETC class

[www.etc.cmu.edu/joinus](http://www.etc.cmu.edu/joinus)

© SILVERTREE MEDIA

# COGSWELL

## The Fusion of ART & ENGINEERING

Bachelor of Art & Science Programs:

- \* Digital Art & Animation
- \* Digital Motion Picture
- \* Digital Audio Technology
- \* Digital Arts Engineering
- \* Electrical Engineering
- \* Software Engineering

WASC Accredited  
Financial Aid Available  
Small Class Size  
Tours Available

**ACCEPTING APPLICATIONS!**  
**CALL NOW!**



**Yes! Tell me more about the Programs at Cogswell College.**

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Email \_\_\_\_\_  
Phone \_\_\_\_\_  
School Now Attending \_\_\_\_\_  
Present Grade Level  9  10  11  12  College

Digital Art & Animation  
 Digital Audio Technology  
 Digital Motion Picture  
 Digital Arts Engineering  
 Electrical Engineering  
 Software Engineering  
 Fire Science

Where Did You Pick Up This Card?  
\_\_\_\_\_

**COGSWELL**  
Tel: (800) 264-7955 Fax: (408) 747-0764 www.cogswell.edu

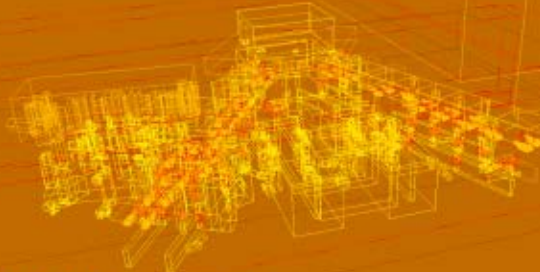
**COGSWELL**  
POLYTECHNICAL COLLEGE

1175 Bordeaux Drive  
Sunnyvale, California 94089  
(408) 541-0100

[www.cogswell.edu](http://www.cogswell.edu)

# BUILD

something new.  
FIEA.  
culture.  
knowledge.  
your future.  
experience.  
projects.  
connections.  
a better way.



## FIEA

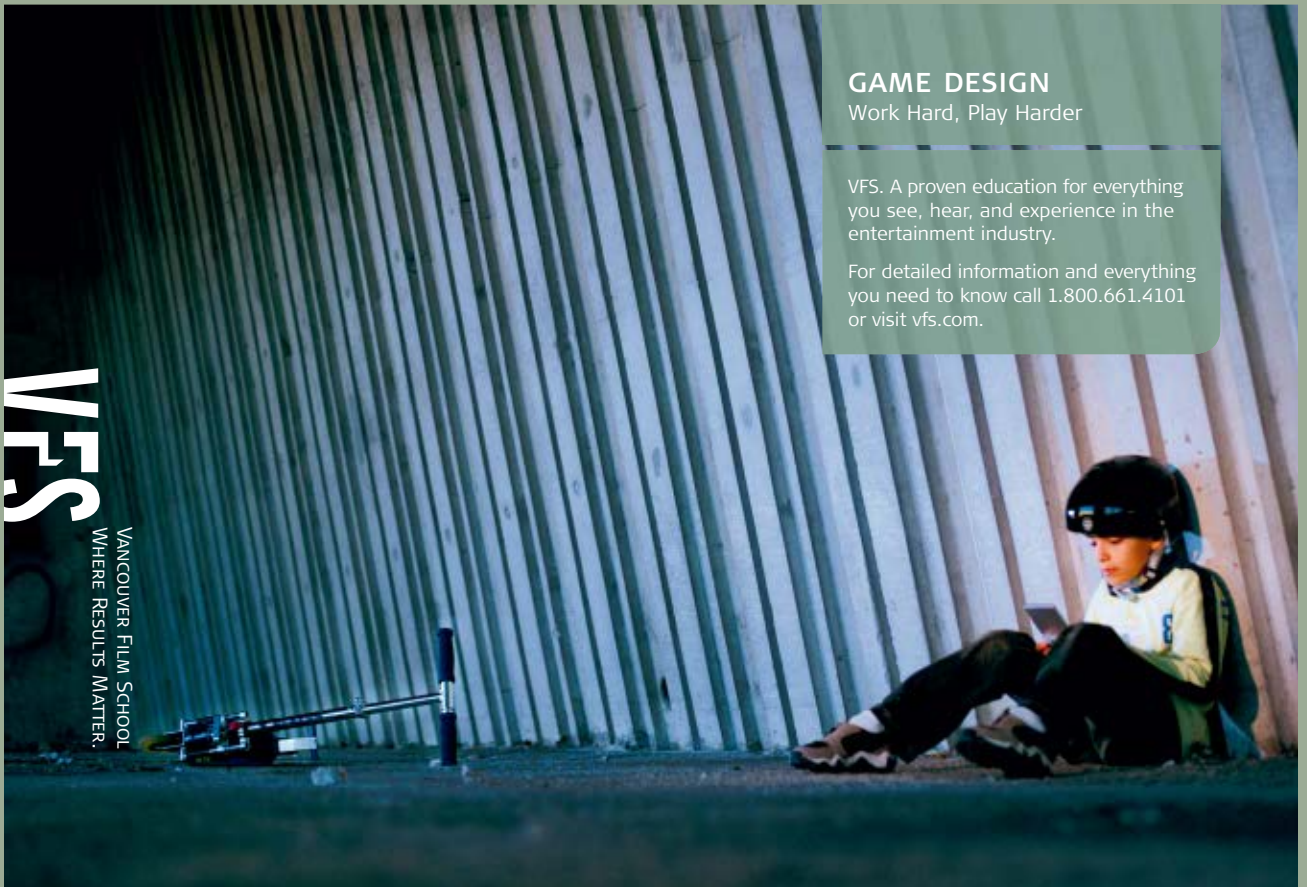
Florida Interactive  
Entertainment Academy

407.823.2121 • [www.fiea.ucf.edu/gdm](http://www.fiea.ucf.edu/gdm)



UNIVERSITY OF CENTRAL FLORIDA

Opening Fall 2005



# VFS

VANCOUVER FILM SCHOOL  
WHERE RESULTS MATTER.

## GAME DESIGN

Work Hard, Play Harder

VFS. A proven education for everything you see, hear, and experience in the entertainment industry.

For detailed information and everything you need to know call 1.800.661.4101 or visit [vfs.com](http://vfs.com).



to advertise in  
Creative Careers and  
Get Educated

call Aaron Murawski at  
(415) 947-6227,

or email to:

amurawski@cmp.com

to advertise in

Marketplace

call Susan Kirby at

(415) 947-6226,

or email to:

skirby@cmp.com

**SOFTIMAGE XSI**

**Alias Maya**

**Virtools Dev**

Visit us at:

<http://www.coyote3d.com>

To request a free trial lesson CD

**ONLINE GAME ART PROGRAM**

Academy of Digital Animation  
Cerro Coso College, Ridgecrest, California

Earn a Certificate or A.S Degree



\$78 per course - CA residents  
\$501 per course - non residents  
State and Federal Financial Aid Available

To contact us by email:  
recruit@cerrocoso.edu

screen shots from student UT Mod - "Camulodia"

Why does gaming professional  
**Randy Pitchford**  
recommend **The Guildhall?**  
Simple. He helped design  
the curriculum.

Randy's credits include: Halo®: Combat Evolved  
Duke Nukem™ 3D  
Half-Life®: Opposing Force  
Brothers in Arms™  
Tony Hawk's Pro Skater™ 3

THE  
**GUILDHALL**  
AT SMU

LEARN FROM THE PROS.

<http://guildhall.smu.edu>

"When recruiting new game developers, my direction  
for Gearbox Software is to start at The Guildhall."

Randy Pitchford  
Gearbox Software

Brothers in Arms is a trademark of Gearbox Software. Halo is a registered trademark of Microsoft Corporation.  
Half-Life is a registered trademark of Valve Corporation. Duke Nukem is a trademark of Apogee Software, Ltd., Action Entertainment, Inc.



Game Design & Development  
Bachelor of Science  
Degree Program



Associate of Science &  
Bachelor of Science  
Degree Programs

school of

- ▶ Computer Animation
- ▶ Digital Media
- ▶ Entertainment Business
- Film
- ▶ Game Design & Development
- Recording Arts
- Show Production & Touring

800.226.7625  
fullsail.com

3300 University Boulevard  
Winter Park, FL 32792

Financial aid available to those who qualify  
Job placement assistance  
Accredited College, ACCSCT

© 2004 Full Sail, Inc. All rights reserved. The terms "Full Sail," "Full Sail Real World Education," and the Full Sail logo are either registered service marks or service marks of Full Sail, Inc.

R·A·D·I·U·S | 360°

- SOUND DESIGN • ORCHESTRAL SCORE
- MUSIC PRODUCTION • 5.1 AND STEREO MIX
- TALENT DIRECTION • DIALOG RECORDING/ADR
- LOCALIZATION • EDITING • CONSULTING

WHY PUSH THE ENVELOPE...

...WHEN YOU CAN RIP  
A CAR IN HALF.

MAXIMIZE YOUR GAME AUDIO.  
NOT YOUR BUDGET.



RADIUS360 IS COMMITTED TO GAME AUDIO AND ITS EVOLUTION, WITH OUR HIGH IMPACT APPROACH, REGARDLESS OF YOUR FINANCIAL AND TECHNICAL RESOURCES. OUR NAME REFLECTS OUR TALENT, RANGE OF SERVICES AND DEDICATION TO YOUR CREATIVE VISION FROM BEGINNING TO END.

FOR MORE INFORMATION OR TO DISCUSS YOUR NEXT PROJECT, PLEASE CONTACT US OR VISIT [WWW.RADIUS360.COM](http://WWW.RADIUS360.COM)

2004 G.A.N.G. "MUSIC OF THE YEAR AWARD" AND "BEST LIVE PERFORMANCE RECORDING" NOMINEE FOR VAN HELDING.

13547 VENTURA BOULEVARD, SUITE 612, SHERMAN OAKS, CA 91423  
TEL: BO BENNIKE (818) 926 6704 BTEVE KUTAY (818) 926 6882  
URL: [WWW.RADIUS360.COM](http://WWW.RADIUS360.COM)

See us at GDC Booth 326



Movie quality matters.



CRI Middleware Co., LTD.

Free evaluation of CRI Middleware for qualified developers  
<http://www.cri-mw.com/eval/371>



KHRONOS MEDIA EXPERTS

# Invite You to DevU

An all-day, all-technology forum on March 10th in San Francisco

DevU is a no-cost, all-day, all-technology forum where you will learn details about the new technologies needed to develop for the embedded and mobile multimedia markets!

Khronos Group is the not-for-profit consortium that has developed the widely-accepted, royalty-free, open standards: OpenGL® ES, OpenML™, OpenVG™ and OpenMAX™. These standards are the building blocks for the billion-dollar, billion-user embedded and mobile multimedia markets.

If you develop graphics for mobile, develop multimedia content, or develop graphics for automotive, avionics or industrial controls – you do not want to miss this free event!

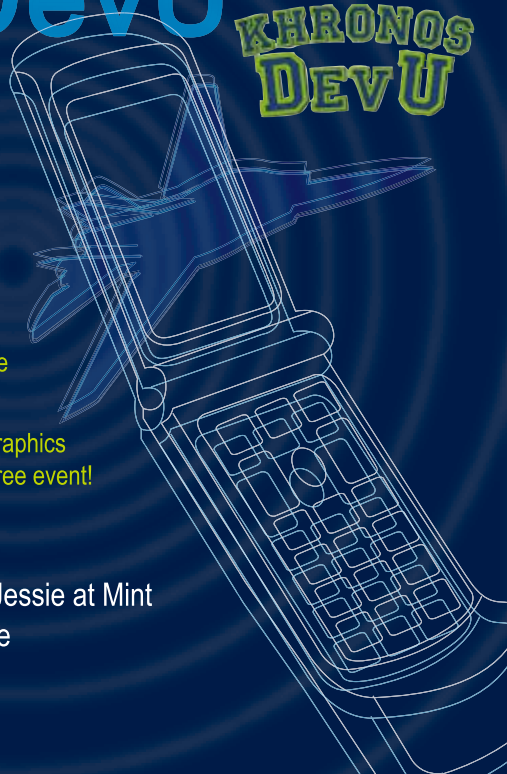
**When:** March 10th 9-5 for sessions; 5-8 for panels and beer

**Where:** Two blocks from Moscone Center at “mezzanine”- 444 Jessie at Mint

**Cost:** FREE for developers or member of the press, but please register: [www.khronos.org/devu/register.html](http://www.khronos.org/devu/register.html)

**Info:** [www.khronos.org/devu/locations/sanfrancisco2005.html](http://www.khronos.org/devu/locations/sanfrancisco2005.html)

KHRONOS  
DEVU



## EXPERIENCE

THE NEXT GENERATION OF MODELING SOFTWARE



THANKS  
TO ALL OUR  
FANATICAL  
FANS!!!



[ NEIL BLEVINS ]

FROM  
**NPOWER**  
SOFTWARE



[ MIKE THEODORIDIS ]



### POWER BOOLEANS

THE MOST ADVANCED BOOLEAN AND TESSELLATION CODE IN THE INDUSTRY.

- [ CLEAN, LOW POLY RESULTS ]
- [ ADVANCED POLY REDUCTION ]
- [ MULTI/GROUP BOOLEANS ]
- [ ADVANCED QUAD TESSELLATION ]

### POWER SOLIDS

UNLEASH THE POWER OF PARAMETRIC 3-D GEOMETRY MODELING.

- [ RAPID COMPLEX MODEL BUILDING ]
- [ DYNAMIC MESH TESSELLATION ]
- [ IMPORT IGES, RHINO, STEP, SAT ]
- [ VARIABLE EDGE FILLETING ]



**npower**

EMPOWERING CREATIVITY WITH ADVANCED TECHNOLOGY. [WWW.NPOWERSOFTWARE.COM](http://WWW.NPOWERSOFTWARE.COM)

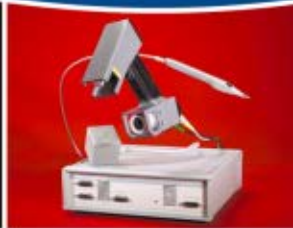
# The right way.



NEW PENCIL

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

## FASTSCAN™



PROVIDING SOLUTIONS FOR SPECIALIZED NEEDS

The **LIGHTWEIGHT, HAND-HELD, PORTABLE SOLUTION**  
for **REAL-TIME 3D SURFACE LASER SCANNING**

Real-time Surface Registration • No Post Processing • Export Files to 12+ Formats • Affordable

OVER 35 YEARS OF EXCELLENCE

# POLHEMUS

*First in the third dimension®*

40 Hercules Drive | PO Box 560 | Colchester, VT 05446-0560

US and Canada: 800. 357. 4777 | 802. 655. 3159 | fax 802. 655. 1439

[www.polhemus.com/fastscan.htm](http://www.polhemus.com/fastscan.htm)



Copyright ©2004 Polhemus. FastSCAN is a registered trademark of Polhemus.

# FLASHBANG'S SEALAB 2021

CONTINUED FROM PG 6

indie development effort that helped make it. "The game was developed in around three and a half months," says Matthew Wegner, development director for Flashbang. "We had a fixed X amount of time and Y amount of dollars with which to make the game. We're all big fans of the *Sealab 2021* show, too, so obviously we wanted to stretch ourselves and try to cram as much as we could in the limited amount of time we had."

"All of the artwork and music for the game was produced by us in-house," Wegner adds. "For technology, we developed the game using *Virtools* ([www.virttools.com](http://www.virttools.com)). Our team included a programmer, a lead artist, an artist, an audio director, and audio contractors."

Despite the limitations, Wegner was careful to avoid the quality-of-life issues plaguing the industry with excessive crunch time. "We tried to

rigidly enforce development hours," he says. "I have 1,400 incremental saves of the main gameplay logic file here, so I was able to graph the time of day that each one was saved, to show at a recent IGDA talk I gave on the title."

At the end, according to Wegner, the result was "54 levels, 6 playable characters, 15 enemies, 3 bosses, over 200 lines of voice-over from the show's actors—it was great fun to hear the raw session files—9 minutes of new music (all incorporate the main theme, some more subtle than others), and 3 minigames."

Cartoon Network will again hold the Project Goldmaster competition at the 2005 IGF Awards, this time with increased online feedback, as the creators make a higher-profile development diary documenting their game creation.

—Simon Carless

# STARDOCK'S DESKTOPX 3

CONTINUED FROM PG 7

very quickly," says Brad Wardell, CEO of Stardock. "We can see what it's going to look like in the game and drag and drop things into position and have them be like that in the game right away."

In the indie game scene, Stardock's ability to make its own tools, like DesktopX, gives its developers an advantage in their niche market space.

"For us, it's the great equalizer with the big guys," Wardell says. "We've spent six years developing DesktopX for non-game commercial use, so it's a very mature product. It's the kind of tool that the mega studios are not likely to have and hence lets

us have one or two graphics designers do the work of what other companies probably require three times as many people to do."

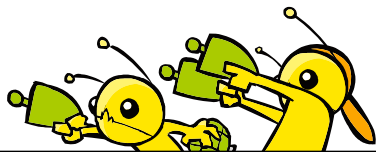
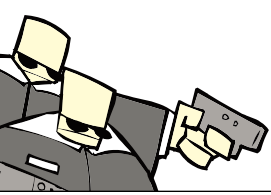
Beginning this month, Stardock will offer DesktopX to the public at three levels: DesktopX runtime, which only lets you run widgets that others create (\$15); DesktopX Standard, in which you can design desktops, widgets, and objects for personal use and sharing (\$25); and DesktopX Pro, in which you can export objects and widgets as "gadgets" that anyone can run (\$70).

—Jill Duffy

## ADVERTISER INDEX

COMPANY NAME	PAGE	COMPANY NAME	PAGE	COMPANY NAME	PAGE
Academy of Art University	85	Electronic Arts/Tiburon	25	RAD Game Tools	C4
Activision	66	Expression College	81	Radius360	92
Akamai Technologies Inc.	2	Factor 5	68	Retro Studios Inc.	81
Aladdin Knowledge Systems	47	Flagship Studios Inc.	76	Rockstar Games	69
Alias Systems	20	Full Sail Real World Education	92	RTzen Inc.	C2, 1
Anark	30	Genemation	10	Savannah College of Art	72
Avari Inc.	75	IDA of Singapore	9	Seapine Software Inc.	17a–17d
ATI Technologies Inc.	23, 26	Integrity Ware Inc.	93	Softwrap	54
Avid Technology—Softimage	41	Iron Lore Entertainment	68	Sony Computer Entertainment	70, 72
Avid Technology—NXN	C3	IT Global Secure Inc.	58	Sony Ericsson Mobile	13
Blizzard Entertainment	79	Khronos	93	Superscape	28
Carnegie Mellon University	88	LucasArts	81	Techexcel Inc.	53
Center for Digital Imaging at Boston University	84	Macrovision Corporation	38	The Art Institute Int'l	82–83
Cerro Coso College	91	Marist College	86	The Collective Inc.	76
Charles River Media	27	Microsoft	37	The Hartecenter at SMU Guildhall	91
Cogswell Polytechnical	89	Midway Amusement Games	71	THQ	67
Collins College	84	Morgan Kaufmann Publishers	48	Trymedia Systems	42
Course PTR	32	NCsoft	70	Ubisoft-China	78
CRI Middleware Ltd.	92	Neversoft Entertainment	74	University of Advancing Technology	87
Criterion Software Ltd.	5	New Pencil	94	University of Central Florida	90
Cryptic Studios	77	Nikitova LLC	27	Vancouver Film School	90
Day 1 Studios	80	Novodex	19	Xoreax Software Ltd.	44
DeWolfe Music	33	Numerical Design Ltd.	29	Zenimax Media	80
Discreet	45	Perforce Software	51		
Electronic Arts	73	Polhemus	94		

*Game Developer* (ISSN 1073-922X) is published monthly by CMP Media LLC, 600 Harrison St., 6th Fl., San Francisco, CA 94107, (415) 947-6000. Please direct advertising and editorial inquiries to this address. Canadian Registered for GST as CMP Media LLC, GST No. R13288078, Customer No. 2116057, Agreement No. 40011901. **SUBSCRIPTION RATES:** Subscription rate for the U.S. is \$49.95 for twelve issues. Countries outside the U.S. must be prepaid in U.S. funds drawn on a U.S. bank or via credit card. Canada/Mexico: \$69.95; all other countries: \$99.95 (issues shipped via air delivery). Periodical postage paid at San Francisco, CA and additional mailing offices. **POSTMASTER:** Send address changes to *Game Developer*, P.O. Box 1274, Skokie, IL 60076-8274. **CUSTOMER SERVICE:** For subscription orders and changes of address, call toll-free in the U.S. (800) 250-2429 or fax (847) 647-5972. All other countries call (1) (847) 647-5928 or fax (1) (847) 647-5972. Send payments to *Game Developer*, P.O. Box 1274, Skokie, IL 60076-8274. For back issues write to *Game Developer*, 1601 W. 23rd St. Ste. 200, Lawrence, KS 66046-2703. Call toll-free in the U.S./Canada (800) 444-4881 or fax (785) 841-2624. All other countries call (1) (785) 841-1631 or fax (1) (785) 841-2624. Please remember to indicate *Game Developer* on any correspondence. All content, copyright *Game Developer* magazine/CMP Media, LLC, unless otherwise indicated. Don't steal any of it.

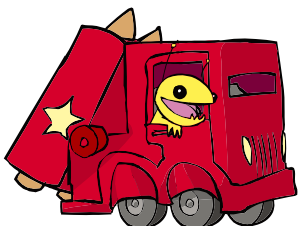
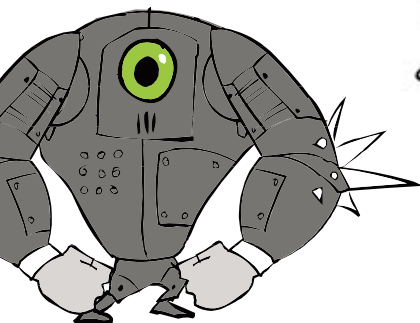


# A THOUSAND WORDS



## THE BEHEMOTH'S ALIEN HOMINID

Artist: Dan Paladin



### K&B BOSS



EXTRA



HAMMER AND SICKLE CAN BOTH BE ~~RIDE~~ RODE UPON IF YOU JUMP OFF BUILDING

..... DON'T JUMP TILL HE HAS HIT IT WITH THE HAMMER THOUGH!

NIPPLES ARE TWO MINITURRETS (360°) SHOOT HIS HEAD DODGE SICKLE AND HAMMER DODGE NAPALM THRUSTERS IF YOU DIG UNDERGROUND, HE WILL CHISEL YOU OUT

LEANS BACK TO BECOME INVULN

(UNLESS YOU RIDE HIS HAND)

\*DASH TO DODGE HAMMER/SICKLE BETTER

[Other competitive solutions require multiple supporting packages to handle our assets. With **Alienbrain**, everything we need is in one package.]

**Christopher Bretz** Art Director, Secret Level

**Starts**  
**at**  
**\$690**



# Brainpower

**Avid Alienbrain Studio 7.1** has the intelligence to help your team work faster and smarter.

Its intuitive interface tells you more than the what, where and who of an asset. It tells you what an asset references, what it's referenced by, and whether it's buildable, it's optimized, or it's redundant. It knows what platform an asset is for and what should happen to it next. It even knows an asset's location in a texture map, its resolution in level three, and how much damage it inflicts when eaten. Alienbrain knows. You know. Your pipeline knows.

## ASSET MANAGEMENT FOR CREATIVE TEAMS

Witness the power of **Avid Alienbrain Studio 7.1** at GDC 2005.  
Avid Computer Graphics Booth 413.



[www.avid.com/alienbrain](http://www.avid.com/alienbrain)

**Avid**  
computer graphics

© 2005 Avid Technology, Inc. All rights reserved. Product features, specifications, system requirements and availability are subject to change without notice. Avid is a registered trademark of Avid Technology, Inc. in the United States and/or other countries. Alienbrain and the Alienbrain logo are trademarks of NXN Software AG. All other trademarks contained herein are the property of their respective owners.

# Pixomatic brings you the whole world

## A Global Solution

Games with Pixomatic can run on any Windows or Linux machine that supports MMX. Sell to the largest possible market, save on tech support, and say goodbye to games that get returned because they don't run.

## Just Author For Hardware

Pixomatic offers robust DX7-class functionality that your game can fall back to just as it would on an older 3D card.

## Easy To Add

Adding Pixomatic to your games is easy, since we designed it with porting in mind. We can even integrate Pixomatic for you—we've ported Unreal® Tournament 2003 and Dungeon Siege, among others.

## The Planet's Best Software Rasterizer

True 32-bit pixel processing • per-triangle MIP mapping • bilinear filtering • alpha blending • alpha test • 2 textures and 3 full multitexture stages • independent alpha & RGB channels • 32-bit textures • fog • specular • stencil • 16- & 24-bit z-buffering • indexed primitives • vertex streams • high-speed blitting • and much more!

## Built For Performance

Pixomatic automatically generates optimized code optimized for MMX, SSE and 3DNow! on the fly, delivering up to 77 million multitextured, Gouraud pixels/second and 4.5 million textured, Gouraud triangles/second — that's enough to run Quake II at more than 100 frames per second. (Benchmarked on a P4 3.06 GHz)

## Source Code Included

Full rasterizer source code in C and ASM included.

For more information:

**425.893.4300**

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

Unreal is a registered trademark of Epic Games Inc.  
Dungeon Siege is a registered trademark of Cas  
Powered Games Inc.



## THE BEST IN GAME DEVELOPMENT TECHNOLOGY

