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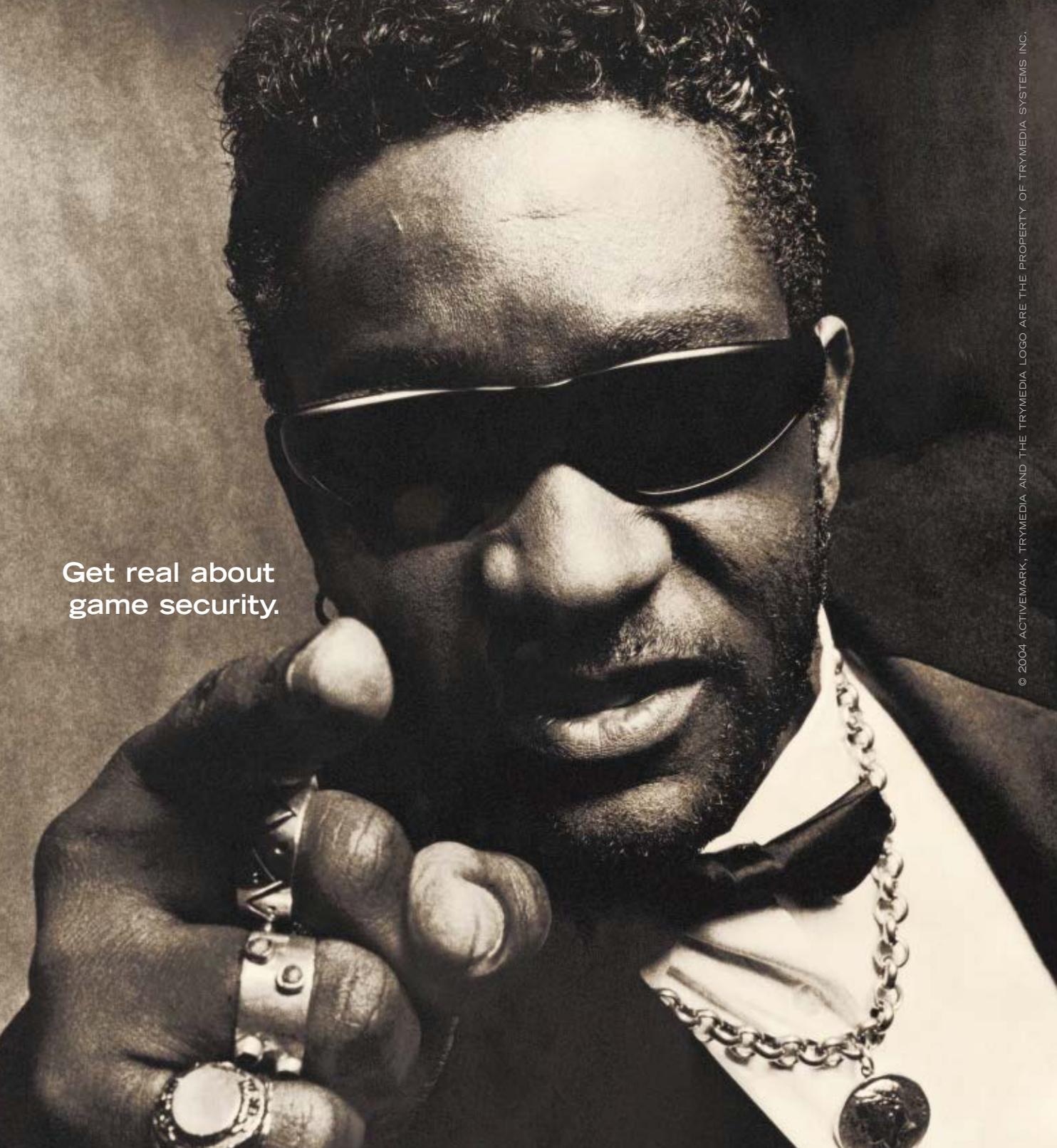
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POSTMORTEM: AVOIDING SEQUELITIS IN THE SIMS 2



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POSTMORTEM

38 AVOIDING SEQUELITIS IN THE SIMS 2

What works once can't possibly still work the second time around—or can it? After three-and-a-half long years in development from concept to final, Maxis has tweaked and toned its sequelized brainchild in search of equilibrium between old and new. Seconds, anyone?

By Lucy Bradshaw with contributions from Matt Brown, Tim LeTouneau, and Paul Boyle

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One EA spouse and the IGDA confront developers' deteriorating quality of life; DS launches, and more.

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What tools are your key weapons when on the development front line (read: deadline)? *Game Developer's* seventh annual Front Line Awards recognizes eleven tools for their excellence, and inducts one indispensable tool into the Hall of Fame. Determined by a panel of industry pro judges, the winning technologies stand a head above the rest for enabling developers to do what they do best more precisely, effectively, creatively, and gratifyingly.



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The Blue Fang gang discusses its methods and philosophies for balancing overtime, crunch time, and sick time, while still shipping its games on time.

By Hank Howie



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Aspyr Media, one of the smaller, surviving, and independent studios creating original content, has been in the game (business that is) since 1996. Founder Michael Rogers spoke with Zack Stern about the company's evolving business process, including how Aspyr interacts with larger publishers and retailers.

By Zack Stern



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TREADING LIGHTLY

WORKING ON THE FRONT LINES OF GAME

development is tough, made more complex with countless issues to trip, ensnare, or otherwise impede the unwary game creator. Along the lines of tools, 2004 saw more than its fair share of software point releases and upgrades. Toss in the hype around an increasing number of available platforms—from Nintendo's DS to mobile phones—and we're left wondering, "How does one keep up?" In 2004, ethically-questionable game content was formally challenged by several state law makers. And chronic controversy over unremitting work hours doesn't seem to dissuade thousands each year from pushing their foot in the game development door.

Although *Game Developer* certainly doesn't have a cure-all for these industry ills, we can at least point to some solutions we see others using successfully, both technical and logical, which may help you ship your next AAA game without pulling your hair out or forgetting the names of your loved ones.

TOOLS MADE TO WIN

At the top of each new year, we present the Front Line Awards (page 10), another analytical slice from the ever-expanding world of game tools. The question is: How, with such a diversity of small and large aids to creating games, do the Front Line Awards objectively compare products with massively different scopes in the same general field? The answer is that it's tremendously difficult.

Our panel of expert judges in the thick of game development selected a winner or winners in seven categories—game engine, programming, middleware, art tool, audio tool, hardware, and book—the tools they felt were the absolute finest, whether for their brilliance in a particular application, or a wide-ranging suite of tools that work together serendipitously.

BLEEDING EDGE

Technology moves quickly, but not always in a strictly forward motion. The three most recently released game platforms all have an eye for the past. Nintendo's DS combines Game Boy Advance compatibility with a brand-new touch screen interface, to create something

truly innovative. The XGameStation is an assembly language hobbyist's dream, with Erector Set-like construction, but also an eye for the future, as a completely open-source hardware and software hacking tool. Taito's Type X brings Windows PCs and global networking into the arcade sphere, a major step in the company's plan to, as stated in its most recent financial results report, "be the one and only company in the amusement industry."

ALL WORK AND NO PLAY

Extended work hours (to put it lightly) and reduced "quality of life" are the most pressing issues for many game developers today. Can you reconcile a job and family that you love, a social life, and an 80-hour work week? Hank Howie's "Making Great Games in 40 Hours Per Week" (page 18) confronts the ruckus over work hours in the games industry by detailing how his employees manage deadlines and overtime while still hitting their ship dates on time. And flanking Howie's article, we've got some Heads Up Display coverage of the "ea spouse" controversy—the open testimony of one game developer's spouse who has had enough of so-called "abuses" in the industry.

After the right tools have been utilized, and crunch times navigated with a minimum of overtime and divorced significant others, what do you get?

SIMS SEQUEL

This month's Postmortem voices the struggles and successes of the teams and leads alike responsible for Maxis' PC title *THE SIMS 2* (page 38). The sequel has sold more than one million copies almost instantly, likely on its way to similar multi-million sales figures as its Will Wright-masterminded predecessor. Whether you appreciate vomiting babies, shadowy Grim Reapers, or just its deliriously sardonic take on little computer people, *THE SIMS 2*'s sandbox gameplay and stylish look shows that PC gaming hasn't entirely withered on the vine. ❖

—The Game Developer team

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The Spouse EA Built

IT ALL STARTED QUIETLY ONE DAY in November. A LiveJournal user known only as *ea_spouse* posted her first and only entry on a newly created weblog. In it, the unnamed spouse complained of a husband lost to incredible crunch time, 9 A.M. to 10 P.M., seven days a week. The spouse pleaded with her husband's employer, the Redwood City-based Electronic Arts, to release her captive husband, and to reconsider its overtime policies. Since then, the *ea_spouse* weblog entry on LiveJournal has been flooded with

comments from sympathetic ex-employees, industry insiders, and game enthusiasts who are learning for the first time what crunch time can mean for a development team.

"The response to *ea_spouse* has been seen throughout the game industry. It really shows the need for this litigation. It's really moved not just from that blog but to many other web sites that are having conversations about EA's practices," says Miranda Kolbe, an attorney at Shubert & Reed, a San Francisco law firm. She is

representing Jamie Kirschenbaum, an artist who claims that EA owes him unpaid overtime for his work at the company from July 2000 to the present.

But the breadth of this problem is not confined to Electronic Arts. Programmers, artists, and designers from around the industry have been combatting the rising tide of crunch time for years, and as game budgets grow, the problem has only gotten worse.

On November 16, the IGDA posted an open letter to the game

development community stating that quality of life issues were holding back the games industry. The IGDA will host a full day think tank on quality of life issues at the Game Developers Conference in March. Choosing to avoid negative reinforcement, the IGDA has released a white paper on best practices and praised some studios, such as BioWare, Firaxis, Team 17, Blue Fang, and Cyberlore for their focus on the quality of life of their employees.

—Alex Handy

>> first person



Jason Della Rocca
Program director of the IGDA

What we see now is the managers saying, "If he wants to work, who am I to stop his passion?" That's where our attitudes need to change. People need to realize that after the ninth hour, they're just not as productive anymore. We're not suggesting that crunch is wholly avoidable. We're suggesting it should be more manageable, more sane, and it should be planned. There's a lot of difference between EA or another big company exploiting their employees in this way, because they have the money and the resources to do things right. That's different from a startup, where just a few other folks are going to make it or break it.



Lance Stites
NCsoft producer

My strategy in dealing with crunch time involves doing what I can to avoid it in the first place. My staff helps develop the initial schedule. If we need to crunch because someone has missed a self-created deadline, it is a bit more tolerable. Crunch time is (and should be) the exception, not the rule, and should only be entered into when clearly defined goals need to be achieved. When we meet the goal(s), I reward my team appropriately.



Martin Carrier
Director of communications and public affairs for Ubisoft, Montreal Studio

We've taken on the issue [of quality of life] from both ends. Before actually going into production, we have a project management office that deals with all the schedules. We've tried to professionalize our approach with some proper management techniques. It's not necessarily how many people you throw at something, but how you approach it. We've installed directly, on each project, someone from HR. They monitor everything that goes on. They're a resource person so that if something comes up within the teams, they have someone to talk to.

Tammy Schachter
Senior manager of corporate communications at Electronic Arts

As the industry leader, EA generates a lot of attention on issues common to all game developers. Everyone who works in a game studio knows that the hard work that comes with completing games isn't unique to EA. [In October], every EA employee received our bi-annual survey that allows them to anonymously tell us where we need to make improvements.

We take this survey seriously because it comes from current employees who know firsthand what it's like to work for EA. We trust them and make changes based on their input from this survey. EA remains committed to our customers and our employees and will continue to do all we can to ensure that EA is a great place to work.

Nintendo DS Ships



FURTHER AFFIRMING THE industrywide acknowledgment of North America as the dominant market for videogames, Nintendo has released its new dual screen handheld console, the DS, in the U.S. before all other territories.

The DS launched November 21 alongside seven software titles, and sold some 500,000 hardware units in less than two weeks. The system

launched in Japan 11 days later, hitting the 500,000 unit mark in only four days, making for a worldwide combination of well over a million as of press time. A March release is planned for the U.K. The dual screen setup, in combination with touch screen and stylus make the console unique in the market and thus something of a risky venture for smaller developers. "I like

what DS represents, a return to idea-driven games," said Matt Bozon of WayForward, developers of PING PALS for the DS. "But I wonder if developers are going to understand how to properly put the DS features to good use. Nintendo had an inspiration, and I'm not sure if everybody really understands how to carry that."

—Brandon Sheffield



Mariakay Chakos, Johnathon Vasquez, David Tractenberg, Sue Procko, Jeff Furton, and Theresa Black of Traction PR.

Making Tracks

DAVID TRACTENBERG, PRESIDENT AND FOUNDER of the firm, alongside his business partner Sue Procko, launched Traction Public Relations late last year in response to the un-addressed PR needs of game developers. Their vision is simple yet innovative as far as PR is concerned: Rather than promote games solely to retailers, Traction focuses on hooking up developers with publishers. "[Our competitors] aren't really focused on developers," Tractenberg says, adding that there

are probably about five good gaming PR agencies, three of which make themselves known but still are typically unresponsive to smaller developers—especially to teams that comprise only one or two people.

"To developers, these games are their babies," Tractenberg says. "It's nice to be the ones who are trusted to help get these babies into the world."

—Jill Duffy

XGame Station, Retro-Education

WITH THE RELEASE OF THE DS, Nintendo has started the flood of next-generation game consoles. As the PlayStation 3 and the next Xbox console loom on the horizon, Nurve Networks has released a console of its own, one with less processing power than a Game Boy Advance.

The XGameStation (XGS)

Micro Edition is not meant to live on top of a television, nor to be sold in major retail chains. André Lamothe and Alex Varanese designed the XGS as a development tool for hobbyists and students alike. At its core is the processing power of an Ubicom SX52 "Super-PIC," offering 80 MIPS of

performance with a 12.5ns instruction cycle. Combine that with 128K of SRAM, 3 channels of sound, and compatibility with Atari 2600 joysticks, and you've got an excellent platform for a budding developer who needs a primer on the development process.

—Alex Handy

Type X Takes PCs Into Arcades

IN A BOLD ATTEMPT TO revitalize the Japanese arcade market, Taito plans to bring high-profile U.S. developed PC games, notably HALF-LIFE 2 and UNREAL TOURNAMENT, to its new arcade board, Type X. The board runs on a stripped-down version of

Microsoft Windows XP and is similar to a high-end PC. Games will be connected to a nationwide network, allowing death-match play, score ranking, and the saving of character data. The Type X has been in Japanese arcades since November 2004, with a

base board that runs on a 2.5GHz Celeron processor, an Intel 865G chipset, and a 128MB ATI Radeon 9200SE video card. Taito will release HALF-LIFE 2 to Japanese arcades in the spring, with a worldwide launch to follow.

—Brandon Sheffield

calendar

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ALIENBRAIN STUDIO 7 Tom Carroll

ALIENBRAIN STUDIO 7



STATS

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Alienbrain Asset Management
321 Hampton Dr., Suite 201
Venice, CA 90291
(310) 393 8535
www.alienbrain.com

PRICE

Developer client: \$690;
Designer or Cross-platform
(Mac OS X, Linux) client:
\$1,250; Manager client:
\$2,190. Server included in
client price.

SYSTEM REQUIREMENTS

Alienbrain Studio 7 Server.
Windows NT 4 Server,
Windows 2000 Server; 256MB
RAM (512MB RAM
recommended).

Windows Client. Pentium III,
500MHz or better; Windows
98, ME, NT 4 SP5, 2000, or XP;
64MB RAM minimum (128MB
RAM recommended);
Microsoft Internet Explorer
5.5 or later

Java Client. Mac OS X 10.2 or
higher; Linux; 128MB RAM
(256 recommended)

PROS

1. New Reference Manager gives client developers excellent information.
2. Change Sets streamline some workflow procedures and protect data.
3. New Araxis Merge functions make automatic source code management easier.

CONS

1. Package could prompt users with an action box when custom file formats are encountered.
2. Game development tasks don't always conform to the demands of Change Sets and "atomic" operations (really only half a "con").
3. Search options could be more robust for local files.

NOT EVERYONE IN THE GAME BUSINESS

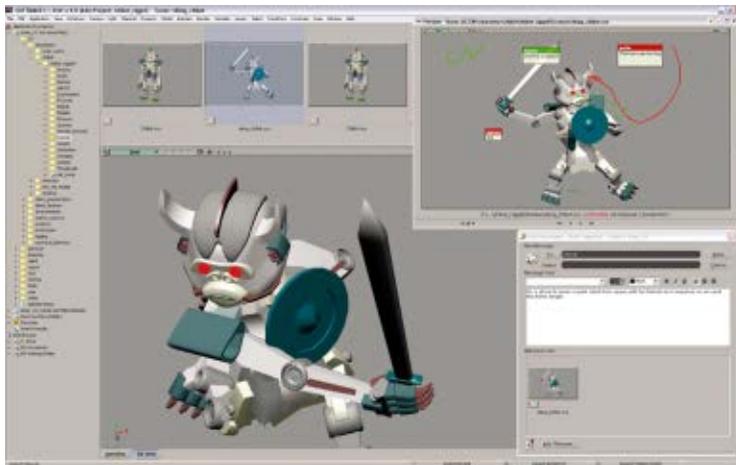
has actually used Alienbrain Studio, but nearly all serious game developers are aware of Avid's amazing asset management package, if only because it has such a catchy name. What's holding Alienbrain Studio back at this point (if anything) are hitches related to connectivity and inclusiveness, not basic feature sets or the package's ability to do what Avid says it can do.

In looking at this product, I'm inclined to include information about the new corporate structure at Avid, as well as provide an overview of the package's current state of affairs, a review of version 7's new features, and a few hints about what game developers still need that might be addressed in a hypothetical version 8. Because Alienbrain Studio is a vast software package, I also consulted a few programmers and technical artists to help provide a more complete overview.

I've used version 6.01 for more than a year, so I realize what a lot of other folks already know: Alienbrain Studio is the 800-pound gorilla of asset management packages.

The reason for Alienbrain Studio's excellent reputation is that it is extremely difficult to mess up your assets when you play by its rules. Its functions and interface help keep team members focused on the tasks at hand, and considering that the average development team includes scores of people working from different departments, buildings, and cities, this trait is very valuable, indeed.

While Alienbrain Studio's combination of version control, source code control, project, and workflow management tools make it an effective asset management tool, it also includes third-party application support (for 3DS Max, Maya, Photoshop, Softimage XSI, Visual Studio, CodeWarrior, and Araxis Merge, for example), along with scripting tools and SDKs for customization. Alienbrain Studio is also supported by other third-party tools such as Virtools' DevTool, RenderWare Studio, and MotionBuilder. That's a lot, especially when you consider it's all in a single package, regardless of



Alienbrain Studio 7 can smoothly integrate multiple programs, such as Softimage XSI (shown), Maya, 3DS Max, and others.

whether you're a programmer, artist, technical artist, or designer.

In March 2004, when Avid began shipping version 7, it offered 40 or so improvements from the prior release. But there are five primary areas of improvement, all of which make the package work faster and smarter across more operating systems (cue the previous allusion to connectivity and inclusiveness).

MAJOR IMPROVEMENTS

1. Management, please. Alienbrain Studio 7 supplies users with a Reference Manager, a tool that helps them get an immediate overview of any 3D scene by displaying which files a scene refers to, and in turn, which scenes refer to a specific file. In game development, in which one asset is often referenced in tens, or even hundreds of times in various files, this new feature is invaluable.

2. Change Sets. Users can speed up work flow by grouping all files that must be modified into a single unit, called a Change Set. The team can complete all the required work and then check the entire Set back in, which Avid calls an "atomic" operation. Atomic transactions take place in full or not at all. This helps preserve data integrity on the server.

3. Optimizing through-put. By optimizing load handling, Alienbrain Studio 7 now works faster on multi-

processor and hyper-threaded computer systems. Its improved storage management system archives better and helps remove restrictions on team size.

4. The CCS. The Central Configuration Server (CCS), new to version 7, is a component within the Alienbrain server used to centrally set up projects and manage users and MIME-types. A single CCS can be used for multiple Alienbrain servers.

5. Banzai pipeline. Alienbrain's open architecture enables programmers to more easily integrate the tools they develop into the projects they are working on. Through the new Windows Integration Framework, a C++ SDK, you can integrate any Windows application into Alienbrain Studio. Perhaps more important, developers with teams using different operating systems won't have to ask them to standardize. Alienbrain Studio runs in mixed environments with native clients for Windows, Unix, and Macintosh operating systems.

PROGRAMMING AND ART

New developments roll out quite often, for instance, an upgraded plug-in is now available that provides smooth integration between Alienbrain Studio 7 and the latest versions of Maya, Max, and Softimage XSI. These integrations provide access to Alienbrain Studio's asset management features directly from



Although Alienbrain Studio 7 sports five major improvements, the software has been updated in other ways too.

within the program—all the better to manage artwork with greater efficiency.

Automatic merging of text files is invaluable when multiple versions of a game's source code that have been modified by different programmers must be integrated into a single entity. In fact, a lead programmer working with version 6 tried with some success to integrate this functionality, but wasn't completely satisfied with the results. Avid's development team took this to heart and integrated automatic merging directly within the Alienbrain Studio 7 Client. Specifically, the merge options are found in the following two places:

- Tools > Options > Merging/Differencing > "Perform merge operations automatically if possible"
- Tools > Options > Merging/Differencing > "Accept successful automatic merges without confirmation."

The lead programmer in question was quite eager to try out these features.

A prominent technical artist wanted Alienbrain Studio 7 to offer the same Advanced Search Options for local files as it did for networked server assets. Avid confirmed that this functionality will be available in the next Alienbrain Studio release. The same pro also noted the package's inability to automatically recognize custom file formats, such as various tuning files that are created on an ongoing basis during a game's development cycle. While custom file formats can be added by creating a new MIME-type in the Central Configuration Server, and preview/thumbnail functionality can be extended to image

files through the Image Library with the ImageLib SDK, this artist was hoping that some day the package would prompt the user with an action box whenever an unknown file type was detected.

FROM NXN TO AVID

NXN Software, the company that gave life to Alienbrain Studio, was founded in 1997. The tool won industry excellence awards nearly every year since. Several big-name companies adopted

Alienbrain; you may have heard of Sony and Electronic Arts, to name just two.

In January 2004, NXN was acquired by Avid Technology Inc., a leader in digital nonlinear media creation, management and distribution solutions. At the time, the honchos at Avid noted that bringing NXN onboard would help it to integrate Alienbrain Studio's digital asset management technology into film and video postproduction, broadcast, and 3D animation.

In the short run, the acquisition probably won't have much impact on game developers, and perhaps it won't in the long run either. Regardless of whether you're making a AAA videogame, 3D animated feature film, or Fortune 500 web site, you will always need to guarantee the integrity of the assets involved, even as more and more people and companies stick their fingers in the pot, so to speak.

TOM CARROLL is a 3D environment artist working on *Midnight Club 3* for Rockstar San Diego. Concurrently, he writes short story installments based on the original character *N8 SL8*, *Digital Detective*. Contact him at tcarroll@gdmag.com.

DELL PRECISION 670 WORKSTATION:
AN ARTIST'S VIEW
Spencer Lindsay

AS A PROFESSIONAL GAME DEVELOPER, the first and last thing you ever see at work is your workstation. For some developers, it's your little buddy in the office. For others, it's an extension of body

and mind. It tells you what's going on in the world. It brings you mail. It allows you to frag that guy in marketing six times before he realizes you're spawn-camping. But most important, it lets you bring the amazing things that come out of your head to life. Developers spend an average of one-third of their lives in front of a workstation (unless you work for EA, then it's one-half). One of my priorities at work is to make sure that the gear I use during those precious hours of my life is the most ergonomic and useable equipment I can find.

If you can afford the big-ticket price tag, the Dell Precision 670 is an excellent addition to any digital artist's workbench.

OUT OF THE BOX

Setting up this machine was a breeze. Although not sexy as a candy-wrapper clad Mac, all the components were nicely put together and easy to assemble. The first boot process went smoothly, and I was running in less than five minutes from box cutter to login.

Considering I reviewed this machine by itself and not against any others, I'll explain how I thought the unit worked under my normal workday conditions as an artist, rather than list a bunch of gear-headed benchmark specs that aren't totally applicable to game artists.

After setup, I immediately loaded trial versions of Maya, 3DS Max, and Photoshop. I use these three programs almost every day, all day long, so they provided the test bed.

SOFT

3DS Max. Running 3DS Max 6.0 on this machine was a real treat. Rendering operations such as advanced lighting and





A Dell machine makes its way down the factory line.

ray tracing, which typically take between five and 10 minutes on my fastest machine (a single processor, 2.5GHz box with 1GB RAM), completed in only a minute or two, a great boon to iterating renders and animations.

Maya. I've been doing a lot of modeling in Maya for my current project and have found that even a 2.5GHz machine with a healthy video card gets bogged down sometimes. The Dell Precision 670 cleaned house in the modeling category. Our 3D world databases are typically around 250,000 triangles for the terrain and between 10,000 and 100,000 tris for buildings, trees, and the like. Doubling these datasets didn't hamper this machine in the slightest. It acted absolutely rock solid at 60Hz. Playblast animation tests were screamingly fast as were the IPR render tests. Again, iterations are much faster on the Precision 670, which increased my output significantly.

Photoshop. Testing Photoshop's gaussian blur function on this machine seemed silly. Who in their normal workflow applies a 70 percent gaussian blur to a 4,000x4,000 pixel image? So instead, I opened a few 40MB .PSD files to test the program. Although this operation usually takes a few minutes on my regular machine, I was amazed to watch Photoshop load the files in seconds. Tablet drawing was equally nice and quick (more an effect of the video card than the computer) and open/save/export

operations took no time at all. I never had to wait for a filter or a layer effect, which in turn allowed me to experiment a lot more than I usually do. It's worth repeating: Decreased iteration time is possible with more power.

HARD

As artists go, I'm a relatively technical one. But I'm still daunted by the Byzantine world known as "hardware specification."

The machine I tested sported two Xeon 3.6GHz processors with an 800MHz front side bus and 1MB of L2 cache; 2GB of 400MHz DDR2 SDRAM; a RAID 0 controlled dual 74GB hard drive; and an Nvidia Quadro FX 3400 video card. The Dell system I tested instantly became my favorite workstation in the lab.

I've broken the specs down to illustrate exactly what they are and how they apply to game developers.

Two Xeon 3.6GHz processors with an 800MHz front side bus and 1MB of L2 cache:

- These take advantage of multi-threading, which means the computer can divide the workload for complex mathematical tasks, such as rendering, physics calculations, filters, and so forth, in two and get them done at close to twice the speed as a single processor.
- They also allow you, in cases where you have a large process running (like a code build or a render), to continue using the machine with little performance degradation.

2GB of Ram:

- This allows for much larger texture maps to be displayed in real time, and you can edit larger images without your computer ever sounding like a coffee maker from all the hard drive thrashing.
- Texture-heavy modeling in Maya and 3DS Max, and all operations in Photoshop, are significantly faster with more RAM.

The Nvidia Quadro FX 3400 graphics card:

- The Nvidia Quadro FX 3400 is one of the leading high-end workstation graphics cards today. OpenGL just smokes on this card.

- It can deliver resolutions up to an amazing 3,840x2,400.

RAID level 0 controlled hard drives:

- RAID 0 utilizes two or more hard drives and then offers these to the computer system as one logical drive. Files are broken into stripes of a size dictated by the user-defined stripe size of the array, and stripes are sent to each disk in the array.
- This allows for much faster disk access times, but unfortunately is also just as fault-intolerant as a single drive.

The Dell Precision 670 computer also boasts the ability to run 64-bit operating systems and executables that allow for instructions to be processed across a 64-bit bus instead of the standard 32-bit one. Adobe, in anticipation of the new 64-bit Apple machines, has a 64-bit version of Photoshop, and other software vendors are planning 64-bit versions in the near future.

The machine is not only incredibly fast, but amazingly quiet. When the workstation idles, I sometimes have to check that the little green light is on to make sure it's still running.

The box, like all the desktop Dell models now, is extremely easy to get into, modify, and close back up. The screwless connections for all the components inside make them very easy to replace or upgrade.

FACTORING THE COST

This machine absolutely soared through every task I put it through. The main drawback from purchasing this machine is that it costs nearly three times what you'd typically be willing to pay for a lesser (albeit drastically slower) workstation. But if you've got the ducats and want an absolute monster workstation, Dell's Precision 670 will leave you smiling. ❖

SPENCER LINDSAY is an

independent consultant who works with game development teams and design firms. He can be reached at slindsay@gdmag.com.

DELL PRECISION 670



STATS

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(800) 388-8542
www.dell.com

STATS

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AS TESTED

2 Xeon 3.6GHz processors with an 800MHz front side bus and 1MB of L2 cache; 2GB of 400MHz DDR2 SDRAM; RAID 0 controlled, dual 74GB hard drive; Nvidia Quadro FX 3400 video card.

Additional graphics cards

supported: PCI Express bus graphics cards up to 150 watts. PCIe graphics: Nvidia Quadro FX 3400 (PCIe x16 card, 256MB). Performance PCIe graphics: Nvidia Quadro FX 1300 (PCIe x16 card, 128MB). Mainstream PCIe graphics: ATI FireGL V3100, (PCIe x16 card, 128MB). 2D PCIe graphics: Nvidia Quadro NVS 280 (PCIe x16 card, 64MB).

Audio. Integrated AC'97 full-duplex audio (or optional Sound Blaster Audigy 2 (D), w/Dolby Digital 5.1 & IEEE1394).

PRICE

Varies depending on customization. As tested, about \$6,863 (including the Dell UltraSharp 2001FP Flat Panel [20.0 in VIS] Adjustable Height, DVI/VGA).

PROS

1. Supports incredibly fast modeling and rendering.
2. Quiet as an optical mouse.
3. Easily upgradeable.

CONS

1. Out of most studios' price range for every day modeling use.
2. Big case.
3. Apple aficionados will say, "It's not a Mac."



THE 2004 FRONT LINE AWARDS

ONCE UPON A TIME, IN THE DAYS WHEN “ENGINES” BELONGED IN cars and “models” belonged in clothing, developers designed games from the very ones and zeroes of existence—bit by bit, register by register, pixel by pixel. Programmers used hex editors and wrote their code in assembly (now a largely ancient tongue). Artists painted dot by dot long before technology supported normal mapping.

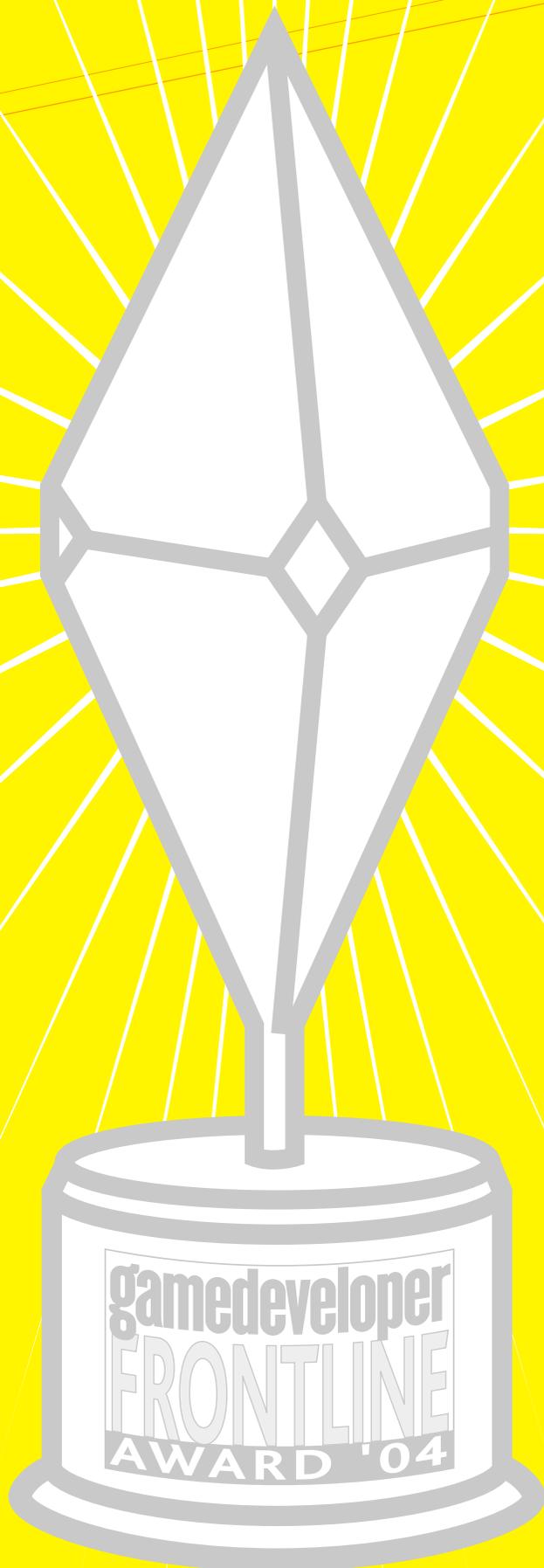
These primitive days are but a memory. Making games in the world of real-time 3D requires huge teams, major expenses, long hours, and rooms full of equipment. It is into this void that the Front Line Awards storms, in its annual quest to find the best tools for game creation.

Fifty-seven finalists were selected from hundreds of nominees. Seven categories divided the playing fields: game engine, programming, middleware, art tool, audio tool, hardware, and book. Eleven winning products were selected, plus one for the Hall of Fame.

Nominations for the Front Line Awards were open to all new products and new versions of products related to game development released between September 1, 2003, and August 31, 2004. A distinguished panel of industry-leading professional game developers (see facing page for judges) specializing in the fields relevant to each product category selected both finalists and winners. These decisions were based on criteria such as utility, innovation, value, and ease of use, with an aggregation of multiple votes leading to the eventual results.

These are the tools that help create worlds, build entire realities, and push life into them. The vast scope of modern games would not be possible without them (or the developers who master them). We salute the creators for the tools' increasing complexity and power, allowing for games with greater depth, vaster scopes, and even more uproarious fun.

—Alex Handy



The Front Line Awards would not be possible without our panel of judges, whom we thank sincerely.

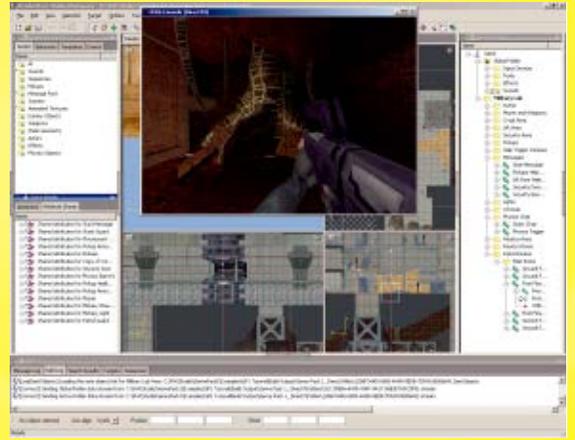
JUDGES

Karthik Bala
Steve Boelhouwer
Adel Chaveleh
Kasson Crooker
Eran Egozy
Ethan Fenn
Dan Filner
Ron Fosner
Jeremy Jessup
Andy Lang
Spencer Lindsay
Noel Llopis
Justin Lloyd
Tom Long
David Osbourn
Denis Papp
Gene Porfido
Matt Rapelje
Paul Skibitzke
Jeremy Soule
Geoff Thomas
John Williamson



Hall of Fame

RENDERWARE



RENDERWARE IS THE MOST widely used console middleware. Quite simply, RenderWare has had an enormous effect on our industry and is the closest thing we have to a single unified platform. More than 500 current generation titles that have either shipped or are in development used RenderWare during their development. That's one in every four console games, which makes it truly the gold standard for console-based 3D engines.

RenderWare lets overworked teams invent new games rather than new wheels. With Criterion's (well, EA's as of

July 2004) versatile and reliable graphics engine in hand, dev teams have more time to create original art and gameplay: extra time being mana from heaven for any team, to be sure.

Criterion, the company behind RenderWare, was founded in 1992 as a spin-off of a Canon research group in the U.K. The initial releases of RenderWare were PC-based and competed against rival SDK's BRender from Argonaut and Reality Lab by RenderMorphics, which, in a semi-prophetic move, was eventually acquired by Microsoft.

As DirectX matured, RenderWare became more console-focused. The culmination of this refocus came when Criterion worked closely with SCEI during the development of the PlayStation 2.

RenderWare offered a solution that was significantly more advanced than most developers could have produced internally. Many studio heads and producers quickly discovered that the middleware could make the difference between a mediocre product that

shipped late and a top notch title that met its milestones.

With its domination of the middleware scene for the current generation, it's understandable that Electronic Arts purchased Criterion. Despite industry concern over this acquisition, there's no denying that RenderWare is a transcendent industry tool that appeals to those working on not only small projects, but also multi-million dollar epics.

—David Osbourn,
Freestyle Games

Electronic Arts:
www.renderware.com



Middleware

NET-Z

DEVELOPING A TITLE FOR online play is one of the most challenging problems a time-constrained developer faces. Networking is often a feature that's left until later and is of very high technical risk.

Quazal:
www.quazal.com

Quazal has addressed this risk directly with Net-Z, a peer-to-peer networking middleware package that tackles all the plumbing and allows developers to focus primarily on game content. Net-Z provides solutions for all the "hard stuff"—everything from a reliable UDP-based protocol

and NAT traversal, to entity creation/migration, RPCs, and graceless disconnects. Developers simply describe their networked objects in an easy C-like data language, and Net-Z pre-compiles it into C++, from which your game classes derive. Quazal's support is excellent—e-mail turnaround

time is generally on the order of a few hours, and escalations quickly become instant messenger conversations or phone calls. Net-Z is a great alternative for anyone thinking of rolling their own console networking code.

—Charles Nicholson,
Sammy Studios



MIDDLEWARE FINALISTS
AI.implant 2.5, BioGraphic Technologies
GameSpy.net, Gamespy
ReplicaNet 4.1, Replica Systems
SimBionic, Stottler Henke Associates, Inc.

Your masterpiece deserves a great canvas.



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Sony Ericsson is Platinum Sponsor of GDC Mobile and you'll find us in booth number 130 at the Game Developers Conference (GDC) 2005 in San Francisco in March. You'll also be able to learn more about mobile game development with Java 3D in a sponsored seminar session on March 11th.

Go to www.SonyEricsson.com/developer or visit us at GDC 2005 to learn more about the fine art of market success.



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Game Engine

UNREAL ENGINE 3



UNREAL ENGINE 3 IS more than just a game engine: It's an entire development platform, with full source code, rich tools,

GAME ENGINE FINALISTS

Gamebryo 1.1, NDL Source Engine, Valve Software Torque Game Engine, GarageGames Virtools 3.0, Virtools

and a complete asset pipeline ready to create games on PCs and the next Xbox console. This version, a major rewrite, has eliminated a lot of legacy code and is more console-friendly, but still maintains the same workflow and use of UnrealScript as before. Graphics are definitely one of the strongest points of Unreal Engine 3, which sports HDR rendering, normal mapping (along with a distributed normal-mapping computation

tool), a very powerful material system, and advanced shadowing techniques. The tools put the power in the hands of the content creators. In addition to UnrealEd, there are great tools such as UnrealMatinee and Kismet, which allow designers to create any set of game sequences in a point-and-click interface. Epic's support is top notch,

and members of their team will answer questions in a matter of hours. Overall, Unreal Engine 3 is a great choice for any team that wants to release a game on the PC and/or next-gen consoles around 2006 and wants to get started in production right away without starting from scratch.

—Noel Llopis, Sammy Studios

Epic Games:
www.unrealtechnology.com



Programming

NVIDIA SDK 8.0

NVIDIA HAS DONE A GREAT JOB OF assembling tools and tutorials to help developers make the best use of its hardware. This may seem like a no-brainer, but as a former developer relations manager for gaming hardware, I can attest to the fact that maintaining this level of support is not easy. nVidia should be commended, and other gaming hardware support should strive to reach this level. The SDK and its related tools offer something for both programmers and artists, from tutorials to performance analyzers. Many of the tools work as plug-ins for 3D Studio Max and Adobe Photoshop, and offer great exporters and previews for FX composition, texture creation, and lighting effects. nVidia has really gone above and beyond the support typically expected from a hardware manufacturer, and considering the fact that all the company's tools are available free of charge, this makes them indispensable for development on the Xbox and PC alike.

—Matt Rapelje and John Williamson, Zombie Inc.



nVidia:
<http://developer.nvidia.com>

Programming Finalists

Alienbrain Studio, Avid Metrowerks CodeWarrior Nintendo DS Development Kit, Metrowerks Visual Assist X, Whole Tomato Software

BUGZILLA

BUGZILLA IS A GREAT WEB-BASED, defect tracking solution. For free software, Bugzilla provides a solid solution that you can customize to your needs. If your needs are more complex and you need to modify the tool, doing so is a cinch because it's web-based and written entirely in Perl. In fact, some companies have gone so far as to modify Bugzilla for task management. It can be a little cumbersome when dealing with a large number of tasks, but with a little modification it can take on any manner of problems. What's important about this software is that you can start using only minimal functionality then add features as you begin to develop your process. It's the perfect solution for tracking bugs in a budget-minded environment, or a boot-strapping startup that doesn't have time to implement a large-scale solution.

—Denis Papp, TimeGate Studios

Mozilla Foundation:
www.bugzilla.org

PERFORCE 2004

PERFORCE IS A SOFTWARE configuration management system. Because it is command line-based, it's easy to build on top of. But it also comes with a good GUI for those developers who are not comfortable with the command line. It can handle binary files which can be used for documents as well as game assets (that is, artists and designers use it). The change list paradigm goes a long way to improve how you develop and think about software development. The client and servers are easy to set up and install. In fact, the software is free to download for evaluation—it's the licenses that cost money. The database is fast and robust, and best of all, the technical support staff is knowledgeable and has a record response time. Perforce is an excellent software solution.

—Denis Papp, TimeGate Studios

Perforce:
www.perforce.com/perforce/



Art Tools

POLYTRANS 4.1 AS AN ART DIRECTOR, I CAN'T

count how many times I've heard: "Can I use software X instead of Y to do that? I'm so much faster with X." I'm a big softie, so my answer is always, "Yes, as long as you can get it into software Y clean and fast." Of course, that's not always as easy as it sounds. Usually, this process is so difficult that after all the translations are done, there's no real-time savings. If you count any modifications that happen after the fact, the time lost just isn't worth it. Okino's PolyTrans makes the whole 3D data translation process that much easier.

PolyTrans comes with integrated Max and Maya plug-ins so you never have to leave your native software. This pipeline is

very robust and can translate many types of data—polygon models, materials, U/Vs, cameras, lights, object and skeleton hierarchies, mesh skinning, and animation. PolyTrans can translate data from many 3D animation and CAD packages, including 3DS Max, Maya, LightWave 3D, Mirai, Filmbox, Renderman, Softimage, trueSpace, Pro/Engineer, SolidWorks, and many others. PolyTrans provides a functionality that I didn't even think existed at this level. And although it won't transfer everything for everybody, it's the very best importer/exporter you can get.

—Sergio Rosas, *Ion Storm*

Okino:
www.okino.com

ENDORPHIN 1.5 THERE ARE TOOLS AND THEN

there are secret weapons. NaturalMotion's endorphin version 1.5 is a secret weapon. The initial sticker shock (\$12,795) suggests only a superhero backed by a millionaire could own this brainchild. But fear not, what this little gem can save in production time more than makes up for the startup cost. The secret behind endorphin is what NaturalMotion calls Dynamic Motion Synthesis. It uses AI and biomechanics techniques to create high quality character animation data sets.

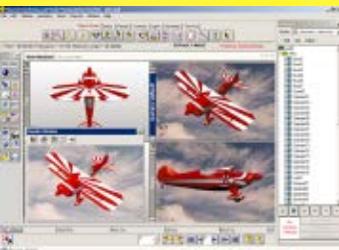
Animators become virtual directors and breathe life into characters with "adaptive behaviors" to accomplish animation scenes that could not be



realized with motion capture alone. Endorphin is revolutionary in animation practice, yet it seamlessly integrates with motion capture, key-framing, and simulation data. In about an hour or two of working with the program, an animator can master it and output production quality animations. This product is truly a significant advancement for the animation industry.

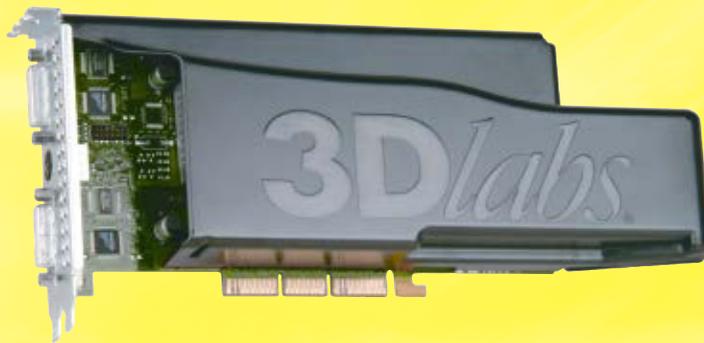
—Tom Long

NaturalMotion:
www.naturalmotion.com



ART TOOL FINALISTS

Form-Z 4.1, Auto.Des.Sys
FX Composer 1.5, nVidia
gameSpace, Caligari
Impersonator 1.1, OC3 Entertainment
LightWave 3D 8.0, NewTek
Maya 6, Alias
Painter IX, Corel
Power Solids 2, nPowerSoftware
Softimage XSI 4, Avid
SpeedTreeRT, IDV Inc.



Hardware

WILDCAT REALIZM 200

HOW FRUSTRATING IS IT

to be slowed down by inept tools when you just want to get your work done? Poor drivers on consumer cards running DCC tools just don't cut it when you need to meet a deadline. The Wildcat Realizm series of cards from 3Dlabs is designed for artists and designers who spend all day running Maya, 3DS Max,

LightWave, Houdini, or Softimage and need a workhorse that won't let them down. 3Dlabs has always offered burly cards, and they've kept it up with this latest offering. The low end of the Realizm line can address 16GB of virtual memory, while the newest addresses up to 256GB. It's a glimpse into the future of graphics hardware for us lowly

residents of the present with up to 32 simultaneous textures; 32 hardware lights; pixel shaders up to 256K in length; and 128 bits-per-pixel rendering on displays up to 3,840x2,400, GLSL, HLSL, and PS 3.0 support. A card of this magnitude lets you stretch your creativity. If you're creating video and need a card with genlock or

framelocking capabilities, an add-on card can supply those capabilities. If you create digital content for a living and need a solid rendering card, you can't do better than the Realizm.

—Ron Fosner,
DirectX.Com

3Dlabs:
www.3dlabs.com

HARDWARE FINALISTS

AMD Opteron, AMD
GeForce 6800, nVidia
Radeon X800 VPU, ATI
Spaceball 5000, 3Dconnexion
Voodoo EDEN f:2, Voodoo





Audio Tools

GARRITAN PERSONAL ORCHESTRA

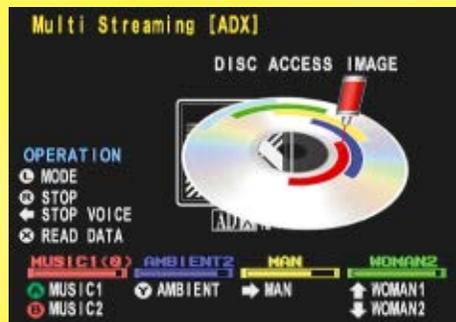
WITH THE NEED FOR HIGH quality orchestral software packages growing every day, the Garritan Personal Orchestra is a worthy contender, especially considering what you get for the paltry price tag (\$279). While there's nothing terribly new here in the software itself, it's the quality of the instruments that drives this package. Each instrument is perfectly represented, a true feat when compared to the price tag most MIDI instrument packages of this quality carry. The ease of use [the mod wheel controls both volume and timbre] in creating realistic swells and dynamics is top notch, and it is very easy to get expressive solos and

explosive pads. Personally speaking, the ability to choose vibrato or non-vibrato patches is great, since MIDI vibrato often irks me. Some of the note attacks in the woodwinds are not quite convincing, but the strings, harps, and percussions just blow me away. And for the price, you could not ask for a better tool for creating full, lush symphony orchestrations at home.

—Kasson Crooker, *Harmonix*

Garritan Orchestral Libraries: www.garritan.com

CRI ADX
THE TASK OF INCORPORATING streaming audio into games is made easy with CRI's ADX library. This clean, self-explanatory API lets you play



multiple streams of monaural, stereo, or multi-channel interleaved audio data with minimal effort. The SDK contains plenty of documentation, tutorials, and sample code. The supplied authoring tools [for Linux or Windows] allow 4:1 or higher compression of audio with very good sound quality. But the real benefit using ADX comes from the additional features integrated into the API. These include simultaneous audio and file streaming, simultaneous playback from multiple independent audio streams, 3D surround panning (Dolby Pro Logic), Dolby Digital playback, and seamless looping or concatenation of audio files. Multi-platform developers will be happy with the unified cross-platform API and data formats (PC,

PlayStation 2, Xbox, and GameCube). The only downside of this approach is that hardware-assisted decompression [such as VAG decompression on PlayStation 2] is not employed, thus resulting in slightly higher CPU and memory overhead that could otherwise be avoided. But if your goal is to save development time with a quick, easy-to-implement, multi-platform solution, the ADX library is a sure bet.

—Ethan Fenn and Eran Egozy, *Harmonix*

CRI Middleware Co. Ltd.:
www.cri-mw.co.jp

AUDIO TOOL FINALISTS

Cubase SX 2.2, Steinberg GameCODA, Sensaura MusyX, Factor 5 ProTools 6.5, Digidesign/Avid Waves, 360 Surround Tools



Books

GPU GEMS

Edited by Randima Fernando, Addison-Wesley (March 2004).

GPU GEMS IS another in the long line of "gems" books that began in the early 1990s with the Graphics Gems series. *GPU Gems* is presented in the same format—an editor selected

more than 40 of the best computer graphics programming papers covering techniques applicable to modern graphics hardware, and illustrates each technique with full-color plates

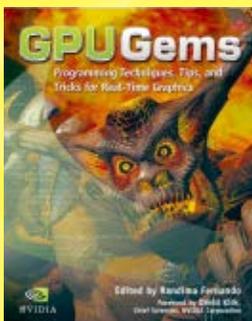
that convey the ideas behind the algorithms and math. These GPU gems require a strong background in graphics programming and a powerful, top-of-the-line video card. The

book is heavily biased toward nVidia hardware, though it attempts to remain platform agnostic wherever possible. Should your day-to-day job involve putting the graphical eye candy into games, then this book deserves a place on your shelf.

—Justin Lloyd

BOOK FINALISTS

Penny Baillie-De Byl, *Programming Believable Characters for Computer Games*
Daniel Sánchez-Crespo Dalmau, *Core Techniques and Algorithms in Game Programming*
David Franson, *The Dark Side of Game Texturing*
Andrew Kirmse, *Game Programming Gems 4*
Dave Morris and Andrew Rollings, *Game Architecture and Design: A New Edition*
Sheri Graner Ray, *Gender Inclusive Game Design: Expanding the Market*
Richard Rouse III, *Game Design: Theory and Practice, Second Edition*
Brian Schwab, *All Game Engine Programming*
Wendy Stahler, *Beginning Math and Physics for Game Programmers*
Martin J. Wells, *J2ME Game Programming*



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» hank howie

MAKING GREAT GAMES IN

40

HOURS PER WEEK

HANK HOWIE began his career in the game industry as a product manager at Spinnaker Software in 1989 and joined Blue Fang Games in 1998 as president. Hank is a member of the IGDA Quality of Life Committee and was a leading contributor to the IGDA 2004 white paper "Quality of Life in the Game Industry: Challenges and Best Practices". You can e-mail him at hhowie@gdmag.com.

SUSTAINED PERIODS OF OVERTIME HAVE LONG BEEN considered "normal" within the game industry and are often considered a prerequisite for creating quality games and meeting deadlines. Some developers go a step further and view working brutally long hours as a badge of honor and something to be admired and respected.

In an attempt to better understand the prevalence of overtime in the game industry, I reviewed 30 Game Developer Postmortems from the past five years.



40 HOURS PER WEEK

Of the 30 I reviewed, only five specifically cited arduous hours and overtime as both regrettable and something to be avoided in the future. Nine implied that there had been serious overtime, but made no mention of it as being either regrettable or avoidable. One of those nine described the practice of their employees working 24 hours straight, sleeping six hours on site, and then working another 24 hours as "fostering a hardcore work ethic." The remaining 16 Postmortems made no mention of overtime. Given what we know of the game industry, I think it's highly likely that a fair portion of these projects entailed some form of crunch time.

The winds of change constantly rush through this industry, and the issue of quality of life in game development continues to gain visibility and momentum. Continued pressure from disgruntled employees, the outcome of the Vivendi and EA lawsuits, and the impact of new federal and state overtime laws may drive legal action and force some developers to limit their staff overtime or face additional compensation expenses.

While the prospect of limiting staff overtime may be frightening to some, it's possible to make high-quality games without severe or extended crunches. Great games can be developed in something resembling a 40-hour work week schedule. How is this possible? With appropriate systems and infrastructure in place, employees who work relatively steady 40-hour weeks are demonstrably more efficient and productive, especially over an extended period of time, such as that of a standard game development cycle. The bottom line is that through effective management and policies, development teams can get more done in less time.

This is not just a hypothesis; I've seen this principle successfully applied to software development in the game industry and in other software businesses. The most effective and successful software development managers I have worked

with understood that performance degrades with prolonged work cycles and lack of sleep. Early in my career, I asked a successful development manager why he was sending people home as opposed to letting them stay and get more work done. His reply was simple: "These guys have been working hard, I know they've been here for quite some time, and I don't want them checking in buggy code." The benefit gained from the extra time spent at work was often outweighed by the cost of increased error rates and the lower overall productivity of a tired and potentially demoralized staff.

His philosophy has stuck with me, and I've seen this principle at work in our game business. Our company, Blue Fang Games, has been in business now for over six years. We've collaborated on one project, shipped two full games and two expansion packs, and we've always taken pride in our ability to make great games while hitting our milestones and shipping our games on time and on budget. Through all of this, our company policy has been to let our employees have their weekends to themselves, actively and successfully discouraging any sort of incessant overtime.

How do we do this? For the most part, it's the application of tried and true software and project development procedures and techniques, combined with what we believe is—or should be—common sense.

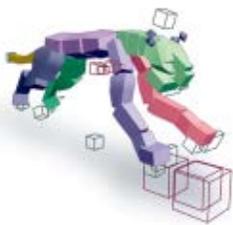
MAKE IT A PRIORITY

First, keeping people's hours reasonable must be a company priority. I submit that it should be one of your company's essential values. Otherwise, and especially if it hasn't been a key value to date, when confronted with a difficult situation, it'll be too easy to backslide into old habits. At Blue Fang, we've made it a part of our mission statement:

To make great games on time, provide an exceptional workplace for our employees, and exercise keen fiscal judgment in our business.

THOROUGH PLANNING

Next, you need to be very thorough in the pre-planning and planning phases of your projects. Planning is perhaps the most critical time for any game's development, and this is where most schedules go awry. Whether you utilize the classic "design, estimate, schedule, and build" methodology, or are using more of a prototyping methodology, if you and your team are not painstakingly thorough here,



The office news wall displays articles on Blue Fang and its products and employees.



The Blue Fang team learns that first-person shooter skills do not translate to paintball during this team-building event.

It's about using the right tools.



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Gabe Newell, Valve Managing Director

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Jay Stelly, Senior Software Engineer, Valve

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40 HOURS PER WEEK

you will not be successful at maintaining your schedule and keeping your team's hours reasonable.

There are some basic planning guidelines that we adhere to here at Blue Fang. First, someone must be functioning effectively as the builder and keeper of the schedule, in our case, the producer. This person has to be detail-focused, persistent, and patient. You are fighting an uphill battle in the planning stage as the natural inclination of everyone on the team is to get through the boring and tedious estimating and scheduling portion of the process as quickly as possible. The team wants to be coding, creating real artwork, and designing. While the design work should essentially be complete at the planning stage (keeping in mind that some changes are inevitable), no real coding or artwork should be done until the job of task estimation is done.

The truth is that during the planning phase, your team needs to exercise the greatest level of discipline. You need to drill down on each and every task, and then drill down again. There should be no such thing as a five-day task (this excludes broad category items such as optimization and bug fixing, which can take considerably more than five days). When an engineer, for example, labels a discrete task five days, it's a clear indication that he or she hasn't thought enough about the feature or problem. Break that task down into more specific pieces so that none are longer than five days.

KNOW WHAT CAN AND CAN'T BE CUT

It is also important to have a clear grasp of the essential components of your game and the various components that critically affect the scope of the game. Our companies' founders, Adam Levesque and John Wheeler, among others here, have always impressed me with their fundamental understanding of the required scope of the games they're working on. In other words, they always know what can and can't be added or cut in the game.

PLAN FOR THE UNEXPECTED

When building the schedule, account for absolutely everything: attending shows and conferences, creating demos, vacations, sick time, maternity leave, and anything else that could throw a monkey wrench into the works. In addition, we (usually) add a fudge factor—from 15 to 25 percent—for unexpected events. If you truly want to do away with extended crunches, you must live and breathe the notion that you cannot add features or tasks without either removing others or adding time.

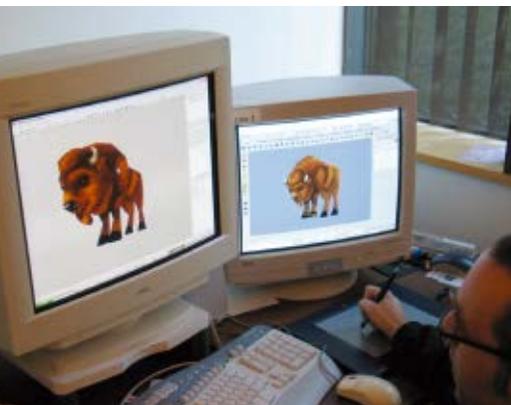
REGULARLY UPDATE YOUR SCHEDULE

You must continually monitor the progress of your product. Ideally, we update the schedule for all tasks

once a week, and we completely redesign the schedule from the ground up half-way through the project in order to apply new thinking, updated information, or just to check that our estimates are holding true. On our most recent project, we didn't always hit the once-a-week update, and we were forced to completely redesign the schedule twice. This was not ideal, but it was better than remaining ignorant.



Art director Lou Catanzaro works on a bison model for Zoo Tycoon 2.



Artist Andre Gressieux works on texture mapping Zoo Tycoon 2 downloadable content.

USE OVERTIME SPARINGLY

Having railed against overtime to this point, I'll now add that, when used intelligently, it's actually a very useful tool. It's fairly widely recognized that workers can absorb a temporary 15 to 20 percent increase in their workload for short periods of time. We usually schedule one crunch week for each of the early and middle milestones, and two weeks per milestone during the closing stages. Crunch weeks entail working four 10-hour days. The fifth day (individuals choose which day that is), is a normal day. We publicize crunch weeks well in advance, so people/families can plan for it. Whenever we have to schedule two crunch weeks in the same milestone, we try never to have them back-to-back.

PEOPLE-MANAGEMENT IS CRITICAL

Blame Dilbert: management gets a bad rap in the U.S. Nowhere is this more true than in game companies. Yet managers, the people actually responsible for the direction and performance of the staff, are perhaps the most critical element to your success. Most game companies have people who manage projects, but my observation is that the management of the actual people doing the work is stressed less heavily. It's easy to understand why. Hierarchy, management, and reporting structures aren't necessarily second nature to most game developers. Most game shops were initially formed around the cohesive vision and goal of building a game, and/or on the strength and talent of its founders. Those forces can hold people together to a point, but beyond that point, the company's infrastructure and management provide the glue.

Management is also a sensitive issue. Employees, even the good ones, are human and can falter. Problems outside work can dramatically affect productivity. Employees can lose motivation, become over stressed, lose their focus, or even lose sight of the project's goals. Good managers know how to deal with people effectively. They get the most out of their people and make each of them work better. It is generally accepted in business that a very good manager can improve performance in an individual by at least 10 percent. Conversely, a poor manager costs you at least that, and undoubtedly more. If, in each case, the manager is managing six people (ours manage more) over the life of an 18-month project, this productivity difference is just less than two man-years of development.

Just because a person is your best programmer, artist, or designer, it doesn't mean that he or she is your best manager. And the opposite might be true too. If you make that person a manager, you've done the worst possible thing: taken one of

Why NOT to buy a commercial graphics engine

Reason #4

**You've got
a time
machine.**

A good engine should be useful beyond just one or two games, and if you're designing for consoles, you should be prepared to reprogram the engine – and all the art tools, exporters, optimizers, etc. – to work with the next generation of hardware.

Unless you've got a time machine to help you know what's on the way, you've got to dedicate a large part of some poor engineer's life to staying on top of every little change in PC graphics hardware. Not to mention big changes like next-generation console hardware.

If you still haven't mastered the space/time continuum, consider a flexible graphics engine and toolkit like Gamebryo.



For the full list of reasons not to buy a graphics engine, visit gamebryo.com

40 HOURS PER WEEK

your greatest assets and made him or her far less productive and valuable. On top of that, you've probably negatively affected all the other folks who they are now directing. Egos can be involved when making decisions on who is placed into management positions, but it is up to whoever is in charge to push through that and make the right move.

Lastly, management is also about supervision. The only way that regular work weeks are effective is if everyone is contributing at their highest level during the work day. There can be no sloughing off for a certain number of days or weeks, and then furiously working to catch up. This practice defeats the purpose of establishing regular work hours. Clearly communicate the quid pro quo involved here from the outset. People can have their weekends and regular workdays, but that means we've all got to be working diligently for at least eight hours during the time that we're in the office.



COMMUNICATE WITH YOUR PUBLISHERS

Where is the publisher in all this? Clearly, your relationship with the publisher is another one of the key components in keeping schedules normalized. A forward-thinking publisher will understand the relevant issues and won't push the developer to do or promise things that are just not possible under normal circumstances. We've all heard the horror stories, but my own sense is that these destructive developer/publisher situations are becoming less frequent.

Publishers want what we all want: great, non-buggy games shipped on time. In addition, most want to build longer term relationships with good developers. It's up to you to communicate your professionalism and expertise to your publisher. Carefully building a schedule and then being able to adhere to it is one of the best ways to do that. The publisher must believe that the development company knows what it is doing. When this happens, the publisher will more readily trust the studio when it makes recommendations regarding the game, even if that entails cutting features to add others, or adjusting the scope of the game to maintain the schedule.

AGAINST THE WALL

Since this article was first written, Blue Fang has wrapped production on *ZOO TYCOON 2*. During the nearly two-year development of this game, the methodologies and core beliefs described here were tested to the limit, particularly in the final stages. In the last two-month stretch, we endured more overtime



than ever before. I'm not proud to admit that faced with the very real concern that we would not hit our targeted ship date, we worked 26 days straight in August 2004 to meet our deadlines.

With our focus on project planning/monitoring, it is logical to ask how we found ourselves in this position to begin with. We are currently dedicating a great deal of attention to fully answering this question ourselves through an in-depth postmortem process. The obvious excuses are there: we were dealing with brand new technology and the scope of the game was much larger and more complex than any of its predecessors. Ultimately, however, we in management have taken responsibility—and rightfully so—and will work to improve our performance so that we don't put our employees in this situation again.

The one positive to come out of this (other than a quality finished product of which we're proud) was a further substantiation that having reasonable work hours makes sense for effective game development. Thankfully, we had well managed our team's time up until that final stretch, and they weren't burnt out going into the final month. Thus, they had enough in reserves at the end of the project to work reasonably effectively during that period. I say reasonably effectively, because I observed the aforementioned costs of overtime (increased error rates, lower overall productivity) during the final weeks, and I'm more convinced than ever that we never want to be in that position again.

In the end, the product shipped in time for the holidays. It was close—closer than we like or are comfortable with—but we got there. We are also doing our best to thank our employees for their efforts. Flowers were sent to spouses every time an

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The Blue Fang team gathers in all its glory for a group photo.

employee had to work a weekend [that was very much appreciated—at least the first time] and we diligently tracked each employee's weekend overtime and will be providing them with additional vacation days based on that. Via our postmortem, we will identify areas that need improvement, fix what went wrong, and keep making high quality games that ship on time while continuing to respect our employees' quality of life.

GONE GOLD

One could easily write a book on this and related topics. In fact, many have already been written. I strongly urge you to read as many of the good ones as possible (see References). There's also much good work being done by the IGDA on this very subject. If you haven't read the *Quality of Life* white paper the IGDA published in April of 2004, I heartily recommend that you do.

I exhort everyone in our industry to consider new ideas and perspectives on this subject. Don't just accept the status quo, nor the notion that gamemaking is done a particular way because that's the way you've always done it. The truth of the matter is that if you don't recognize the inherent problems

caused by extended overtime and death marches, you will be at a competitive disadvantage to the game companies out there who have recognized this and are doing something about it. Companies that effectively manage their time will develop better products and will have a higher likelihood of shipping on time. In doing so, they will demonstrate their proficiency and professionalism to publishers and other partners. Their people will always be fresh, and they will continue to produce high-quality products indefinitely. They will retain their best people and there is a good chance they will absorb the talent from the companies who aren't taking advantage of this improved outlook and work methodology.

If you do things right, you'll hit your schedule regularly, and instead of being working at midnight on a Saturday, you can be home with your family or friends. Heck, you may even have time to sit down and play your favorite game. Doesn't that sound like fun? ❄️



Even after working on games all day, some employees still love to play them.





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Media in 1996 to publish games for the Macintosh. Since then, Aspyr has expanded to offer games on other platforms, foster the development of original products, and publish other media such as

music and DVDs. As the president of an independent media publisher, Rogers has served many roles, including marketing, selecting titles, and managing accountants. Here, he shares his thoughts on running a diverse, smaller publisher.

ZACK STERN *creates content with written articles and video productions, tracking gaming and technology stories for several publications. He is based in San Francisco.*

E-mail Zack at zstern@gdmag.com.

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Id Software has always tried to reach Mac gamers. Aspyr is scheduled to release DOOM 3 on the Mac in early 2005.

Zack Stern: How has Aspyr grown and developed since 1996?

Michael Rogers: We've grown quite a bit. We have about 45 employees now and the mission is still pretty much the same: Find some entertaining products, some fun products, and bring them to market. The things we do in-house versus the stuff we do out-of-house have changed quite a bit, but the mission has always been the same.

ZS: How has your business model changed?

MR: We've always seen ourselves as an entertainment company. And we think that there is an opportunity for a small company that does things well—that brings products to different markets that the big boys aren't interested in, to a lot of this republishing that you see us doing—taking PC products and bringing them to Mac, Xbox products to PC and Mac, or Game Boy stuff.

We get to work with products and content that have huge brands and have spent millions and millions of dollars in marketing and development, and bring them to a new audience. So we get the opportunity to work with those triple-A titles and bring those titles to platforms or to consumers who wouldn't normally be exposed to them. So the big guys win in that as well. And we really like that partnership.

ZS: How do you form the relationships with the big companies?

MR: Certainly we're much smaller than the EAs and Activisions of the world, so I don't think they're seeing us as any kind of a threat or anything like that. Hopefully, it's one of those really strong partnerships.

What they entrust us with, when we do the republishing stuff, is really big. This is their brand. Not so much the source code,

Aspyr has ported three of the TONY HAWK games to the Mac and PC.



although that's a big issue as well—the security of the source code and ensuring that we deliver a good game are important—but those brands you know, the TONY HAWKS, THE SIMS—we even did MADDEN FOOTBALL one year—TIGER WOODS, all of those brands are incredibly important to those companies. It's their intellectual property and their competitive advantage in the entertainment space. Entrusting those brands to us really shows us they have some belief that we're only going to enhance their brand and not take anything away from it. We work really hard to ensure that that's the case.

ZS: How do you establish distribution to retailers?

MR: It's sort of a complicated issue. I think distribution is always one of those difficult and necessary pieces of the whole supply chain. The brick-and-mortar retailers are still incredibly important to the games industry, and it looks like they'll continue their importance long into the future, as far as I can see anyway.

We realize that our role in that is to help them make money. You know it's pretty simple for the retailers as well. They have a lot of power in the industry, but they have shareholders, profit margins, inventory turns, and numbers that they need to make as well. So if we can help solve some of those problems for them, then we're a useful partner. If not, then there's no real reason for them to deal with us. So we have to be good partners to both sides of this chain. I think that's a good position to be in frankly, knowing and really taking the time to understand what the retailers are looking for, what the licensors that we deal with are looking for, and sort of configuring the company; driving the company with all these other issues makes our job pretty straightforward.

ZS: Do you have any advice for publishers smaller than Aspyr in getting that distribution?

MR: Well, my opinion is that you can't look at the sales to a retailer—meaning the retailers picking it up and putting it on their shelves—as the final step in the whole thing. That's really the first step. When we get in trouble or when anybody gets in trouble with the retail channel is when they think, "Well, my job is done," when really the work has just begun. It's

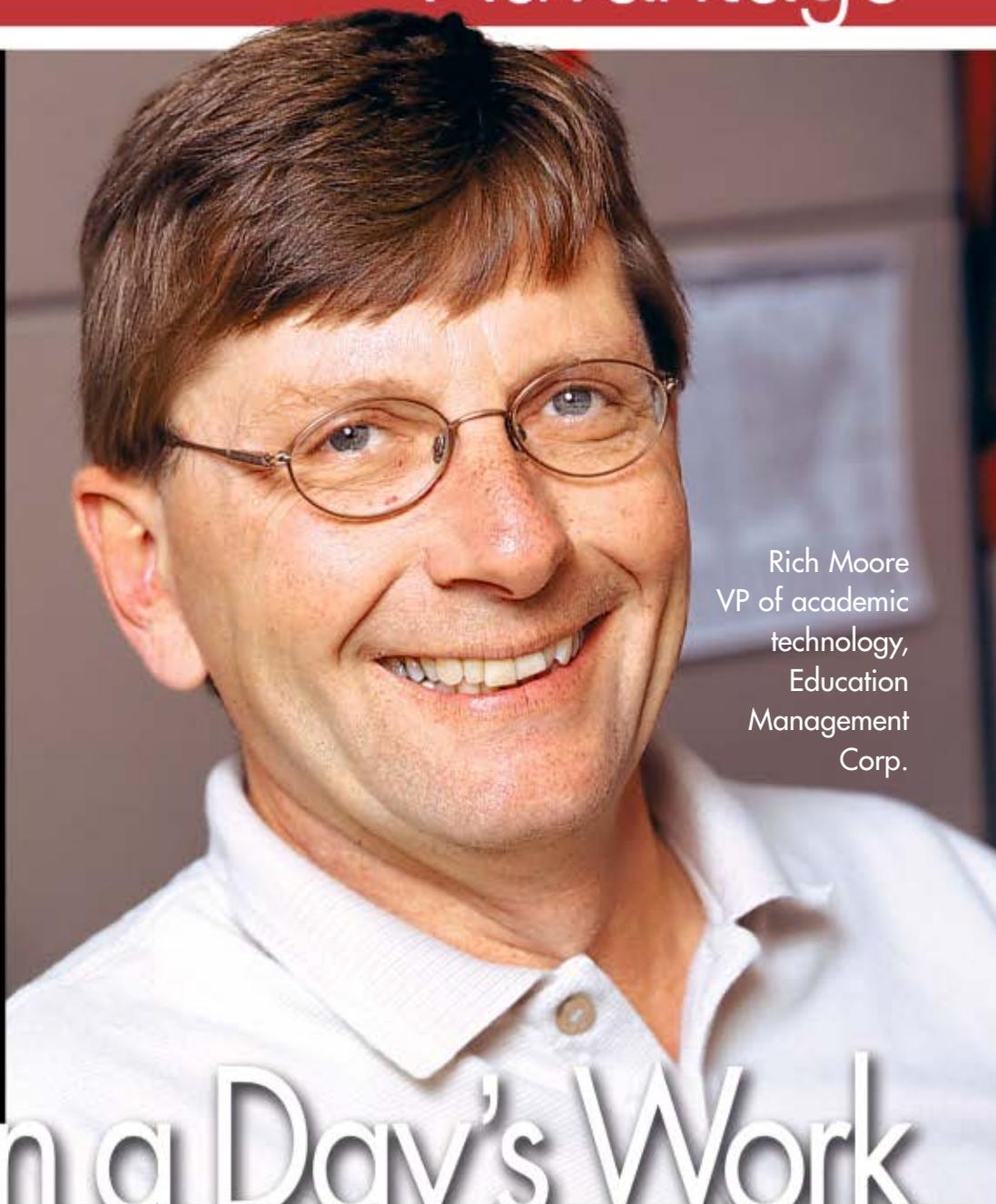


CONTINUED ON PG 37

The **Small Business** Advantage

Inside:

- > **Infrastructures get "creative"**
- > **Streamlining the animation process**
- > **A blueprint for productivity**
- > **HP technology: Tailored for digital content development**



Rich Moore
VP of academic
technology,
Education
Management
Corp.

All in a Day's Work

Smart technology plays are helping game developers avoid needless risks

Saving Gra

Faced with intensifying price competition and customer demands for faster turnaround, large numbers of small and medium businesses (SMBs) are becoming more dependent on information technology.

"It's a very competitive business environment for smaller companies, and to get the most efficiency and productivity out of their operations they have to be willing to embrace technology solutions that can provide these advantages," says Helen Chan, senior analyst for small and medium business strategies at The Yankee Group, an IT consultancy in Boston.

The pressure on SMBs to improve productivity is unrelenting. Observes Chan: "Enterprises that do business with smaller companies expect them to operate more efficient supply chains, know more about the products they manufacture, react more quickly to marketplace changes and do a better job anticipating demand for products and supplies."

Investing for a Competitive Edge

A recent Yankee Group research report on SMB strategies found that lowering costs and streamlining processes to improve overall business efficiency were major SMB challenges.

Fortunately, Chan says, applications designed to boost productivity and increase supply-chain efficiency have become affordable for many small and medium businesses. For example, Hewlett-Packard provides a series of productivity solutions geared for SMBs in specific industries such as legal, accounting, health care and real estate.

"SMBs are investing in IT to remain competitive within their industries," says Chris Ogburn, director of sales development at HP. This, he says, was verified in a recent SMB survey commissioned by HP*, in which 96 percent of the respondents indicated that keeping their technology investment up to date is more valuable to their business than ever.

"You used to find that SMBs were using technology defensively just to keep up," Ogburn says. "Now they're becoming very ROI-focused; they are making IT investments to increase productivity so they can gain a competitive advantage."

Blueprint for Productivity

Hammel, Green and Abrahamson (HGA), an architectural and engineering firm in Minneapolis, Minn., has built an IT infrastructure consisting mainly of HP servers, desktops, portables and printers. HGA architects and engineers use sophisticated computer-aided design software to create drawings for clients. By investing in new HP workstations every two years, the firm ensures that its designers will have some of the most powerful tools available to support their CAD applications.

No Pain, Much Gain

HP Helps Small and Medium Businesses Automate Processes and Boost Productivity

Given mounting pressure from customers and suppliers alike, small and medium-size businesses are striving to reduce costs and increase efficiencies. Recognizing this, Hewlett-Packard continues to develop more products and resources to help SMBs automate their operations and increase employee productivity.

The following are the most frequently asked questions regarding HP's productivity tools and services and the many ways in which these solutions can help SMBs gain a competitive edge.

Q How do advanced technology solutions from HP help smaller businesses streamline their supply chains and deliver greater value to their customers?

A: HP offers Smart Business Application Solutions that address core business processes and help ensure that the entire solution—including the hardware, software, services and support—meets the requirements of smaller businesses.

For example, HP File & Print Solutions allow small and medium businesses to improve their file and print server reliability by upgrading to Windows Server 2003 on a ProLiant server, and to upgrade their server infrastructure to NT4

with tools that improve security, operational efficiency and performance. These solutions also allow SMBs to consolidate multiple storage devices and assess their printing assets and usage patterns to determine the optimal mix of single and multifunction devices for their business. All of this helps to increase efficiency and decrease costs.

Another example, HP Communications and Collaboration solutions help SMBs become more competitive through secure and efficient information sharing among their employees, customers and suppliers. Using these tools, SMBs can upgrade to Microsoft Office Systems 2003, add HP's wireless networking and access devices, and utilize HP mobile access and security solutions.



New productivity tools let SMBs keep up with demands from their large customers and suppliers

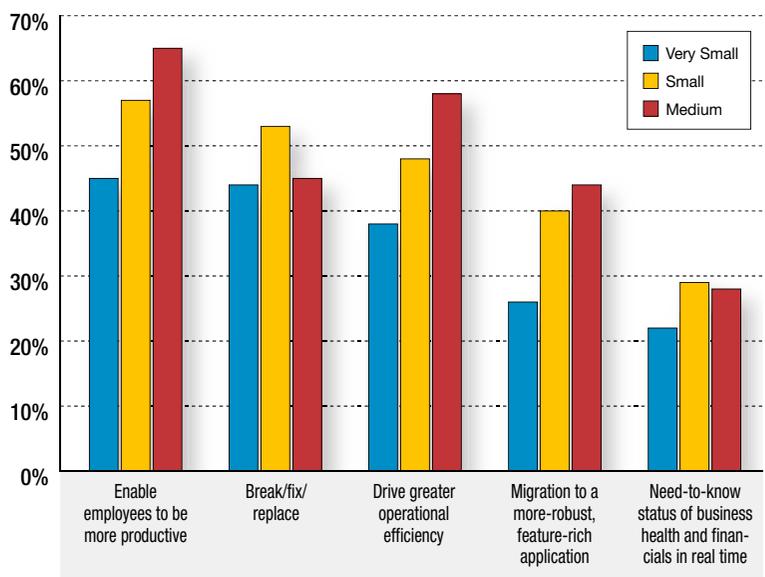
“We understand our customers’ requirements,” says Nancy Schmidt, IT director at the 550-person firm. “The more efficient the equipment is, the more productive we are. We finish work more quickly because of these machines, which allow engineers and architects to work at a faster pace. If we weren’t so efficient, we’d lose our competitive advantage.”

Compulink Technologies, a New York-based IT consulting and networking services firm that specializes in the SMB market, has observed the same trend. “Many smaller companies are looking for technologies to streamline operations because they don’t have the manpower to get things done,” says Denise Arboleda, vice president of sales.

Technology investments by SMBs to increase productivity will continue, says John Madden, director of the Selling to Small and Medium Businesses Practice at Summit Strategies in Boston.

“SMBs want the technology capabilities of large enterprises to improve their operations, but also because many of their customers and suppliers are demanding it,” says Madden. “They realize that these kinds of solutions are no longer out of their reach.” ■

Key factors driving SMBs to purchase or upgrade business applications



Definitions: Very Small (2-19 employees); Small (20-99); Medium (100-499)

Source: The Yankee Group SMB Applications and Web Survey, December 2003

* Conducted by Penn, Schoen & Berland Assoc. in May, 2004. Results can be accessed at www.hp.com/hpinfo/newsroom/press/2004/smb_survey_report_5-14-04.pdf

Q What are HP's industry-specific solutions?

A: HP offers SMB-oriented solutions and online resources for the health-care, legal and real estate markets.

For the health-care industry, HP works in collaboration with leading healthcare application vendors such as Allscripts Healthcare Solutions to deliver state-of-the-art offerings. An electronic prescriber solution based on Allscripts's TouchScript.NET eRx software and HP IT technology enables physicians to ensure prescription safety. With checks for drug to drug interaction, patient allergies, formulary compliance, generic equivalent availability, electronic prescription ordering and medical database access, physicians are able to improve clinical results and patient well-being.

HP legal solutions can help attorneys

increase productivity and reduce costs. These include NetDocuments, a Web-based service that provides a central storage system for legal and business documents. HP also partners with Amicus Attorney to provide law practice management software, and with Print Inc. to offer imaging and printing services for law firms.

For the real estate industry, the entire HP product line is available at special terms through the National Association of Realtors' REALTOR VIP program.

Q What is the mySAP All-in-One Program and how does it tie into HP's SMB offerings?

A: The mySAP All-in-One program links HP and SAP value-added resellers, allowing them to deliver SAP solutions to their SMB customers more quickly. These solutions include Business

One and mySAP All-in-One. The program offers resellers access to a portfolio of HP and SAP offerings through an SAP/HP SMB partner Web site. In addition, the program offers lead generation and sales incentives for HP partners as well as educational materials, training courses and certification on products from both companies.

Q What are HP and Intuit doing to help SMB customers?

A: HP and Intuit have signed an agreement to jointly offer financial management solutions that allow small and medium businesses to quickly and easily manage their finances. These solutions combine Intuit's QuickBooks accounting software with HP's ProLiant servers to provide SMBs with a robust financial management function that can keep pace with the growth of their business. ■

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HP's Smart Office program: A broad range of hardware, service and support for small and medium businesses.

Creative Development

HP technology animates the Art Institutes' classrooms

It's a study in creative energy. The 31 Art Institutes throughout North America educate students in the fast-growing field of electronic media and art, sending these budding designers out into the world to help produce the next animated movie hit or develop a best-selling computer game.

Behind this artistic and educational endeavor is an aggressive approach to technology. At least once a year the Art Institutes refresh their classrooms with the latest workstation technology to provide the blazing processing speeds required by the latest animation and e-media software.

The Art Institutes offer creative and applied arts degree programs throughout the U.S. and Canada and have graduated more than 125,000 students. All 31 of the institutes rely extensively on machines from Hewlett-Packard, including servers, printers and some 4,500 desktop and laptop devices. Each of the institutes' administrative offices uses HP desktop computers, printing and storage systems to help keep processes like scheduling and billing running smoothly.

Drawing Power

But it's in the classrooms that the technology really stands out. Here, where future animators and illustrators learn their craft, workstations such as the HP XW4100 run the high-speed applications needed to create ultra-sophisticated animation.

The HP workstations are ideally suited to support functions such as rendering, the final step in the three-dimensional animation process and the one responsible for such image attributes as colors and textures. "We've come to rely on the power of these machines to teach the animation process to our students," says Rich Moore, vice president of academic technology at the Art Institutes' parent company, Education Management Corp.

Optimum Performance

Moore, who oversees technology purchases for all of the institutes, is comfortable equipping the classrooms with HP machines because he knows that the software used in courses like digital content creation will perform optimally. "HP tests all the software we use for animation and has certified that it will work on those machines," he says. "HP has also worked with the various graphic card manufacturers to ensure that software and cards will work well together with its machines."

One of the biggest benefits of the HP equipment, Moore says — both in the administrative offices and in the classrooms—is its reliability. That's one of the main reasons the Art Institutes has standardized on the vendor's hardware since 1996. The few times Art Institutes has needed support from HP, such as figuring out how best to use a new graphics card with new hardware, HP has



"But it's in the classrooms that the technology really stands out. Here, where future animators and illustrators learn their craft, workstations such as the HP XW4100 run the high-speed applications needed to create ultra-sophisticated animation."

— Rich Moore, Vice President of Academic Technology
Education Management Corp.

resolved issues promptly, Moore says.

"We've had very little downtime, and that's extremely important," says Moore. "When students are in class we want 99 percent or greater uptime. It's tough enough learning how to be an animator and to use these complex applications at the same time. We don't need to make it harder with equipment failures." ■



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Publishing rights take time to secure. The Mac version of TOM CLANCY'S SPLINTER CELL was released about two years behind the Xbox launch.



have some titles that are—I would call them kids' titles. So there is no set standard that says there needs to be a game that's E-rated or M-rated, or a certain subject matter, or even someone's preference here in the company. You know, we're not trying to sell games just to me or the people who work here; we're trying to sell games that are fun, that are of value to the people who choose to buy them, meaning they're worth the money that we get people to pay and that gives somebody a good experience. So the real factors are: "Is it fun?" "Are there titles like that?" "Is this a title that we want to have in our lineup because we think that it will be successful?" Those factors are far more important in the game industry overall than any of the other things—even brands and stuff like that. If it's a fun game and we believe that it can sell, then we're interested in it.

At the core of our business, we sort of see ourselves as a publisher, a re-publisher, a co-publisher—you could even say developer, co-developer, re-developer. We publish products, we co-publish products, we republish products, so really we're looking for opportunities in all three of these areas. One doesn't take priority over another in our strategic planning, except for the fact that publishing original stuff is a lot more expensive, so a company our size can't afford today to do that well with more than one or two titles at a time. So we like to do the republishing model. It's less risky, the resources are much smaller than the original stuff. But we want to do more. ❖

New developer Wideload Games signed on with Aspyr to publish STUBBS THE ZOMBIE for Xbox, PC and Mac in 2005.



CONTINUED FROM PG 28

sort of incumbent upon everybody—and even the retailers—to be sure that stuff is moving through: consumers vote with their pocketbooks. If they're not buying your product for a specific reason or the price is too high, or it doesn't have a good box, or they don't know about it but it's in the stores, that's a big issue.

ZS: Do you have any general advice or recommendations for a smaller company starting out in the publishing business?

MR: Don't be afraid to partner with different companies. That's probably one of my biggest messages, that lots of different companies in various stages of the supply chain are trying to solve different problems. If you can come up with a way to solve a problem for them, then you can be successful. If you can do that often enough, then you can become very successful.

ZS: How do you choose titles to publish?

MR: We get asked that question quite a bit because we have a pretty diverse lineup. You know, we have some games that are really violent and M-rated and quite gruesome. And we

Acquisition of popular licenses such as Aspyr's Mac port of SHREK 2: THE GAME helps to build credibility.



POSTMORTEM

AVOIDING SEQUELITIS

» SEQUELS TO SUCCESSFUL GAMES may seem obvious—maybe even too obvious. And with *THE SIMS*, we at Maxis had a lot of content to work with and many leaps in technology

to take advantage of since the first game was shipped back in 2000. Even so, sequels pose a unique challenge. *THE SIMS 2* team had to understand what led to the success

of the original and devise a way to evolve (and ultimately how to innovate) while juggling colossal expectations from fans, critics, and the company.



WRITTEN BY:

LUCY BRADSHAW with contributions from Matt Brown, Tim LeTouneau, and Paul Boyle. Send comments about this article to editors@gdmag.com.

IN THE SIMS 2



GAME DATA



PUBLISHER:
Electronic Arts

**NUMBER OF DEVELOPERS
AT PEAK:**
140

**LENGTH OF DEVELOPMENT
FROM CONCEPT TO SHIP:**
3.5 years

RELEASE DATE:
September 17, 2004

PLATFORMS:
PC

**TOTAL NUMBER OF
BUGS REPORTED:**
Approximately 39K

**NUMBER OF POWER
OUTAGES:**
36

SOFTWARE USED:
C++, Perforce, Maya,
Photoshop, .Net

WHAT WENT RIGHT

1 PROTOTYPING. Maxis has always been a major proponent of rapid prototyping when kicking off a new game. We used early prototypes to resolve look and feel issues, to help understand the key emotional connection, and most importantly, to test out the new gameplay concepts. Building these prototypes during the concept and pre-production phases instead of during the full steam production phase just makes sense.

Many of these prototypes significantly affected the final design of the game. The look-and-feel prototype, for example, established how the Sims look, particularly in the adult and teen years, and set the tone for the new 3D environments. The HeadToy prototype helped evolve the Create A Sim tool. Later in the project, the “aspiration, wants, and fears” prototype guided the way we created the new gameplay. All of these prototypes were done as separate applications, using existing tools, such as Maya and .Net, and executed by one or two engineers or artists. Our key to success is being rapid, staying focused on what we’re trying to solve and moving quickly. We aim to show progress and iterate frequently. If someone working on a prototype has not

shown us something each day of the week, it’s probably going sideways.

Each of these prototypes was different in its implementation. The visual look-and-feel prototype was simply a movie, but it set the bar for the lighting, camera, environment, and characters.

The HeadToy prototype gave us a chance to explore some rather extreme possibilities in the new Sims’s appearances. It also inspired Sim DNA, the virtual genes that are passed along to Sim descendants. One of the core design concepts that came out of this stage of the project was that the Sims would grow up in *The Sims 2*. The prototype not only nailed the various

ages and the creative possibilities, but also validated the Sim DNA concept. This influenced the user interface, changed the way we talked about the game, and ultimately became part of the marketing campaign: “Genes, Dreams & Extremes.”

We used the “wants and fears” prototype later in the project, but it was critical in providing the major innovation in regard to player focus and gameplay pacing. The prototype, built by Matt Brown and his team, let the designers and the engineers play through the wants and fears trees and establish the logic involved.

2 UNDERSTANDING THE AUDIENCE. Our challenges in making a sequel to *THE SIMS* was to intrigue the currently active players as well as recapture players who had uninstalled long ago. The audience of *THE SIMS* has changed rather dramatically since the original—they’ve evolved from hardcore players to ones who are very casual or new to games all together.

We focused on what we felt were some of the key factors of success in *THE SIMS*. We worked with our publishing partners to get a picture of our player base. We also spent a lot of time on the forums in our web site, as well as other fan-sites and bulletin boards. We came to several conclusions. One was on the topic of *THE SIMS*: a game about people is something that most folks can connect with. Other factors that we felt were critical were the creativity, the open-ended nature of the experience, and the sense of irreverent humor.



We spent a lot of time brainstorming ways to improve these aspects of the game. We enhanced the creativity by improving the Create A Sim module, refining the building and designing options, and by creating a new means of storytelling via movie-making. We bolstered the open-ended nature of the game by keeping the same depth and breadth, and by making the lives of the Sims feel richer through additions to the social landscape. Finally, the key to this audience was the addition of growing Sims and playing through the generations of their families.

We recognized that we needed to attract our previous players through innovation. A major lure for these lapsed Sims players was the move to full 3D. This gave us an instant leg-up on the original, but we also parsed a lot of feedback from reviews, player suggestions, and focus groups. From these outlets, we heard that players were tired of managing the mundane aspects of their Sims’ lives—they wanted a new focus and pacing. Another thing we identified from listening to focus groups and player testimonials is that a great many players had not discovered some of the crazy things that could happen in *THE SIMS* and its expansions. Players had simply not put together the right combinations of actions and objects to discover these bits.

We boiled this down to the need for new pacing and rewards as well as a need to refine and maintain the open-ended gameplay. We had to find a better way to guide players and expose them to more of the possibilities that we had created.

The entirety of these observations drove much of our brainstorming about features and rewards, and led to the composition of features that we eventually included.

3 KLEENEX TESTING. Use once, throw away. Kleenex testing, in our vocabulary, means using disposable testers throughout the design process—from alpha to release candidate. The key to fresh feedback is using each tester only once: just like Kleenex. Since so much of our game hinges on players immediately understanding the gameplay and the interface, and that the rewards hit with good pacing, we elicited feedback and acted upon it regularly throughout the development process.

The most important part of Kleenex testing is finding people who can play a game with someone looking over their shoulders and while voicing the thoughts that go through their heads. Not everyone is cut out to be a piece of Kleenex.

We completely iterated the Create A Sim interface three times because of feedback received during Kleenex testing. This testing allowed us to better categorize the steps and make the flow of Sim design more natural and clear to players. There’s quite a bit of depth to creating a Sim, and since a Sim’s appearance can be very important to the player, this is an area in which we had to supply both complexity and simplicity (ease of use).

4 CUSTOM CONTENT AND COMMUNITY. At Maxis, we believe that a great deal of the success of *THE SIMS* came from the wealth of content and characters created by our user-base and enthusiast communities. When we initially shipped *THE SIMS* in February 2000,

Situational humor helps to create an emotional bond for the player.



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There are more than 11,000 animations in *The Sims 2*.

we had already created and released tools that enabled fans to create Sim skins. We continued to foster this community by adding more tools to a frequently updated and community-oriented web site.

When we embarked upon *The Sims 2*, our philosophy was: If you could see it on the screen, you should be able to customize it. We also wanted to integrate this capability more seamlessly into the game, making it easier for players to manage the content they gathered or created. We designed the user interface for data

management to realize this goal. We also integrated our web site directly into the game through an in-game browser that allows players to download skins or objects and use them immediately.

In addition to this, we continued to keep an open dialog with the fans and webmasters supporting *The Sims*. We asked their opinions, got their feedback, and even kept up a weekly mailing on the progress of *The Sims 2*. We maintained this mailing list for a full year before we shipped. One very successful event was the launch of *The Sims 2 Body Shop*, our tool for creating *Sims 2* skins. We made this available to the community on the opening day of E3 2004, when we premiered the game on the show floor. We had more than 80,000 skins on the site by the time we shipped the game. One problem we encountered with this simple-to-use tool, however, was that we made it easy for users to brand the work of others as their own. We built some solutions into the shipping product and web site to make sure the creator identity is seen (if desired) and made sure we created strong community ethics for our site.

Today, the community is thriving, and player-created content made with the *Sims 2 Movie Maker* is something we are very proud of.

5 SWAT TEAMS. SWATs are small, cross-discipline teams within the larger development team that tackle key features and technical issues. SWATs (some call them pods or cells) helped *The Sims 2* team focus on several fronts, thanks to strong leadership in each group responsible for decisions, communication, and tasks, such as pushing for the completion of their team's projects. On a large team such as ours, this requires an essential tactic. These SWATs evolved over the course of the project, coming together and disbanding as their objectives were initiated or met.

We had a neighborhood SWAT, which was responsible for all the visual features in the neighborhood: everything from the on-the-fly creation of house imposters to the landscape and effects. There was also a neighborhood story SWAT, which built all the finished neighborhoods. This team created all the pre-built content, relationships, and ephemera so players could jump right in and experience the game. The Create A Sim SWAT was the team that created the workflow and technology behind the Create A Sim module. The *Sims 2 Body Shop* SWAT shipped a "product" twice during the production of *The Sims 2*. The Body Shop had to go through Q/A, CQC, localization, and all the other processes a stand-alone product must weather. This was an amazing team of people.

One of the most distinctive teams on the project was the believe SWAT. They were saddled with the duty of changing the behavior of our Sims to match the new, more detailed aesthetic. This team worked together to really put our animation engine, which was designed by David Miller, through its paces. Human beings know

how human beings behave. One of the major challenges we faced in *The Sims 2* was matching the motion to the meat. We had to experiment with using the animation engine to its fullest, which extended all the way to adding a breath channel and a very subtle but effective facial movement channel (before we put this in, Sims just looked too noticeably mechanical and creepy—see Steve Theodore's "Uncanny Valley," December 2004).

As for behavior, the challenge was to create new routing, awareness, moods, and personalities which would work autonomously, be eminently interruptible by the player, and provide clear feedback about what was going on with the Sim in question. We knew we had it right when our testers didn't notice it. When we got to that point, we figured we had believable Sims.

There were many other excellent SWAT teams on our project, and they all contributed to the final feature set in ways that could not have occurred without this specific compartmentalization.

WHAT WENT WRONG

1 NOISY FEEDBACK. Players need to be able to read how their actions affect the game structure. Feedback, therefore, must be simple and intuitive. The believe SWAT team had to experiment a great deal with the behavior and movements of the new Sims in order to strike a successful balance. One of these experiments was a bust, which ate up a lot of time and effort.

We were experimenting with bringing the personality dimensions of each Sim to the forefront by enabling players to affect this area to a greater degree. We experimented with animations and behaviors that were intended to show off the extremes of the five personality sliders: neat, nice, outgoing, playful, and active. What we ended up with were crazy looking Sims that were difficult for players to read. We learned a few things from this experiment that ultimately helped us make sharper decisions later in the project.

First, the player really does need simple UI devices that tie well to the Sims' behavior. In the case of the personality sliders, having five that all worked at the same time didn't clearly demonstrate to the user what was happening. Second, more behavior and angles of interaction are not necessarily better. In the end, we did keep some of these animations and behaviors, but we made them function as additions to Sim characterization rather than another whole dimension of Sim management. The learning from this experiment gone awry also came to bear when we implemented the desperation behavior of our aspiration-challenged Sims. When they exhibit desperation, the behavior is tied to one dimension of the UI with a very clear means of affecting it positively.

2 THAT'S A LOT OF CONTENT. In terms of total volume of content, we bit off a lot. The goal of aging Sims meant creating three separate Sim skeletons and designing a rich variety of skins in for five age categories—toddler, child, teen, adult, and elder—and two sexes. In addition, we had to execute unique animations for each age, as well as unique behaviors and voices for each age and sex.

There are more than 11,000 animations, 1,200 skin meshes (textures increase the variety by re-using the same mesh), 40,000 voice samples, not to mention the models, design modes, effects, cinematics, sounds, full text in 21 languages, and music.

During the development, we felt like we were constantly playing catch-up. Getting all the content executed, tracked, and reviewed took a great deal of process invention. Initially, our tracking was not as detailed as it needed to be to follow each asset through the pipeline and transfer the information to the various sections of the team. Even the design specificity needed



to be greatly enhanced.

We had to fix these problems after the content generation had already begun. Creating build processes, databases, and pipeline tools that helped validate the accuracy of this content should have been implemented right at the start. Some exceptional work by our development directors, engineers, configuration management team, and technical art director really got us on track.

Needless to say, generating all that content required dedication from a fantastic team of artists, engineers, audio specialists, and producers.

3 NEW ENGINE, NEW PIPELINES, LEARNING CURVE. While we were still learning the capabilities of the new animation engine and putting together our pipelines, we were simultaneously breaking down design elements, for example the animation trees. Early on, some assumptions were made based on knowledge of how things used to work in the original THE SIMS engine instead of how things would work in THE SIMS 2 engine.

We had to go back and re-work content to better utilize the capabilities of our system. We also found that we really needed to train our new hires better—there were many technical tricks and steps to understand, and training them on these tasks would greatly improve the pipeline. This was not insurmountable, but it certainly made for better execution once we invested the proper attention to training and reviewing content in not only the content viewer but the game as well.

4 SEQUELITIS. Pursuing features that add complexity to existing gameplay is a trap that we almost fell into early in the project. There was a great passion from some of the team members to improve systems that they had lived with for so long. If you read some of the fan boards and our BBS, you'd think that this direction would have been met with great success. It is actually a natural thing to want to do.

An example of this was an early design inclination to add to the Sims' motives, that is, their basic needs. Numerous posts on our forums extolled the virtues of this. For a while, we experimented by adding thirst and stress to the mix of needs that the player must manage. I think we realized this was the wrong direction when we saw mockups that showed how additions to the Needs Bars would look: too overwhelming. Another factor was that we

CONTINUED ON PG 63



The Sims 2 shook the money tree, with one million copies sold in the first ten days.



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OPTIMIZING PATHFINDING
PART II: MODELING**IN THIS SERIES OF ARTICLES, I'M**

exploring the creation of a pathfinding engine to support 10,000 units moving on a 1K by 1K tile map. Last month I looked at optimizing code by exploring many different orthogonal implementation strategies configured with #defines, avoiding getting caught in local maxima by making multiple changes at once. I held the problem fixed; all the implementations produced the same path [or, at least, a path of identical, optimal length]. This month I'll look more closely at the problem I'm solving to try to get a handle on what happens if I allow different (sub-optimal) solutions in the interest of improving performance, as occurs when using an inadmissible A* heuristic or performing hierarchical pathfinding.

MOVEMENT MODEL AND ERROR

The goal of a pathfinder is to determine the "best" route for a unit to move from location A to location B. Although "best" could involve avoiding enemies or staying in cover, typically it just means the shortest route, or, to be explicit, the fastest route: the route that takes the least time. To find an optimal route in this sense, A* has to use the actual time it takes for a given unit to traverse a given graph edge. Depending on the game design, diagonal movements might take the same time as axial-aligned movements, or they might take 1.414 times as long or some other amount. Tile-map pathfinding nodes generally represent the center of a tile, and edges



Figure 1 Three paths are clearly non-optimal, and for two paths, optimality is uncertain.

represent movement from one center to another, so each edge traversal involves movement across two tiles. If different terrain has different movement speeds, then the time taken to move from one node to the next would typically be the average of the cost of crossing each of the terrain types (since half the distance travelled is in each tile).

In my A* implementations last month, I assumed that diagonal movements cost 1.5 times an axis-aligned movement, that differing terrain costs were small integers, and that I could use the travel time of only the source tile when determining the cost of an edge. These assumptions allowed for a faster implementation (small integer edge weights allow a fast multi-list priority queue, and source-based edge costs reduce the expense of determining the cost when probing the 8 adjoining nodes). In the best case, the game simulation would be tweaked so it matches these costs, but that will rarely be possible.

What happens if the costs the pathfinder uses don't match the costs of the simulation? The pathfinder will not find optimal simulation paths. The paths it finds will be optimal for some hypothetical simulation with the costs it uses, but they won't be optimal for the game's simulation.

If this is unacceptable, this kind of optimization can't be made. However, the desire here is to make a game, not win a race. Optimality is not the true goal. I'll

redefine the specification, taking into account this actual application: I want to find a path so a unit can move from location X to location Y without any observable inefficiencies. Any sub-optimality that the player isn't aware of is acceptable.

In a turn-based squad-level tactics game where the player precisely micro-manages units, spending explicit time or movement points, any mismatch between the pathfinder's "optimal" paths and the spending of those points is unacceptable, because this will be obvious (and frustrating) to the player; in terms of my specification, any inefficiency is observable. Fortunately, such games won't involve pathfinding 10,000 characters on a 1K by 1K map in real time, so such a game doesn't require the kind of optimization I'm describing in these articles.

What sorts of inefficiencies are observable? This problem is tricky enough that the rule of thumb in the game industry has been "just use A*." A* produces an optimal path, guaranteeing no observable inefficiencies. Other techniques, like use of waypoints and highways, couldn't make these guarantees, so they were either avoided, or their output would be locally re-optimized. Since plain A* is going to be too slow, there's little choice but to dive in and think about the question in detail, so we know what to look for and fix. Figure 1 demonstrates a

few scenarios to consider. The first is trivially obvious: a unit should never cross its own path, revisiting the same map location—fortunately, few pathfinding algorithms are even capable of generating such paths. Second, a unit shouldn't wander around erratically while following a generally straight line. Again, pathfinding algorithms do not tend to create such paths; but even if they did, the third case is general enough to include it: if a unit makes a turn, it shouldn't be obviously possible to cut the corner instead, as illustrated by the dotted line.

The fourth case in Figure 1 is harder to judge; if units move more slowly over the green terrain, it's not immediately obvious whether it would be faster to cut the corner or not. (It is certain that the unit should never just cut a small part of the corner, e.g. at the dotted line, because a simple proportionality law applies. Also, this works out differently if movement in arbitrary directions is possible, instead of only eight directions.) Similarly, in the fifth case, if the green terrain slows units down sufficiently, it would be better to go around it, rather than follow the direct path through it.

The first three cases are easy for a player to observe because they are trivially apparent just when watching a unit follow its path in a small, local area. The other two scenarios are still observable, but they require the player to experiment to determine which is faster, e.g. by running a race between units, one of which has waypoints to force it to take the path the pathfinder will not naturally select. Of course, neither of these two cases arise if your terrain all has the same movement cost (i.e., merely open versus impassable). But there is a sixth case not shown that applies even without varying terrain costs: the global path might be too long. For example, a unit might be able to route either left or right around a large lake, producing entirely different paths. Again, a person looking at this may not be able to judge easily which path is better, but can time both routes and compare.

These two general ways of observing demand different responses. The first

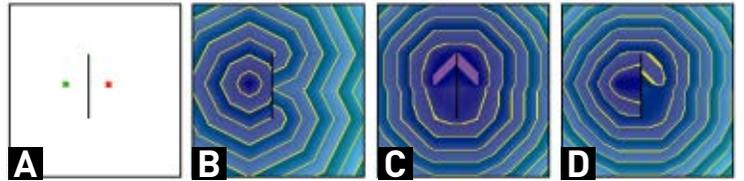
kind, which is trivially observed locally, has to be avoided if you don't want players to think your AI is stupid. The second kind requires more work for the players to detect. If the percentage difference between the true best path and the pathfinding result is small, it may not be a big deal. As the

difference gets larger, it becomes an exploit—a way for players to gain unintended advantage. In a competitive multi-player game, that's probably not acceptable. In a single-player game strategy game, it might still be okay.

Using A* with an incorrect model (for example, incorrect diagonal weights) generally lets you avoid the trivial-local problems, since there's still some reasonable simulation to which the model's solution applies. Any path which is obviously wrong just by looking at it (as in the first three cases of Figure 1), regardless of how it unfolds over time, is never going to be produced by an incorrect (but not absurd) model.

However, some local error might still be observable by experimentation. If there is only one terrain type, the only error arises from misweighted diagonals, which is fairly hard to notice visually. However, if terrain types have different movement costs, accurately represented in A*, but the diagonal is misweighted, this might lead to errors of the fourth and fifth cases, with diagonal shortcuts being made when they shouldn't be, or vice versa. On the other hand, 1.5 is not that bad an approximation to 1.414, so the error is not that large, and won't matter for many possible small integer terrain weights.

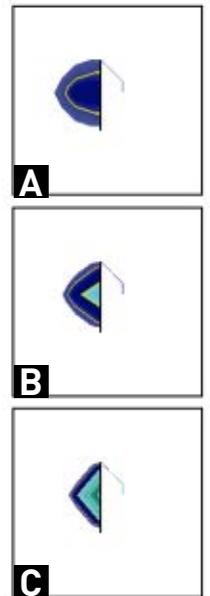
The other inaccuracy in the model I'm using is my use of the source tile cost to represent the traversal cost from center to center along an edge. The error due to this inaccuracy turns out to be fairly small. In fact, if diagonal movements are disallowed (or cost the same as axial



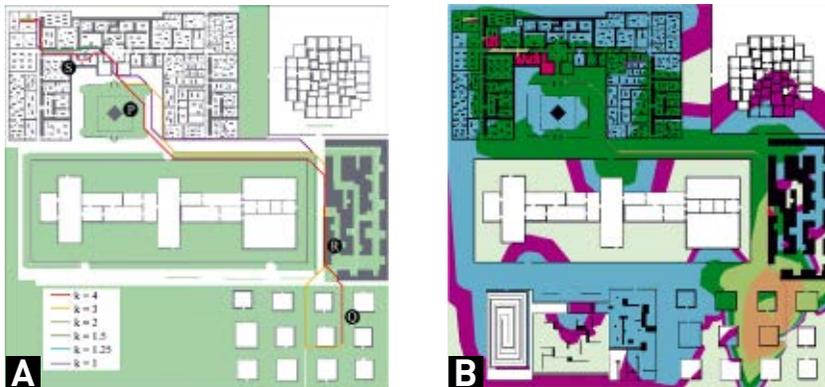
Figures 2A–D A classic pathfinding test case is shown in Figure 2A searching from the green to the red. The actual distance from the start node, in Figure 2B, has diagonal moves 1.5 times longer than axial. The idealized A* function uses exact distance in Figure 2C from the end node as the heuristic. The purple region shows all points with the lowest value of the function. In Figure 2D, A* is shown in practice, using octagonal distance from end node as a heuristic.

movements), it produces exact results. This occurs because the cost of the path is simply the cost of all of the edges traversed. Any tile that the path enters, the path will also leave, except the starting and ending node. That means the true terrain traversal cost due to any tile on the path will be half contributed to the edge entering that tile, and half contributed to the edge leaving that tile. By computing edge costs based only on the node the edge leaves, the cost computation is shifted half an edge out of phase, but it still accumulates the same costs for all the nodes on the path. The only mis-measurement of the path's cost arises from the start and the end. The start will contribute a full tile's worth of cost, instead of only half-a-tile's worth; and the end will contribute none, instead of half a tile. But, since all the paths being compared start and end at the same tile, all paths considered will have the same error in the total path length; thus, whichever path is shortest under this inaccurate cost function will still be shortest with the accurate one.

The simple analysis doesn't apply with diagonal paths of different weight; any time the path turns from axial to diagonal or vice versa, there's a small inconsistency from the ideal measurement; so the pathfinder will bias one of those kinds of turns to the most expensive tile type and the other to the cheapest tile type. In practice, this effect seems insignificant; comparing the "true" cost for the paths found using the fast



Figures 3A–C Actual nodes are explored by A* for the problem in Figure 2A. Figure 3A provides an example of an admissible A*; Figure 3B has an inadmissible A* with a heuristic twice that of Figure 3A. Figure 3C illustrates an inadmissible A* with a heuristic four times that of Figure 3A.



▲
Figures 4A–B Inadmissible A* searches of the canonical path from the previous column (see Inner Product, December 2004). Each inadmissible heuristic is computed by multiplying the original admissible heuristic by some constant k . Figure 4A shows the paths computed. $k=2$ is mostly identical to $k=3$, and $k=1.25$ is identical to $k=1.5$. Figure 4B shows the nodes visited by each of the searches. Each set includes almost all of the nodes from higher-valued k .

edge cost against the length of an optimal path computed using true edge costs, in a sample set of 50 paths from last month's data, 80 percent of the paths were optimal by both metrics, and the worst error was only 1.5 tiles or 0.1 percent of the path's total cost. So this is neither locally observable nor, apparently, likely to be measurable by player experimentation.

INADMISSIBLE HEURISTICS

The above analysis makes me think the inaccuracies in using this A* model, not quite identical to my simulation, are tolerable: they're generally not observable, and they offer some significant performance gains (at least for long paths). Now I can apply the same analysis to other techniques that produce sub-optimal paths; for starters, the use of inadmissible heuristics.

An A* heuristic is admissible if it is a lower bound on the actual distance to the goal. Generally, we want to make the heuristic as large as possible while remaining admissible because this will speed up the pathfind as much as possible while still finding the optimal path. In an ideal world, the heuristic would be the exact true cost to the goal. Figure 2A shows a classic pathfinding test case. Figure 2B shows the distance from the start node, computed by Dijkstra's algorithm. One way to think

about pathfinding with Dijkstra is that we search successively larger distances (as suggested by the yellow isocontours) until we eventually reach the goal; metaphorically, we flood the valley, raising the water level until the water touches the goal.

Figure 2C shows the idealized A* function $f()=g()+h()$ where $g()$ is the distance from the start and $h()$ is the heuristic lower-bound distance to the goal; in this case it's idealized because $h()$ is the exact distance to goal. Given the idealized function, A* merely needs to explore the bottommost level of the valley; every point on the path has the same $f()$ value (namely, the path's total cost). Figure 2D shows an actual A* function, here using the "octagonal" distance function $[\max(x,y)+\min(x,y)/2]$ from the goal. The solution is no longer contained in the lowest value of the function; instead, like Dijkstra, A* explores successively larger regions until it finds the solution. The actual area explored in this case is shown in Figure 3A.

If the heuristic function isn't a lower bound, it's an inadmissible heuristic. This can be faster; by penalizing nodes further from the goal, it encourages the pathfinder to favor working near the goal, at the cost of not necessarily finding the optimal path. Admissible A* guarantees that $g()$, the distance from the start

node, is computed correctly for all nodes on the optimal path. Use of an inadmissible heuristic prevents A* from computing true $g()$ values. Thus there are no meaningful $g()$ values to graph for nodes not visited; instead I can only show the regions actually explored by inadmissible A*. Two such results are shown in Figure 3.

Figure 4 shows the results of performing inadmissible A* on the "canonical" (nearly worst-case) path from last month. The inadmissible heuristic is computed by scaling the heuristic by some constant k . The paths computed inadmissibly show many kinds of errors. At points P and Q, the path from the largest heuristic, $k=4$, incorrectly "shortcuts" across slow terrain [it's probably not a coincidence that the slow terrain is four times as expensive as the normal terrain]. At R, the $k=2$ and $k=3$ paths have gone too far to the right, but move back to the left to use the fast path. This correction is a "locally obvious" sub-optimality—the paths go too far to the right and then move back to the left. Since my rule of thumb is that locally observable errors are unacceptable, these paths won't do without further cleanup.

Since the error at points P and Q are both due to the existence of slower terrain, and many games have only one terrain cost, point S is also of interest. The $k=2, 3$, and 4 paths have followed a globally sub-optimal route. It's unclear how well k can be tuned to avoid these sorts of errors entirely without reducing k so much that there are minimal speedups, nor is there any plausible way of "cleaning up" global errors after the fact. If global errors are unacceptable, inadmissibility may not be very useful. If they're acceptable, then inadmissible paths can offer a huge speedup, as illustrated by how little they explore in Figure 4B.

It's not immediately clear how errors like those at point R can be removed efficiently, since they're "local" but over a very long distance. Before doing performance comparisons, I want to implement path re-optimization/cleanup and include that when measuring runtimes. I'll report on that in March. But next month, I'm taking a break from pathfinding to examine the late-binding of data. ❄

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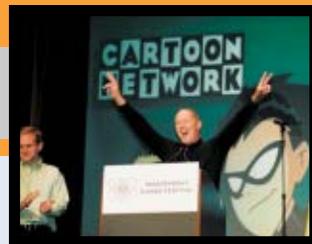


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STEVE THEODORE

PIXEL PUSHER

HOW THE OTHER HALF LIVES

IN A DIVIDED AMERICA, IT'S HARD TO

think beyond the backbiting, bitterness, and partisan rancor. But we must pull together! We all must do our part for reconciliation and compromise. We artists have to learn how to get along with those knuckle-dragging Neanderthals from the other side. You know who I mean: programmers.

CAN'T WE ALL JUST GET ALONG?

The culture clash between artists and programmers is a basic feature of the game industry's ethos. We all know the stereotypes: Programmers are arrogant ("You want 24-bit textures for that? Well sure, if you can write me a new memory manager!"). Artists are flaky ("You mean, if I don't put in that Source Safe thing, my work doesn't get in the game?"). Programmers grab all the credit ("Our game looks so good because we have the best lighting code on the planet!"). Artists are crybabies ("Well, the first version I created looked awesome, but after they made me cut it to 400 polygons, it looked positively dreadful."). If there were game-industry sitcoms, artist-programmer clashes would generate half of the stock jokes (producer jokes, of course, would cover the rest). Whichever side you're on, you can't deny that the artist-programmer relationship comes with a lot of baggage.

Despite what you may have mumbled over a few beers, the real distinction between artists and programmers isn't

psychological, social, moral, or genetic. It's professional. Every job has its share of geniuses, losers, drones, heroes, and flakes. But all programmers are alike in one way: they're all programmers. If you want to improve diplomatic relations with the folks on the other side of the divide, start by considering what being a programmer does to one's outlook on work and one's opinion of artists.

THE MATHEMATICAL MIND

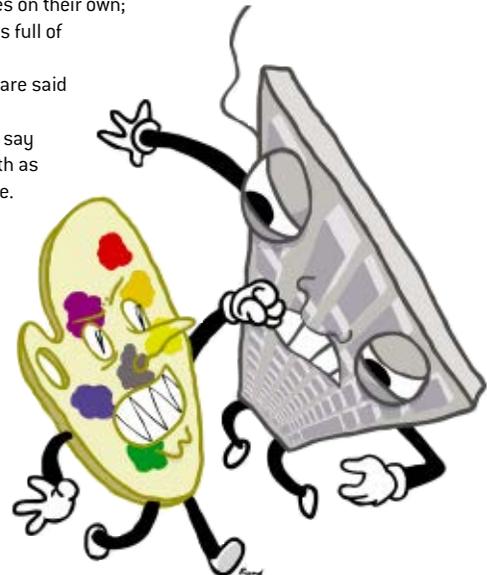
British novelist and physicist C.P. Snow had a theory about what he called the two cultures, by which he meant (a) people who know math and (b) everybody else. Although many coders (particularly in games) are self-taught, software development as a discipline has deep mathematical roots. You can't get very far in coding if you don't have a high tolerance for subjects like logic, calculus, and trigonometry. Even programmers who skipped college usually have to pick up parts of these disciplines on their own; the language of coding is full of mathematical thinking.

People who like math are said to be attracted to its "elegance": its power to say as much as possible with as few symbols as possible. Calc, trig, and logic are extremely efficient and compact ways of talking about complex things. Those things could be described to us yokels in more obvious ways, but only at much greater length. So math tends to resemble stenographic shorthand: it's hard

for the outsider to grasp, but precise and succinct.

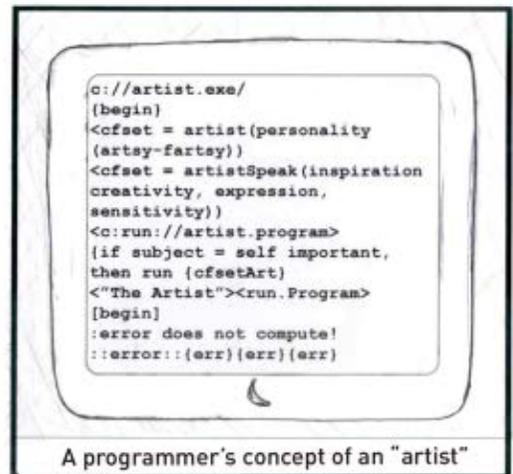
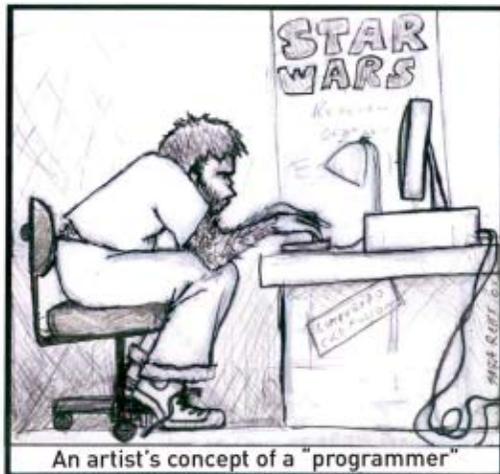
Sound familiar? The conflict between power and accessibility is the deepest fault line in software, from the old DOS versus Mac crusades, to PC versus console arguments, to Maya versus Max flame-wars. Coders and artists, not surprisingly, tend to cluster on opposite sides of the divide. We know which group can find its way through a Unix command line and which one hasn't learned how to create macro buttons in Max. In the allegorical language of the DOS wars, developers are beige-box 286 machines and artists are smiley-faced Mac Classics.

The trench lines in the power versus friendliness conflict run smack through tool development. If you're on the precise-and-powerful side, you don't think twice about designing a level editor or animation system that stores all its object properties in scads of text files. For example, it's easy to make a last-minute, global find-and-



ILLUSTRATIONS BY CHRISTOPHER FORD (PG 49) AND SARA REISS (PG 50).

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



replace change because everybody has a text editor, right? Of course most artists don't see it the same way. For one thing, we don't have text editors that can search and replace across multiple files at once. But text or GUI is merely symbolic; the real issue is how you think about work.

WHAT DO YOU WANT?

We folks from the "friendly" camp are experimental rather than efficient. We want systems that allow us to fiddle around. It's not that we're too lazy or too dumb to deal with complex commands. Our work often demands that we try out hundreds of variations in order to hone an effect. We care about ease of use because we have to do a lot of using. After all, a day's work in Max or Photoshop involves tens of thousands of "edits" at the pixel or vertex level. Each is ultimately just some numbers moving around in a database, but because the feedback on these actions is instantaneous, you don't think about each little tweak as a distinct operation. You just push verts or paint pixels and concentrate on the results.

For a programmer, on the other hand, the process of making a change in code is very discrete, marked by a formal process

(compiling) that clearly separates "before" and "after." Moreover, most edits made by a programmer don't mean anything in a stand-alone environment—they only come alive in the context of many other edits elsewhere in the program. They don't make sense without a larger plan in mind. Coders don't have the luxury of just tossing in an extra line here or there to see what it will do, so it's hardly surprising that programmers often produce tools that do a great job of speeding up your work if you know from the outset what needs to be done. If you're in artsy, experimental mode—or if the job you're doing doesn't fall exactly within the confines of the job as envisioned when the tools were designed, those kinds of tools are as comfortable as a straightjacket.

If you want to reach an accord with your tools guys, you need to translate your feature requests into terms that make sense to people of the concision-power mentality. Make absolutely sure your counterparts understand that some tasks are exploratory and can't be done without a lot of iteration. There's a built-in temptation for the power-over-friendliness crowd to see power as an end in itself, so be clear in explaining that unused power is a waste of their time as well as yours. A mediocre lighting algorithm with a short iteration path will usually beat a super-

duper new technique that's so complex you're afraid to change its default settings. Don't forget, though, that friendliness isn't an end in itself either. Data-entry tasks such as tagging objects as breakable or attaching AI triggers are just clerical work. Don't spend political capital on begging for a GUI for those sorts of tasks—suck it up and install a programmer's editor with a global search-and-replace function.

In the end, the power/friendliness war is a contest between competing half-truths. Unused power and friendly idiocy are both useless. If you can help your coders define what the tools really do—which ones are just data entry and which ones are the doorways to big unexplored realms—they'll come through for you. Of course, that means you'll be taking more responsibility for the overall shape of the art pipeline, which brings us to the other aspect of programmer culture you need to appreciate: engineering.

EMBRACE YOUR INNER ENGINEER

If math is about elegance, engineering is about tradeoffs. Engineers (and thus, coders) are trained to meet measurable goals under measurable limitations. The genius of engineering is that it looks at

every problem in very strictly defined terms: "What are the resources available?" "What are the goals?" "How can we measure success?" Every decision is seen as a compromise between means and ends: "That engine is going to be powerful or fuel-efficient." "That renderer is going to have lots of triangle throughput or lots of texture memory." The best coders are going to find ingenious ways of eking out more performance, memory, and features—but in the end, even the Carmacks of the world have to live within the limits imposed by hardware, time, and budget. The harsh business of living within those limits shapes every aspect of an engineer's outlook on game building.

If you want better results when wheeling for features or resources, try to keep the engineer's mentality in mind. On the simplest level, it means having a clear idea of your own priorities so you can haggle effectively. "Could we get more texture memory if we used palletted sprites?" "Could we push more triangles if we used only two bone weights per vertex instead of three?" An art team that can make feature requests that are backed up by realistic proposals for how to achieve them will earn a lot more attention and respect from coders than one that can't.

You also need to understand how the engineering outlook shapes all developers' perceptions of what we artists do. Coders are often frustrated with artists because they feel we aren't systematic enough. Engineers think (or at least pretend) that their training helps them reach impersonal conclusions. Ideally, if you give engineers a well defined problem, they'll be able to agree among themselves on a best-fit solution. In practice this isn't always true, but it's an ideal that strongly colors the way engineers think about their jobs and about us. Much of what we do is a matter of subjective taste, and to many engineers this implies that it's not serious or professional. If you've sat through many concept art meetings, you might be tempted to agree.

The irony is that artists and coders aren't nearly as different as both parties believe. Amongst ourselves, artists have many of the same kinds of cause-and-effect discussions that engineers have: "This character has that stomping attack, so we really need to emphasize the size and weight of his boots—maybe something like what mountain climbers wear." "Those colors are too warm for the this level. Put more grays and purples in there for a more ominous mood." All too often we hide the businesslike aspect of what we do behind vague words like "talent" and "inspiration" because they're more gratifying to the artistic ego. In the end, though, we are pros, with a complicated body of knowledge that our teams need to rely on.

Therefore, when it comes time to pitch something to your devs, don't try to pretend you're empowered by divine inspiration. It's better politics to emphasize the rational, professional, problem-solving element in your work or suggestions. But learning to think like engineers isn't just about PR. Embracing the nuts-and-bolts aspects of the work environment can give the art team a much bigger role in the evolution of a game.

The engineering mindset, the art of balancing means and ends, is the essence of working in a technological medium. When your tech lead answers your feature request by asking, "Well, what other feature do you want me to cut?" it's not just orneriness or sarcasm—it's a reflection of the basic give-and-take philosophy of their discipline. If you're not

used to thinking like an engineer, that question is a conversation stopper. Certainly, many devs will pull it out for just that reason. But if you know enough about the game and the engine to suggest an actual candidate for a compensating cut, you might get that feature you need after all. And that's why it's important to see how the other half lives. We are just as subject to external constraints—memory, processor power, network bandwidth, and the like—as any coder. Anything we can learn from our teammates about how to eke a little extra life out of our tools is a victory for both of us. ❌

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NECESSARY EVIL

INTELLECTUAL PROPERTY AGREEMENTS

GAME DEVELOPERS CREATE VALUE

every day, even if the source of that value—such as a new idea, model, code, illustration, or program—cannot be quantified or reduced to a tangible form. Intellectual property (IP) agreements, including confidentiality (non-disclosure) and invention assignment provisions, protect that value.

IP agreements establish a legal foundation for the ownership, division, and protection of these intangible assets. Commonly, these agreements dictate that an employer will own the intellectual property developed by employees or independent contractors on “company time,” and that once the employee or contractor is no longer with the company, he or she still cannot use or disclose the intellectual property.

IP agreements are a key measure to protecting trade secrets. The classic example of a trade secret is the formula for Coca-Cola, but virtually any type of idea, design, or technique can rise to the level of a trade secret provided it meets three tests:

- it is kept subject to reasonable security measures, such as a non-disclosure agreement
- it isn't generally known in the industry
- it generates economic value from the fact that it is not widely-known.

In some states—not including Hollywood's IP-rich state, California—IP agreements can even restrict a former employee's ability to work for a competitor. These non-compete agreements can further protect a company that's concerned about its personnel leaving to go head-to-head against it in the marketplace.

NECESSARY

At first glance, IP agreements seem to benefit only one party: the employer. After all, by having designers and programmers sign IP agreements, the employer gains ownership of the employees' works and imposes restrictions on their ability to disclose or duplicate that work for future employers. To an extent, this can be viewed as both a hardship on employees and a means of stifling innovation.

However, that's not quite a complete picture. Without the security of knowing that they will retain the benefits of training an employee and investing in the equipment the employee needs to do his or her job, few employers would be willing to offer the employee a job in the first place. By providing that departing employees cannot use the trade secrets and other IP which they developed or were exposed to while on the job, these agreements actually encourage innovation by requiring the constant development of new and different ideas. This not only safeguards the interests of the former employer, but contributes to the overall vitality of the industry.

Not all IP agreements are the same. It should go without saying that no one should sign an IP agreement without first reading and understanding its terms. As a general rule, employers allow employees to consult with an attorney before signing an agreement; after all, it is in everyone's best interest to be certain of the scope of the agreement and how it affects each person's rights.

If there are portions of an agreement which seem ambiguous or too restrictive, a developer should raise the possibility of clarifying or revising those terms. Of course, an employer may not be willing to negotiate much (if at all), but in practice parties looking to work together can usually find mutually-agreeable terms. A helpful

rule of thumb is to inquire during the interviewing or exploratory stage whether a potential employer uses an IP agreement, and if a copy is available for review.

EVIL (THAT IS, LAWYERS)

A recent lawsuit illustrates how IP agreements can protect a publisher's market share. Ubisoft's Montreal division enjoyed great critical and commercial success in designing TOM CLANCY'S SPLINTER CELL. Soon thereafter, a direct competitor, Electronic Arts, hired away several key members of Ubisoft's SPLINTER CELL design team. Ubisoft filed a lawsuit to prevent those employees from working for EA for a certain amount of time. Ubisoft's lawsuit was based upon two things: the IP agreements it had with those employees, which included non-compete provisions, and the threat that the employees would reveal and use Ubisoft's trade secrets in the course of designing games for EA.

Ubisoft obtained a temporary restraining order to keep the SPLINTER CELL team out of EA. An appellate court reviewing the case affirmed that this type of injunction was appropriate and held that it was important to uphold the terms of IP agreements because “the signing of a contract should mean something.”

Ubisoft anticipated a challenge to its market position (and bottom line), took steps to protect itself, and preserved its interests. Its prospects of doing so would have been much more doubtful without the IP agreements.

DOCUMENTATION

Innovation is the foundation of game design and development. Individuals and corporations alike cannot afford to ignore the importance—if not outright necessity—of documenting and protecting their invaluable new ideas. IP agreements are a straightforward, standardized, and logical way to do just that. ❖

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ALEXANDER BRANDON

▶ AURAL FIXATION

TOP TEN GAME SOUNDS

IN MANY WAYS, GAME SOUND EFFECTS

can be more readily identifiable than music. Just as the legendary hum of the lightsaber and scream of the TIE fighter have solidified their positions in world culture, consider how important the sound of a chaingun is in a first-person shooter, or the sound of a squeaky sneaker in THIEF or METAL GEAR SOLID. These are my (unofficial) top ten picks for most effective and unique sounds in games.

10. CONTRA: "Death," Konami. In CONTRA, a dying player sounds more like a cybernetic android shutting down than a man hit by bullets. But the sound's over-the-top quality and campiness allows for such a technique. When your player dies, the sound hits you like a fist and is one of the most memorable sounds of failure in games.

9. CRYSTAL QUEST: "Level completed," Patrick Buckland/Casady & Greene.

CRYSTAL QUEST was one of the first games to use extensive samples for all of its sound effects. Released in 1987, it used the Mac Classic to the fullest with its 8-bit mono PCM capability. The sound for completing a level is a shout of glee (or ecstasy, as some have interpreted it), that makes you laugh each time it happens.

8. WIZARDS AND WARRIORS: "Mug of ale,"

Rare. This original NES game took itself quite seriously back in the day and was a decent incarnation of ye olde "knight rescues the fair maiden" tale. In the midst of this game reverberates a sound that both perplexes and amuses with absolute originality. When acquiring a mug of ale, the player receives a point bonus and hears a sound that chromatically arpeggiates

upward, resulting in a very bizarre audio effect. If you sing the words "mug of ay-ay-ay-ale" when the sound occurs using the same pitches you end up with at least a few minutes of delightful amusement.

7. DOOM 2: "Double-barreled shotgun," Id Software.

For a game of its caliber, the sounds in the original DOOM were well made, but none can compare to the double-barreled shotgun sound in the sequel. After acquiring the weapon, you feel more powerful than with almost any other gun, even the BFG 9000. Indeed, many years passed before a sound yielded comparable satisfaction in a first-person shooter.

6. SUPER MARIO BROS.: "Jump," Nintendo.

When one thinks of jumping, one doesn't immediately imagine a sound pitch bending from a low pitch to a high one. Even though the sound repeats more than a thousand times before the game is completed, it never seems repetitive. It also symbolizes the main activity of one of video games' most memorable characters, who was actually named Jumpman in his earliest iteration.

5. DEFENDER: "Spawn," Williams.

Williams/Midway games of the arcade age achieved a great quality of synthesized sound using resistors and capacitors on a Motorola 6800 board. DEFENDER was released in 1980 (the same year as PAC-MAN), but it achieved much more textural and engrossing sounds using less advanced technology, even though there were fewer sounds playing at once. By comparison, PAC-MAN used a custom 3 channel PSG on its Z80 microprocessor. A defender's flanged ship materialization was unique amongst arcade and home games alike and generated a layered sound quality not heard to date.

4. COUNTER-STRIKE: "AWP," Valve. When COUNTER-STRIKE was first released, it blew us all away with its weapon sounds. Inarguably, the weapons were far more



COUNTER STRIKES' AWP used a sound that blew many players out of their seats the first time they heard its powerful blast.

visceral than any FPS that had been released to date, not to mention that the weapons caused far more damage (almost realistically so), which made the sounds all the more frightening. The AWP sniper rifle is oft used as a powerful, one-shot kill weapon, and its sound makes that very clear.

3. GAUNTLET: "Elf/Wizard/Warrior/Valkyrie is about to die," Atari.

This sound means one of four players is in serious trouble and needs to restore his or her health. Though technically this is a voice and not a sound effect, it was generated through synthesis using a chip called POKEY by Texas Instruments, similar to those used in the Speak & Spell. This sound, like no other, makes you worry that you're close to death.

2. ZAXXON, "Wind," Sega. The first cool ambient sound ever used is in Sega's ZAXXON. The sound of wind in space doesn't exist in reality, of course, but in this title it sets an extremely barren and foreboding mood.

1. PAC-MAN: "Death," Namco. Perhaps the most identifiable sound in popular culture, the death of Pac-Man is synonymous with failure and, much like the CONTRA death sound, it makes no bones about telling the player they've lost miserably. The sound is used in commercials and films and nearly everyone recognizes it, gamer or not. ❖



WIZARDS AND WARRIORS' mug-of-ale song wins points for amusement and originality.

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



NOAH FALSTEIN

» GAME SHUI

WHAT TRUMPS FUN

THIS MONTH WE CONSIDER AN IMPORTANT rule and some even more important exceptions. Often the basic rules of game design, as articulated in The 400 Project, are fairly simple and even obvious—but the intriguing and enlightening aspects come from understanding when the rule should be bent, broken, or even directly contradicted. That's why the trumping information is so important, as this rule, "Gameplay comes first," shows.

THE RULE

GAMEPLAY COMES FIRST. It's a simple principle, and seems straightforward to apply: Always choose design options that will make the game more fun. There are potential pitfalls in defining just what fun is, or making the assumption that a game designer can clearly evaluate the relative "funativity" of two conflicting choices, but let's set those aside today.

The interesting insights come from considering why a designer would deliberately choose to not follow this rule, consciously making the game less fun to play. Sound like heresy? Perhaps, but it may be enlightening heresy.

DOMAIN. This is a pervasive rule that applies to all levels of game design.

WHAT THE RULE TRUMPS

STORY. At their core, games are about interactivity, not storytelling, and although it's tempting to bend gameplay

to emphasize story or character development, make sure you're not falling in love with your own writing at the expense of fun.

DESIGNERS' PERSONAL PREFERENCES. Some designers simply make games they want to play, believing that their taste matches the audience's, which may be a symptom of laziness or an unprofessional approach, but usually just means the designer is a little naive. Even if the designer truly represents the game's intended audience, at least some aspects of his or her personal likes and dislikes are bound to contradict or clash with the vision of the game. A mark of experience in the industry is the ability to make choices in game design that serve the greater fun of the game, not simply the preferences of the team members.

WHAT TRUMPS THE RULE

RESOURCES. Often there are design choices that clearly would be fun but are beyond the scope of available time and budget, or beyond the abilities of the development team. You can ask for more time or more money, but it won't win you any popularity points with your boss.

LICENSE. If you're designing a James Bond game, it may seem like great fun to give Bond the ability to fly and see in the dark. But he is a human being (well, at least no more than slightly superhuman), and fans won't appreciate their secret agent breaking out of character with a newfound supernatural power. It shatters the player's immersion. Give 007 a jet pack and infrared goggles instead.

SIMULATION. This is one of the "bend the rule" options: If the game simulates real-world situations, sports, or vehicles, you have an obligation to stick to the real-world qualities of what you are simulating. However, the fewer details the average player is likely to know about the topic, the more you can bend the rule. Sid Meier took quite a few liberties with the rise of a CIVILIZATION, but you'll never

get away with making a football field 80 yards long to speed up the action in the next JOHN MADDEN FOOTBALL.

EDUCATION. If you're creating an educational or training game, you'll have specific knowledge and information to impart. Sometimes these goals will conflict with gameplay options that maximize fun.

TASTEFULNESS. Good taste is subjective and can become a point of controversy, particularly in matters of humor or when dealing with ethnic, sexual, or religious matters. Sometimes designers face a choice between one course that pushes the boundaries of taste but will be great fun and another that is clearly inoffensive but dull. In this case, the designer can search for a subtle compromise between the two extremes (see "Ethics of the Slap" in Dean Takahashi's "Ethics in Game Design," December 2004). Other times, the designer might consciously decide to risk the ire of one group by appealing to the tastes of another (by making a nationalistic war game, for example). But often the designer does not have sufficient power or authority to be the sole arbiter of taste.

RATINGS. If your game is mandated to fit into a particular ESRB rating, you may find your desire to maximize fun trumped by the ratings board.

ETHICS. Even if you're not constrained by ratings, there are matters of ethics. I expect that a lot of players would cheerfully learn how to build a pipe bomb with everyday household materials—but does that mean you should put it into a game?

FUN SHUI

Ultimately this is one of the rules that demonstrates how game design is an art. It is never an easy choice to deliberately trump a principle as important as fun gameplay, in favor of one of the conditions shown above. And yet, the decision should be made not only when it is logical, but also when the payoff feels right. ❖



The designer had to stick to the real game rules in EA Sports MADDEN NFL 2005.

NOAH FALSTEIN is a 24-year veteran of the game industry. 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. You can e-mail Noah at nfalstein@gdmag.com.



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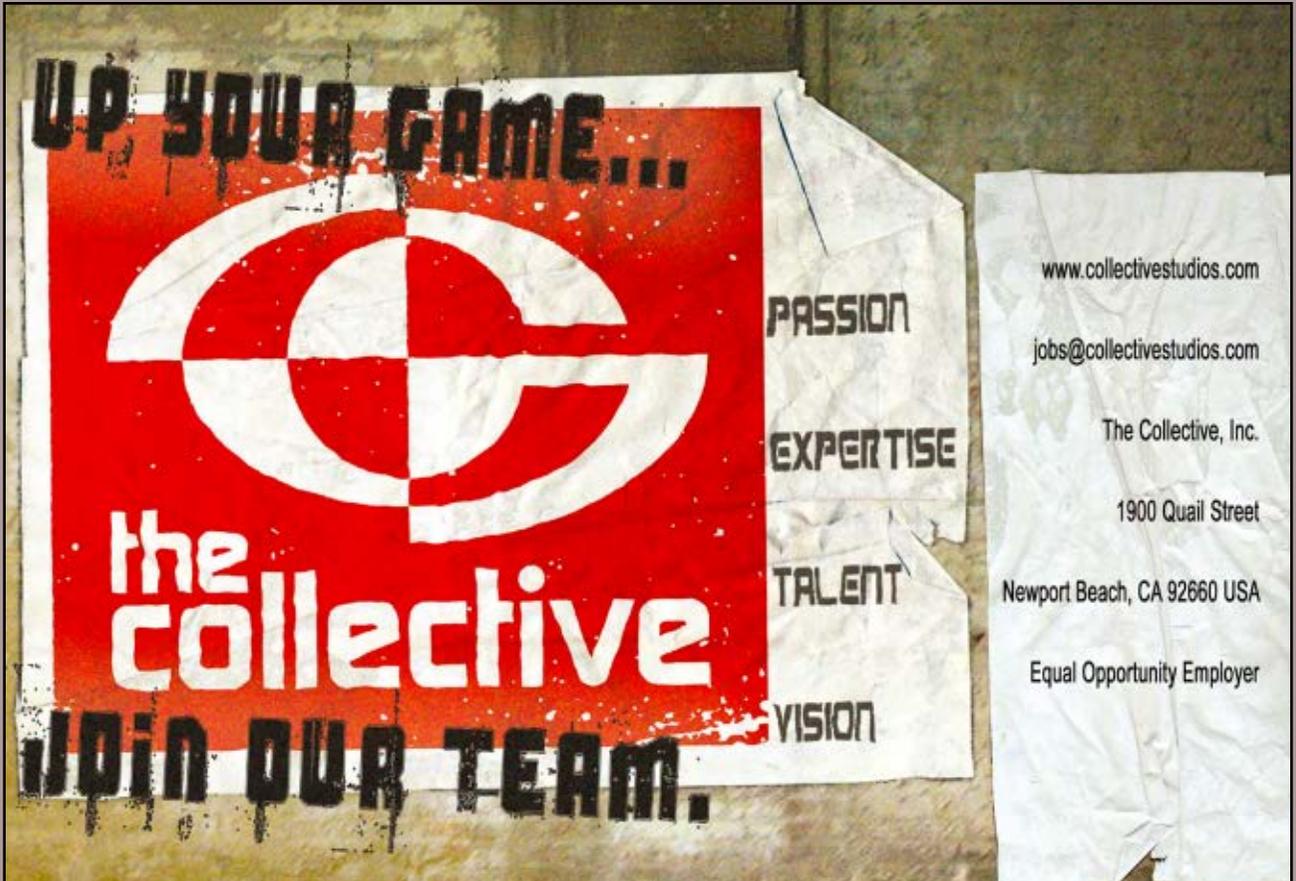
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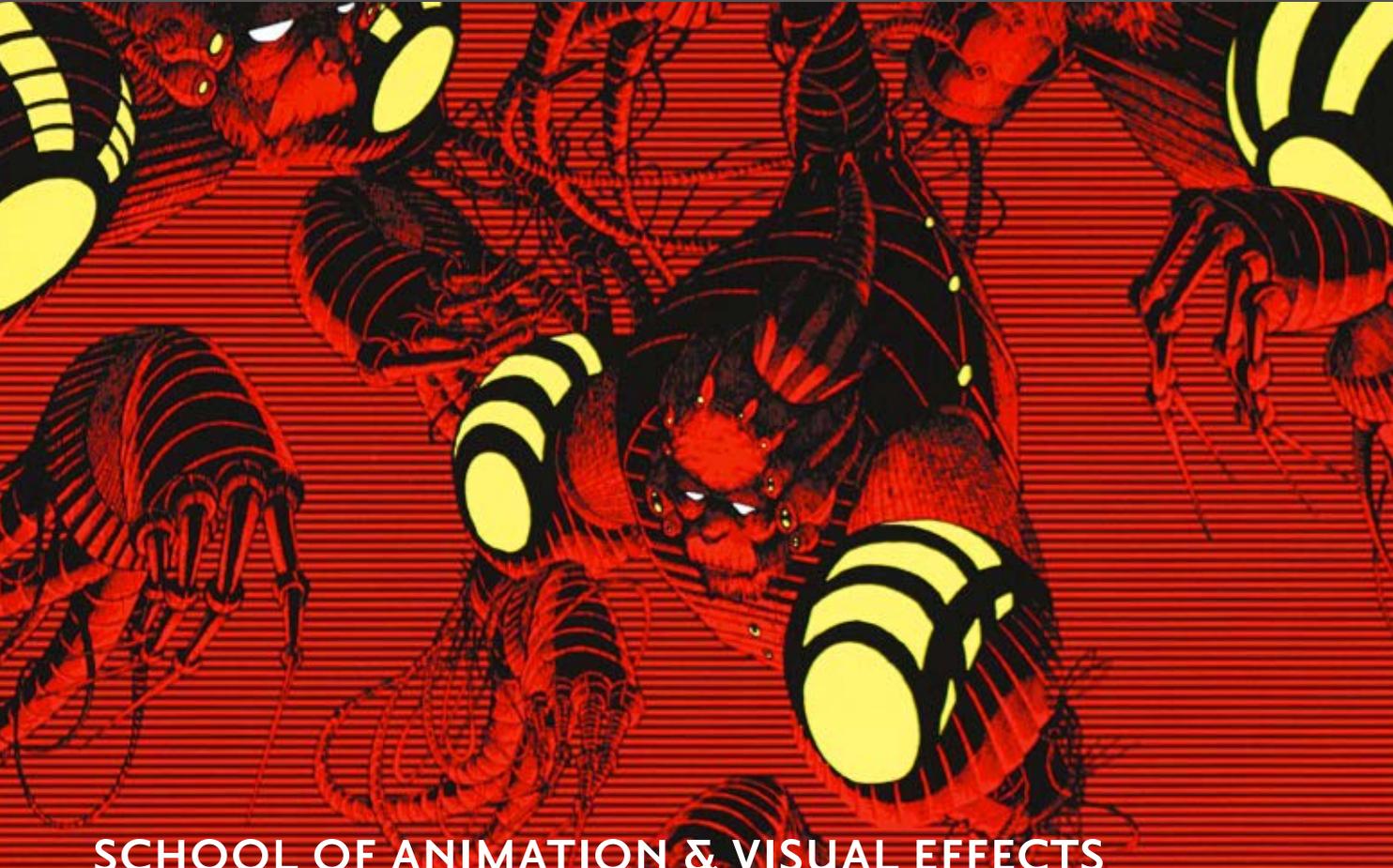
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POSTMORTEM

CONTINUED FROM PG 43

re-read the reviews and player feedback that indicated players were tiring of taking care of their Sims' more basic needs. They wanted a new approach. Since we were already pursuing the growing-up angle, we instead focused on distinguishing the different age ranges by how it affected their needs. For example, teen Sims crave social interaction, a need that decays faster than that of non-teen Sims.

5 BIG TEAM COMMUNICATIONS. By the mid-production phase, we had about 100 people on the team, and by the latter part of the production phase, about 140. It was a big team to manage and we were working on several fronts simultaneously. Our SWAT teams were spread out across the map, each one tackling new problems and tasks as they arose.

It's true what they say about how growing a team from 25 to 35 can require major re-thinking of processes. At 140, we had lots of challenges in key areas: making sure we communicated and had a shared vision, giving people a sense of ownership, and enabling decision-making at the most appropriate levels and then communicating those decisions. Establishing workflow procedures between groups was critical. This was a really tough aspect of the project to keep up with.

Some tactics we developed helped to curve these problems. The SWAT teams helped individuals get a clearer sense of how they shaped the project, giving them a sense of ownership too. Having a seasoned lead on each SWAT team was critical. We worked on the communication channels and project management visibility throughout the development. Elements of the work flow included: team meetings, walls on which we posted milestones, lead meetings (to stay synchronized), training, dailies, content reviews, and even playing the game on a projector screen in the team area. I can't say that it was a completely rosy situation, but we did our best.

SHIPPING OUT AND PLODDING ON

We shipped the game Sept. 17, 2004, and we are all very proud of the final product. THE SIMS 2 team really came through on the



objectives we had for the game, in terms of evolving the elements of the game that have made its predecessor so successful, and continuing to involve the players in ways that go beyond the product that shipped, through movies, stories, and original content. It's very rewarding that THE SIMS 2 has met critical success. We're pleased that it's selling so well and that players are actively sharing and creating via the web. Many of us breathed a little easier when we saw the first week of sales and the first posts on the web from players who had spent the entire night playing.

THE SIMS 2 team overcame some very big challenges on a project that was massive in scope. We've followed a great practice of immediately capturing feedback in discipline and project postmortems and then reviewing and acting upon it. There's a team working away as I write this, building the first THE SIMS 2 expansion, taking advantage of this learning, and making the actionable improvements happen. ❖

Sim DNA allows genetic traits to follow to Sims offspring.

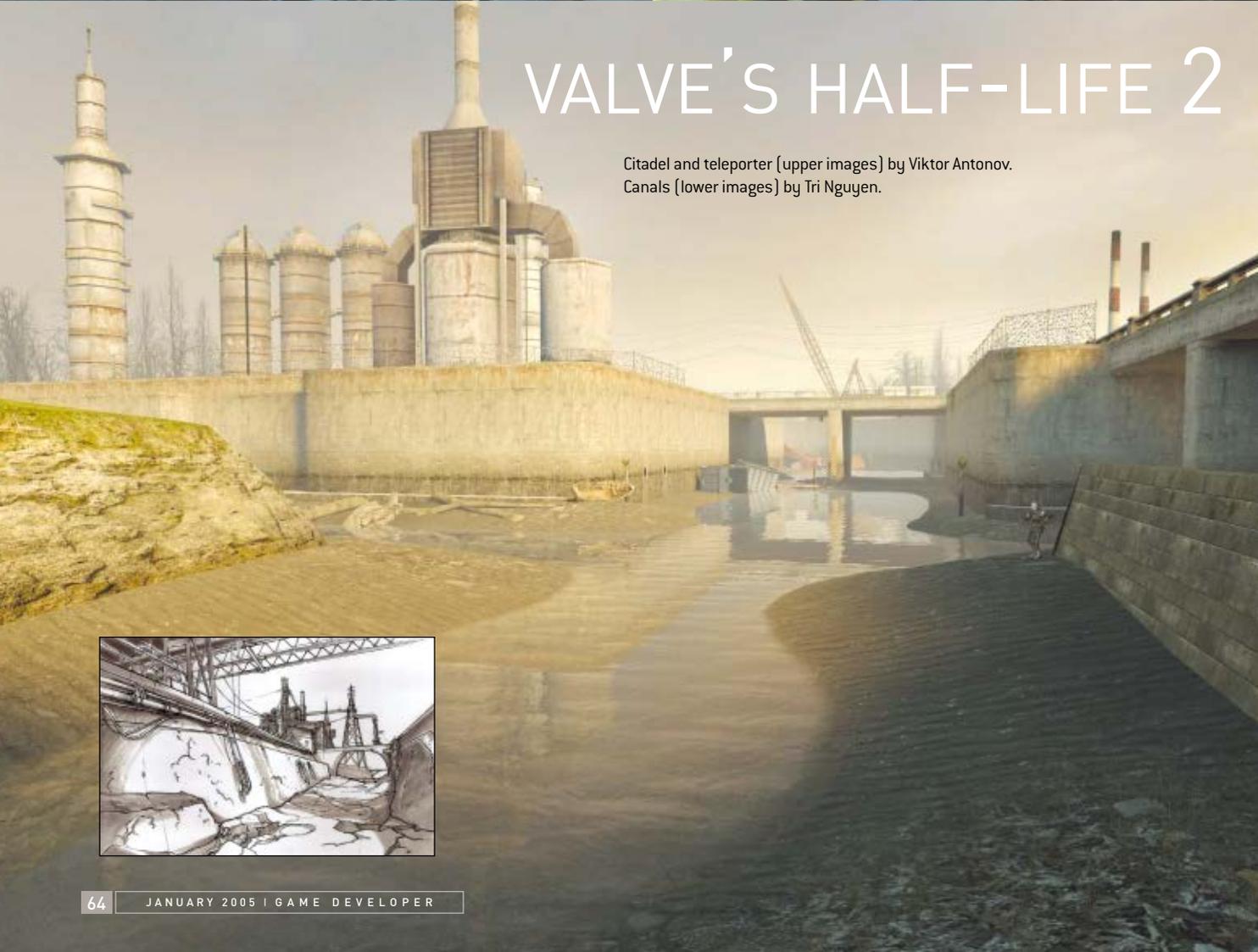
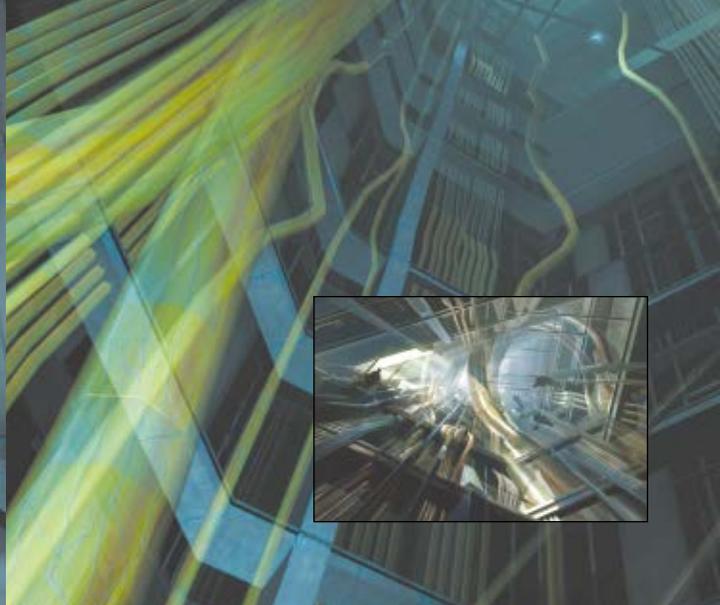
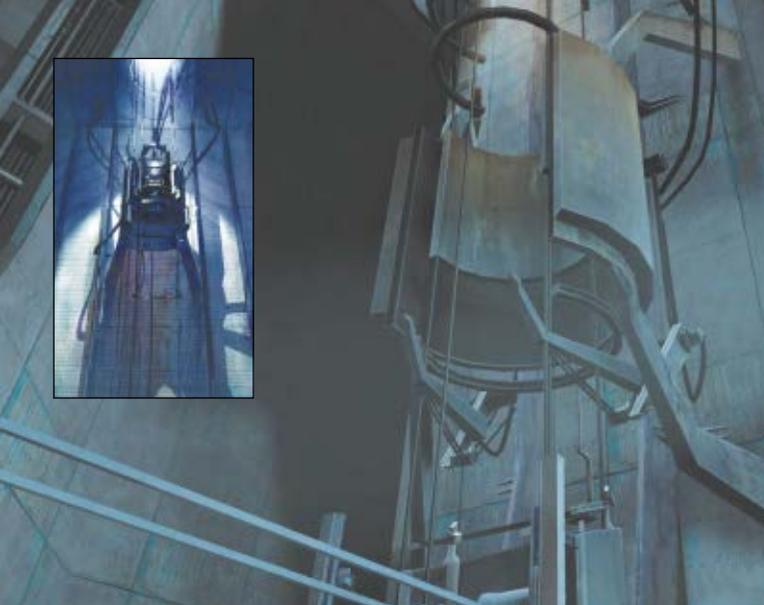
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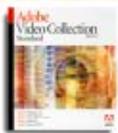
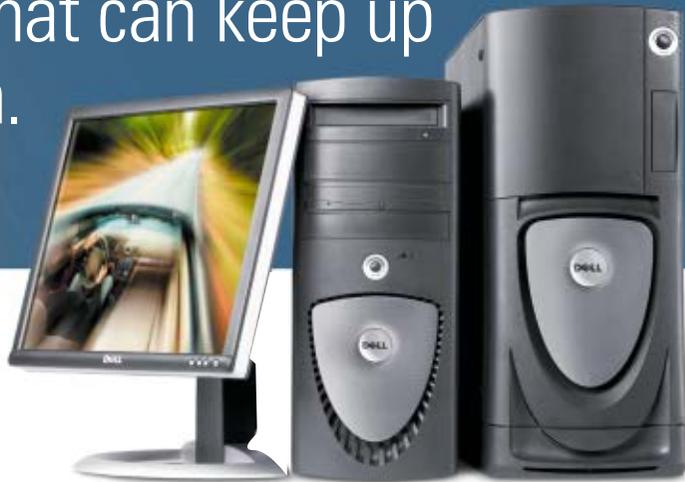


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