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INTERVIEW: CLIFF BLESZINSKI GEARS UP FOR NEXT GEN

MAY 2006

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THE LEADING GAME INDUSTRY MAGAZINE

POSTMORTEM: KONAMI'S METAL GEAR ACID 2

PATCHING FINAL FANTASY XI

THE ART OF SELF-PROMOTION

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Breaking into the games industry is tough enough; creating a name for yourself once in requires true dedication. Treyarch's Stuart Roch maintains that a successful career starts (and ends) with good self-promotion. In this feature article, he shares five steps game developers can take to make the most of their career painlessly ... well, almost.

By Stuart Roch

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How a game patch is disbursed to users and installed varies widely across the industry, with at least four common approaches currently being used. For persistent games, like MMOGs, the patch creators need to establish reliable and accurate methods that accommodate the player, since patches are likely to ship on a regular basis. Fumiaki Shiraishi, who worked on the patch design of FINAL FANTASY XI, shares the technical considerations of these various methods, justifying why, if he had a second chance, he would opt for a hybrid approach.

By Fumiaki Shiraishi

POSTMORTEM

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By Shinta Nojiri

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MARVELOUS IDEAS

WELCOME TO THE EVER-LOVING MAY 2006 E3 issue of *Game Developer*, true believers! Well, you may have spotted that I'm not, in fact, Stan Lee, but this preposterous introduction does have a point. If you've been following Marvel Entertainment's plans over the past few months, you'll note that the company shares something in common with emerging "superdeveloper" game companies such as BioWare/Pandemic Studios or even Turbine Entertainment in the game space, by attempting to take control of its own creative and business destiny. This is an exciting time for the game business, so I'm going to compare the respective models and talk a little about how some developers out there are flipping the tables on conventional thinking—or at least, trying to.

CONTROL MEANS POWER

Marvel announced last year that it would be producing and financing feature films based on its properties, with first titles—including *Captain America* and *Nick Fury*—due summer 2008. For future projects, including those above, Marvel will handle all of the financing (well into the hundreds of millions of dollars), and therefore potentially reap greater rewards.

There's a great deal of creative control here for Marvel, but also plenty of risk. With fewer titles to even out the financials, one big flop can have a major effect on your entire business. But if you can build up enough of a fan-base to operate independently, then it's the holy grail of creative development, whether you're in movies or games. On the game side this means complete ownership of IP, creative control of high-budget works, with no wrangling over sets of features for publisher milestone payments or clashing visions that can easily ruin products.

MARVELING AT GAMES

In the film space, Pixar (before the Disney purchase) reached this golden playground, Lucasfilm is somewhere in the same area, and Marvel is obviously aiming along similar lines. The concept operates financially by using companies that would normally finance and produce their films, such as Paramount, simply as distributors, with Marvel taking a higher cut of the film's gross.

In the game space, Valve is probably closest to doing the same thing. The massive success of HALF-LIFE and HALF-LIFE 2 has meant that it can afford to use Electronic Arts as a physical retail distributor (as opposed to a publisher), and continue pushing digital distribution via Steam on the PC—a method which returns 100 percent of the game price directly to Valve itself. It's a liberating financial model.

It's not clear that BioWare/Pandemic plans to do the same thing, since console publishing requires closer links to physical retail (at least until digital distribution becomes the norm). But building up strong, internally-owned IP is obviously key to the firm's plans for success, now that game-to-film and action figure deals are increasingly common. In addition, the selling of NEVERWINTER NIGHTS-related digital content on the BioWare web site shows that the firm is also looking ahead at least somewhat to a time when the middleman can be cut out.

WHO'S THE BAD MAN?

But the lines are blurring—and confusingly so, one might argue. After all, what's the essential difference in drive between a multi-studio publisher like Activision—with studios like Neversoft and Treyarch in its stable—and a multi-studio developer? They're both business entities that are looking to turn a profit and expand, but one happens to have a division that prints games and ships them to stores, too. Where do we draw the crass "controlling, moneygrabbing publisher" versus "creative, downtrodden developer" line that so many in the industry love to put out there?

As the internet and new distribution methods open up choice, the traditionally fixed entities (whether they be newspapers, movie studios, or retail game publishers) are changing forever. I'm not sure this necessarily means that games will become exponentially better, but it probably does mean an exponentially greater choice of market sizes, approaches, and business models. And if you don't like it, well—"Hulk smash?"

As a final note, thanks to *Game Developer* advisory board member Hal Barwood for giving me a bump to switch out my normal editorials for a different approach. And a sad goodbye to Aural Fixation columnist Alexander Brandon, who leaves us this issue—thanks for the amazing work, and you'll always be our Mr. Fantastic, Alex!

S!

Simon Carless, editor-in-chief

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CRYSTAL DYNAMICS eidos XBOX 360 NVIDIA. XBOX

ON THE CUSP OF REVOLUTION

WHEN WE THINK OF THE NEXT CONSOLE GENERATION, we generally think of bigger processors, better graphics, and greater realism in-game. Nintendo has chosen a different path, though, one which plays more to the company's strengths. The Revolution is proving to be a unique platform for developers, as well as for players, so *Game Developer* asked a few notable industry figures what they think of the planned console, and in what direction it may take them. *—Brandon Sheffield*

MASAYA MATSUURA (NANAON-SHA): "Maybe it really will be some kind of a revolution. I want to make some sort of game for it at some point in the near future, but we're a little afraid of the new console struggle—the war between the three hardware manufacturers."

KATSUYA EGUCHI (NINTENDO EAD): (When asked if he would allow players to build their own furniture with the controller in ANIMAL CROSSING for Revolution.) "I think it's a great idea. Of course, if you made your own furniture, you'd want to share it with others, to be able to give and receive handmade stuff. Otherwise why would you make it? To be able to do that, you have to build in some place to keep that in the memory. That's a challenge I'd like to face, though."

JOSH RESNICK (BIOWARE/PANDEMIC): "I don't think it's going to be as easy to take [an existing] product from one console to the Revolution, and so we are going to be looking to see how we can tailor our products to that platform. We do that with other platforms as well, it's just that the Revolution may challenge us even more."

KEITA TAKAHASHI (NAMCO): "I'm not really interested in it. I don't think a controller should have that much influence on the enjoyment of games. I see what [Nintendo is] trying to do, but they're putting such emphasis on the controller; 'Woah, this controller lets you do *this*!' And I'm thinking, 'Are you messing with us?' So, there's nothing I really want to do with it right now."

NEIL YOUNG (EALA): "One of the challenges for the Revolution is that it's not HD. If you think about RTS games, one element is the control scheme, but the other is the distance from the TV screen when you're playing a console game versus a PC game. One of the reasons BATTLE FOR MIDDLE EARTH II works so well on the Xbox 360 is the controller, but the other reason is the HD. You can see everything as well or better as you can when you're [in front of a PC]. So I think there are some questions there, and the other issue is performance. The hardware performance is sort of current-gen plus, versus the 10x or 20x multiple that you get on next-gen. I mean, EA is building stuff for it, but I kind of prefer the Nintendo DS. It makes the most sense to me."

WILL WRIGHT (MAXIS): "It looks intriguing to me! I love the idea that there's a novel way to approach the input, and also that you might in fact enable a class of games that are just inherently more approachable to the average person. So I'm kind of rooting for [Nintendo], and I like the direction, especially relative to where I think Sony and Microsoft are going."

GAME DEV U.

NINTENDO SHARES GAMECUBE DEVELOPMENT KITS WITH STUDENTS

CONSOLE DEV KITS—WHICH have, to date, been absent from game development academia—are finally working their way into university curricula, thanks to Nintendo and Freescale Semiconductor Inc.

Freescale, the North American distributor of Nintendo's dev kits, announced in late March that it is collaborating with Nintendo to give GameCube dev kits to a number of educational institutions. As of press time, two were already on board: The Guildhall at Southern Methodist University in Dallas, and Grove City College, Penn., according to Roger Edgar, business manager for Freescale Games Organization.

Freescale intends to package its CodeWarrior development tools and testing software (formerly property of Metrowerks, which was subsumed into Freescale last year) alongside the GameCube development hardware.

Traditionally, students in game schools have been taught to develop exclusively for PCs, for which accessibility and ease of use often far exceed that of consoles. Incorporating console dev kits into game development education increases the amount of relevant industry experience students receive as part of their training.

Additionally, because console manufacturers typically keep such tight reins on their kits, sharing them with students is seen as an extended hand. Freescale's Edgar adds, "The dev kits are property of Nintendo, so having one means you're part of an invited club."

—Jill Duffy

ESRB SURVEY CLAIMS HIGH AWARENESS FOR RATINGS

ACCORDING TO A NEW SURVEY CONDUCTED ON BEHALF of the Entertainment Software Rating Board (ESRB), 83% of American parents of children who play video games are aware of the ESRB ratings, and 74% use them regularly when buying games for their families.

The ESRB's non-legislative ratings continue to come under fire in multiple American states as part of violent game bills, and the recently introduced, not yet approved Family Entertainment Protection Act calls for a Federal Trade Commission investigation into the Entertainment Software Ratings Board to determine whether games are being properly rated.

However, the ESRB notes that 2006's figures are higher than those measured in the same study in 2005, when awareness and use were at 78% and 70%, respectively. The study was conducted by Peter D. Hart Research Associates in early March and surveyed over 500 parents of children age 3 to 17 that play video games.

The study also revealed that an increasing number of parents are using the ratings to restrict their children from playing games rated M (Mature). A majority of those surveyed (53%) said they "never" allow their children to play M-rated computer and video games, while 41% said they "sometimes" do. The M rating is assigned by the ESRB to indicate that a game may be suitable for ages 17 and older.

"It's been shown that nine times out of ten, a parent is involved in the purchase of a video game, so we're very pleased to find that more and more parents are using the ratings to help them make informed choices about the games they bring home for their children," said ESRB president Patricia Vance. "Like movies and TV shows, video games are created for a diverse audience of all ages, and it's ultimately up to parents to check the ratings to make sure their children are playing games they consider appropriate." *–Simon Carless*

OTHER ESRB FINDINGS INCLUDE:

94% said the ratings are very helpful (72%) or somewhat helpful (22%).

91% are confident that ratings accurately describe a game's content.

72% said that the rating is the most important (31%) or a very important consideration (41%) when deciding whether to purchase a game.

91% say their trust in the ESRB ratings has either stayed the same (76%) or increased (15%) in the past year

MORE THAN HALF said they check content descriptors "every time" (35%) or "most of the time" (16%).

CASUAL PLAY MAY BE GOOD FOR WHAT AILS YOU

PLAY TWO LEVELS AND CALL ME IN THE MORNING. A growing body of research suggests that playing certain kinds of video games may have positive cognitive effects and may be useful as a stress management tool. The Games for Health Project presented the findings of this burgeoning medical and academic consensus in a report that was supported by PopCap Games.

One finding the report emphasizes is how casual games may help ward off Alzheimer's disease and dementia in the elderly. The mental activity associated with playing casual games is thought to exercise the brain, though no physiological explanations have been determined yet.

Dr. Carl Arinoldo, a Stonybrook, NY-based psychologist with more than 30 years experience, theorizes that synaptic responses which occur in the brain while playing visual computer games are what cause the results, which include a lowered instance of Alzheimer's, dementia, and senility. "Whenever the screen changes, the player needs different kinds of cellular connections to process the information," he says. If the player is winning, the mental exercise is working, since the player's brain is successfully registering the information every time the screen changes—which The Games for Health report calls the "neuro-regenerative properties of mental exercise." Arinoldo adds that casual games such as BEJEWELED provide this kind of brain activity.

Satoru Iwata, president of Nintendo, said in a GDC 2006 keynote speech that his company had in mind these mental health benefits when creating its line of BRAIN games. BRAIN AGE was the first in the series to reach the U.S.

Research on video games in the medical field dates back to the early 1980s, though much of the early work uncovered how games can be harmful, particularly in their ability to trigger seizures in children. It's only recently (since about the mid 1990s) that researchers have turned to the possible benefits of older people playing games. Much of the research on the elderly is further supported by similar studies that assessed the cognitive and health benefits of leisure activities, such as playing board games, doing crossword puzzles, or playing a musical instrument.

More widely in the medical field, video games have been shown to lower stress and increase pain tolerance. Mark Griffiths, a professor of gambling studies at the International Gaming Research Unit, Psychology Division (Nottingham Trent University) has published widely on the subject. His work takes into consideration the fact that games are both cost-effective and can be used by the patient without medical supervision. In particular, Griffiths has noted that games can be used to lower the total dosage of painkillers administered to children undergoing chemotherapy; similarly, for patients with chronic lower back pain, video games can increase pain tolerance, thereby improving their ability to sit.

The Games for Health Project and PopCap report did not contain any new research, but rather reviewed media stories and research from the past few years that had been published in academic and medical publications such as *The New England Journal of Medicine* and *The Journal of the American Medical Association*.

Games such as BEJEWELED have been shown to have certain health benefits.

What's most interesting about the report is the notion that off-the-shelf casual games can provide many of these benefits. The medical community, in other words, already has access to games that can be used as part of patient treatment.

Jason Kapalka, co-founder and chief creative officer at PopCap suggested a potential application of the report. "We look forward to working closely with the Games for Health team to engage the research community to identify specific puzzle- and other problem-solving activities that could comprise all or part of the gameplay in the future products that we develop." *–Jill Duffy*

GDC PRODUCT ROUNDUP

BY JILL DUFFY

IN ADDITION TO BUDDING FLOWERS, hatching hatchlings, and the re-awakening of creatures in hibernation, springtime marks the birth announcements of game development tools. Game technology providers save many of their biggest news pieces for the annual Game Developers Conference (held in San Jose, Calif., March 22 through 24), when the cycle of game tool versions synchronizes with the cycle of life. Here, in alphabetical order by company name, is the roundup.

AGEIA'S PHYSX SDK V2.4

www.ageia.com

Available as of GDC, Ageia has released its cross-platform PhysX SDK v2.4—the newest version of its physics API and runtime engine. The PhysX SDK enables developers to create physics-based environments and effects for both next-generation gaming platforms and PCs with PhysX Accelerator PC add-on boards. The engine supports modeling and art tools, including plug-ins for 3ds Max 7 and Maya 7, and is integrated directly with Softimage XSI 5.

AUDIOKINETIC'S WWISE

www.audiokinetic.com

Audiokinetic has a new set of tools for audio designers and sound engineers, aimed at lowering the audio production costs for next-generation games by lessening the audio department's dependence on programmers. As part of its Wwise Sound Tools middleware, WaveWorksInteractive Sound Engine was unveiled at GDC and will be available this spring.

EMERGENT GAME TECHNOLOGIES' EMERGENT ELEMENTS

www.emergent.net

Emergent Elements is a new comprehensive set of modular game development tools for building, testing and managing games. The components, or "elements" of this trinity are Metrics Element (for measuring game data via a web-based user interface), Automation Element (for automating builds, server operations, and other common development processes), and Gamebryo Element (3D graphics engine). Emergent is selling the products both as an integrated set and separately.

Emergent Game Technologies' Emergent Elements: web-based Metrics Element.

GENEMATION'S GENHEAD V3.1

www.genemation.com

The beta version of this product, shown at GDC 06, creates 3D heads out of 2D data, which can be exported to Maya, 3ds Max, or Softimage XSI (or saved as VRML files). Genemation boasts that creating a 3D head the old fashioned way takes several hours, or sometimes more than one full day. But GenHead knocks that time down to about 20 minutes for most projects. And the 3D update window, which works in real time, doesn't hurt either.

LUXOLOGY'S MODO 201

www.luxology.com

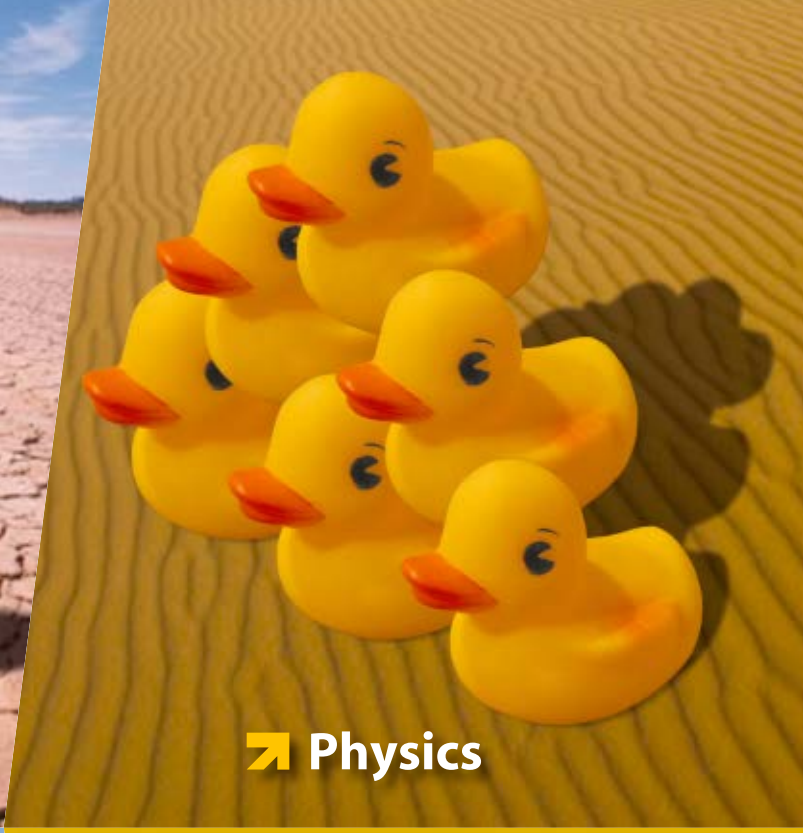
Modo 201, first announced at Siggraph in August 2005, is a strong advancement over its Modo 103 predecessor, adding 3D painting, a UV unwrap tool, asset retargeting features, and rendering capabilities to the existing modeling environment. Another nice little feature to keep artists happy is the turntable preview. With a few clicks, artists can create a Quicktime movie of their 3D model twirling on a virtual turntable, complete with radiosity effects, resulting in a quick and easy way to share and preview assets.

NATURALMOTION'S EUPHORIA

www.naturalmotion.com

NaturalMotion, whose first product endorphin introduced the term "Adaptive Behaviors" to game developers, announced a next-generation tool at GDC: euphoria, the run-time version of NaturalMotion's Dynamic Motion Synthesis technology. The tool's selling point is that its animation playback technology is not based on keyframed or motion-captured segments, but on

NaturalMotion's euphoria.



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Novint Technologies' Novint Falcon.

"actual motor control, muscles, and biomechanics," according to company literature. Euphoria can be used in making games for PlayStation 3, Xbox 360, or PC.

NOVINT TECHNOLOGIES' NOVINT FALCON

www.novint.com

The Novint Falcon, whose design was unveiled at GDC in March, is a feisty little robot designed not for development, but for playing games in a whole new way. The Falcon is a haptics device, meaning it relates to the sense of touch—so when you grab the Falcon's nob, you can feel the weight, shape, motion, texture, and force effects of whatever it represents on screen. If its marketability proves successful—it's scheduled for release in 2007 at around the $100 mark—developers will be vying to experiment with new game play mechanics that make use of its haptics. Developers of serious games with a focus on physical therapy might also find innovative ways to utilize its interactive behavior.

OC3 ENTERTAINMENT'S FACEFX LIVE 1.5

www.oc3ent.com

OC3's FaceFX transforms audio input into facial animation output. The 1.5 release adds real-time capabilities. At GDC 06, the company demonstrated an early version of this new technology (the product isn't quite shelf-ready yet), showing why players would want to enhance their degree of immersion in MMOGs or other chat-intensive synchronous games. Version 1.5 also supports seven languages, custom workspaces with 2D sliders, and new ways to share animations.

SOFTIMAGE'S FACE ROBOT

www.softimage.com

Unveiled in early March and demonstrated prominently at GDC, Softimage FaceRobot is a facial animation tool that concentrates on accurately building heads and faces, and representing soft tissue movement with minimal hand-animation. Softimage, whose tools are used by not only game creators but also high-end film animators, enabled FaceRobot to work with all major 3D packages.

—Jill Duffy

SPIRAL GRAPHICS' GENETICA 2.5 PRO

By Tom Carroll

ARCHITECT MIES VAN DER ROHE ONCE said, "God is in the details." Much less well known but perhaps more germane to creating and using textures is another of his quotes: "Architecture starts when you carefully put two bricks together." Substitute "texturing" for "architecture" and that's where it begins for the average game environment artist. Everything in a game has to be textured and it all has to look as good as it can with as little effort as possible.

Creating seamless textures to mimic brick, stone, pebble, sand, metal, wood, and water is what it's all about. The faster you can do it, Mr. or Ms. environment artist, the better you will sleep at night.

"Five pounds of textures in a three pound box." That's how I think of Genetica 2.5 Pro from Spiral Graphics, the seamless texture editor that hit shelves earlier this year. Browse through the samples that come straight out of the box and you'll see tons of good old brick, stone, ground, marble, metal, tiles, and wall. But it doesn't stop there. It has fiber and weave, vent and grate, crystal and liquid, box and crate. In fact, the Miscellaneous section includes original textures such as Busted Hull, Modern Art, and Gray Bubbly (but please don't use all three on the same spaceship, skyscraper, or dungeon, okay?).

The package's ample standard texture selections are tremendous simply because, although every one of you reading this article is capable of creating your own "hex ice wall" or "bear fur" or "lawn" texture, why should you have to? Genetica isn't just about standard samples—it's about what you can do with them and how quickly.

BASIC NODES, GROUPS, AND LABS

Like most sophisticated software packages, Genetica breaks down complex processes into simple ones, making them much easier to understand and use.

The simplest Genetica concept is the Basic Node. Like the atoms that make up complicated substances, Basic Nodes

GENETICA 2.5 PRO

STATS

SPIRAL GRAPHICS
1025 Oxford Ln. #114
Fort Collins, CO 80525
720.212.0746
www.spiralgraphics.biz

MINIMUM REQUIREMENTS

Windows 2000/XP
Microsoft .NET Framework (available with product download)
Pentium III 450MHz processor
256MB memory
15MB hard disk space

PRICE

$399 Pro ($129 Standard)
Free to upgrade from v.2

PROS

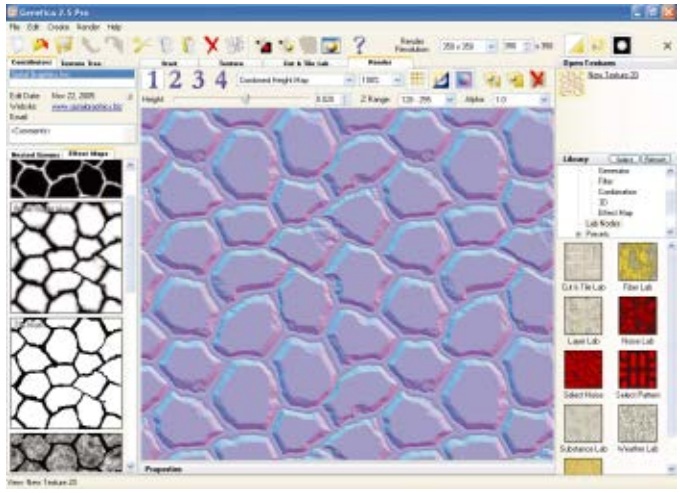
1. Very visual (sliders reflect values with colors where appropriate) .
2. More fun to play with than an Erector Set and Lincoln Logs combined!!
3. Learning to get more from procedural textures without sacrificing existing texture sets is a huge plus.

CONS

1. The nested menus and button placements sometimes require a trip to documentation hell.
2. The package's depth can be overwhelming.
3. More addictive than WORLD OF WARCRAFT.

HOW TO IMPORT IMAGES

1. Click the new document button in the left corner of the menu bar at the top of the screen (see the figure).
2. Open up the Generator section of the Library (the Library is one of three tabs to the left side of the screen—the other two are Select and Refresh). In the menu, click Libraries, then Generator, and you'll see that Imported Image is one of the labeled icons in that section. (It looks like a picture of a door.)
3. Drag Imported Image node (the door) into the blank slot in the middle of the new document.
4. Click the Import Image button (at the bottom of the screen) and then browse for and select an image.



Genetica 2.5 Pro, a texture editor, includes normal mapping capabilities.

perform a wide variety of simple tasks, such as generating a gradient or blurring an image.

When Basic Nodes are encapsulated for a purpose, they are called a Group. Groups can be edited very easily and the process is extremely visual.

A Lab, Genetica's final concept, is a bit more complicated. Lab Nodes perform complex, high-level operations, such as generating a piece of wood or adding rust stains to an image. Think of Lab Nodes as automating sophisticated tasks that would be difficult to handle on their own.

DIGGING DEEPER

Any of Genetica's textures are suitable by themselves—but remember, "God is in the details," and elucidating these details is what makes Genetica worth using.

For example, the standard Giraffe Hide texture just doesn't cut it for me. But I can select it and within seconds begin to edit it with a mind-bogglingly deep set of menus and slider bars. Giraffe Hide, it turns out, is composed of layers within Genetica (Groups and Labs), and they're all editable, too. For instance, part of the giraffe's overall look is how leathery its hide will be. Genetica has about seven components within leather, such as Tone Curve, three Colorize nodes, and Noise, each individually tunable. And that's just one of five components found in the texture.

Or, consider Pool Water. It has the same amazing level of customizable Group parameters, as well as a Lab that allows you to modify Noise, Color, Roughen, Elevate, Shine, Distort, Fluid, and so forth.

Forget WORLD OF WARCRAFT. If you want to immerse yourself in a software package to the degree that you skip meals, miss work, and forget your significant other for extended periods of time, look no further than Genetica 2.5 Pro.

IMPORTING YOUR OWN TEXTURES

Genetica suffices perfectly well as a standalone solution for anyone who needs seamless textures in a hurry, but it's even better for people who have existing libraries of textures that need updating for use in next-generation games.

Unfortunately, the ability to import an image couldn't be buried deeper. I tested Genetica sans manual, relying extensively on Help menus, and struggled with this operation relentlessly. However, once I learned how to invoke the Imported Image button, it really was a snap. (See the sidebar How To Import Images.)

Once I imported an existing seamless texture, I proceeded to an online tutorial (www.spiralgraphics.biz/gen2tutor/weathering_a_texture.htm) that demonstrated how to add weathering effects. With a little experimentation, I successfully beat down some clean brick and scuzzed up some shiny wallpaper. But as soon as I ventured outside the parameters of the tutorial, I felt very much like a new user again.

I recommend that anyone looking to quickly get up to speed on custom textures do what I eventually did: cut to the chase by dropping custom textures into preexisting Genetica files.

Skip step No. 1 from the online tutorial and replace it with the instructions in the sidebar Customizing Preexisting Files (see below). The rest of the tutorial will work the same way, except all operations will be applied to the imported image instead.

NORMAL MAPPING

Normal maps are essential for all next-gen texture artists and the Pro version of Genetica 2.5 now does them with ease. Like its regular textures and other effects maps (bump, specular, reflection, luminance), normal maps can be rendered at any desired resolution.

This latest version of Genetica also introduces Effect Map Lab Intelligence (while this sounds like something from a Ed Wood horror film, it's simply the ability to automatically generate effect maps based on the texture you're using, saving a lot of time in making grayscale channels, for instance), and Color Only Renders (which allow you to create flat-looking versions of your textures so they can be used with baked-in highlights and shadows).

PRICEPOINT

Last, but not least, the Genetica 2.5 Pro upgrade for existing users can be downloaded for free. New users can try a 30-day free demo, available at www.spiralgraphics.biz/download_gen.htm, or purchase the full product for $399. For anyone really interested in learning more about a better way to create new textures and modify their existing libraries, it's only a mouse click away—and possibly way overdue.

TOM CARROLL *is an environment artist with more than 10 years experience in game development. Email him at* ***tcarroll@gdmag.com****.*

CUSTOMIZING PREEXISTING FILES

1. Open a preset texture (I used Tile/Ancient Hopscotch).
2. Find the part of the texture you want to replace with your own image (you'll have to click on Edit button above the "Ancient Hopscotch" group) and drag an Imported Image node over that spot.
3. Click the Import Image button and select a file.

stuart roch

ART: ALEX BRAMWELL

THE ART OF SELF-PROMOTION

GETTING AHEAD WITHOUT LEAVING THE COMPANY BEHIND

OVER THE COURSE OF MY CAREER, I'VE MET A NUMBER OF people who want to have greater exposure in the industry but haven't been able to figure out how to get it. I've talked to all types, from a designer who wondered how to get noticed by studio management and kick his career into high gear, to a programmer who lamented that the guy sitting next to him was a celebrity in the industry while he felt he did better work.

There's no secret per se to gaining exposure and setting yourself apart from the pack. But doing it successfully requires that you know:

1. who can help
2. what you can and cannot share publicly
3. your motives and goals.

The real trick is getting attention in such a way that you successfully promote yourself, while stopping short of completely selling out to the media or embarrassing yourself in front of friends and colleagues. Striking the appropriate balance between self promotion and promoting one's team and company is as important as avoiding overexposure.

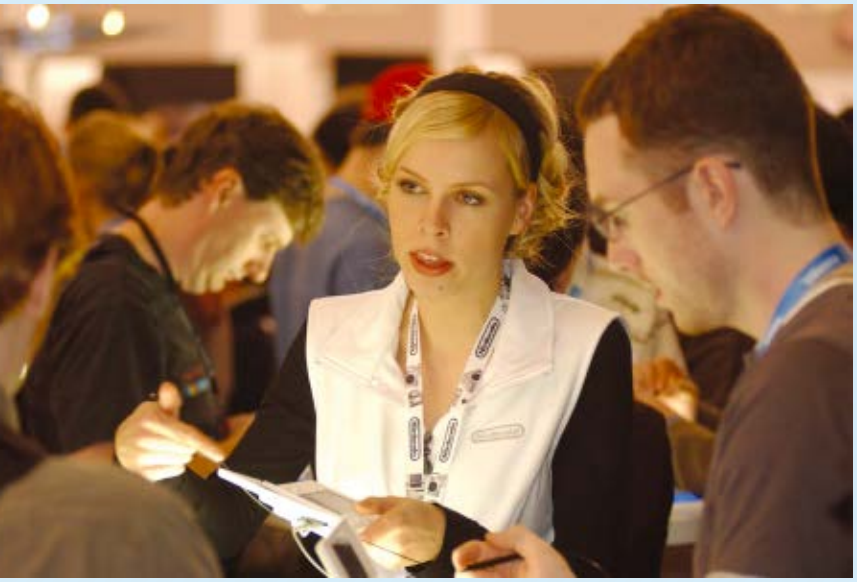
Along with proper self-positioning, you need to coordinate with the people who sign your paychecks and network with the right people. But the first question you probably need to ask yourself is, "Why should I even bother?"

MOTIVATING FACTORS

Having (and emphasizing) extracurricular, industry-related activities will allow you to gain greater exposure among your co-workers, team, and company. Doing so can also help you gain recognition from decision-makers, such as producers, the head of your studio, or even the president of your publisher.

STUART ROCH *is an executive producer at Treyarch. He hopes to see more developers jumping on the speaking circuit and publishing articles in* Game Developer. *Visit his production blog at http://productionblog.typepad.com or email him at* ***sroch@gdmag.com****.*

THE ART OF SELF-PROMOTION



Demoing games at a tradeshow can get you in good with PR, studio heads, and the gaming press.

Being on a first-name basis with your studio head will do wonders in terms of setting you apart from the pack of people on your team who do the same job as you.

Having these extra activities, such as speaking at conferences or writing bylined articles, also gives you exposure outside your immediate company. Peers within the industry will start to recognize your name the more it pops up, and new opportunities will present themselves.

Self-promotion may open doors to opportunities with monetary value, too. The beauty of the exercise is once the ball starts rolling, the quest for greater exposure will build upon itself.

If self-serving interest alone doesn't encourage you to become more involved, bear in mind that self-promotion can also put you in a position to be a spokesperson for your team, which benefits both your project and company. Think of it as additional PR for your game.

As your name is mentioned and your project is discussed, awareness builds around your title, team, and company. If the industry likes you and appreciates the message you put forth, your efforts have the potential to improve the company you work for. For one, the company's reputation will develop—and well-reputed companies attract the best talent. Second, you could boost internal morale; when a bright colleague takes pride and ownership in his or her project, team, or company, it can lift the team's spirits and contribute to a positive work ethic.

Now, how do you get started?

GET ATTACHED TO THE BRAND

Early in your career, you don't have much say over what types of games you work on. However, once you have a few titles under your belt, you should be in demand to other teams and therefore have some choice (though not complete control) regarding which games you develop. At that stage, make sure you work on games that have the potential to be successful both commercially and critically.

After you've worked your way onto a team whose title has a reasonable chance of success, try to attach yourself to the brand. David Perry of Shiny Entertainment spoke about this subject a few years ago. "Attaching yourself to the brand" simply means you should work with your managers and publisher to position yourself as the primary spokesperson for the title so the media and others in the industry will associate you with the game.

Of course, attaching yourself to the brand is only effective if you have innate spokesperson-like qualities: being articulate, carrying conversation easily, persuading your audience, and feeling energetic about public speaking.

Think about some of the most successful games of the past couple years, and then think of who represented the product—there's usually one person who stands out. While the spokesperson is often an influential person on the team, she or he may not necessarily have had the greatest effect on the success of the product.

Attaching yourself to a brand is easiest when you're the game director, but it's not impossible to do from other positions. Because the game's success relies in part on being promoted properly, if the game director is not a strong spokesperson, the opportunity is there for the taking. Someone needs to fill that role, be it a producer or environment artist.

THE PR DEPARTMENT'S DARLING

If you decide to attach yourself to the brand, how will you go about it? The first step is to volunteer your time to your producer, and given the opportunity, your publisher's PR department. Tell them you want to demo the product and be a spokesperson to the media.

I'm always amazed when E3 rolls around and studio heads have to pull teeth to find a team member who's willing to demonstrate the product. Hosting demos of your game at a trade show is an incredible opportunity, as it offers you the chance to meet industry press, network with fellow developers, and score face time with important people inside the publisher organization—people whom you likely would not have a chance to meet otherwise, from sales and marketing executives to the CEO.

If you're not a director, producer, or even a lead, don't be dissuaded from jumping at this opportunity. Often, the person selected to run demos lacks product knowledge, doesn't exude charisma, or is not comfortable speaking in public. The publisher and PR department want the best spokesperson to rise in front of the executives and media

working with public relations

A SELF-PROMOTION CAMPAIGN must be fully coordinated with the PR team, rather than simply informing them of your activities along the way.

If you're working for an independent studio, make sure the studio head is fully aware of what you do and say when you self-promote, since you represent the company you work for.

If your studio is wholly-owned by a publisher, work with its public relations team. They can help connect you to existing opportunities. Follow up with them on leads you drum up before committing and working through them.

cameras, regardless if that person is a Q/A analyst, or president of the studio, or entry-level animator. The person's title makes little difference. As long as you can shine when put on the spot, you can be the new go-to guy or gal and PR department darling!

BLOG YOUR WAY TO NOTORIETY

Blogging is another subtle tactic that sets you apart from the guy sitting next to you. While it's true that a game blog is most often a diary of your opinions and thoughts on the industry, remember that it doesn't have to be.

A blog is a blank slate. It can be anything you want it to be. If you don't want to wear your heart on your sleeve, you can focus the content on game reviews, tool reviews, or tips and tricks for others who share your job title.

Game industry bloggers are often amazed at the people hitting their sites. They're not as random and anonymous as you might expect. For instance, former co-workers will read to keep in touch with what you're up to. Current co-workers will hit the site to get to know you better. Managers and executives will pop in to gauge the morale among the troops in the trenches.

Blogging is also one of the best ways to connect with fellow developers. Because blogs are persistent, they let you network at all times and fairly effortlessly with people from the company down the block or across the Atlantic. You, in the form of your web page, are available at any time, to anyone, in any location. Perhaps more than any other medium, a blog is the best communication tool for self-promotion. It is a hub from which other opportunities spring.

Before starting a blog, however, take heed. What you write will be read by the media—and therefore your publisher's PR team. Check with managers and PR before developing a blog, and if approved, be careful what you type.

This communication medium puts you in public view as a representative for your employer, even if you put a disclaimer on your site stating otherwise. As a voice of your company, avoid anything that's controversial or confidential as it relates to or reflects upon your company. People have been fired for leaking company secrets or discussing information meant to be confidential in a publicly-traded company. Use discretion and remember that negativity and sarcasm come across even stronger when in type.

Creating a game development blog puts your name in front of a wider audience.

Speaking at game developer-specific events can help you get your name out.

SAY YOUR PIECE

Another common way to gain exposure outside your circle of friends is to write a guest article or commentary. As an added bonus, many magazines and web sites pay their authors and contributors, which can give you a little walking around money for that new iPod you've been wanting.

Once you dream up something to pitch, ask your PR team if the angle and timing are suitable—they have information about not only embargo dates of company information, but also editorial calendars for plenty of magazines.

In coordinating with PR, be mindful that they often prefer to be the initial point of contact with the editors. Since it's part of their job to connect with the media, you could be stepping on their toes if you circumvent them.

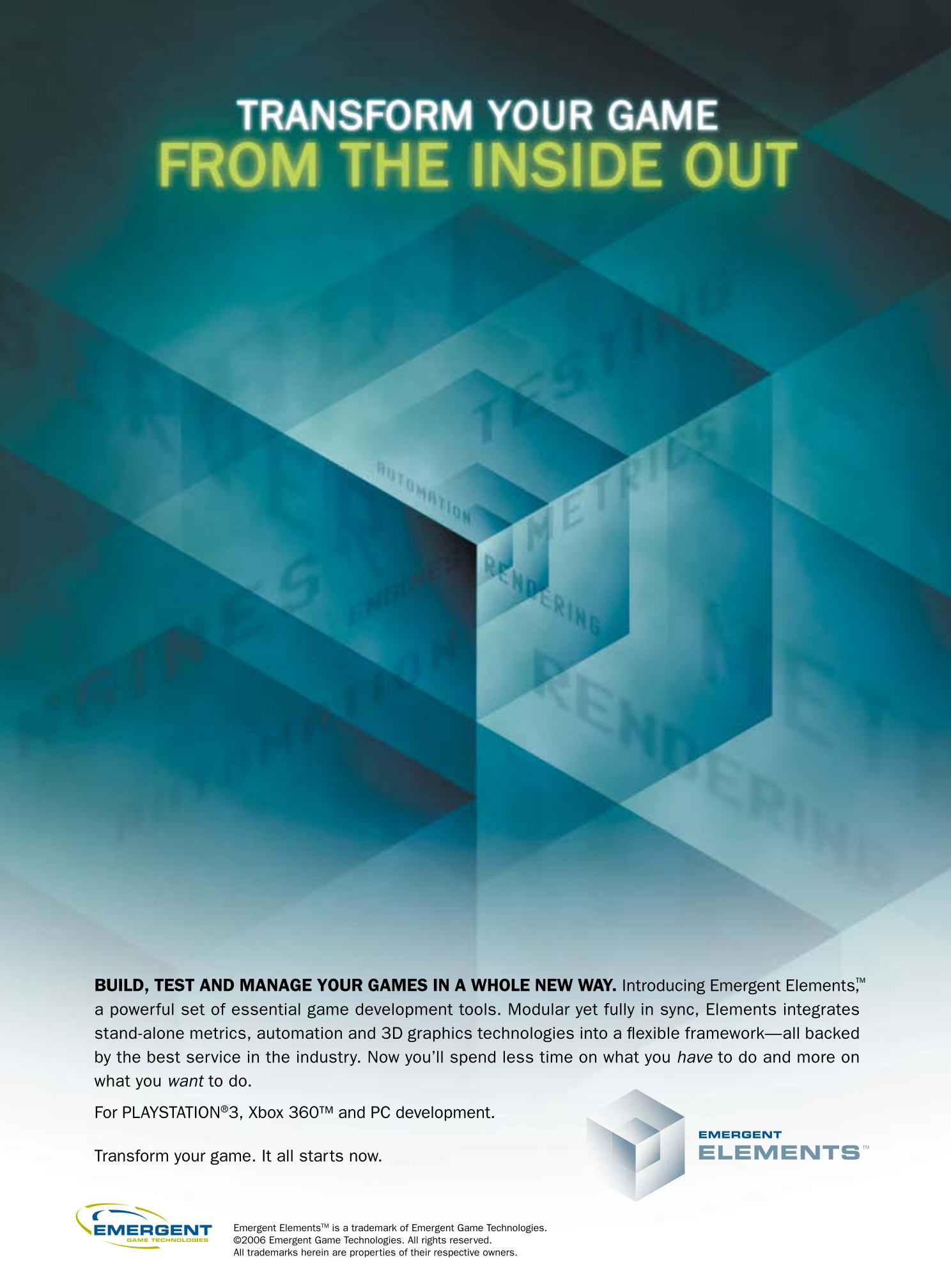
When working up the nerve to put something in writing, keep in mind that no matter what position you hold or how experienced you are, you still have different skills and knowledge from your peers. Sharing it in a well-written article gives you not only exposure, but also an opportunity to give something back to the development community.

When figuring out what to write, remember that putting your ideas in print next to your name—much like in a blog—places you squarely in front of the whole community, which in turn opens you up to criticism from those who disagree with you.

It can be a nerve-wracking exercise, but you can mitigate the risk by sharing your initial drafts with peers. Get people you trust to review and proofread the article before you submit it to a publication or web site. You can always revise both content and structure based on their feedback.

Finally, if your article is received well by the editors, they may seek you out for future assignments or longer-term opportunities.

If you've mastered the process of writing articles, you may want to take the big leap and stand up in front of a crowd to



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THE ART OF SELF-PROMOTION

Sometimes, the more you get known, the more you're worth to the company.

speak. Beyond the Game Developers Conference, many other venues exist for you to share your knowledge of game development.

Again, check with the appropriate PR teams (internal and/or the publisher's) to solicit their opinions. They might know of an opportunity or could already be looking for the perfect candidate to pitch for an event.

Conferences are increasingly popular, and there seems to be one almost every month, which allows you to submit a variety of proposals often to both large and small events.

Speaking at a conference shares many of the same benefits as writing a bylined article or becoming the demo developer. Choosing a noteworthy topic, too, can positively influence community opinion of your project and your company.

If standing before 100 people isn't your idea of fun, consider participating on a panel of speakers or even hosting a roundtable discussion to take some of the heat off. As with writing an article, presenting at an industry conference has the added benefit of padding your wallet, since many events offer a speaker honorarium.

GIVE BACK, NETWORK MORE

Many opportunities exist for developers to get involved, share their expertise, and give back to the development community. In fact, it's volunteer networks that enable the success of organizations like the IGDA. Whether you're interested in topics related to your field or subjects that are ancillary to game development, start seizing those opportunities that allow you to contribute whitepapers, influence the direction of future initiatives, or simply get involved with a local IGDA chapter.

Getting involved and volunteering helps improve our industry, and like the other self-promotion suggestions, can indirectly offer you more self-serving benefits.

When you participate in volunteer work, you're likely to be introduced to new people, such as other developers in your region, organizers of special interest groups, game studies students and instructors, and, if the timing is right, influential people.

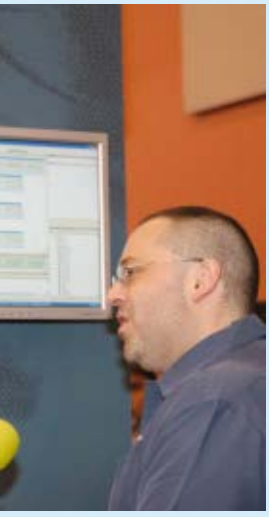
Networking is extremely powerful. And keeping your contacts organized and searchable is priceless. Save business cards you receive and add their information to your email address book or another organized and searchable database. Ping your friends from former employers and update their contact information. Building a contact database can help you land new jobs, too. Web-based networking tools such as LinkedIn or Plaxo can complement your address book, helping you not only keep track of everyone but get job endorsements as well.

COMMON PITFALLS

All these self-promotional suggestions will connect you with people and organizations outside your comfort zone. This exposure is likely to bring you before any number of people who can influence your career or who may potentially open up opportunities for you to earn secondary revenue streams. However, career advancement tactics come with their own set of common pitfalls, many of which can be avoided if you're aware of them.

Chiefly and most importantly, be in synch with your publisher's PR team before setting out. Whether you're writing an article or speaking at a conference, make sure to clear the content with your managers and company PR department. They're charged with overseeing the success of the project and, especially in the case of public companies, the PR department is supposed to protect the company and approve communication in everything from a press release to a speech at GDC. This makes them personally vested in what you communicate and how you express it. Failure to collaborate with the PR department can land you in as much trouble as an errant blog post. But if you can help the overall objective while improving your own standing, then go for it.

As previously mentioned, be careful what you write, say, and type. Like it or not, once you make



your opinions public, they become not only a reflection of your views, but indirectly also those of your team and company.

From time to time, industry luminaries say wildly controversial things to garner pull-quotes in a magazine or make a web headline — but keep in mind that they can get away with it because of their long-standing prestige and established personas. These types of sensational comments will land you, or any other average Jane or Joe, in hot water. When in doubt about an opinion or idea you want to communicate, get peer feedback.

There's a fine line between shamelessly seeking self-interests and promoting yourself while servicing both the development community and your team. While straddling that line and making sense of its nuances, always graciously give credit where it's due, even if it temporarily takes the spotlight away from you. For example, if you use someone else's idea or words, name them. If your ideas spring from collaborative efforts or were inspired by some other great work, provide your audience with a list of references or resources. When writing a postmortem, be sure to credit your team members, calling them out by name and job title as you list their contributions. If you credit the whole team for the product's success, you'll maintain a good reputation among your teammates and improve your standing in the community. When it's your name on the byline, you're already earning exposure points. There's no need to hog the limelight in the body of the article.

LADDER CLIMBER

Whether you want to be the next game god or simply on a first name basis with your studio head, promoting yourself is the most valuable thing you can do. When handled properly, self-promotion can not only expose you to new opportunities, but also develop your career with a minimal amount of effort. A positive promotional message and name recognition can lead to faster promotions or a call from a recruiter.

Of course, there's no substitute for doing great work and having AAA titles on your resume. That alone will get you to wherever your career desires lie. Still, doing a bit of self-promotion on the side will get you farther, faster.

fumiaki shiraishi

FINAL FANTASY XI'S PATCH SYSTEM DESIGN

PC GAME DEVELOPERS KNOW WELL THE method of making patches available for download. These patches were usually data or binary files that users would copy manually. But what they have not typically used is a proper "patching system."

Console game developers, however, need to put a patch system in place which downloads the latest version automatically, because the user is unable to do it manually. Online games also need a patch system to verify the client's version and make sure the client is up to date. They also require emergency patches to fix balance problems or exploits, which needs a patch system for speedy distribution.

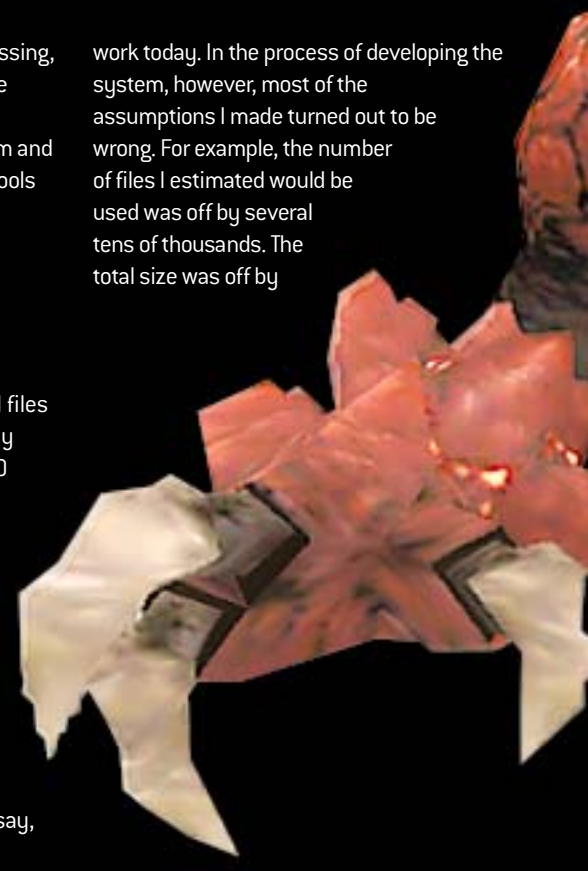
Patching is an essential part of an online game service, allowing bug fixes, game adjustments, and the distribution of new content. For the users, however, patching represents long waits when they most want to play. This article discusses what has been done and what can be done to ease the pain of patching.

A patch system is a collection of programs, tools, and servers that allows game developers to distribute the latest version to all users. Figure 1 shows a classic system. The patch client is the small program on the user's PC or console. The client checks for newer versions and downloads any necessary files. The patch client will also perform any uncompressing, copying, and configuring that might be needed. The server is responsible for communicating with the client program and sending any necessary files. Finally, tools package and prepare all the data for download and use.

FINAL FANTASY XI

The patch server for FINAL FANTASY XI originally started out with plans to manage and update several hundred files totaling several dozen megabytes. My first test data consisted of about 200 files of dummy graphics data—about 50MB—although I had assumed that the number of total versions would be small—somewhere in the order of a few dozen. The system was meant to be robust, with the users able to update to the latest version regardless of what version they were currently using or which files they might be missing. Needless to say, my initial concepts were incorrect.

Fortunately, the FINAL FANTASY XI patch system, which is also used for FRONT MISSION ONLINE and other online games compatible with the PlayOnline system, continues to work today. In the process of developing the system, however, most of the assumptions I made turned out to be wrong. For example, the number of files I estimated would be used was off by several tens of thousands. The total size was off by several gigabytes. The system only continues to function today due to the hard work of the programmers who maintain and improve it.



ARCHITECTURE

Most of the performance and limitations of a patch system are dictated by the overall architecture. Selecting the right architecture involves considering both technical and business issues.

The client/server architecture is the most straightforward approach. There is just

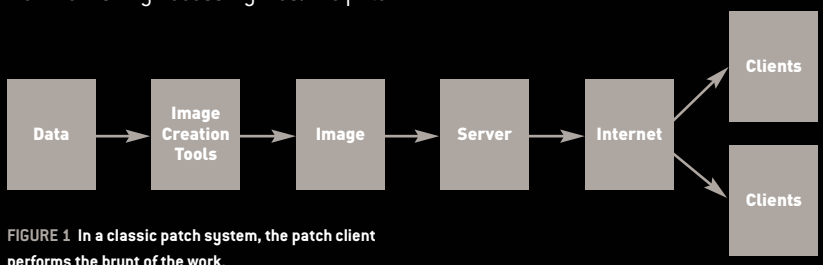


FIGURE 1 **In a classic patch system, the patch client performs the brunt of the work.**

FUMIAKI SHIRAISHI
graduated from MIT in '99, majoring in Computer Science. He currently works at Square-Enix as a game programmer, and has worked on Final Fantasy XI and Front Mission Online. His interests include reading, traveling, and hockey. Contact him at ***fshiraishi@gdmag.com****.*

FINAL FANTASY XI'S PATCH SYSTEM DESIGN

one group of patch servers to which all clients connect. The problem is the bandwidth and server cost. A patch system is only needed when an update is released. Depending on the game, this could be just a few days every few months. On those few days, however, the developers will need significantly more bandwidth and server power than usual—and paying for bandwidth capacity that you need only a few days every few months can be costly and wasteful.

Rather than having one server group, you can make each one of your clients also work as a server, creating a peer-to-peer architecture. Using peer-to-peer will greatly reduce the bandwidth and computing power needed to release an update. This approach might also decrease download time for users as well. The downside is that such a system will be more difficult to develop, and the service quality will be harder to maintain. If the client base is large, each user will have a lot of peers to download from, reducing the average download time. However, if the game is a niche product with few users, then each user will have fewer peers to choose from, and the download time will suffer.

Realistically, the best compromise is to use a hybrid system in which a user can download from another user when possible, or from the central server if not.

Another approach is to not bother with a patch server at all, and rely on the old-fashioned method of simply releasing a self-installing binary and placing it on various gaming sites—although for most console games, this technique is not possible. Additionally, more casual players find it a daunting or tedious task to surf the web for the right binary and then install it manually. This approach also doesn't work for emergency patches or patches that are absolutely required.

For FINAL FANTASY XI, which is available for PC, PlayStation 2, and Xbox 360, we used the simple client/server approach. As I mentioned, it is not without its problems, but it has succeeded in maintaining a certain level of quality.

KNOW THY DATA

An important step in designing an online game is deciding the file structure of all the data. This is more of an issue with the actual game rather than the patch system, but it still has an effect on the patching performance. The important trade-off to consider is file size versus file number. Having a good balance of file size and number is especially important in an online game.

Packing different kinds of data into one file could improve performance by reducing seek time and the overhead associated with opening and closing a file. Having large, packed files tends to increase compression rates as well. The improved loading time is important not just for game play, but also for installing and patching. At the same time, though, if the wrong kinds of data are stored in one file, you might end up having to read or skip irrelevant data just to get to what you're looking for.

In terms of patching, you may end up having to download a big file just to make a very small change. Dividing data into small, discrete files tends to make programming easier. Having small files minimizes the amount of data that needs to be patched to make a certain change. On the other hand, having a large number of files often slows down copying and searching directories, which could lead to a considerable penalty in the game and patching performance.

The FINAL FANTASY XI patch system uses mostly small, discrete files. When we were first designing the game, modems were still prevalent so we focused on reducing patch size above all else. We also did not know the extent of the performance penalty for opening and closing files on the PlayStation 2. We succeeded in reducing the patch sizes for FINAL FANTASY XI, but the overall patch time suffered because of all the opening and closing of files. The actual game also suffered from the long load times.

THE SQUEEZE

The simplest way to create a patch is to compress the files using a common compression algorithm. To install the patch, the user can simply uncompress and copy over the older version. There are many compression algorithms available to do this, with the ZIP format being the most common. Except in rare situations, the algorithms available will compress files to about 40 or 50 percent of the original size, which is adequate for simply sending a few files, but not when the patch is 100MB.

In FINAL FANTASY XI, we improved that compression rate by leveraging older versions of the same file. We calculated the difference between the old and new versions, and compressed that difference. Figure 2 is an example of the diff compression.

We compare Version 1 and Version 2 of the same file and isolate the parts that have changed. We then extract the changes, called "diff" in this case, and compress that. Finally, the diff is compressed using a common algorithm to create a "patch" which is the actual data that needs to be sent.

Decompression is simply the reverse of the compression algorithm. First we uncompress the patch to recreate the diff. The diff is then inserted into the older version, or Version 1 in Figure 2. The resulting file will be Version 2, which is the desired end product.

The difficult part of this approach is calculating the diff. With text files, this is fairly easy due to the existence of line numbers. Each line can be treated as a unit of comparison, allowing easy detection of line additions and line modifications. With binary files, however, the problem is much more difficult. Instead of lines,

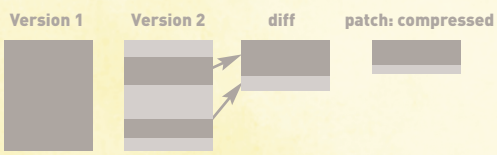


FIGURE 2 **Diff compression.**

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FINAL FANTASY XI'S PATCH SYSTEM DESIGN

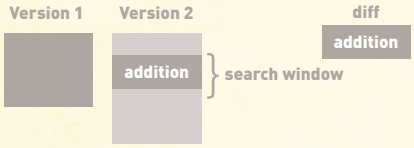

FIGURE 3 **Successful diff search.**

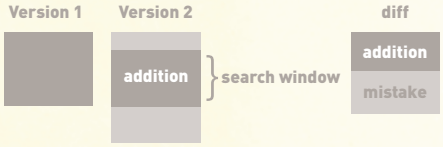

FIGURE 4 **Unsuccessful diff search.**

we have to use a single byte as a unit of comparison. With bytes, a simple comparison of two files is time consuming and unrealistic.

For our purposes, we put a cap on the search window for each byte. As a result, we have restricted our computation time, but we also added strong restrictions in our algorithm's ability to detect differences correctly.

In Figure 3, the additional data are smaller than the search window size, resulting in a successful extraction of just the additional data. In Figure 4, however, the additional data are larger than the window size. The algorithm will give up and deem the entire rest of the file to be different.

With our algorithm, compression rates differed widely depending on the file format and the changes made. For example, with a search window of 100K, if 500K of data were added to the end of the 1MB file, and only the added data were compressed and sent, it would result in a patch of maybe 300K. If a total of 500K of data were added to the very beginning of the file, the entire file would be compressed and sent, resulting in maybe 800K.

In FINAL FANTASY XI, the file formats were tweaked so that changes could often be added to the end of the file. This method worked great. In the long run, though, tweaking the file format to increase compression rates can be a bad idea. If the game optimizes based on certain assumptions about the patch system, the patch system loses the ability to change its compression algorithm and policies. Ideally, the patching system should work independent of the actual game it is patching.

DOWNLOADING MORE THAN THE SUM OF ITS PARTS

The simplest approach to patching each user's game is to apply each update one version at a time. If the game is more than one version behind, it is updated repeatedly until it's completely up to date. With this method, all the changed files in a version can be packaged into one archive and compressed, getting a better compression rate overall. For the purpose of this article, I will call this the archive method.

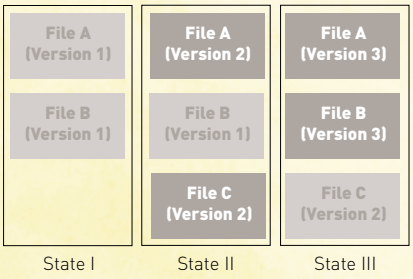

FIGURE 5 **Patching state to state.**

The problem with the archive method is that the same file is often patched over and over again. Certain files have a tendency to be changed often, and when you are outdated by three versions, you are probably patching the same files three times. Figure 5 shows an example of this redundant patching. File A is modified for both Version 2 and Version 3. If we use the archive method, the user would first download Version 2 of File A, and Version 2 of File C, ensuring that the user has a full State II environment. The user would then download Version 3 of File A and version 3 of File B, finally reaching State III. If File A was large, we probably wasted a lot of time downloading Version 2 of File A.

Rather than patching one version at a time, a user could also patch one file at a time. One way to do this is to check every pertinent file on the user side and calculate a checksum, a unique ID for the content of the file. The client would send this checksum to the server.

The patch server would then compare the checksum for the client's file and the latest version's file. If the checksum is different, a copy of the latest version is sent. In the example from Figure 5, the user would download Version 3 of File A, Version 3 of File B, and Version 2 of File C. I'll call this method the file-based approach.

For FINAL FANTASY XI, we used the file-based approach with some further optimizations. Whenever we created a new version, we figured out the best way to patch to that version for each file from all previous versions. If a file has four versions including the latest one, we have to figure out the best patching path for each of the three previous versions. For example, Figure 6 (page 26) shows four different versions, with Version 4 being the most recent. The number below each file represents the compressed size of that file. The number below each arrow represents the size of the diff compression, as described earlier.

For a Version 1 user, the user should first patch directly to Version 3, downloading 0.7MB, then patch from Version 3 to 4, downloading another 0.2MB for a total of 0.9MB. Here, the file-based approach works out to be less taxing than patching straight to Version 4, since that would require 1.0MB.

For Version 2 users, the user should patch to Version 3 then to Version 4, resulting in 0.6MB of data to download. Version 3 users should simply patch to Version 4, with just 0.2MB to download.

The downside is that checking the files on the user side takes time. Another problem is there's overhead associated with comparing, compressing, and sending each file. If the data are divided into numerous small files, the overhead will add up and performance could be quite bad. In Figure 5, if File A is very large, then calculating the checksum and sending files separately is the best approach. If File A is small, however, the archive method will be both smaller and faster.

TAKE ONLY WHAT YOU NEED

Not all files are necessary for every user. Some maps are only needed by high-level players, while some models are only

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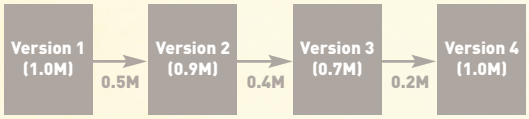


FIGURE 6 **Patch path.**

needed by characters of a certain race or country. By differentiating necessary and unnecessary data, we can further minimize patch download times.

One way to do this is to sell certain files separately as expansion packs. The user can then decide which files or packages to purchase and maintain. This method is good in a business sense because users pay extra for the packages.

FINAL FANTASY XI uses expansion packs in a limited way. The patch server in the game will not patch expansion pack files unless the user already has them. In other words, unless the user has bought a copy of an expansion pack, the files are not patched. Once a user has installed an expansion pack, all those files will then become a target for patching.

Similarly, you can allow the user to choose when to install certain non-essential files. Players who don't have any intention of going into a certain area of the game can decide not to patch the affected files. On the other hand, users who advance a level and plan to travel to new areas can patch the necessary files when they're ready.

The third method is to download on the fly or in the background, an idea that has come up for both FINAL FANTASY XI and my current project. An example of downloading on the fly would be a user who downloads a patch to a map as he or she approaches the specified area. There's always the fear that the user will not be able to download the necessary files in time, resulting in downtime, but in the end, the trade-off is downtime before the game for downtime during the game. If done right, the user might not feel delay at all. When a new enemy appears on the horizon, the model and the textures could be downloaded from the game server, cached in the client, and then displayed.

By differentiating between essential and non-essential data, we could significantly decrease the downtime experienced to download to the latest version. The trade-off here is the added complexity, which will require more development and more testing. As we get better at making online games, we should become better at hiding more of the patching time.

REGRETS, I HAVE A FEW

One problem we had in creating the FINAL FANTASY XI patch system was creation time. The current system minimizes the

amount of data downloaded by the user, but takes a very long time to create and configure it. This was a result of our policy to weigh user's downloading time more heavily than the developer's patch creation time. In retrospect, I think this was a mistake.

While user downloading time is important, patch creation time is equally important. If it takes the developers hours to make and distribute a patch, how quickly will they make patches in an emergency, and how quickly will they respond to other emergencies? Even for normal updates, slow patch creation is frustrating and wastes time. When we consider how an online game can continue service for a very long time, and consider how often developers will be creating and testing patches during that indefinite amount of time, it's easy to see how much time and energy is saved by putting a little effort into having a fast patch creation standards. To add to all this, the user's download time will decrease over time due to improvements in bandwidth. Patch creation time, on the other hand, is often limited by disk I/O, which improves at a much slower rate.

I also regret all the false assumptions we made about our data. We were inexperienced and did not know at the time what we were getting into. A patch system has to work and scale independent of the actual game. To develop such a system, we had to look past the current design parameters and think about how an online game would continue to grow. The patch system needs to handle this growth without requiring any changes unto itself.

Finally, the biggest problem with the FINAL FANTASY XI patch system was the development attitude. The system was developed like any other part of the game—under considerable stress. What we did not foresee was that compared to other parts of the game, the patch system would be much more difficult to fix. The game program and data are modified and fixed frequently, but the patch system is rarely modified, if at all. This is because a mistake in the patch system could be disastrous to the game's service.

Once the service starts, the patch system is a very difficult system to fix for political reasons. As a result, it's crucial to get it right the first time. Had we known this, we probably would have developed the system differently.

HOLISTIC DESIGN

If given a second chance to develop another patch system, I would do many things differently. First of all, rather than designing the client and server, then adding various tools as needed, I would try to design the system as a whole. The lifecycle of a patch includes not just the downloading and installing but also developing, testing, and retesting. I would try to remember that players are not the only users of a patch system. If anything, game developers are the real users of a patch system, so it's important to design the system for their use.

Second, I would probably scrap the diff compression scheme and modify our file downloading policy since the majority of active players are only one version behind. To optimize performance for the majority of players, I would create an archived patch specifically for people who are just one version behind. I would also want to build an archived patch for new installations, for people who are playing for the first time. All other players would have to check each file individually, downloading only the necessary files. One additional benefit of this theoretical approach is that players who have broken versions, due to either tampering or disk errors, can have their environment fixed by the patch system.

Other improvements I would like to add are peer-to-peer updating and patching on demand. These features have already been implemented in newer MMORPGs and have shown to be quite effective.

The system we designed for FINAL FANTASY XI continues to work, but is showing signs of age as data grow larger and more games are supported. At some point, the system may require a major overhaul, to accommodate the things we've learned in the past three years running PlayOnline games.

Though internet bandwidth continues to improve, the volume of game data is increasing at an alarming rate. The problem of patching and waiting will not go away by itself. As much as we patch system developers would like to spend our time on something more fun (like working on the actual game), we know that as we look forward to the third and fourth generation of online games, the patch system will require modifications in order to improve the overall game experience.

KONAMI'S METAL GEAR

PLAYING THE 3D CARD

FOLLOWING THE WORLDWIDE SUCCESS OF METAL GEAR ACID ON PSP, I was asked to create a sequel, and in the process, I was given the opportunity to perfect my vision for a card-based, tactical version of METAL GEAR.

The road to submitting the master disc of METAL GEAR ACID 2 (MGA2) was exciting but difficult, as it rounded out two straight years without a single day off—which also included the production of the first game. For MGA2, my staff and I called ourselves the Solid Eye Team (named after our cool new 3D technology) and formed a common bond as we pumped out an immensely superior sequel in just eight months.

But before I dive into detail about the MGA2 development process, let me rewind to when work began on the first game. At the beginning, we were tasked with putting together a METAL GEAR game for Sony's then upcoming handheld (the PSP). We worked under a lot of uncertainties. When would the PSP launch? Were these "final" PSP specs really final? Will METAL GEAR fans dig a card-based version of their beloved series?

By the skin of our teeth, we released METAL GEAR ACID within the launch window of the PSP hardware in Japan. But as became a common theme in the next year of my life, there was no time to rest and enjoy the moment. We immediately got to work on the North American and European versions of METAL GEAR ACID.

SHINTA NOJIRI *has been with Konami since 1994, and is currently director of content for the Kojima Productions team. He was the game director on METAL GEAR ACID 2. Send inquiries about this article to* ***editors@gdmag.com****.*

AC!D 2

GAME DATA

DEVELOPER
Kojima Productions

PUBLISHER
Konami

RELEASE DATE
December 8, 2005 (Japan)
March 21 (North America)

DEVELOPMENT TIME
8 months

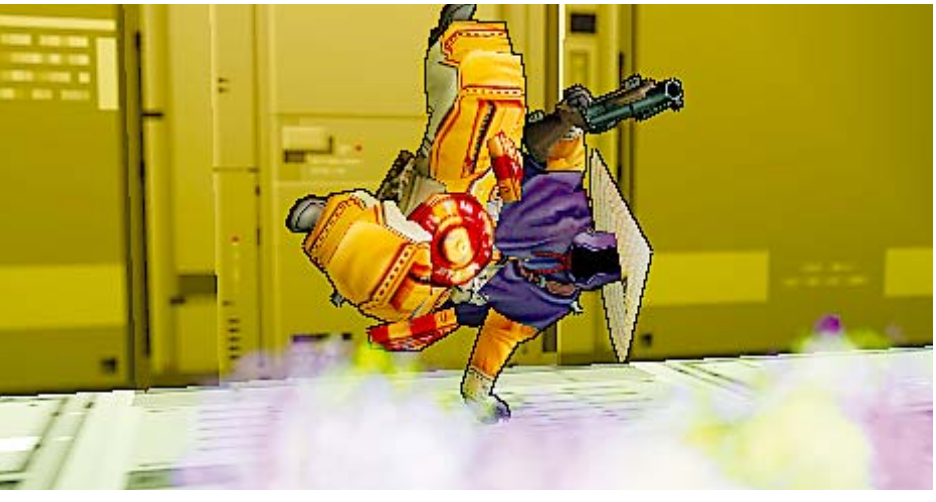
PLATFORM
Sony PSP

LINES OF CODE
405,736

WHAT WENT RIGHT

1 **PROJECT MANAGEMENT.** Thanks to thorough planning and great support from my staff, I was able to juggle two big projects at once. In March 2005, I worked on the European version of MGA1 while creating the foundation for MGA2, a game that we would premiere a mere two months later at E3.

Now I won't name names, but when it comes to making a sequel, many developers are satisfied with just fixing some graphical glitches and adding some new characters and stages. Personally, I would not be able to forgive myself if I did that with MGA2.



When planning began for the game, I made an ambitious concept document. In the first two months leading up to E3 2005, we created not only a new heroine, new bosses, and new stages, but also a new graphics engine. In March, I mapped out the content for the game and the E3 trailer. Near the end of the month, we had an early version of the game working, which we then used to take video for the trailer. We inserted some clips of MGA1 to show viewers the difference between the two games, did a quick edit, and then barely submitted our trailer in time to be shown at E3. I'll be the first to admit that our E3 plans were risky, but the result made it worth it. I arrived at the convention with a radically different-looking sequel that surprised everybody.

2 **IMPROVED TEAM.** To some development teams, it's a thorny request to ask that the developers beef up the foreign versions of their game. However, when the MGA2 team was approached with this proposition, their response was incredible. Without their hard work and organization, we could not have developed this game in the short time that we did.

Conversely, the MGA1 project didn't always run smoothly. A number of factors contributed to the rockiness, including the hardships of developing on a new platform. Looking back, I think a lack of organization within the MGA1 team also played a part.

Organization and careful planning is something that I take very seriously. More so than most producers I know, I put a lot of time and effort into making realistic and thorough schedules. It's not the most exciting work, but it pays off in the long run. This habit stems from my roots as a game planner, which in the West is somewhat similar to the title game designer, but involves management as well.

I entered Konami in April 1994 as a game planner and managed a team of scripters working on the PlayStation version of POLICENAUTS. This was long before the formation of Kojima Productions. In fact, my boss, Hideo Kojima, really didn't like me at the time. "That Nojiri is a pretty dull guy," he once said.

Dull as I may be, I carried my planning habits over into my new role as game director. With the MGA2 project, I had my team leaders stick to firm schedules as well. Character modelers, for example, were given strict deadlines: create one character per week. As hard as that was for the modelers, a dozen people were waiting for that character data to get into the game, so if you have eight months to make a game and your character modelers are delayed even one week, that delay creates a huge domino effect.

Another important factor in making sure the MGA2 train ran on schedule was our producer, Noriaki Okamura. My personal interests lie in scheduling and art, while Okamura loves promotion, which made us a great combo. In short, we had a well-oiled development machine, which was totally different from the previous game's development. Back then, we had some troublemakers who gave the team a hard time—many wouldn't even show up for work! I'd call them in the early afternoon and then they'd roll into work in the evening with no motivation. When you only have three scripters and one doesn't come to work, that's a heavy burden to pass on to your partners.

3 **REUSING ASSETS.** Working off our MGA1 build made our lives much easier in developing the sequel. We learned a lot about the PSP and really utilized our experience with the hardware's memory, UMD drive speeds, and data processing schedules. If this had been our first PSP project, MGA2 would have taken two years to develop. Thanks to our work on MGA1, MGA2 only took eight months (with zero days off for holidays and weekends).

Since we already had our rendering engine from MGA1, we were able to tweak it and use it with MGA2, saving months of work. I also cheated by stealing a few 3D models from the first METAL GEAR SOLID game, like the military Jeep, and Vulcan Raven's tank!

One thing we nailed this time around was minimizing the load times, a game feature I've always been curious about. Do

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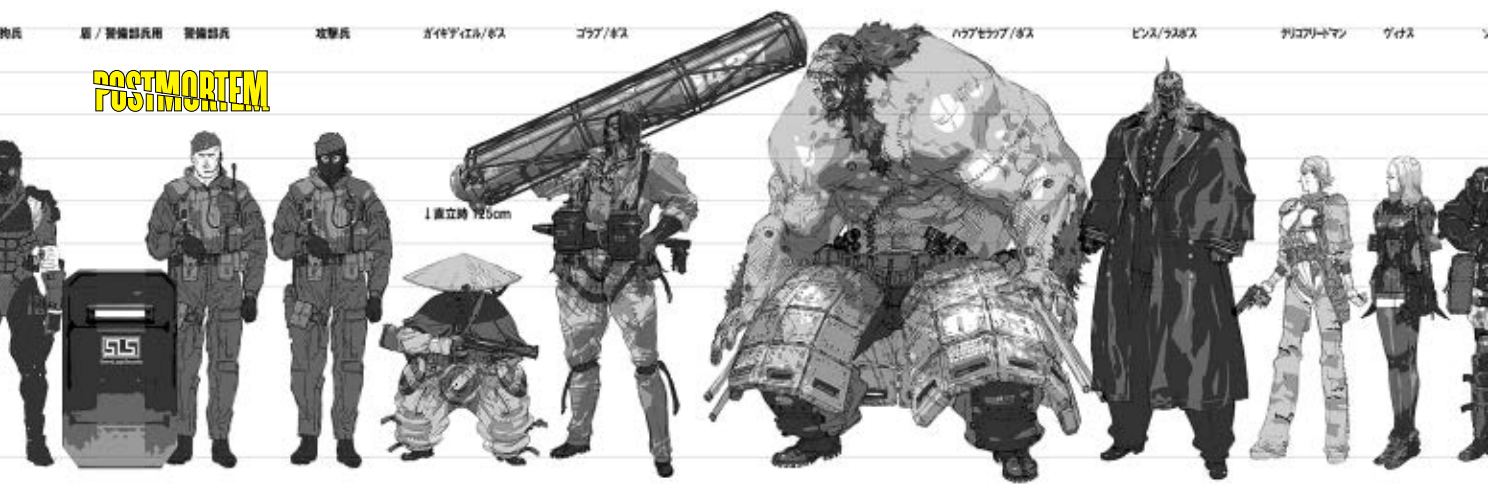

Americans hate long load times? Or are the load times inconsequential? I've noticed that particularly with U.S.-developed games, long load screens are prevalent at the beginning of the stage, but then the gameplay is seamless thereafter.

In MGA2 we used some tricky techniques to make sure the UMD drive was spinning off data in the background. As a result, the load times were so short that we didn't even feel the need to create a loading screen. But do people really care about this feature? I get the impression that nobody pays attention to load times unless they are unusually long—then they'll take notice and complain. Very few players seem to vocally appreciate short load times.

4 3D VISUALIZATION. The month of March has a glut of newly released games. As such, it was necessary that MGA2 have some feature that really set it apart from other titles. Thankfully, we implemented something you won't find in any other game—3D goggles!

From a development standpoint, the Solid Eye 3D Goggles were a unique feature. Packaged inside the UMD case of MGA2, the goggles strap onto the PSP, enabling 3D visuals throughout the entire game, from start to finish. Players can also watch videos in 3D, like METAL GEAR SOLID 3: SNAKE EATER cinematics, dozens of videos starring sexy models in bikinis, and the METAL GEAR SOLID 4 trailer.

Bringing a 3D viewing mechanism to the handheld market was something I had wanted to do for years. I actually got the idea while developing MGA1, but didn't have the time to implement it. When the order came in to make a sequel, I finally had an opportunity to incorporate my 3D fetish.

Putting in the 3D feature worked well with my development philosophy. If I'm going to spend nearly a year of my life on a sequel, I'm going to make it worthwhile for both myself and for those who purchase the game. Adding new cards, making new characters, and writing a new story is the easy route in developing a sequel. I wanted something fresh with MGA2, and to be honest, I can't think of anything more exciting than packaging in 3D goggles.

This version of the 3D Eye peripheral is a bit more elaborate than the shipped product, but the effect is the same.

The Metal Gear Acid 2 team celebrates after the long haul. The red-haired Shinta Nojiri is strategically positioned just above the champagne.

5 REACTING TO FEEDBACK. Searching for and reading negative feedback of your latest game is a tough job, but it was necessary when moving forward with MGA2. We scoured gaming message boards and collected every review ever written on MGA1. Some criticisms were valid, like the annoying item pick-up system where players had to land and finish their turn on an item rather just being able to walk over it and pick it up. However, I felt like many reviewers just didn't give MGA1 a chance because it wasn't an action game.

For MGA2, we worked hard to implement a more streamlined experience. Now, Snake maneuvers in real time more often, and actions like climbing ladders, hitting opponents, and hanging from ledges can all be performed on the fly with the D-pad.

WHAT WENT WRONG

1 LINGERING LOCALIZATION ISSUES. At E3, Noriaki Okamura (MGA2 producer) and I made an effort to hear the praises and complaints of MGA1 from journalists who came in to interview me. By the third day of E3 I could almost set my watch to the timing of the question, "The translated English text of MGA1 wasn't very good. Are you planning to remedy that in MGA2?"

Upon my return to Tokyo, I made sure that MGA2's localization process took high priority. I hate to make excuses, but for MGA1, we simply didn't have time to prepare a perfect English translation; we were restricted by the PSP hardware North American launch date.

I faced a similar situation this year with MGA2—should I push for a Christmas release in North America and forgo a thorough


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English localization? Or should I stick to my lessons learned at E3 and give the localization process the time it deserves? MGA2 launched in North America on March 21 with an awesome English translation.

One thing I'm happy we addressed is the initial Japanese-to-English translation text. Most of it was error-free, but the tiny nuances of some of our characters were missing in the English text. I asked our in-house native English speaker to rewrite many of the lines from our silly characters Dalton and B.B., whom I designed as hilariously stupid in the Japanese version. Perhaps the translation company didn't think the characters were supposed to be that thick-headed, but their absurdity was intentional. Young hacker character B.B. in particular needed tuning—he lost much of his boyish vernacular in the initial English translation.

It's admittedly very difficult for the Japanese to create games that Americans will interpret as culturally normal. But I'm not pointing fingers—we're guilty, too. Here's proof: In the MGA2 Jeep escape stage, take a look at the road. The game is set in the U.S. but the speed limit notices on the road are on the left side of the road. At least the Jeep has the steering wheel on the correct side. We noticed our mistake about the road a few days after master submission.

I'm sure all developers experience this, but I just didn't have time to do all the things I wanted before the master submission. Namely, for the North American version, I wanted to swap the X and O button commands on the PSP to fit American standards. As you probably know, circles like the O button on PlayStation controllers signify "OK" or positive connotations in Japanese. X means no, or cancel. I know that this is different abroad where X is often used to indicate selection. X marks the spot, right?

In the foreign versions, I wanted to swap the X and O commands but I was afraid it would trigger some bugs and cause us to miss our master-up date. So instead, we opted to beef up the game by adding new MGS4-themed cards as well as four website cards that were designed by viewers of some of America's most popular online gaming sites.

2 BUG CHECKING. I hate to call bug checking a bad thing because it's not really the team's fault, but some members did have some trouble with it in the final stretches of MGA2 development. For one, members who lack programming experience are very slow bug checkers, and with a relatively small team like the Solid Eye Team, I had to assign every member to bug checking duties.

As anybody with bug checking experience will tell you, playing through the near-complete version of the game the first few times is fun, but it soon gets boring, tedious, annoying, infuriating, and mentally draining. No matter how much coffee and sweets Okamura would bring in to help refuel the team, our artists in particular were very upset near the end of the bug checking process. "I'm an artist! Why I am checking for bugs?"

Q/A is tough, and sometimes you don't even notice really obvious errors. There is one bug in particular that eluded the entire MGA1 team until work on MGA2 began. Many players complained about how long it takes for Snake to use the flamethrower weapon—he blankets his enemies with flames in an extremely long animation. I later found out that was a bug: the animation counter for the action was set at 2! So that animation actually loops once before you can return to the action.

3 RELEASE SCHEDULING. I know one thing that many gamers don't appreciate—jam-packed game release periods. Often around Christmas, the release schedule is so full of AAA games that many gamers don't have time to try out all the quality titles, leaving many great games forgotten in the shadows of giant colossi. And that unusually crowded release line-up near Christmas hurt MGA2's sales in Japan.

We fought head-to-head with Ryu Ga Gotoku (Yakuza), Mario Kart DS, Rogue Galaxy, and the aftershocks of Animal Crossing. So much great software was released in December that MGA2 went largely overlooked. But there are still many benefits to launching software in time for the holidays, as game sales are much higher than spring and summer months.

Due to my desires to put out a well-localized game, the North American version of MGA2 was released in March 2006. I kept a

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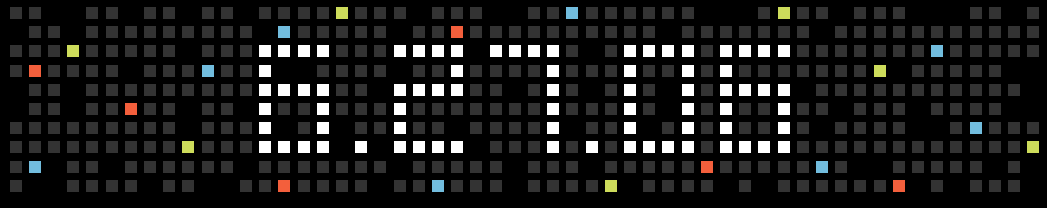

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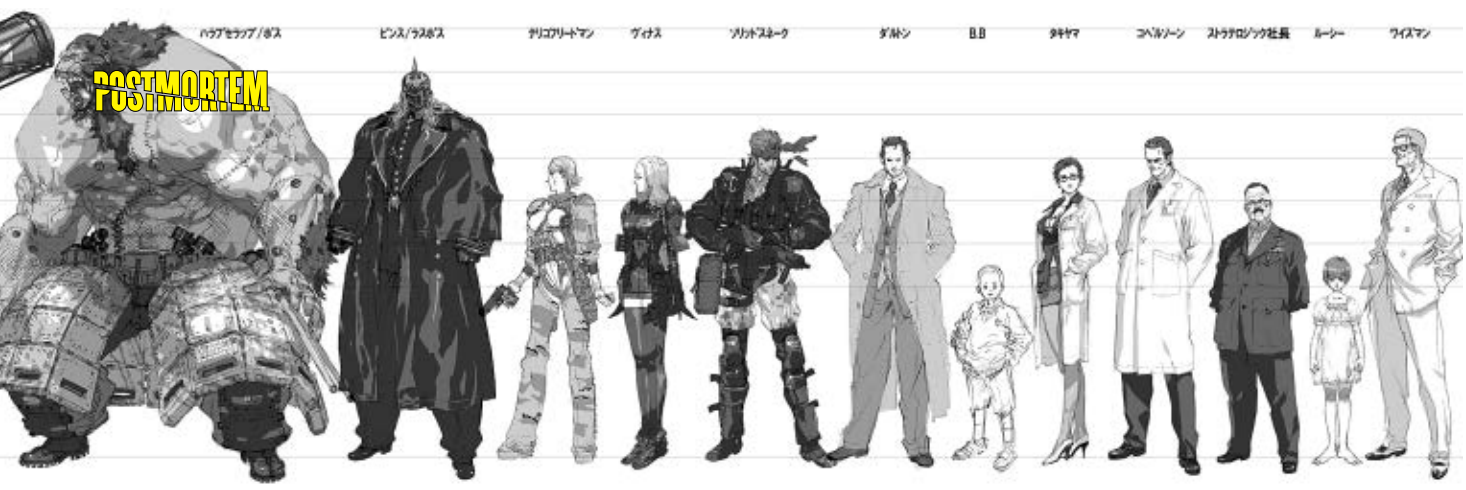

careful eye on the March software line-up since late 2005, and I gradually watched March (the end of many companies' fiscal years) fill up with more and more AAA titles. It was like a second Christmas! Suddenly, March was loaded with METAL GEAR rivals like SYPHON FILTER and SPLINTER CELL on PSP, not to mention GHOST RECON: ADVANCED WARFIGHTER on Xbox 360, and KINGDOM HEARTS II on PlayStation 2. From a developer's point of view, though, I try not to worry too much about software line-ups, especially when work on a title begins so many months (or years) in advance.

4 **GOGGLES.** Developing the Solid Eye 3D Goggles was a chore. First, it doesn't fall into the safety zone that many Japanese bean-counters like to be in. I proposed that we include the goggles with the game without raising the retail price. It was a tough sell, especially because 3D visuals aren't very popular in Japan, but I got it through.

The lenses we used offer some of the latest in 3D technology. They were a bit pricey, but the remaining materials were cheap to produce. In fact, I built the first prototype using scissors, tape, and cardboard. They were very low tech, but ultimately, they helped sell the idea to higher-ups.

Although he's now a big fan of the 3D goggles, Kojima Productions head Hideo Kojima was a bit hesitant when I first presented the idea to him. Armed with my homemade goggles, I roamed the studio, showing anybody who would try them out, and gradually converted the majority of the team, who later wound up supporting my crazy idea.

During MGA1 development, I had a secret society of people within the team who liked my 3D idea. While working on their main jobs, they would quietly help me get my Solid Eye project off the ground. Since I'm not a programmer, I really relied on the help of my team to realize this dream.

The idea eventually was approved for MGA2, and my full staff had to buckle down on incorporating the 3D peripheral. Rendering was extremely laborious. We needed hundreds of gigabytes to render the special graphics and had to assign many people to manage the task of putting MGS3: SNAKE EATER graphics into video that's compatible with the 3D lenses.

At the last minute we decided to try and put the METAL GEAR SOLID 4 trailer in 3D, which meant I had to borrow staff from that development team. In order to realize the video in 3D, the team had to go back and tweak the original renders of the MGS4 trailer. This was also true for the SNAKE EATER cinematics included in the game.

5 **ADDED 3D CONTENT.** One fun thing about Solid Eye was choosing what kinds of things we wanted to make 3D. I asked many people what they would like to see in full 3D. Most replied, cool game trailers, race cars, and other mundane stuff. I, on the other hand, had something completely different on the brain—girls in bikinis.

Early on in development, we struck a deal with the Japanese men's magazine Sabra to do a cross-promotion. Three Sabra models were dedicated to the project, whom we photographed and used for in-game cards. They showed up at promotion events like the Tokyo Game Show, and of course we shot footage of them in bikinis to view in 3D.

My only regret is that we didn't have the budget for more than one day of video shooting. We rented a special camera that could take 3D video, which was quite expensive, and so throughout that day we had to tweak and experiment with the camera in order to get the right shots. It would have been nice to have two or three more days to shoot film.

The cold, hard reality is that no matter how cool I think the Solid Eye peripheral is, I know that the 3D gimmick won't excite everybody. One day I brought my 3D prototype home and showed my girlfriend who gave it a quick try and said, "Oh, that's nice," and returned to whatever she was doing before I interrupted her.

GEARS KEEP TURNING

I want nothing more than for all fans of METAL GEAR SOLID to try out this new spin on the METAL GEAR series. With MGA2, I really think we've made the best version of ACID possible. This round we've added arena mode, a two-player link battle mode, USB linkage with METAL GEAR SOLID 3: SUBSISTENCE on PlayStation 2, just to name a few features.

If one of my colleagues gets assigned to make a sequel to MGA2, he's going to have his work cut out for him. Despite the hardships of bringing METAL GEAR to a new genre and developing two games back-to-back, we've truly made the most complete, perfect version of a card-based METAL GEAR possible.

Now it's time for a vacation!

John Knoll | BA University of Southern California | Visual Effects Supervisor, Industrial Light & Magic, San Francisco, California | Co-creator Photoshop | 20-year SIGGRAPH attendee

Tobi Saulnier | PhD Rensselaer Polytechnic Institute | CEO, 1st Playable Productions, Troy, New York | 3-year SIGGRAPH attendee

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INTERVIEW:

CLIFF BLESZINSKI

AT WAR WITH COMPLACENCY

CLIFF BLESZINSKI, ALSO KNOWN AS CLIFFYB, IS renowned for his outspoken nature in the realm of game design. As Epic's principal design mind, one of the key creators of the UNREAL series, and the driving force behind the highly-anticipated Xbox 360 title GEARS OF WAR, he's not just speaking off the cuff. Though sick at home with a cold, and with a dog chewing up his furniture, Bleszinski was as ebullient as ever when *Game Developer* spoke with him on the phone, sharing his thoughts on the next generation, games as art, writing in games, and how to shake up a growing industry.

BRANDON SHEFFIELD *is associate editor of* Game Developer. *He will be very disappointed if* GEARS OF WAR *does not make espresso for him. Or at least a nice steamed milk. Email him at* ***bsheffield@gdmag.com****.*

Brandon Sheffield: *Is there a lot of pressure to perform right now, since* GEARS OF WAR *is being lauded as one of the first real next-gen games?*

Cliff Bleszinski: The thing is, I actually love the hype, and I love the fact that everyone thinks it's going to be great, but the problem is that expectation management is a very tricky thing. People thought HALO would be very good, but they didn't think it would be as great as it was because the expectations weren't there. And now there's so much hype for this game that if it doesn't make espresso for everybody and completely change every single perception about video games, there's no way we'll be able to match up to the hype. That said, I'd rather people know about the game than not. The bottom line is that it's a damn good problem to have.

BS: *What do you feel makes next-generation gameplay, then?*

CB: People say it's more enemies, it's larger levels, it's more open-ended gameplay. But what next-generation means to me is being smarter about what your controls do. In GEARS OF WAR, A is your context-sensitive movement button. You use A to get into cover, to get out of cover, to somersault, to climb over, to climb down. You can hold A to do a roadie run, which is that kind of panic run where the camera shakes—we have done such a good job with the control scheme of this game that we actually had to look for something to put on the Y button, basically. We're thinking maybe in co-op you can use it to check in on your co-op buddy and see where he is.

A lot of games make the mistake of not using the controller well. It's like, "Oh look, I have all these

buttons, so they should all do eight million things." But that's not necessarily the case. I played GHOST RECON: ADVANCED WARFIGHTER, and I think it's an excellent game, but it's extremely deep and extremely tricky to learn. Within the first five minutes, you're learning 400 different things on every single button, and some of them are pressed, and some of them are held, and it's just crazy. You've got to have something that's easy to learn but takes a lifetime to master, you know?

BS: *Yeah, it's really frustrating to see control schemes where absolutely every button has a completely different function.*

CB: I have this theory about kindling. The human mind is capable of learning amazing things. We can learn to program robots and games, and we can be fighter pilots. We can learn to be racecar drivers—but you start small. You learn little things. You don't just light a match and then throw a redwood tree on it. You start with a little bit of fluff, then you add some branches, and eventually you have a forest fire, but with learning.

JAZZ JACKRABBIT, a DOS shareware game, marked Cliff Bleszinski's first foray into professional game design.

What you have to be doing while you're learning this stuff is you have to be having fun, and that's the other big mistake people make. Like people are paying for this experience and you're going to sit them down in a classroom and act like you're going to teach them something? You're going to put them through boot camp? Come on! I want to be entertained. Entertain me!

BS: *It feels somewhat remiss on the part of the designer to put people through a gauntlet to play these games.*

CB: Yeah, it's jumping through hoops. What if this new blockbuster movie came out—*Black Hawk Down*, let's say—but you had to endure six hours of boot camp before we'd let you watch the movie?

It's completely possible to teach people within the context of the game. The proverbial opening mission of "the base is under attack," where you may be learning something, but it's action packed while you're doing it. The bottom line is that people will remember [anything] better if they're learning under pressure. If they're in a boring classroom studying, they're not going to remember, as opposed to learning something in the field, where there's actual pressure to learn. [The ideal situation is] a hooked on phonics kind of thing. Basically kids are having so much fun they don't realize they're learning, that's what you want to do. There are so many oldschool games in the old [classroom] paradigm, and they need to change.

BS: *Koji Igarashi (current CASTLEVANIA mastermind) once told me that old 2D games were all about precision and distance, while 3D games are about proximity and timing.*

CB: That's a good point. I think there's been a significant decrease in clarity of experience as we've made this transition into 3D that we're only starting to combat at this point. If you look at the 2D platformer games, everything looked crappy for a while, then you had your Super Nintendo, and a ninja pretty much looked like a ninja, and you could tell what the pickups are and where to go and what to do. Then we got to 3D, with the PlayStation, and the early games. Yes, they were 3D, but they looked so crappy that it wasn't obvious what was going on. So now at the end of this cycle, with the PlayStation 2 and Xbox, where the graphics are tighter, we're actually encountering problems as game designers, where the more realistic the graphics are, the harder it is to figure out where your enemies are. We have to give visual clues of where you are and what you have to do, so you'll end up with something like GHOST RECON, where the HUD is really cool and all, but it winds up looking like Lucky Charms, where you've got pink hearts, purple diamonds and blue clovers everywhere. It really takes you out of the experience. So how do you make that tradeoff of having visible enemies that don't look like they're shiny and purple?

We go back to film for that inspiration. Jerry O'Flaherty, our art director, knows a lot about lighting characters, so that they actually have a nice rim light so that they can actually pop a little against the background. At the end of the day, you just want to have a good idea of where you're going, who you're shooting, and where you're getting shot from, especially as graphics get better and more realistic. We're always trying to hit that balance between cinematic, art, and gameplay.

BS: *It seems like some games are capable of building more hardcore players out of casual players. Is that something you're aiming for?*

CB: Well to go back to the HALO example, HALO took a genre that has been extremely popular among PC gamers for many years. Games like GOLDENEYE had come out, and that was a pretty big

success. But by and large, most console players hadn't played first-person shooters. [The HALO team was] very smart about the controls. They made a compelling universe, they made it very clear where to go and what to do, they had a cool twist, which was vehicles, and they had cool weapons. They made the game easy to learn and a lifetime to master, and therefore you have a phenomenon.

So I'm glad HALO existed, and I'm glad games like PERFECT DARK ZERO and GHOST RECON are pushing the whole cover thing, because they're setting a precedent that we can leverage with GEARS, so that we can just knock it out of the park. And if KILL.SWITCH hadn't come out before GEARS, I don't think we'd be in as good a position as we are. But because some of these games are doing some cover mechanics, I think gamers are willing to see the whole cover mechanic as its own new thing, much like an FPS or stealth game was previously.

BS: *How are you going to integrate the narrative in there? I know this is Epic's first big story-driven game. Did you have to do a lot of research?*

CB: For us, it was just working with the writers, who are [*Halo: The Fall of Reach* novelist] Eric Nylund and Susan O'Connor, and they've been really good to work with. The problem is you can't just take some Hollywood screenwriter and plop them on a game, because there are key decisions we make about the narrative and the writing that are based upon gameplay. There's also a balance where we have to make sure that

a mission sequence works within the fiction. As a game designer, I sit there with the level designer, and we go over the goals of the level, but if there's a lot in there that doesn't fit with the fiction, we're willing to change that. But if there's part of the fiction that doesn't fit with the gameplay, the writer's willing to change. So there's this kind of ebb and flow of checks and balances where you make sure you have something that's interesting and compelling as well as having a very good gameplay mechanic.

We do have some non-interactive cutscenes, but I can guarantee you that they're going to be pretty interesting, and also pretty quick and to the goddamned point. There are multiple ways that you can tell a story in an interactive experience. You can have cutscenes, or you can have characters who just mention something to you, or you can have a poster on the wall that teaches you about the universe. There are just so many ways that we can do this that the player who wants to get more out of the story, or more out of the universe, can. If you want the stupid cutscenes, you're perfectly entitled to do that. But if you take a great game and you put a great story on it, it's still a great game—but does it hurt it that it has a better story?

BS: *In terms of people that write for games, how do you gauge their ability?*

CB: You look at their samples, and then you get other people to vouch for them, plain and simple. We brought Susan O'Connor on a few months ago for GEARS and she's been doing a lot of the meat and potatoes writing for the game. I'm not a very good writer. I'm pretty good at coming up with a cool universe, but when it comes down to doing the meat and potatoes of dialogue exchanges, I'm pretty bad.

We needed real writers on this project, and the first thing with Susan, we sat down and she gushed about the series she liked on HBO, from *Sex in the City* to *Six Feet Under* to *The Sopranos*. And I thought, "OK, well if Susan is a fan of this kind of writing, then this is the quality bar she's looking for," which is good writing, good directing, and just quality entertainment. There's a good sign right from the get-go. If I met her and she was talking about how much she loved

Disney Channel original movies, we would have had a problem.

BS: *Game writing still hasn't evolved very much over the years, though it's just starting to, so it seems like it would be hard to gauge someone's ability in a game space.*

CB: You need to look at basic scripts, just to see how well the person can write. If they wrote a script for a TV show or something like that, see if it just reads well, and sounds like dialogue that people would actually say. Then we'll see if they can write a game script, which had branch conditions, and talk about the fact that what goes on in this section is purely handled by the scripted dialogue and just has combat chatter. Or any number of different characters that may or may not be with you the whole time. That's where it gets very difficult: where you're just doing a choose-your-own-adventure type thing. Having a plan of attack for that, understanding the tradeoff between game design and narrative, it's all that kind of stuff. A script for a video game looks drastically different from a script for a film.

UNREAL, released in 1998, was arguably the game that made Bleszinski as a designer—and Epic as a company.

BS: *You once told me that you cried while playing LUNAR. Do you think you can give that same kind of emotional experience to the more jaded people playing games today?*

CB: Yeah, absolutely. I'm actually a little embarrassed to admit that I cried at LUNAR, because I was a little dorky otaku. I was willing to believe in these little anime characters, and I kind of let myself into it. I think it's very possible, though. The reason crying is often cited as the most tricky emotion to get out of people is because it's one of the hardest things to do. It's easy to make a player feel scared, or empowered like he's Rambo. But to make a player believe in a love story ...A lot of these emotions are very subtle, and we haven't had really good writers in the industry until the last couple of years. We haven't really had the media to show people a believable character, something that looks human. Look at *Toy Story* and *Toy Story 2*. The graphic power was very good, sure, but we're getting to that point now. We should be able to make a person cry with the graphic power we have at this point. It just comes down to the writing and the pacing and what we actually try to do with the game.

BS: *It seems like a difficult issue because not only is the writing not always quite there, it also seems like voice acting isn't taken as seriously as it should be.*

CB: Well, it's a combination of people not wanting to spend the money on it, not wanting to use union talent, not casting the right people, or not understanding the medium. I think we're at a good point now and have a good stable of actors who are going to do very well for GEARS OF WAR.

If you look at a game like HALF-LIFE 2 or GOD OF WAR, good voice acting makes all the difference in the world. I mean every time you hear someone say something like, "Hey mister, I'm gonna blow your face off!" it totally takes you out of the experience. So you have to have a cabal of people who understand what a good line is and are media savvy enough and have enough experience to know when to let a line just play. Or they have an interior what I call "cringe-o-meter," where if you hear a line that makes you cringe, that's not going to fly. If the lines are delivered well and they're well written, you will never cringe. You can watch *Apocalypse Now* a million times and it will always flow perfectly. It's just well acted, and it works!

BS: *What do you think about the recent trend of using big name, high profile actors for voices, instead of dedicated voice talent?*

CB: It beats programmers, I'll tell you that! It depends on what's right for the project. For certain projects, if you get Vin Diesel in a video game, I actually think it makes it a cooler video game , because he brings that Vin Diesel persona. I read the script for *Mr. and Mrs. Smith* before it even came out, and I thought the script was pretty stupid. But then you get Vince Vaughn and Brad Pitt and Angelina Jolie in there, and their personalities bring it to life. It's what they bring to it as people, as actors, as masters of their craft. I have a lot of respect for what actors are able to do, and I think that the right actor in the right role can really make a difference in a game.

That said, there are multiple ways of looking at it. You can bring somebody in for their star power, a la Vin Diesel or whomever, or you can just get the right guy for the right job, which is what Pixar usually does. Pixar will get a guy just because he has the right voice, like Disney got Gilbert Gottfried as Iago the parrot [*Aladdin*] because that just made sense. It's all about what's right for the project. I think it's bad to make a blanket statement that star power can sell a game, because we can sell games with or without triple-A actors. It's just a bonus to make the product better.

BS: *I read an interview with Billy West, who does a lot of the voices on* Futurama *among other things, and he was complaining that it seems as though more and more high profile, big name actors are getting work instead of people who can do convincing voices.*

CB: That's the thing, you also need actors who are workhorses, because you aren't just doing a two-hour voice over. You're doing

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something that takes 10 or 15 hours to complete. That's many, many sessions doing the same character and keeping high quality acting. Often those guys, like people from *Futurama*, are going to be the types of people who can crank that stuff out much faster than your traditional "needs green M&Ms in their trailer" actor.

BS: *Some developers I've been talking to recently don't seem to really be gamers, or at least don't come from an oldschool game background. What do you think about that?*

CB: I think that's OK, but I think that for every person on the team who doesn't play a lot of games, you need someone who does. You need someone who understands the current state of the industry and knows what the gamers represent. You need the slice of the target demographic on the development side. You need the female level designer who maybe hasn't played a lot of games but likes making the environments look nice, and you need the hardcore "loves everything Japanese" otaku type guy, who wants everything to be more Japanese. You need the hardcore American guy who loves the Jerry Bruckheimer films and loves his HALOs and World War II shooters. You need that balance. I mean you're building a team. The designer may be in a whole other division, but he needs to know his leads and trust them.

BS: *Why do you think video games can't be considered an art form? I remember Ebert said they weren't. Was it Ebert? Which one's alive again?*

CB: (laughs) You've got to love it when you have to ask that. I mean that's the answer to your question right there, right? When you have a critic of a business and you have to ask if he's alive or not, that clearly says that he's of a previous generation.

Everyone's always scared of a new medium. Growing up, if all you knew was movies and you devoted your life to movies, and then there's this new medium that comes along and claims that it is, in many ways, more compelling than film, do you think you'd be scared? I'd be scared. I mean if tomorrow there's some new medium that comes along and says that it's going to be more interesting than video games, and it's a new art form, it's going to be dismissed as not art. Like the documentary called *First Descent*, which is about snowboarding. They were talking about how some major magazine said that snowboarding was a joke when it first started out, and now you have kids in the Olympics, and there's a whole phenomenon based on that.

Any new medium is always considered a passing fad. Rap music is one of the top selling genres of music in this day and age, and at the beginning people said, "it's just talking. Where's the music? It's just garbage." I'm proud that we're the new Elvis and Dungeons & Dragons, and I think anyone who says we're not an art form is a complete idiot. And any game designer that says video games aren't art is single-handedly alienating his entire art department.

BS: *What do you think is missing from games today?*

CB: I think a lot of usability is missing. Microsoft has an excellent usability department. There are so many games out there that make so many rookie mistakes, like you can't get out of the first room, or you actually have to open the instruction booklet.

The fact that video games actually ship with an instruction booklet just makes me nauseous. The designer has everything within the tools of his trade to teach the player everything he needs to know within the context of the game. Players should never have to go out to the manual. Do books come with a manual on how to read them? Do films? It's just absurd. Granted we're interactive, but we can use that interactivity to teach people how to learn the game.

The fact that the business is publisher-driven and very often is date-driven, I think there really needs to be a balance between the time that's allotted to develop a game and the quality bar. So many game developers just miss that core loop of what makes the game fun. It's like—before you do anything else, make it really fun to move your character through a room and shoot a gun and kick or whatever, and then go from there. I've just played so many games where it may be deep, it may be interesting, but just the basic "hit the button and watch the guy do something" element isn't fun. Maybe it's due to bad graphics, bad animation, bad response time, or anything. But you've got to get that core element before you can get everything else going. That's what's most important. There's a huge gap between hardcore and casual gamers, and it's a big concern of mine. I think it is industrywide. Games like the ones on Xbox Live Arcade are going to help stop that gap.

BS: *Is GEARS OF WAR going to be bold and ship without an instruction manual?*

CB: There will be one, but I guarantee it'll be short and sweet. It's important to realize that there's a difference between Cliff's insane rantings and what he can do to change the industry versus what the industry actually is. I mean I'd love to ship this game at $20, you know. I'd love to ship it without an instruction manual, all those types of things. But you can only change so many paradigms over a certain period of time. One thing at a time.

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STEPHEN SMITH

PLAY SMART WITH WAGES

IT'S GOOD TO BE BUSY. AS ANY DEVELOPER knows, the key to success is a steady supply of work. It keeps cash flowing, it pads the resume, and it adds equity. But being busy creates added responsibilities for studios, especially in the area of wage and hour law.

Game developers are the busiest whenever a major milestone is due. At those times, it's often impossible to conform to a 40-hour work week. Walking into a development studio in the days before a major delivery is like walking into a hive, with a team of bees working 24 hours a day to complete the milestone on schedule. But if those employees are "non-exempt," their employer had better be paying them overtime.

IGNORANCE IS BLISS

Many companies don't want to address the issue of exempt versus non-exempt employees. When everything is going well and the employees are happy, it's easy to think that overtime pay isn't an issue. I've often had clients tell me that employees aren't even required to be on the premises past 5 p.m. but are instead just "sticking around," as the project is a labor of love.

Such wishful thinking ignores the realities of a modern-day game studio, which often employs scores of people, any one of whom could create a class action wage and hour lawsuit seeking millions of dollars of overtime pay, interest, and penalties that could destroy the company's financial stability. The problem is pervasive in this industry, as frequent and tight deadlines to deliver major milestones create an environment ripe for overtime violations.

This issue exploded onto the scene in November 2004 when the infamous EA Spouse issued her rant about working conditions and long hours. Soon thereafter, employees from Electronic Arts, Vivendi Universal Games, and Sony Computer Entertainment America filed lawsuits, seeking back overtime pay. They alleged that their employers forced them to work under conditions that many independent developers have experienced first hand. In October 2005, EA reportedly settled the lawsuit brought against it for $15.6 million.

LETTER OF THE LAW

What can be done? First, you must be aware of both federal and state laws regarding overtime. Complying with the Federal Fair Labor Standards Act (FLSA) may not be enough. Many states have laws of their own, which impose obligations that are much more difficult to meet than those of the FLSA.

Once the applicable laws are found, employers must accurately identify and categorize employees as either exempt or non-exempt under those laws. For example, the "computer professional" exemption is common in this industry. It includes workers who are proficient in theoretical and practical application of computer systems analysis, programming, and software engineering, but does not include functionaries or workers who use or repair computers. Under the FLSA, these employees must be paid a minimum of $455 a week on a salary basis, or $27.63 per hour in order to qualify as exempt. However, in California, the employee must be paid $47 per hour in order to qualify as exempt.

Before classifying anyone as exempt or non-exempt, you need to know exactly what your employees do at work each day and what they are paid for doing that work. Only then can the decision be made to classify people as exempt or non-exempt.

Once you identify who is exempt and who is not, you have to follow the law with respect to that classification. The company has to pay exempt employees at least the minimum set forth under both federal and state law, and pay the non-exempt employees overtime whenever they work more than 40 hours per week.

The employer also should periodically review each employee's responsibilities to ensure that he or she remains accurately classified as either exempt or non-exempt. If the employee's status changes, the change must be documented, and the way the employee is paid needs to be modified.

Employers should also maintain meticulous, current records related to all those factors so that they can easily prove the facts in case an employee files a claim. You don't want to be in the position of having to recall the facts from memory two years later when the case goes to trial without any record of what actually occurred.

The most important thing to do is make sure non-exempt employees go home at the end of the work day. Clocking out is not enough because it's possible to remain liable for overtime even if the employee is just hanging around the office socializing with co-workers and not really working.

PLAY IT STRAIGHT

The lesson is simply to treat employees fairly under the law. If they are exempt, they should be paid the minimum. If they are non-exempt, they should be allowed and encouraged to go home at the end of the day, or they should be paid overtime. No company should make the mistake of trying to shoehorn a non-exempt employee into an exempt classification. If that happens, the company may face a significant wage and hour class action lawsuit and wind up paying a lot more than if it had simply complied with the law in the first place.

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MICK WEST

PARALLAX MAPPED BULLET HOLES

FIGURE 1 **A high resolution bullet hole.**

YOU KNOW AS WELL AS I THAT GAME players love to wreak havoc on their game worlds. One common effect in video games is showing damage being applied to walls and other surfaces when players (or NPCs) shoot them. Physical destruction, as an in-game effect, makes players feel like they are actually interacting with their environment, making the simple act of shooting a wall somewhat satisfying.

In an ideal situation, the player shoots the wall and chunks of it fly off, leaving actual holes in the wall. Eventually, the wall would be chipped away completely, falling to rubble before the player's very eyes. Unfortunately implementing such a general-purpose solution is highly complex and expensive, since it requires the creation of arbitrary amounts of new geometry and possibly textures.

A more common technique is to apply a decal to the wall. A decal is a two-dimensional image of some damage, such as a bullet hole, that's pasted in some way over the surface of the environment geometry. Decals are also used for other in-game, player-created modifications to the world, such as graffiti and blood spatters.

DECALS AND BULLET HOLES DON'T MIX

There are several ways to implement decals. One is to create a new quad that's aligned with the wall surface, with the decal texture face mapped to the quad. In another method, you could make a copy of a section of the wall geometry and position the decal by adjusting its UV coordinates. Or, you could apply the decal as an additional rendering pass on the original geometry.

Each of these methods has its pros and cons, and the one you choose will depend on what you generally use decals for. For bullet holes, we want to allow an arbitrary number of holes per mesh, since you will want to splay bullets all over it. In this case, it's probably best to create a new quad for each new bullet hole.

The problem with decals is that they are 2D, and while 2D works fine for graffiti and blood splats, bullet holes have depth, so a flat image is less than convincing. A solution worth investigating is to use a pixel shader technique called parallax mapping to give the illusion of depth to a 2D texture.

Parallax mapping is a surprisingly simple technique, but it can be quite difficult to visualize exactly how it works. Basically, we store a per-pixel depth map for the decal texture, then for each pixel rendered, we offset the UV coordinates based on the depth at that pixel and the view vector. It's best explained with a working example.

CREATING ASSETS

First, we need a bullet hole, so we create a detailed 3D textured model, such as Figure 1. This model in particular is excessively detailed with more than 1,000 polygons. But that's not important, as we are only using it to generate our decal texture and the depth map.

From the model, we render the diffuse map (Figure 2A), which contains an alpha channel that matches the outline of the hole (Figure 2B). We also render a normal map (Figure 3A), which has a depth map in the alpha channel (Figure 3B). A combined normal and depth map is often referred to as a relief map.

There are a number of different ways to generate the depth and normal maps. For instance, you could draw the depth map by hand. In Figure 3B, you can see it is fairly simple. The wall surface is black with a depth value of zero. The flat bottom of the bullet hole is white, carrying a depth value of 255 (which is 1.0 in the shader; more on that later). The walls of the bullet hole are a smooth gradient from black to white. If you drew this depth map roughly by hand, you could then generate the normal map from the depth map using any one of several free tools.

FIGURE 2A **Diffuse texture.**

FIGURE 2B **Diffuse texture alpha.**

However, you'll get better results if you generate the depth map and the normal map directly from a 3D model. I generated the examples shown using 3ds Max and the Render to Texture function to generate a matching pair of diffuse map and relief map from the high-resolution model. All the assets I use here, together with the shader code, can be downloaded from www.gdmag.com.

DOING THE MATH

When rendering a triangle at the pixel level, consider a point (P) on that triangle. If we were rendering a triangle in the ordinary manner, P would have UV coordinates associated with it, and we would have the view vector (v). Given the UV coordinates, we would normally just

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FIGURE 3A **Normal map.**

FIGURE 3B **Depth map, in alpha channel.**

sample the texture and then use this color to apply lighting, and other features.

With parallax mapping, however, we perform a number of very simple additional steps:

1. Read the depth at this UV coordinate
2. Transform the view vector into tangent space
3. Scale the view vector by the depth we just read
4. Add the *x* and *y* components to the U and V coordinates
5. Use the new UV coordinates.

The math here is simple, with the most complex sounding part being step 2. The view vector is the vector from the camera to the pixel in view space (meaning the camera rotation has already been applied by the vertex shader). Tangent space is a coordinate system defined by three basis unit vectors: the normal, binormal, and tangent vectors. These basis vectors can vary per pixel. To translate them into tangent space, one must form a rotation matrix from the basis vectors and then multiply the vector by this matrix.

When we have the view vectors in tangent space, we have the situation shown in Figure 4, which shows a cross-section of the bullet hole. The point we are rendering is P; the view vector in tangent space is *v*. Since this is a cross-section, you can't see the *y* component. We're only seeing here the *x* component (left to right) and the *z* component (up).

At P, we read the depth of the bullet hole (*d*). The view vector is normalized and then scaled by *d* (and with an arbitrary constant, you can make the hole deeper or shallower). The resultant vector is then added to the UV coordinates from point P, ignoring the *z* component, which gives us the UV coordinates for a new virtual point P´. (Note in Figure 4, *v* is a vector and *d* is just the scalar depth, not a vector.)

When trying to visualize what's happening, it's important that you realize the points we render do not themselves move around. We're only adjusting the UV coordinates of the point P so they match the UV coordinates of P´. P is still rendered at position P, just with the UV coordinates of P´. Think of it as the point you are rendering, pulling its texture from a bit further away. The greater the depth and the greater the angle between the view vector and the surface, the greater the distance from the rendered point to the actual point used in the texture.

Listing 1 shows the implementation of this extra processing in a pixel shader. The view vector, the UV coordinates, and the basis vectors are passed to the pixel shader by the vertex shader. The remaining code in the pixel shader is exactly the same as a regular pixel shader in terms of lighting and its other characteristics. All that's been added are the steps above, which modify the UV coordinates.

SIMPLE OCCLUSION

The word "parallax" refers to the effect where objects that are closer to the viewer move more than object that are at a greater distance, when the viewer moves their position at right angles to those objects. As such, the parallax effect is best appreciated in motion. Figure 5 shows the bullet holes mapped onto a plane with and without parallax mapping. Figure 5A shows the bullet holes rendered in the normal manner. Figure 5B shows them with

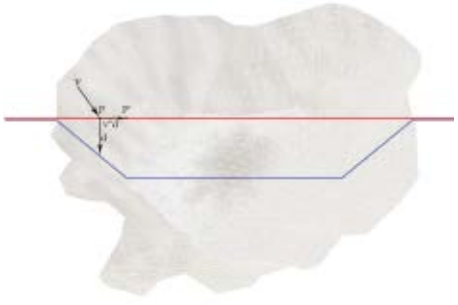

FIGURE 4 **Cross section of the bullet hole, showing the calculation of the UV offset from view vector and sampled depth.**

parallax mapping. In these static images there is not so much difference, but note how the closer sides of the hole have shrunk, and the far sides have grown.

Parallax mapping is a simple technique, meaning it's relatively cheap and it's compatible with more graphics cards than a ray-casting solution. However, it's still only a very approximate mapping to what you would actually want to see on screen and suffers from a number of problems. The most obvious is that there's no occlusion. You can always see all the texture—it's just distorted. As the texture shifts around, there's more distortion, with the base of the bullet hole seeming to climb partially up the sides of the hole.

In the general case of parallax mapping, no cheap solution exists; you would need to do some iteration in your shader. However, in the rather specific case of a

LISTING 1 Modifying the UV coordinates in the pixel shader

```
// Given the regular UV coordinates
float2 uv = IN.TexCoord0*tile;

// Step 1 - Get depth from the alpha (w) of the relief map
float depth = (tex2D(reliefmap,uv).w) * hole_depth;

// Step 2 - Create transform matrix to tangent space
float3x3 to_tangent_space = float3x3(IN.binormal,IN.tangent,IN.normal);

// Steps 2 and 3
float2 offset = depth * mul(to_tangent_space,v);

// Step 4, offset U and V by x and y
uv += offset;
```

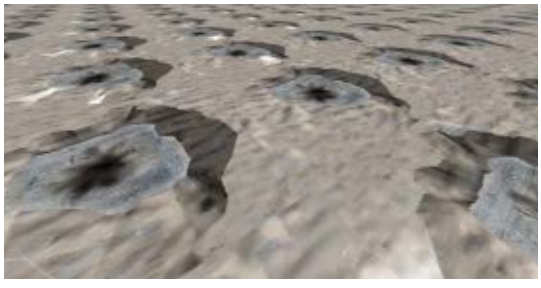

FIGURE 5A **Normal bump mapping.**

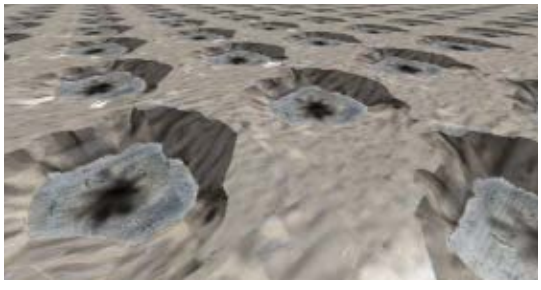

FIGURE 5B **Parallax mapping with faked occlusion.**

LISTING 2 Occluded base

```
float2 offset = hole_depth * mul(to_tangent_space,v);
if (tex2D(reliefmap,uv+offset).w < 0.96)
{
    offset *= (tex2D(reliefmap,uv).w);
}
```

LISTING 3 Fixing streaking

```
float2 offset = hole_depth * mul(to_tangent_space,v);
float depth_at_1 = tex2D(reliefmap,uv+offset).w;
if ( depth_at_1 < 0.96f)
{
    offset *= (depth_at_1 + (tex2D(reliefmap,uv).w)) * 0.5;
}
```

basically concave bullet hole with a flat base, we can make certain assumptions that allow us to greatly improve the appearance without an excessive performance hit.

First, note that the base of the bullet hole has a constant depth value of 1.0. We want the base of the hole not to be distorted and to be properly occluded. This can be achieved by first assuming the point P has a depth of 1.0, then finding the projected point P. If this point also has a depth of 1.0, then we know the ray actually intersects the base of the hole, regardless of the depth at point P. If it does not, then we recalculate the offset using the depth at point P. Occlusion is then taken care of by the base pixels sliding behind the alpha mask. The relative movement of the base also becomes more realistic.

To implement this modification, we remove the initial lookup of depth and replace the calculation of the offset with Listing 2, which takes our pixel shader from 35 to 40 instructions on a GeForce 6800 GT (including lighting.)

Although the arrangement will begin to look a little better from our efforts, we still have a problem with the texture streaking when viewed from extreme angles, especially near the rim of the hole on the side farthest from the viewer.

The depth at point P is 1.0, yet the ray actually intersects the rim fairly close to the top, where P is closer to 0.1. But we can get a surprisingly effective improvement simply by averaging the two depth values we read earlier. Again, this is a simple and cheap modification, requiring no iterations and only adds 2 instructions to our shader. See Listing 3.

COMMON PROBLEMS

The biggest problem I had in implementing the parallax map was ensuring the coordinate systems were consistent. The coordinate systems used by 3ds Max and DirectX are right-handed and left-handed, respectively. Moving from one to the other requires changes in the shader. More specifically, I had to change the order of the basis vectors to make the tangent space calculation come out right.

The height map used here is actually a depth map, ranging from 0.0 to 1.0 units into the plane of the texture. Many implementations of parallax mapping use the range 0.0,1.0 to –1.0,1.0, to allow for features raised above the plane of the texture. Here, we're implementing a specific shader for bullet holes, so be aware of this difference when looking at other code.

You might also have problems with the sign of the height map and the normal maps. And although you could just flip them in the shader, it's more effective to get them right the first time, which you can quickly test by inverting components of the maps in Photoshop.

With parallax mapping, we can get quite realistic-looking bullet holes using a relatively simple and inexpensive pixel shader. While this method does not give us the full occlusion of an iterative approach, it's both quicker and more likely to run on older graphics cards. By writing a shader specifically for a particular kind of topography, we're able to adjust the algorithm to give more pleasing results without worrying about the general case.

RESOURCES

Donnelly, William. "Per-Pixel Displacement Mapping with Distance Functions," in *Game Programming Gems 2*. Charles River Media: Hingham, Mass., 2005.
http://download.nvidia.com/developer/GPU_Gems_2/GPU_Gems2_ch08.pdf

Kaneko, Tomomichi et al. "Detailed Shape Representation with Parallax Mapping," *International Conference on Artificial Reality and Telexistence*. Tokyo, Japan: December 5-7, 2001.
Http://vrsj.t.u-tokyo.ac.jp/ic-at/ICAT2003/papers/01205.pdf

Welsh, Terry. "Parallax Mapping with Offset Limiting: A Per-Pixel Approximation of Uneven Surfaces," Infiscape Corporation, January 18, 2004.
www.cs.ualberta.ca/~keith/610/papers/parallax_mapping.pdf

STEVE THEODORE

BEST PRACTICES FROM A COLLECTIVE FORCE

Sit down, pal. Let's talk about naming conventions.

AS A MEMBER OF THE GAME INDUSTRY, you're a past master of numerous brands of gobbledy-gook, mumbo-jumbo, hokum and hooey. You can talk about SKUs and GPUs. You know the difference between sell-in and sell-through. Being an artist, you can tell a texel from a pixel and a skybox from shadow volume. In short, you've got a healthy stock of impressive jargon. Take a bow!

Actually, as modern business goes, the game industry is actually fairly low on the jaw-busting jargon scale, for which we should all shout a hearty, "Hallelujah!" Once, as a young animator on the make, I had to produce a training video for a large pharmaceutical company, which proudly claimed to be: "committed to market leadership in the ethical health-care space, combining a customer-centric praxis with synergistic alliances horizontally and vertically throughout the value chain."

Thirteen years later, I'm still not sure what it means. Shooting Nerf bullets over the tops of cubicles just seemed a lot more appealing than a lifetime of creating elegantly understated backgrounds for bullet points like that—which is how I ended up in games.

But fast-forward a decade and I've found myself in the slightly embarrassing position of having to wave pom-poms on behalf of an especially unhappy bit of corporate speak: "Best practices" is a phrase that belongs in the mouth of the boss from *Office Space*, but it's also a concept that's long overdue in our end of the company.

TALES FROM THE COLLECTIVE

"Best practices" may be a clunky phrase, but it embodies an important idea. There are a lot of competing definitions, but the most useful one is simple: Best practices represent the collective knowledge of a profession because they are reliable standard answers to predictable standard problems, which have been battle-tested and found enduring.

In an industry that's overly fond of reinventing the wheel, best practices is a powerful idea. However unique our individual studios or projects or pipelines, there are a lot of problems which recur in the life of the working artist. All too often the solutions to these problems aren't born of careful planning or research. The "system" is to "do what we did last time when we had to throw something together to meet a deadline."

And too often the reason for keeping the system is "that's how we did it last time, even though we know it stinks." Sometimes there really is a better way out there, and it's in everyone's interest to get people talking about what that way might be.

One of the most useful ways to understand the nature of best practices is to analyze how they are phrased. A system or a process can be described in all sorts of impressively logical ways, for example, "We believe that every artist should spend an hour a week in figure drawing because that's the foundation of all art!" This example may sound like a fundamentally great idea, but it's basically laying out a philosophical proposition.

A real best practice, on the other hand, usually contains some kind of history: "We discovered that forcing people to leave the office at 6 p.m. on Fridays, regardless of deadlines, added up to a great net gain in productivity." Here's another: "Integrating VSS check-ins directly into Maya seemed like a great way to enforce our check-in procedures, but it almost sank our project."

The postmortem articles in *Game Developer* always contain great examples of the kind of information that makes a best practice, as opposed to merely an attractive-sounding policy. The historical component of a best practice story is also an important safety factor. It reminds us that any practice belongs in a particular context and shouldn't be taken as an unqualified commandment.

TALES FROM THE FRONT LINES

Because they are based on history, best practices are fundamentally democratic. They may come sauced with a bit of management-speak, but ultimately they come from the collected experience of people just like you and me, the grunts in the trenches. Best practices usually are not bits of rocket science or brilliant innovations. In fact, most are a mixture of technical expertise, common sense, and street psychology. Above all, they aren't a magic bullet.

Having access to other people's war stories isn't going to solve all your problems at a stroke. It may even turn out that the jerry-rigged method you use now is pretty good, compared to the way other people get the same job done. But if you don't know how things are done

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At High Moon Studios, best practices include pair programming.

elsewhere, you can't adequately judge your own methods.

Most of us have amassed this kind of information anecdotally, in the course of moving from job to job or through friends. It would be a boon to the profession as a whole if we could get more of these stories out in the open where they can be seen, debated, and gradually diffused throughout the business.

At this point, of course, half of you are stampeding for the door, since tales about the right way to name file folders aren't exactly a gripping read. As a group, artists generally would rather focus on how to make cooler rocket packs or scalier dragons than how to handle the asset review process.

But the dull stuff is important—sometimes even critical. If you've ever been cornered by an angry build manager after leaving for the weekend with a bunch of important files checked out to your machine, you know it can be a matter of life and death.

CELEBRATE NATIONAL ART PROCESS MONTH

Most studios already have their own best practices in place. Often, the art leads or producer simply carry much of this information around in their heads. In tighter places, where the art staff has been together a long time, most of the rules are known intuitively, but not written down. If the industry is serious about growing up, though, we're going to have to move more of that knowledge out into the open, even at the cost of (horrors!) writing documentation or sermonizing at a couple of meetings.

Against that backdrop, I'd like to nominate May as National Art Process Month. Get together with your teammates over a beer or a game of foosball and try to put into words the rules under which your studio operates, then see if they can be improved.

The odds are pretty good that half the things you come up with will be embarrassingly obvious and the other half will flame into debate for a while. That's a good thing: Arguing over a practice forces you to make a decision about its reason for existence or implementation, instead of just treading water with it.

Hashing these issues out publicly will also prompt people who have worked at other companies to explain how processes worked there. Some of the old timers might relate how that brilliant idea of yours was tried (and failed) back in the good old days. In short, swapping stories is a key part of figuring out what to do and how to do it, or how not to do it.

SHARE THE WEALTH ... OF KNOWLEDGE, THAT IS

In the spirit of National Art Process Month, you are invited to share your studio war stories with me for collection in a future column.

The most useful information to share is the most universal, the kind of problems that are common to all studios, large and small, in any corner of the business. If you'd rather tell horror stories than brag, please do. The key point is to highlight very good—or very bad—approaches to the common business of churning out game art. All submissions will be reported anonymously unless explicit permission is given otherwise.

Since it would be a bad idea to share anything confidential or proprietary, let's rule out two topics:

1. No mention of monetary compensation (see "*Game Developer*'s 5th Annual Salary Survey" in the April issue, if you really want to know how you measure up to the average artist).
2. No discussion of projects or proprietary tech.

Here are some of the questions you might want to think about while pondering your own studio's best practices.

Hiring. How does your studio screen potential hires? What is most important in a candidate's profile: reels, resumes, or word-of-mouth information? Are artist job candidates required to take a test during their interviews? Is compensation awarded on a case-by-case basis or by job title? Does the hiring process start inside the department, or with HR, or with management?

Career management. Does your studio have formal classifications among artists? Are these based on skill, seniority, technical qualifications, or something else? Does your company have an artists' promotion track that does not necessitate taking a management position? What review process is used? What kind of training or outside education is provided to employees? Are artists encouraged to specialize or learn new disciplines? Is there an apprenticeship program or a relationship with an art school?

Content. Does one asset "belong" to one artist, or is it passed around to several? Does "ownership" vary by discipline? What content review process is in place? Are show-and-tell sessions a regular part of the development cycle?

Process. How much does your team rely on naming conventions for managing assets? On file folder organization? On databases or other tracking software? What, if any, source control system is used? Who manages it? How is use of the system enforced?

Overall. How much of the pipeline or process is captured in writing? How closely does the actual practice resemble what's documented on paper? Is there a system for formally reviewing or updating the process?

Send your war stories, horror stories, and tall tales to *stheodore@gdmag.com*. When there's a good bundle of sage advice, I'll present it here. In the meantime, stock up on marshmallows—there's sure to be some fire in the results.

NOAH FALSTEIN

GAME SHUI

112 DOWN, 288 TO GO

The State of The 400 Project

NOAH FALSTEIN
has been a professional game developer since 1980. His web site, 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****.*

MORE THAN FOUR YEARS AGO WHEN I first started writing this column, the idea was to chronicle the evolution of The 400 Project, an attempt to collect rules of game design from designers across the industry. Inspired by a lecture that Hal Barwood gave at GDC 2001, the idea was there are probably hundreds of useful rules game designers use, consciously or unconsciously, as tools to craft and perfect their designs.

The process has been harder and slower than I'd expected, but I'm pleased to say there are now over 100 rules documented, available at www.theinspiracy.com.

Hal's original estimate of "about 400 rules" was never meant to be the last word on the subject, but in fact I think he pegged it fairly well. It's my sense that by the time we reach 400 we'll be down to the point where the rules are of marginal use and more effort than the work justifies, like a vein of gold being mined out.

Luckily, many of the more obvious rules—and more useful ones—were much easier to identify and document, as previous columns in this magazine have shown.

Of particular interest to me is the fact that we finally have enough rules to see larger patterns and themes emerging—and that's the subject of this column. As patterns develop, rules begin to shift into rule families (see below for a few common themes, as well as some examples of the rules).

RULES ACROSS PROCESSES AND GENRES

There are many other themes that arise—rules that apply only to multi-player games, or games with 3D depictions of worlds, or casual games. There are rules that apply to brain-storming, tuning, or the production process, or designing for localization.

There have been very few rules that apply only to one specific genre, as our industry tends to define the word, such as rules only for RTS, RPG, sports or FPS games. Most rules that appear to be for one of these are often more clearly stated as general rules for all games.

Intriguingly, there are "fuzzy" themes that are hard to categorize, like psychological rules—nearly all the rules use some elements of psychology, but some affect the players' perception without much changing the more concrete design parameters.

Another fuzzy category is rules involving The Flow Channel (see May 2004). These are rules that deal with keeping the player's attention by matching increase of difficulty in challenges to player's increasing mastery of the game to avoid boredom or frustration. They overlap with most rules about both difficulty and variety, as well as many psychological rules.

There are also meta-rules, rules about the design process itself; rules that act on the designer, not the design. A few examples of these:

- Provide a Single Consistent Vision for the Game
- Ask, "What Does the Player Do?"
- Play the Game Every Day
- And dare I add, "Read Game Shui Every Month?"

RULE FAMILIES

Story. Some rules are limited to, or particularly important in games that have strong stories. Such rules include:

- Maintain Suspension of Disbelief
- Raise Emotional Stakes to Maximize Player Involvement
- Design Levels With Backstory
- Show Character Through Action
- Personify Villainy

Simplicity. A theme I've visited many times in these pages, simplifying the game appears in at least six rules:

- Use Real-World Formulas and Minimize Cheating in Simulations
- Make the Effects of AI Visible to the Player
- Things that Look Alike Should Behave Alike
- Ruthlessly Minimize Clicks
- Make Common Actions Easiest to Perform
- Everything Should be as Simple as Possible—But No Simpler (my favorite simplicity meta-rule from Albert Einstein)

Variety. Many rules touch on ways to introduce variety into the game:

- Fight Player Fatigue
- Turn Constants into Variables
- Add a Small Amount of Randomness to AI Calculations
- Vary Rate of Difficulty Increase Within the Flow Channel
- Make Your Game Familiar, Yet Different
- Make Challenges Vary in More Than Degree
- Provide Multiple Solutions to Challenges
- Provide Both Safe and Dangerous Areas
- Require Multiple Abilities for Challenges

Balance. Balancing game difficulty and keeping specific units, characters, or strategies from becoming too weak or too strong is a common challenge. Rules include:

- Provide Parallel Challenges with Mutual Assistance
- Balance Units Starting With the Middle of the Pack
- Use Negative Feedback to Balance Game Difficulty and Player Skill
- Make Rewards Proportional to the Difficulty of the Task Required to Earn Them

ALEXANDER BRANDON

DATABASIC IDEAS

Part II: In-game Utility

IN THE FIRST INSTALLMENT OF THIS TWO-part series, I discussed how databases can make life easier for audio directors and producers. This follow-up explores the use of databases in the games themselves.

All too often, especially in small scale teams and projects, a programmer will take it upon herself to organize a great deal of audio integration in code, whether it be in arrays, tables, binary trees, or any other object class. Unfortunately, this practice denies visibility and control to anyone who isn't a programmer.

A solid (and controlled) relational database scheme is a great way to surmount the problems that crop up. The number one problem is depending on a programmer to integrate audio on an infrequent basis.

As a member of the team responsible for production or implementation of audio, it is incumbent on you to interface with programmers. And programmers responsible for audio need to remember that the job requires a certain degree of control from the audio department.

MANAGE YOUR DATA

A database can be represented by any code-based object that meets the needs of development while maintaining optimized data I/O. The following list demonstrates considerations necessary for basic audio control in conjunction with other assets and includes objects that will represent those assets in the game's data structure.

One of the most important concepts is "the template and the instance." Objects in games oftentimes are not created individually, but are controlled through a database that consists of object templates. A wood door, for example, is created once with all its properties—including sound—being placed on it. It's simply copied when it needs to be used again rather than repeating the process for every door. Fabrication and duplication. What's important to consider is customization of instances. If you have a "fire weapon" animation on multiple models but the weapon changes, how do you apply a new sound? In such cases it's a good idea to incorporate a system that allows you to change the properties of an instance as well as the properties of a template. This practice is the foundation for a good relational database system for game objects and their respective assets.

Animation is probably the biggest sticking point these days, but the concept is simple: animation consists of frames. Allow an audio file to trigger when a frame is triggered, and you're good to go. This capability can be exposed in an object editor or a text file depending on how long you want to spend on it. Ah, but what if you're using animation smoothing? That can be tricky, since frames might be skipped, but the same applies to anything attached to the animation, such as particles. Create a routine that approximates to the nearest played frame.

Particles should have sound properties as well, which the audio designer can tweak. Examples include individual water drops, flames, and explosions.

Voice is where more nitty gritty aspects of relational database theory come together. A good way to set up how voice over assets are organized is a spreadsheet, with character, line, level, and other details defined. Hooking these fields into your game system with a naming convention is an excellent way to eliminate integration of voice over files by hand, and is especially useful for batch editing and import/export.

Music is fairly arbitrary and is dependent on the needs of the title, since music design follows three main types: one piece of looped music per area, selectable licensed music at any time, and an adaptive soundtrack. The latter two can be combined of course, but this practice has been employed by very few titles even though it is potentially the most innovative music design idea. You should consider a relational database structure for it only if using the adaptive method.

Radius/zone is how sound itself is represented in physical space. In reality, it emits from a point, though new technology is enabling sound to be generated from entire objects or planes. Whether you have an emitted sound with max/min distance for its radius, or a sound represented within a space with fade/crossfade parameters, this type of sound placement in the world is an important part of a database, especially when used in conjunction with AI awareness, collision, and pathfinding.

A trigger is something that tips off an event, such as a sound cue, when tripped by the player. In-game, this can be represented physically however you wish, from a button on the ground to a floating box with *x*/*y*/*z* handles for an area effect, or zone trigger. It's also used as a bare bones logic variable: "If *X* happens, *Y* sound plays." This can be represented in code (again, not preferred) or in a text/script file.

Custom is any behavior or sound that doesn't fall into the above categories, such as an engine or physics sound matrix. These constructions are usually very specific but are playing an increasingly important role in overall A-list titles.

With all this in mind for both the sound designer and programmer, it can serve as the foundation for more robust audio technology that can provide the proper tool sets and tasks to the proper engineers.

A FOND FAREWELL

I'd like to conclude this column by saying very sadly that it is my last. With thanks to George Sanger, Jen Olsen, Simon Carless, Brandon Sheffield, and Jill Duffy, this magazine has always been both an educational and inspirational resource, and I look forward to seeing what great new articles the editorial team cooks up in the future.

ALEXANDER BRANDON *has been involved with game audio since 1994 and is currently the audio manager at Midway in San Diego, Calif. You can email him at* ***abrandon@gdmag.com****.*

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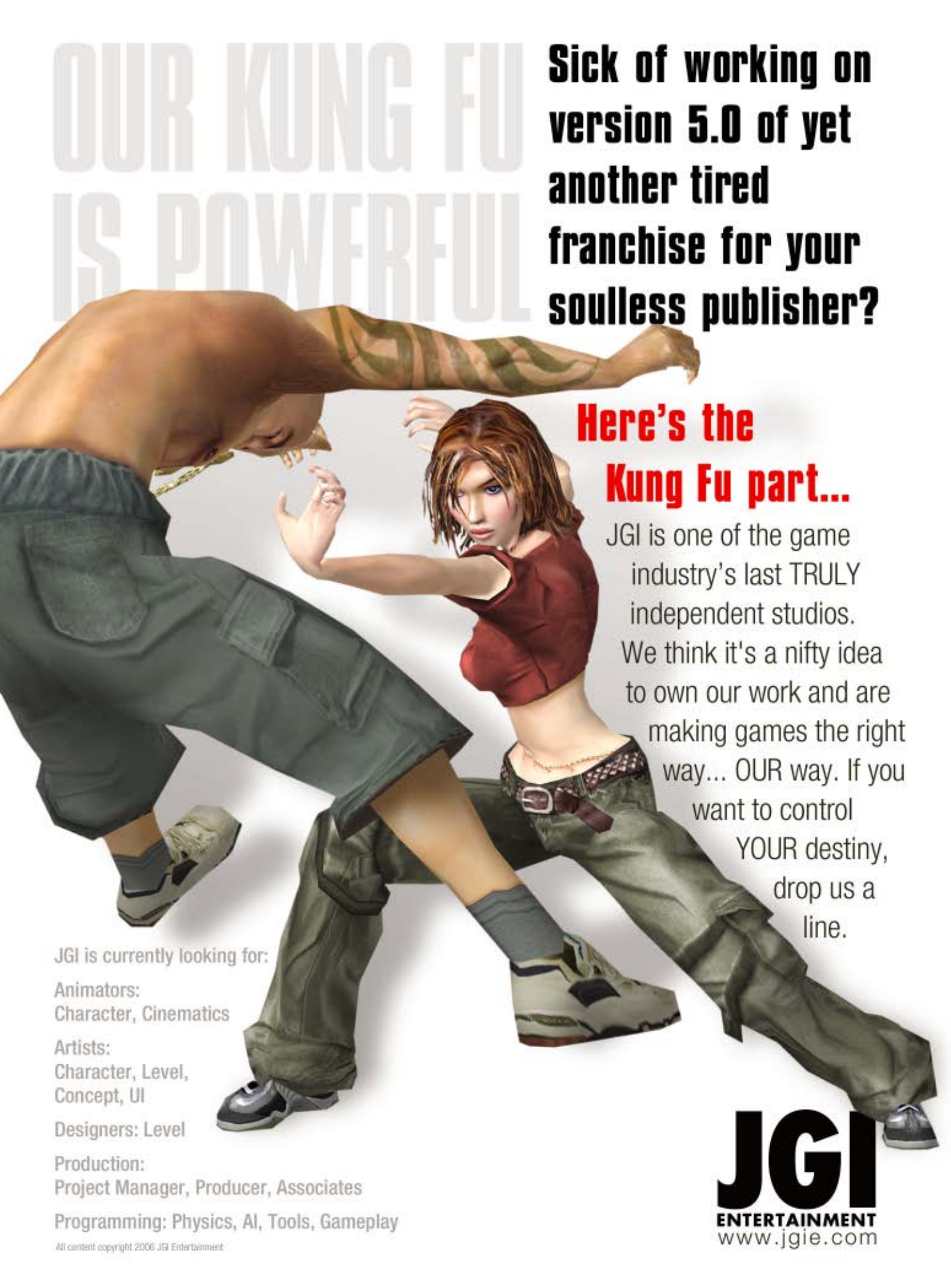
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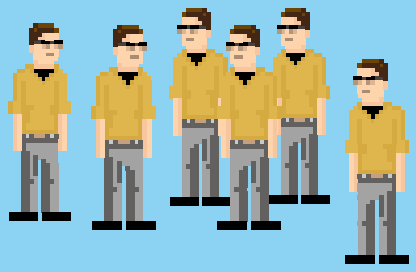

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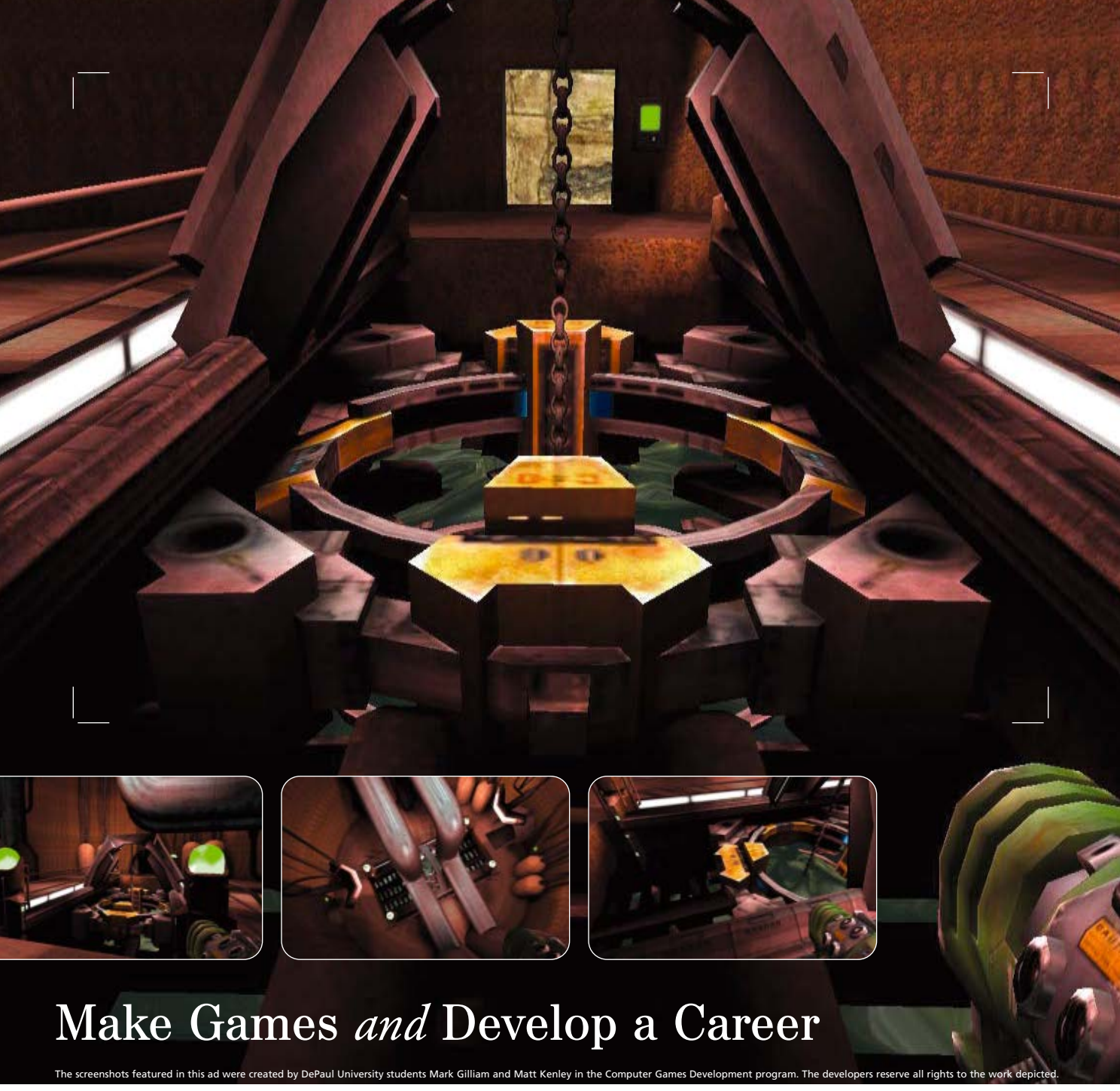

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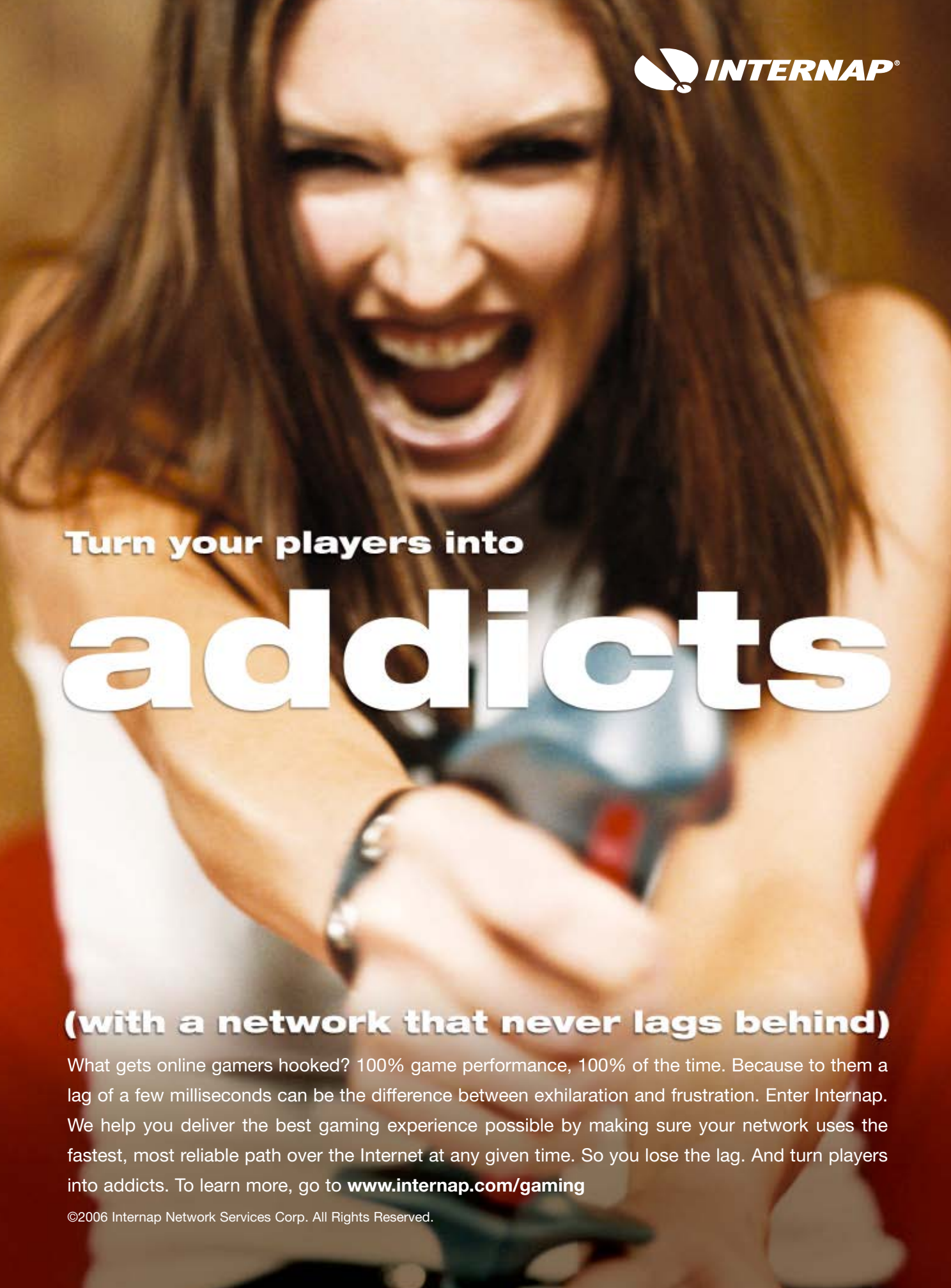
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