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5TH ANNUAL GAME DEVELOPER SALARY SURVEY

APRIL 2006

game developer

THE LEADING GAME INDUSTRY MAGAZINE

POSTMORTEM:
UBISOFT'S KONG IS KING

EXCLUSIVE INTERVIEW:
WILL WRIGHT

gamedeveloper

APRIL 2006
VOLUME 13, NUMBER 4

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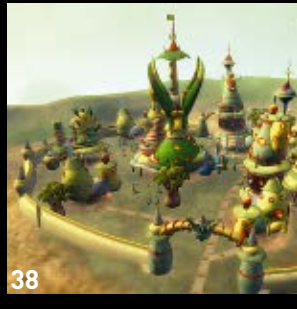

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MONKEY PUNCH

THIS SPECIAL APRIL 2006 ISSUE OF *GAME Developer* is, unfortunately, not particularly filled with April Fool's Day pranks, mainly because it debuts at Game Developers Conference 2006 in late March, and also because we're completely humorless automatons.

Fortunately, what we do have (*clink*, *whirr*, *björk*) is another deliriously expanded issue of the magazine, complete with some rather kickass features. In particular, you may have spotted the ugly mug of the great ape himself glowering at you from the cover, and our special postmortem (pg. 28) of Ubisoft's critically acclaimed PETER JACKSON'S KING KONG, which launched for multiple platforms late in 2005.

The feature covers Michel Ancel's $15 million Ubisoft Montpellier-led project in wonderful detail, including images from the game's alternate ending and movie pre-production images from Weta Digital rarely, if ever seen before. By the end, you'll believe that a monkey can fly—or at least, that Jack Black needs to be pinioned down while in the recording studio.

SALARY CRUNCHING

The monkey doesn't care about the money, but we do, so that's why this issue also presents the Fifth Annual Game Developer Salary Survey (pg. 11), the only canonical record of game development salaries in North America. In fact, this year, we've added information on Canada and Europe to our traditional American data, thanks to over 6,000 unique responses worldwide, and have redoubled our efforts to track regional and gender variations, as well as bonuses and perks.

Overall, it all adds up to the only information you'd ever need to show your boss (or conceal from your employees) on the game industry's salary recompense in 2005, from programming and art through audio, business, and game testing roles.

Plus, frequent contributor Paul Hyman looks at some of the most important regions for game development in the U.S. and Canada in a companion feature, "Urban Development" (pg. 19). Speaking to a few key developers in places known for their dense population of game studios, Hyman looks at the flavor, camaraderie, and community of those areas, from the San Francisco Bay Area to Austin and beyond.

WRIGHT IT DOWN

Also making a splash on the front cover is legendary game designer, SIM CITY and THE SIMS creator Will Wright, who kindly took some time out of his intense production schedule on Maxis and EA's SPORE to chat to *Game Developer*'s associate editor Brandon Sheffield (pg. 38) about robots, casual gamers, and what we teach those who play games.

In a surprisingly wide-ranging chat, we learn some of Wright's more abstract influences from the world of urban planning, why his colleagues are more perturbed about what he's planning on SPORE than the EA executives are, and how Wright's Stupid Fun Club, which puts automatons in odd places to see how the public interacts with them, is faring. This is the first in a new series of interviews with creators that count speaking on subjects you may not see discussed elsewhere. Watch for more.

WANTING TO CHANGE

Finally, while I may be spoiling part of a perfectly good interview by excerpting it, I want to point out Will Wright's suggestion regarding his aims as a game designer: "I want players to have a deeper appreciation for both how complex and how elegant the universe is."

Why is this important? For me, this is a carefully considered goal that wholly encapsulates what makes Wright special, and what we may need more of in the industry—game creators with an agenda. If you're out to entertain on a pure level, then that can produce amazing entertainment, from BURNOUT 3 to GEOMETRY WARS EVOLVED.

But when we move beyond the visceral and find that itch to educate, or create emotion, or change emotion, that's when we transcend games as a twitchfest to create ones that are... more. And that can only be good for the industry and the artform. ⁘

Simon Carless, editor-in-chief

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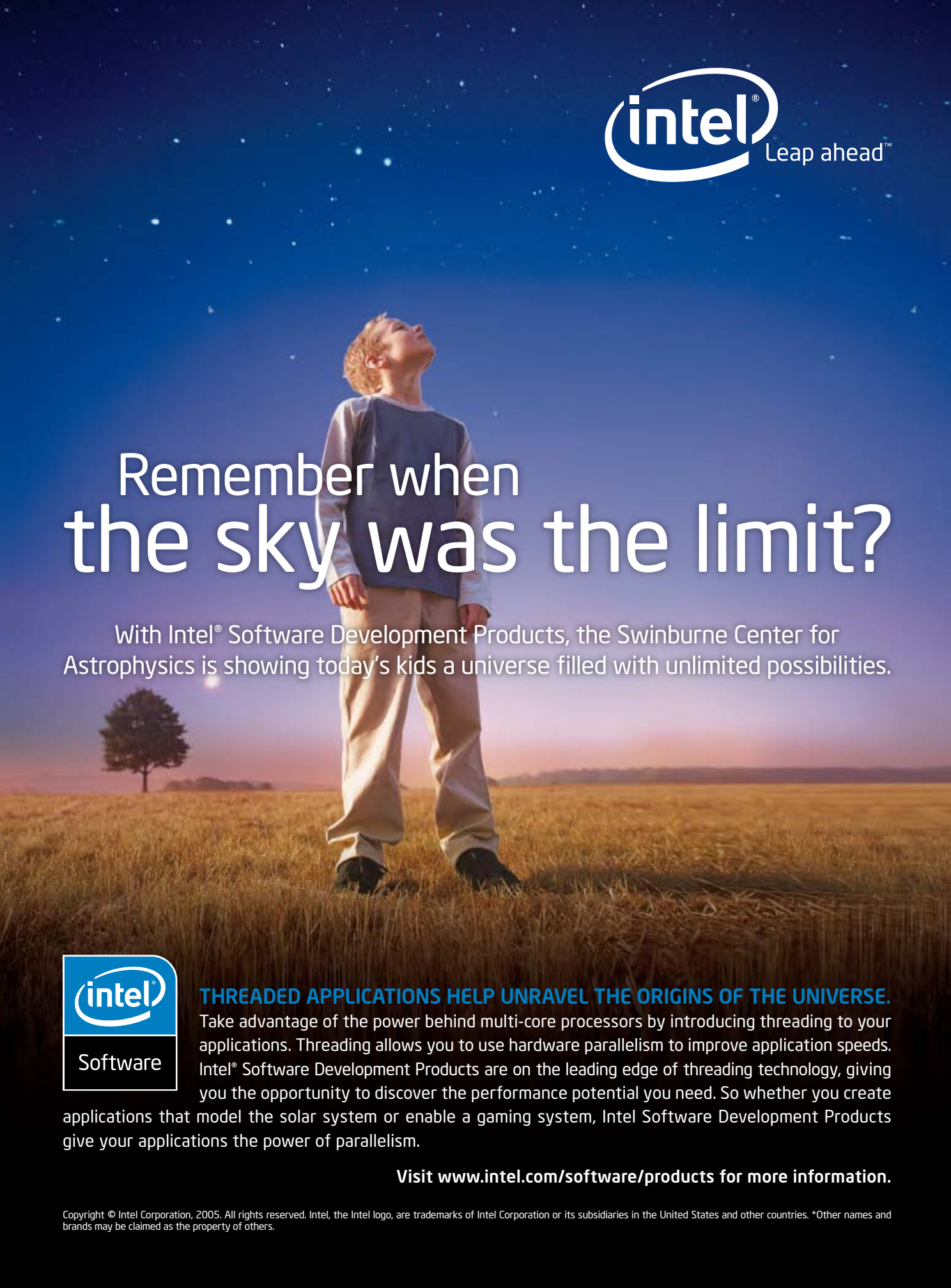
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THE YEAR OF THE SLUMP?

THE WARNING SIGNS ARE NOTABLE: ELECTRONIC Arts, the world's biggest third-party developer, has announced plans to lay off 5 percent of its workforce. Activision, the second biggest, will cut 7 percent. Worst of all, U.S. post-Christmas game software sales are down 5 percent from 2004, according to the NPD Group. On the surface, it looks like a dip in demand—but there's more than meets the eye.

One piece of the puzzle is the flagging interest in the current generation of games. With the Xbox 360 here and the PlayStation 3 and Revolution on the horizon, consumers are increasingly looking forward and interested less in what's available now. When discussing the 5 percent cut (roughly 300 people) at EA in February, CFO Warren Jenson commented, "While we expect several positives, we have no reason to believe that this abrupt change in demand for current generation software will reverse itself."

Activision, when discussing its post-holiday financial troubles and a 7 percent workforce cut (roughly 150 people), blamed softer than expected next-generation sales more specifically. Robert Kotick, Activision CEO, blamed the company's troubles on "the transition from current-generation consoles to the next generation of video game systems."

On paper, the next generation push should eventually lead developers and publishers into a sweet spot, with early adopters and high attach rates. The trouble is the hardware just isn't there yet. Official NPD numbers regarding the Xbox 360's total U.S. sales in 2005 show a disappointing 600,000 units moved before the new year, even more disheartening when we take into consideration that demand was considerably higher. Microsoft's initial dream of 2.5 million consoles in American homes within the first three months of launch have been shattered due to an inability to manufacture the units—specifically, a finicky memory chip—fast enough.

As of the end of January, there have been 850,000 Xbox 360s sold in the U.S., with the console still virtually impossible to purchase in stores as of press time. This, naturally, leads to lower than expected sales numbers for both developers and publishers. You can't sell a game if the players don't have the console.

The next piece of the puzzle is the PlayStation 3 and Revolution factor. The vague "spring 2006" PlayStation 3 launch date has certainly made it tricky for next-generation game publishers to sell current-generation titles. In a late 2005 conference call, EA's Jenson mentioned this possible PlayStation 3 launch date, noting it's "causing some people to stay on the sidelines," even though EA believes that a second-half 2006 launch is much more likely for the console in North America.

In addition, Nintendo's Revolution is believed to be launching some time around Thanksgiving in North America, but the lack of a concrete announcement, alongside specific hardware and controller details, may be amplifying anticipation but it's reducing consumer willingness to purchase current-generation titles.

The higher costs associated with making a next-generation game just can't be recouped until the next generation is fully upon us. Analyst firm Wedbush Morgan's Michael Pachter hammers this point home, stating, "We think that the decline in overall sales of current-generation software in January indicates the continuation of a trend that will persist well into 2006, and we anticipate double-digit declines in overall console software sales for the first half of 2006. ... We do not expect sales of next-generation software [to offset] the current-generation software sales decline until the PlayStation 3 and Revolution are launched."

—Brandon Sheffield

product news

SOFTIMAGE FACE ROBOT

THE SLIGHTEST TWITCH OF AN EYEBROW OR upturn of a lip can be a dead giveaway in terms of reading human expression. But game animators typically use slightly more exaggerated gesticulations, given the minute, realistic movements are too slight to be intuited easily.

Softimage (a subsidiary of Avid Technology) has come up with a solution for game and film animators: Softimage Face Robot. The product comes in two versions: Face Robot Designer, which lets the user build heads, define the shape of the face, tune behaviors, and animate the result; and Face Robot Animator, the animation environment only. When animating, artists can either apply keyframe animation techniques or manipulate motion capture data.

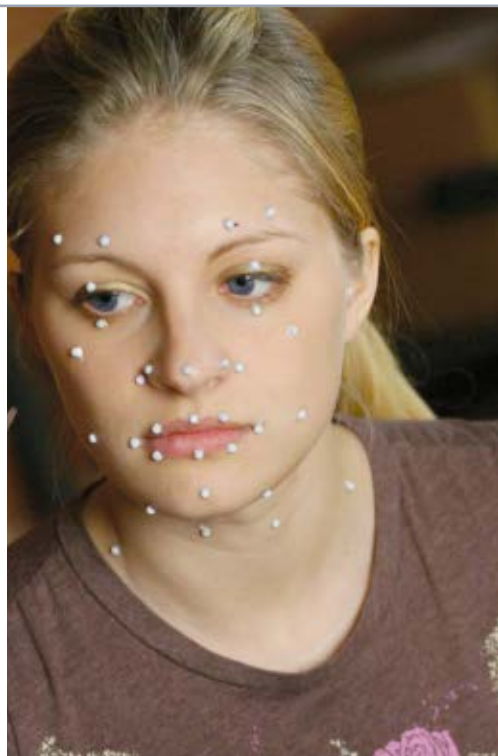
Michael Isner, Face Robot product designer and manager for Softimage, says the software was designed to let the user animate both "anatomically as well as the way art directors like to animate faces."

"The human face only has one joint (the jaw); everything else is based on deformations of soft tissue that are nearly impossible to capture with existing computer graphics tools," according to company literature.

Face Robot, which is a stand-alone tool wholly separate from Softimage's Flagship XSI, is a task-specific environment aimed at increasing the number of heads an artist can produce and the quality and detail of animation on them.

Announced March 9, Face Robot will be available for preview at the Game Developers Conference, retailing for $94,995 (Designer) and $14,995 (Animator).

—Jill Duffy



GAME ON REBOOTS TO 2.0

FOLLOWING ITS RECENT INSTALLATION AT THE TECH MUSEUM OF INNOVATION in San Jose, Calif., Game On—a hands-on museum exhibit exploring the history and global impact of video games—will reappear at the Museum of Science and Industry in Chicago until April 30. The show had originally appeared at the Chicago museum during a six-month engagement in 2005 and is being reincarnated following last year's success.

Game On was originally organized by the Barbican Art Gallery, London, in collaboration with the National Museums of Scotland to offer visitors a chance to play more than 100 of their favorite games. Game On 2.0, the updated exhibit for 2006, includes 20 newly added game titles, including arcade favorite CENTIPEDE as well as PRO EVOLUTION SOCCER 5, MADDEN NFL 06, and STAR WARS BATTLEFRONT II.

"We found that during last year's run of this exhibit, guests wanted to come back more than once for the Game On experience, and it was clear that it would be a great exhibit to bring back," says Scott Beveridge, multimedia exhibit manager and the exhibit producer at the Museum of Science and Industry in Chicago.

The exhibition explores the world of video games from 1962 to today through a number of the industry's sub-categories, such as Japanese Character Design, The Making and Marketing of Games, and Early Arcade. Visitors are also invited to play games, including several arcade titles such as ASTEROIDS, MS. PAC-MAN, DONKEY KONG, and SPACE INVADERS, and console titles like MARIO 64, THE SECRET OF MONKEY ISLAND, BUBBLE BOBBLE, ADVENTURE, ANIMAL CROSSING, and R-TYPE.

The show has one other U.S. venue planned for 2006—the Pacific Science Center in Seattle from May 26 through September 4—before it returns to the U.K. at the Science Museum in London (December 1 through May 1, 2007).

"Video gaming is a $10 billion industry that has a huge following in today's culture, and this exhibit is a great way to discover the story behind game development while having a great time playing a variety of games from around the world," says Beveridge.

—Simon Carless

FFXI TO STOP GOLD FARMERS, HYPER-INFLATION

SQUARE ENIX HAS ANNOUNCED IT IS BANNING the accounts of many in-game "gold farmers" in its FINAL FANTASY XI, following economic problems in the massively multiplayer online game. The move is similar to other actions being taken inside popular MMOs such as Blizzard's WORLD OF WARCRAFT, a game that has been particularly proactive on the issue of in-game economic stability.

A statement officially released by Square Enix on the issue reads: "Since the end of last year, item values have risen astronomically on all worlds due to the manipulation of prices by a small percentage of the player base. The development team and the GMs carried out a detailed investigation of this problem and discovered the existence of a group using illicit methods to produce large amounts of gil [in-game money] that are later sold in the real world [Real Money Trading or RMT]." The statement then outlines the "measures that have been taken to correct the issue."

After the investigation, Square Enix reported it had terminated "more than 700 accounts among those found to be involved in large-scale RMT operations. We will continue to monitor accounts suspected of dealing in gil created or obtained in an unfair manner."

Controversy over real-world trading of in-game items, which is not allowed in the end-user license agreement of most MMOGs, but is still nonetheless practiced by companies such as IGE, has been growing over recent months, with U.S. magazine *PC Gamer* recently choosing to prohibit such companies from advertising in its pages.

—Simon Carless

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ANNOSOFT'S LIPSYNC SDK 3.3

BY BIJAN FORUTANPOUR

LIPSYNC SDK 3.3

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SYSTEM REQUIREMENTS
Windows 98 or higher.
Pentium 400mHz or higher.
Mac OS X or higher,
G4 or higher.
These requirements are for Lipsync SDK 3.3 only (as opposed to Text Based, Textless, or Lipsync's desktop tools). For system requirements of other versions, see Annosoft's web site.

PROS
1. Easy to integrate into an existing pipeline.
2. Produces good animation results.
3. Provides good text timing analysis and allows for custom user data.

CONS
1. Should provide better sample model mouth shape references.
2. Pronunciation override feature needs improvement to completely ignore the sound file in deciding final mouth shape.
3. Would be nice if some sample Maya plug-ins and batch scripts were made available to make the SDK plug-and-play ready for production pipelines.

CHARACTER ANIMATION HAS ALWAYS been a labor-intensive mixture of pleasure and pain. Not surprisingly, many new technologies strive to tip the scale toward fun and increased efficiency: motion-capture, ragdoll physics, inverse kinematics, and the list goes on.

Annosoft has a new piece of magic: its Lipsync SDK with speech analysis using statistical modeling techniques and Hidden Markov Models. In simpler terms, it's "free" lip-synch animation. Put the sound file in, and animation curves come out.

THE PROBLEM

Annosoft's Lipsync is a software development kit that creates character lip-synched animations by analyzing an audio file of spoken dialog. There may be hundreds if not thousands of spoken phrases in any given game, with each phrase taking anywhere from a few seconds to a minute or more.

Let's estimate that an animator (using a standard 3D package) requires approximately four hours to keyframe mouth blend shapes for a 20 to 60 second segment of dialog. For a game with 500 segments of dialog, it would take (500 x 4 hours) 2,000 work hours, or one work year. Many games easily have 2,000 pieces of dialog, and some MMOGs currently contain between 50,000 and 100,000 segments of dialog. Clearly, creating realistic-looking mouth shapes for this volume of dialog is not worth the investment to most game development companies.

In contrast, any artist tool or plug-in developed using the Lipsync SDK will be able to generate animation curves corresponding to the input dialog sound file in approximately 5 seconds for every 60 seconds of dialog. Therefore, using a batch process it would be possible to process 2,000 dialog sound files in less than an hour. Of course an animator would still have to to preview it and perform quality control of the results, but even that step could be greatly accelerated by developing a batch render process to generate one or more movie files of the resulting animations.

Annosoft Lipsync SDK is targeted specifically toward 3D game development (although it may also be used for animated 2D Flash presentations) and is also available as an ActiveX control for scripting using Microsoft Visual Basic. There are actually three versions of the SDK: Text Based, Textless, and Realtime. As one would expect, each version produces a level of quality depending on the amount of information input to the system. The company also licenses a standalone desktop application called Lipsync Tool (not an SDK), which I'll discuss briefly at the end of this article.

The Text Based SDK provides the highest quality animation. It requires as input the recorded dialog sound file (in .wav format), a simple text transcription of what is said, and a language-specific "rules of pronunciation" file. Annosoft provides customizable language pronunciation files in six languages: English, French, Spanish, German, Italian and Russian. When asked about the different dialects within languages (such as British, American, and Australian English), the company said that, to date, there haven't been any quality problems related to this issue, but dialect lexicons can be done upon request. The Textless Lipsync SDK only requires a dialog sound file. And finally, the Realtime Lipsync SDK just requires a live sound stream coming in, usually from a microphone. An important side note is that the Realtime SDK is not available for any game console at this time.

QUALITY VS. SPEED

The quality of animation delivered is very noticeably different between the SDKs. By "quality," I mean the accuracy of the results: Are the actual phonemes and mouth shapes detected correctly? Are the millisecond timings of the mouth shapes in sync and accurate?

I would highly recommend using the Text Based Lipsync SDK if real-time reactions are not required. The slight additional effort it takes to provide a text file of what is said is well worth the much larger time saving you'll get during the animation process. If an artist is still required to make manual adjustments to the final animation, the hours you saved will quickly disappear; in fact, repairing someone else's animation is often more difficult and time consuming than just doing it all over from scratch. Annosoft's Text Based SDK does deliver lip-synch animation that's high enough in quality to meet the demands of today's 3D games

Business is busting at the seams for Orlando's digital media sector. Home to top-notch studios like Electronic Arts, specialized higher-ed training programs, and the world's largest concentration of simulation developers, it's no wonder companies around here are so animated.

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with extremely little artist tweaking, if any. It contains some hidden gems and secrets as well, such as customizable word pronunciation and custom user data hooks (blind data), which can be used for developing automated facial expressions and automated subtitling and closed captioning systems.

At the other end of the spectrum, the animation quality delivered by Annosoft's Realtime Lipsync SDK is very hit-or-miss. It correctly handles the silences and pauses between words, and some sounds are handled better than others. The animations are not hero-quality, but may potentially be passable for an avatar or chat room talking head.

THE COMPROMISE

In the mid-range quality between the Realtime and Text Based versions lies the Textless SDK. There's a noticeable difference in quality between the Text and Textless, but if you're working in languages that are not currently supported by the Text Based, this is still a strong option for you. The documentation states that this version has been used successfully with Chinese, Japanese, Arabic, and Hebrew.

With the Textless version, having fast talkers actually helps. If the speaker on the sound file is talking quickly, the results are slightly better on the game characters because the program spends less time creating each mouth shape, so there's less room for error.

The difference in quality comes not so much in the timings of the mouth shapes, but the actual mouth shapes detected. For instance, 'n' and 'm' sound almost identical but have very different mouth shapes when a person speaks, which affects the look and believability of the animation.

PUTTING IT ALL TOGETHER

Sound markers—the set of information needed to define the mouth's shape, the time the sound starts, and its duration—can be read from a file or accessed directly by linking with the Lipsync library. Included in the documentation and code samples is a very illuminating and useful C++ project called "cmdlinesync." Cmdlinesync is a standalone command line executable that writes the sound markers to an ASCII file. Free of any windows or GUIs, it's perfect for using as-is, whether in a batch process or as part of a plug-in or script for 3D packages like Alias Maya or Softimage XSI. Even though Cmdlinesync was provided as a how-to file (on using the lip-synch library), it had such a clean interface and the output file was so simple that I decided to just write a quick parser for the output instead.

A sound marker is written out, one per line, in the output file and consists of: Start time (milliseconds), End time (milliseconds), Intensity or "how much of a mouth shape to use" (0–100), and the phoneme (a one or two letter label). One additional field is the marker type, which is usually "phoneme," unless you're working in the Text Based SDK, in which case you can choose from a list of provided marker types: word, sentence, or XML marker.

The word and sentence markers provide the start time and end time of a word or sentence and can be used to implement an automated game subtitling or closed-captioning system. The XML markers provide a few important features.

First, it can pass pronunciation override commands to the Lipsync SDK. In rare and difficult cases, if a word doesn't look correct in the animation or has special pronunciation rules, one can specify how that word is to be pronounced correctly. For instance, for CIA, using <pron value= "see eye ay"/>, ensures perfect animation every time. Another useful XML tag is the <pause/> tag for forcing a slight pause and distinguishing words.

For example, I tried an Australian accent of "g'day mate" a few times. One came out perfectly and the other one didn't. Lipsync had missed the "g'd" part, thinking it was part of the previous word even though there was a good pause in the sound file. I tried correcting it with the <pron> tag, to no avail, and finally hit success with a <pause/> tag, which helped to distinguish the previous word. My impression was that using the <pron> tag has varying levels of effectiveness or that it takes practice, and at some point it may be best to simply fix the issue directly in a 3D animation package.

The second and much more potent use of the XML markers is to add your own custom data, which Lipsync safely ignores but does timestamp. For instance, an expressionless face with the lips moving isn't very compelling. But with an <angry value ="5"/>, <sad value="3"/> , or <eyebrows value= "2"/> you can see how natural dialog draws out not only lip movement but character and emotion, too.

ART AND FINESSE

Even though the Lipsync SDK performs well, there remains the task of integrating it into a production pipeline. The first step developers need to take is to get the tool into their artists' hands. Whether they use Alias Maya, 3ds Max, Softimage XSI, or LightWave 3D, a custom plug-in needs to be written that will:

- allow artists to specify a sound file
- use the Lipsync library (directly or indirectly) to compute the analysis and return the sound markers
- create animation curves in the 3D animation package, setting keyframes corresponding to the given timestamps and corresponding mouth shapes at the resulting intensities.

In my case, a few weeks were allocated to the task, but after only a few days, with help from an animator, I had something up and running inside Maya.

With Lipsync SDK, the most important thing you can do to achieve ultimate animation performance is to build the mouth shapes carefully and label them correctly so they can be referenced by the plug-in.

Annosoft's web site offers some examples of how mouth shapes should look (check under Phonemes in the Display menu). However, the page has a disclaimer stating, "The author is not an artist."

After looking closely at the diagrams of the suggested plausible mouth shapes—not all of which I agreed with 100 percent (disclaimer: I am not an artist either)—the first thought that came to mind was "Then get an artist!"

The model in the sample applications and documentation looks very unnatural. Both a better model and better texturing would vastly help make the animation

look more convincing. Critics with an untrained eye have a hard time distinguishing between when to blame the art and when to blame the animation when something just doesn't look right.

It will take some time to get the perfect series of 10 to 12 practical mouth shapes that map into the 40 phonemes that Lipsync outputs. For the sake of time, I used the "plausible" set that Annosoft recommended, even though I knew it could be improved upon—but that is more of a lip-modeling improvement.

HISTORY AND CONCLUSION

The Annosoft Lipsync SDK has been under development for at least four years and is currently on version 3.3. Since version 2.0, new languages such as German, Italian, and Russian have been added, as well as many improvements to their internal algorithms for multiple pronunciations.

Lipsync Tool, the desktop application that I mentioned briefly at the start, is available as a standalone tool for about $500. I feel that the application should either be included in the price of the SDK, or greatly improved to justify the price tag. The audio waveform display is a bit odd and not very helpful, and the quality of the 3D head needs improvement to help judge the animation. The tool does output a 3ds Max script to create animations, but lacks other 3D file formats like Maya. Some simple things like window resizing while avoiding stretching the 3D view are essential.

Working with Annosoft SDK from a software development standpoint was very simple. It does one thing, it does it well, and has a simple interface. The bulk of the work involved as a game developer was focusing on mouth shapes and 3D animation package issues. Frankly, I'm surprised Annosoft hasn't produced plug-ins for the major animation packages already, but if they're still focused on improving the magic behind the SDK's speech analysis, I say more power to them. We need more compelling and convincing 3D characters in games.

BIJAN FORUTANPOUR *is a senior graphics programmer at Sony Online Entertainment in San Diego. He has worked in the visual effects and game industries for 11 years, four of them specifically in video games. Email him at* ***bforutanpour@gdmag.com****.*

jill duffy

GAME DEVELOPER'S 5TH ANNUAL SALARY SURVEY

APRIL MEANS TAX SEASON IN THE U.S., AND THE SCENT OF FORM 1040S IS in the air. We at *Game Developer* pay homage to April 15 with our annual Salary Survey issue, which celebrates its fifth birthday this year. The Salary Survey aims to synthesize and analyze data collected from anonymous developers across major disciplines on their income. Last year, we updated the survey by welcoming business and legal people of game development to complete the survey. This year, we've further updated the survey to bring you even more surprises.

Each year we've conducted the survey, the number of respondents from countries other than the U.S. has crept up, up, and up. It became clear that we could no longer discount international developers. This year, we put a call out to developers around the world and gathered enough information from both Europe and Canada to include statistics for those regions.

METHODOLOGY

With the help of research firm Audience Insights, we sent email invitations to Game Developer subscribers, Game Developers Conference 2005 attendees, and Gamasutra.com members in January 2006 inviting them to participate in our annual salary survey.

Although we received well over 6,000 unique responses worldwide, not all who participated in this survey provided sufficient compensation information to be included in the findings. We also excluded cases in which the compensation was given at less than $10,000 USD, and the highest salary range was limited to $200,000 USD to prevent a limited number of outliers from distorting the true central tendency of the computed average salaries in each category. We further excluded records missing key demographic and classification information. Finally, this report includes U.S. compensation mainly, plus additional consolidated figures for respondents from Canada and Europe (see pg. 17). The total sample reflected in the data presented for the U.S. is 2,706; for Canada 409, and for Europe 764.

The sample represented in our salary survey can be projected to the overall game developer community with a margin of error, for the U.S. statistics, of plus or minus 1.85 percent at the 95 percent confidence level. The margin of error increases for specific subgroups reported within this community.

ILLUSTRATION BY ERIN MEHLOS

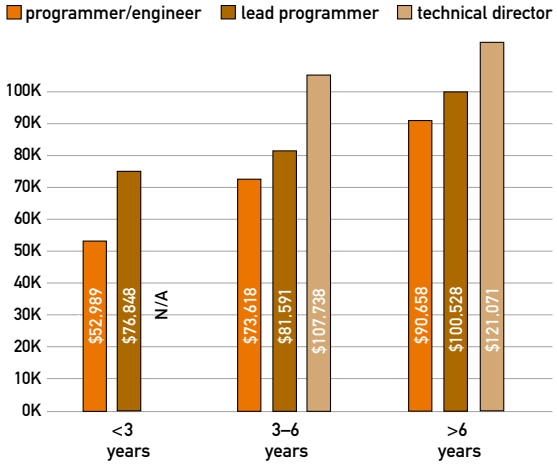
PROGRAMMING

PAY RATES FOR PROGRAMMERS in 2005 rose nearly across the board since 2004. Programmers and engineers with more than 3 years experience took home roughly $5,000 more than in the previous year. But salaries for programmers with less than 3 years experience stayed nearly the same.

Lead programmers with less than 3 years experience made a whopping $18,000 more on average in 2005 than in 2004; leads with 3 to 6 years under their belts made nearly the same; and highly experienced leads tended to pull in $7,000 more per year.

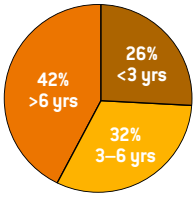
Technical directors, too, reported that their salaries, on average, were way up from last year. TDs with 3 to 6 years now claim six figures. Very experienced TDs on average pulled in about $6,000 more than in 2004. Among all disciplines, females are least represented in programming and earn roughly $12,000 less per year than their male coder counterparts.

Programming salaries per years of experience and position

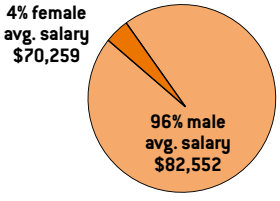


ALL PROGRAMMERS AND ENGINEERS

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 73%

Average additional compensation $13,946

Average salary $82,107

Type of compensation

Annual bonus	58%
Project bonus	32%
Royalty	22%
Stock Options	46%
Profit Sharing	18%

Receive some benefits 93%

Type of benefits received

Medical	98%
Dental	92%
401K/retirement	86%

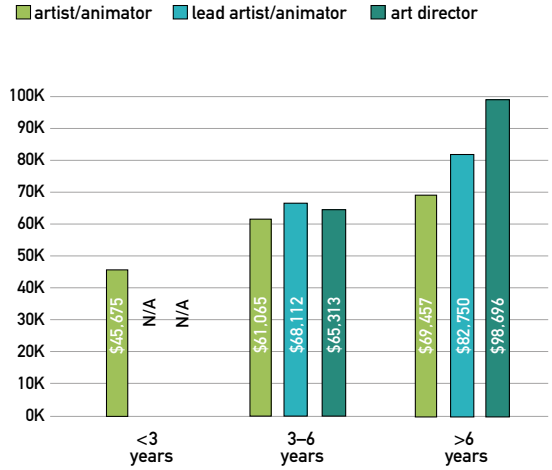
ART AND ANIMATION

SALARIES FOR ARTISTS AND ANIMATORS rose steadily since 2004 by between $3,000 and $5,000 for all titles and level of experience indicating good stability in the field. Newbie artists and animators took in about $3,000 more; mid-level artists brought in about $5,000 more; and those with 6 or more years experience earned about $4,500 more than in 2004. Salaries for leads were up as well: by $2,500 for leads with 3 to 6 years experience and up by almost $10,000 for highly experienced leads.

In past years, we haven't included the title "art director," but we're happy to report that in 2005, highly experienced directors took home a salary that's just shy of six figures on average, showing the importance of strong leadership on ever-expanding art teams.

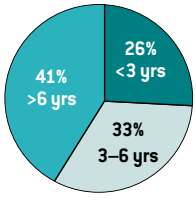
Finally, women in game art showed a stronger presence in 2005 than in 2004, comprising about 10 percent of the field as opposed to the less than 7 percent they held a year ago.

Art and animation salaries per years of experience and position

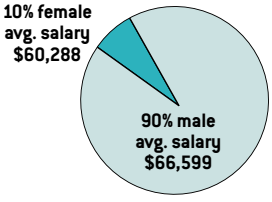


ALL ARTISTS AND ANIMATORS

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 67%

Average additional compensation $11,182

Average salary $65,986

Type of compensation

Annual bonus	48%
Project bonus	35%
Royalty	32%
Stock Options	37%
Profit Sharing	22%

Receive some benefits 93%

Type of benefits received

Medical	98%
Dental	93%
401K/retirement	85%

CONTINUED ON PG 14

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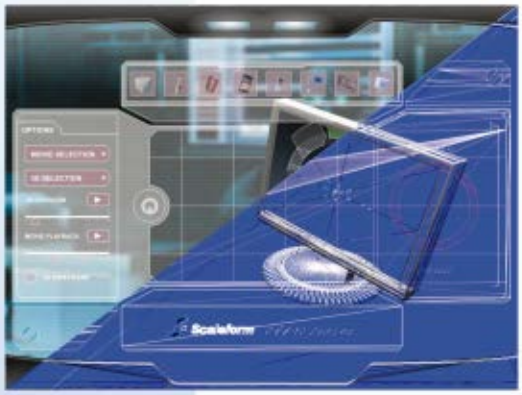

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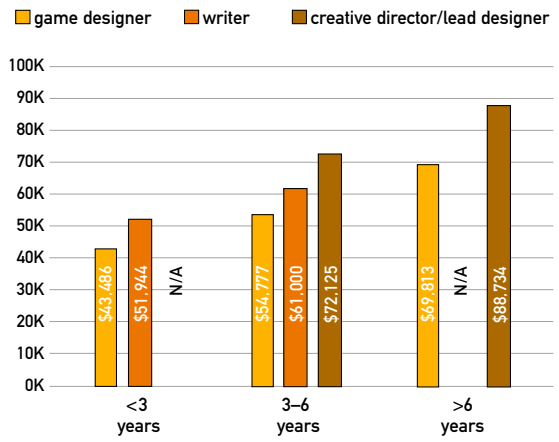
CONTINUED FROM PG 12

GAME DESIGN

GAME DESIGNERS OVERALL in this year's survey didn't see too much change in pay. Less experienced game designers averaged about what they did last year. Salaries for more experienced designers only crept up a little. Those with 3 to 6 years and 6 or more years experience made only about $2,000 more on average. Creative directors and lead designers saw the biggest spike in pay. Mid-range directors and leads earned about $20,000 more, and highly experienced leads/directors averaged almost $10,000 more.

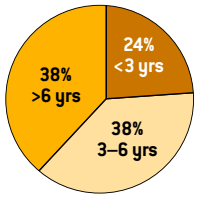
New to the Salary Survey this year is the title "writer." Whether a writer's job is to map out epic narratives or record lengthy documentation, game companies have been realizing the importance of hiring (and paying) these specialists. The average salary reported across all years experience for writers is nearly $57,000, which is to say that writers can expect to make a little less than what artists and animators make.

Game design salaries per years of experience and position

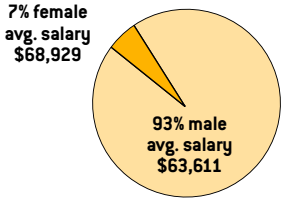


ALL GAME DESIGNERS

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 67%

Average additional compensation $11,801

Average salary $63,986

Type of compensation

Annual bonus	46%
Project bonus	27%
Royalty	30%
Stock Options	35%
Profit Sharing	22%

Receive some benefits 88%

Type of benefits received

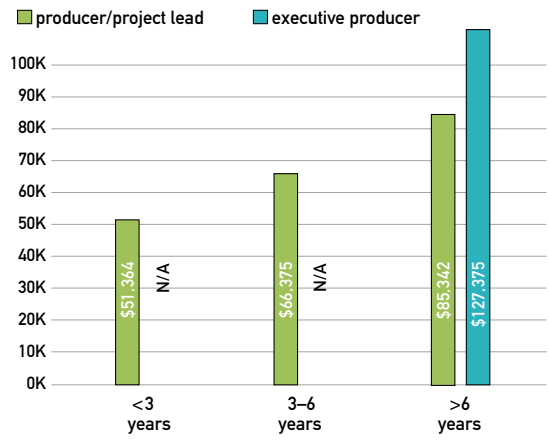
Medical	98%
Dental	94%
401K/retirement	86%

PRODUCTION

IN THE 2004 SURVEY, 61 percent of all production people had 6 or more years of industry experience. This year, the lesser-experienced producers and project leads were more greatly represented. Personnel with 3 or fewer years experience accounted for 18 percent (up from 13 percent), and those with 3 to 6 years experience made up 33 percent (up from 26 percent). Females were very highly represented in the production arena, second only to the business/legal department, making up 21 percent of respondents this year. However, pay for females in this field is, on average, nearly $13,000 lower than for males. And since half of all respondents are highly experienced, it's difficult to write off the male/female pay disparity to females having fewer than 6 years experience. Salaries for producers and project leads did not rise significantly, but showed rather normal growth.

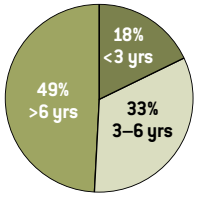
Mid-level producers/project leads earned about $6,000 more than in '04, whereas salaries for equally experienced executive producers remained relatively flat. Highly experienced producers/leads earned about $2,500 more, and executives earned about $9,000 more.

Production salaries per years of experience and position

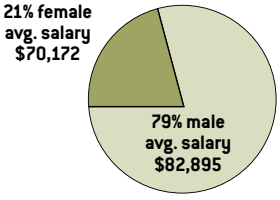


ALL PRODUCTION

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 77%

Average additional compensation $12,471

Average salary $80,192

Type of compensation

Annual bonus	62%
Project bonus	30%
Royalty	17%
Stock Options	45%
Profit Sharing	17%

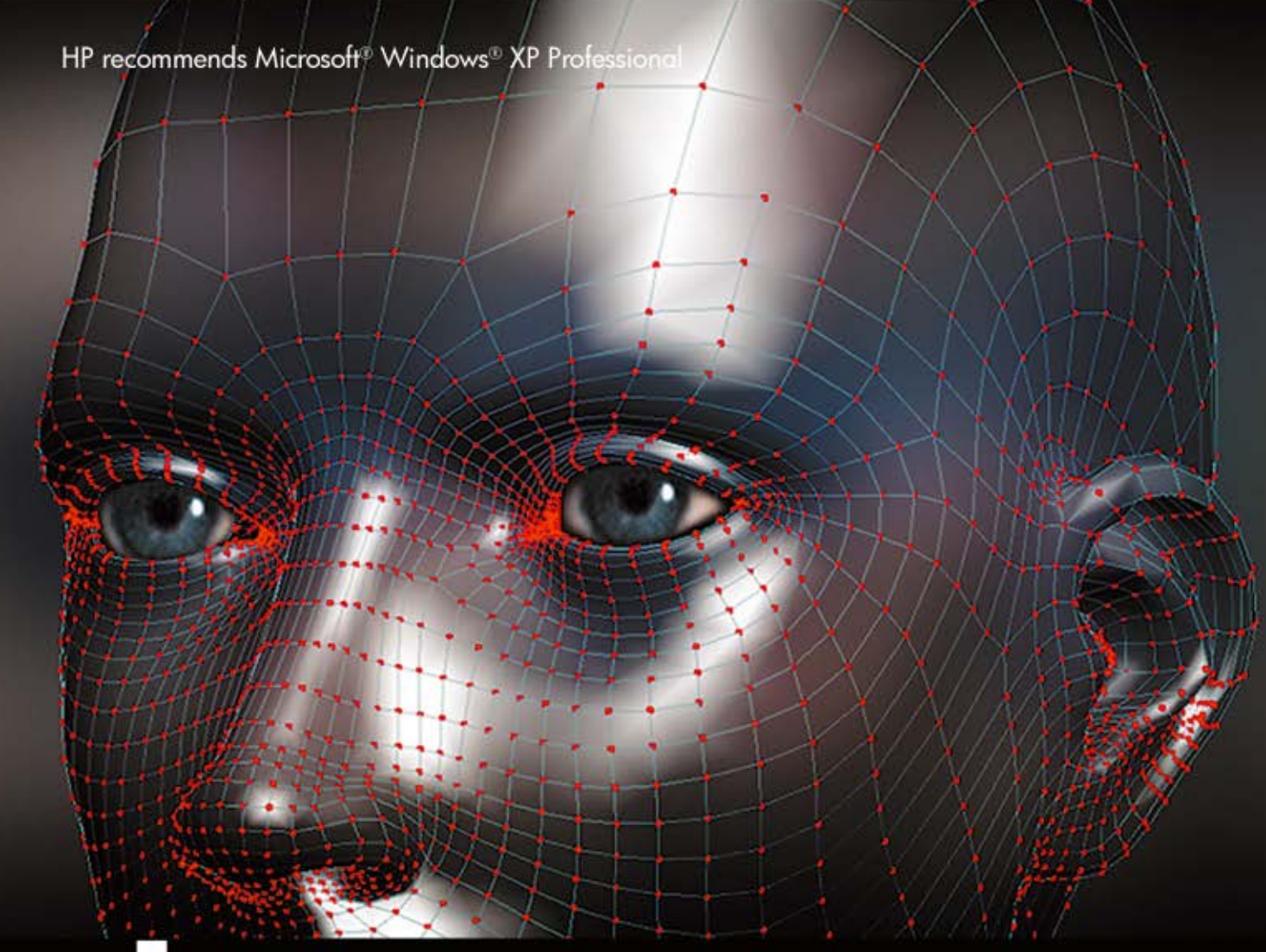
Receive some benefits 93%

Type of benefits received

Medical	99%
Dental	93%
401K/retirement	87%

CONTINUED ON PG 16

HP recommends Microsoft® Windows® XP Professional



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CONTINUED FROM PG 14

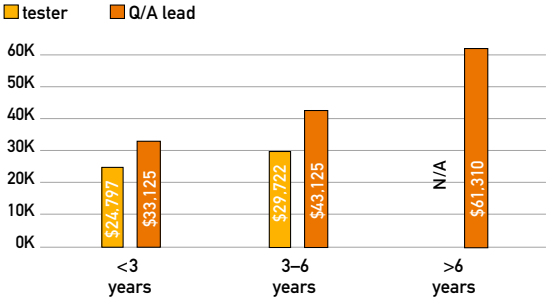
QUALITY ASSURANCE

THE LEAST REPRESENTED DISCIPLINES in past salary surveys have been Q/A and Audio, and this year, unfortunately, is no exception. Q/A respondents totaled less than 5 percent of the whole survey. However, due to some small changes in the wording of some survey questions, the data gathered this year is likely to better represent actual Q/A wages from 2005 than in previous years.

Testers, across all levels of experience, earn an average of $37,210, easily the lowest paid group in the business. For Q/A leads, the least experienced ones reported salaries down since '04 by about $10,000; mid-level leads earned $5,000 less; and salaries remained relatively flat for highly experienced ones.

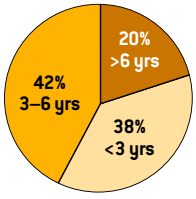
A surprising result this year is that 71 percent of Q/A respondents received some kind of medical, dental, or 401K benefits, an atypical result of a group traditionally thought of as being part-time, hourly-paid workers. One anonymous Q/A tester said although all his Q/A co-workers are hired full-time, they are paid hourly wages. "Most of the Q/A staff get their main income through overtime," he said. "I think Q/A pay is fair for an entry-level job. I originally was hired at $10 an hour, but that jumped up to $11.50 when I was rehired (as a level 2 tester). I want to stay within the industry; but the chances to grow are extremely competitive."

Q/A salaries per years of experience and position

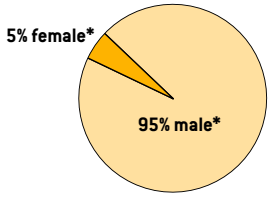


ALL Q/A

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 43%

Average additional compensation $10,953

Average salary $37,210

Type of compensation

Annual bonus	71%
Project bonus	17%
Royalty	3%
Stock Options	41%
Profit Sharing	22%

Receive some benefits 71%

Type of benefits received

Medical	96%
Dental	94%
401K/retirement	88%

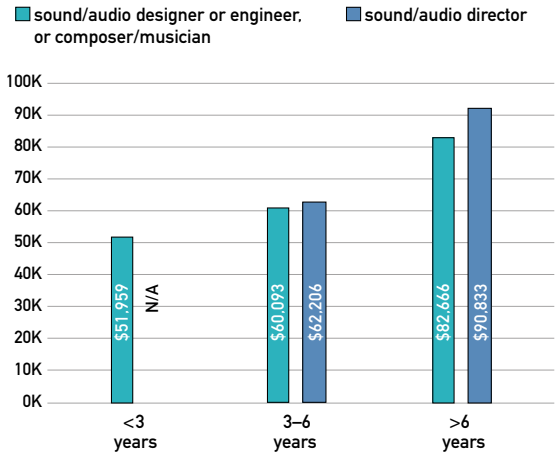
*Average salary by gender not available

AUDIO

DUE TO FEEDBACK from survey respondents, the classification among audio personnel changed in such a way that prevents a thorough comparison between 2004 and 2005 results. However, we can comment on sound/audio designers or engineers with more than 3 years experience: Reported salaries were up by nearly $9,000.

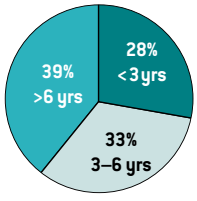
Some other notable changes across the discipline are measurable—for instance, women now make up 9 percent of audio departments, up from a meager 3.2 percent in '04. Although audio jobs are often thought of as being contract positions, a surprisingly high percentage (76) received medical, dental, or retirement benefits, a trend mirrored in the Q/A department. And of course, the audio department wins for being the most likely group to earn royalties.

Audio salaries per years of experience and position

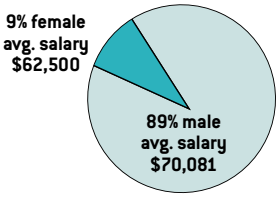


ALL AUDIO

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 63%

Average additional compensation $13,380

Average salary $69,361

Type of compensation

Annual bonus	44%
Project bonus	29%
Royalty	41%
Stock Options	26%
Profit Sharing	30%

Receive some benefits 76%

Type of benefits received

Medical	95%
Dental	88%
401K/retirement	82%

BUSINESS AND LEGAL

IF MONEY IS YOUR OBJECTIVE, business and legal is the way to go. Suits win the prize for highest average salary in the game industry and for having the greatest representation of women (27 percent).

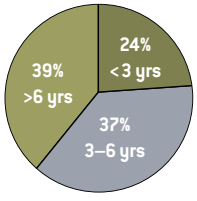
However, compared to last year, salary increases and decreases for marketing/PR/sales folks were not uniform. Those with less than 3 years experience reported an $8,000 decrease in pay; mid-level staff reported a $20,000 increase; and highly experienced staff reported figures up by almost $11,000.

Executives, on the other hand, reported higher salaries across all levels in comparison with '04 results, with highly experienced execs earning about $12,500 more. Mid-level and less experienced executives both earned about $13,000 more as well. Other staff/admin. with fewer than 3 years experience earned about the same as in '04.

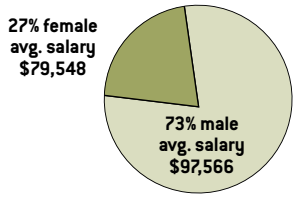
Business/Legal per years of experience and position

ALL BUSINESS/LEGAL

Years experience in the industry



Average salary by gender



Percent receiving additional compensation 75%

Average additional compensation $19,179

Average salary $92,757

Type of compensation

Annual bonus	59%
Project bonus	19%
Royalty	19%
Stock Options	47%
Profit Sharing	26%

Receive some benefits 84%

Type of benefits received

Medical	99%
Dental	90%
401K/retirement	83%

NATIONAL TRENDS

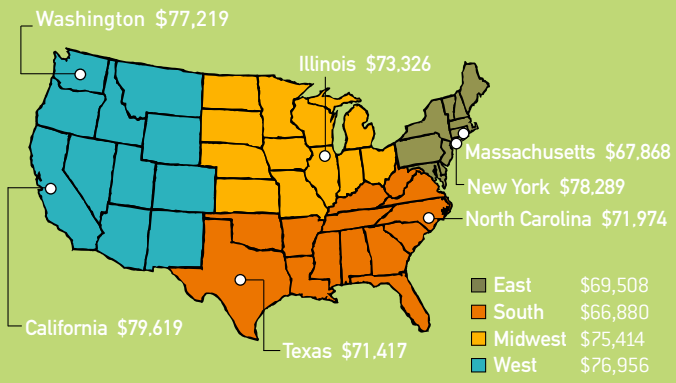
As a game developer, you're likely to earn the highest possible salary if you live in California, New York, or Washington state. However, you're almost twice as likely in Washington (71 percent) than California to own your own home. A scant 38 percent of Californian respondents owned a home, which was almost as low as the percent of New York state residents (26), despite the fact that California and New York account for the highest salaries on average by state.

Highest U.S. average salaries across all disciplines by state:

1. California
2. New York
3. Washington
4. Illinois
5. North Carolina

Conversely, although Texas ranks sixth in terms of top-paid developers by state, 60 percent of Texan respondents own a home.

Game developers have also been spreading into new territories, creeping into states with low cost of living. Apart from the hotbed states noted in the map below, we received salary survey responses from at least 35 people in the following states: Florida, Utah, Virginia, Maryland, North Carolina, and Arizona.



INTERNATIONAL DATA

Average salaries in Canada, Europe, and the U.S. across all levels of experience and titles within disciplines (all reported in U.S. dollars)

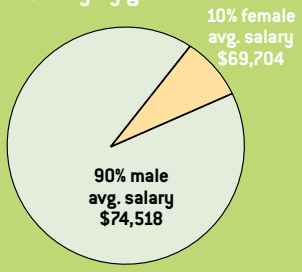
	CANADA	EUROPE*	U.S.
Programming	$58,944	$46,997	$82,107
Art	$53,556	$44,403	$65,986
Game Design	$48,520	$40,849	$63,986
Production	$70,696	$52,557	$80,192
Q/A	$28,750	$30,667	$37,210
Audio	$60,250	$47,500	$69,361
Business/Legal	$68,095	$66,679	$92,757

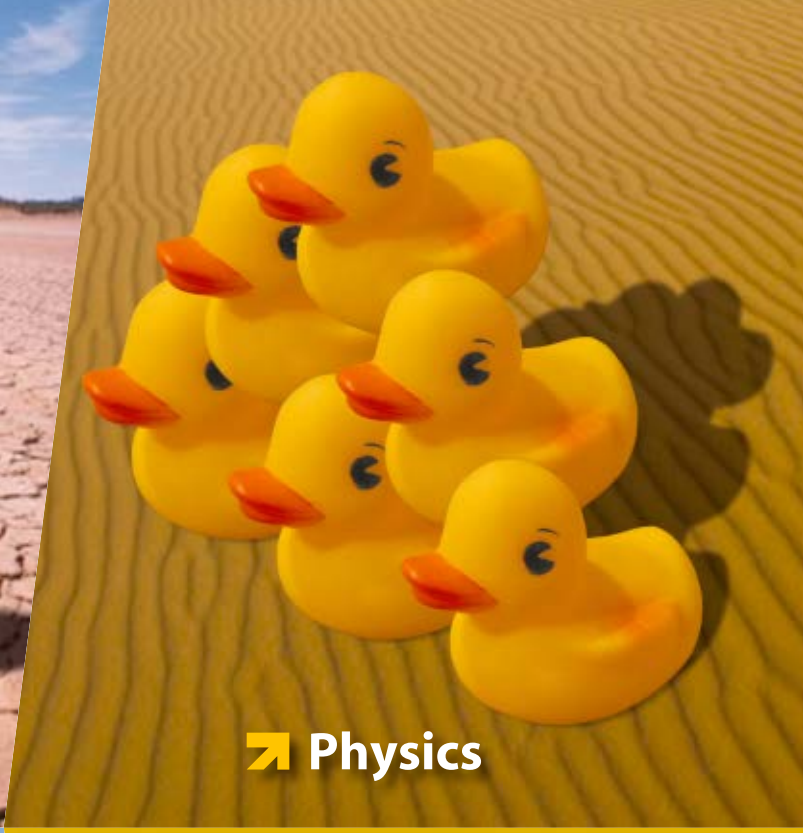
*Most European respondents were from the U.K. (45%) with others primarily in Germany (9%), France (8%), Spain (7%), and Sweden (5%)

YES, WE LADIES FINALLY HAVE REASON TO CELEBRATE.

After many years of concerted effort to attract more women into the industry, females have finally hit a major benchmark. Well, maybe 10 percent isn't quite "major," but it's noticeably higher than it was even two years ago when it was only 7 percent. The formation of special interest groups for women developers, dedicated conferences, improved hiring policies, and open discussion of life/work balance have all contributed to the increased awareness of gender issues. Advocates of equal gender representation in the industry contend that a more diverse development team will result in a more diverse market (read: not just 18- to 35-year old white males). Most importantly, more diverse teams will create richer games and deeper experiences for players.

Overall average salary by gender





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URBAN DEVELOPMENT

GAME CREATION ACROSS THE MAP

HEAVY CONCENTRATIONS OF GAME developers are found all over the map: the San Francisco Bay Area, Seattle and the outlying suburbs, Austin, Vancouver, Los Angeles, San Diego, and Montreal, just to name a few. Since 30 percent of developers have worked for three or more game companies during their career, according to results from the 2005 Game Developer Salary Survey, relocating is a viable and common option.

The bad news is if you're considering a new job, you need to make an informed decision as to where you'd like to relocate, and decisions of that magnitude are never easy. Each geographic hub of game development offers different work and play environments, from the level of secrecy maintained between colleagues at other local studios to the quality of life the employer can afford to create for you. For example, although the average salary for game developers in Washington state is slightly lower than for Californians, people located in Washington are almost two times as likely to own a home.

PAUL HYMAN *was the editor-in-chief of CMP Media's* GamePower *and currently writes a weekly column on the game industry for* The Hollywood Reporter. *He's covered gaming for more than a dozen years. Reach him at* ***phyman@gdmag.com***.

URBAN DEVELOPMENT

Matt Householder, director of development for Flagship Studios.

THE GOLDEN GATE: SAN FRANCISCO BAY AREA

Video game development has a long history in the San Francisco Bay Area, according to Matt Householder, director of development at San Francisco-based Flagship Studios, who's worked in the vicinity for almost 20 years.

As he understands it, Nutting Associates was the first game developer in the area, opening its doors in the late 1960s. The company hired Nolan Bushnell in 1971 and began producing his game COMPUTER SPACE, generally regarded as the very first coin-op video game. Bushnell left the company the next year and launched Atari, which opened in 1972 in Sunnyvale, about 40 miles south of the city.

These days, there are so many developers in the area it's difficult to name them all, but Householder lists a few off the top of his head: Electronic Arts, Eidos Interactive, Sega, LucasArts, Double Fine, Ubisoft, Secret Level, Stormfront Studios, Castaway Entertainment, and Hyboreal Games.

"These last two or three years, we've seen a real upsurge in game development companies in San Francisco proper," observes Bill Roper, CEO of Flagship Studios, "a handful of which are within just three or four blocks of here. I believe that has something to do with our being in the wake of the unfortunate dot-com failures. A lot of money and effort had been poured into buildings to get them completely wired and to create amazing advanced workspaces that have sat empty for a few years now. I know that when Flagship was looking for a home about a year and a half ago, we had a plethora of choices, most of which suited both our needs from a technology standpoint and also our desire for space that's conducive to making games, to creativity."

Flagship Studios has apparently had no problem attracting job candidates. Salaries in San Francisco are competitive with other parts of the country, says Householder, although the cost of buying a home is a lot higher than elsewhere.

"The price of a house is exorbitant. If you go to work in, say, Austin, you're going to get a lot more house for your dollar," he says.

"To be honest, when I moved up here from southern California, I went through severe sticker shock," admits Roper. "But, on the positive side, I've owned my house for four and a half years now and its value has gone up a good 30 percent. If you can afford a home around here, you will be making a great investment because the prices never go down."

Any game company that tries to offer wages that keep up with the housing market will quickly go out of business, says Roper, and so, instead, employers have come up with creative perks to attract leery out-of-towners.

"Here at Flagship, we have programs that give employees certain benefits when a game ships," he explains. "We also try to custom-design each person's space to make it as appealing and as conducive to creative work as possible. The company has season tickets to San Francisco Giants games, which are available to anyone who wants to go. We subsidize employees' commuting expenses and we pay for company parking spots next door," a huge perk for a city in which parking is a notorious drawback. "And we've got Fresh Fruit Mondays, Bagel Wednesdays, and, of course, Donut Fridays, which is a Silicon Valley tradition."

Householder describes San Francisco as a world-class urban area with attractions that bring people from all over the world — the city itself, the moderate temperatures, and the topography give San Franciscans access to the ocean, the mountains, and the famous redwood forests.

The area is also steeped with educational opportunities for developers as well as fresh and intellectually stimulated talent from local universities. Stanford University, the University of California—Berkeley, and University of San Francisco are all within close range. Local video game gurus have been known to speak at San Francisco State University. And the Academy of Art University and Art Institute of San Francisco specialize in courses on modeling, texturing, and animation.

"If you're trying to decide whether the Bay Area is right for you, you need to consider what it means to be in an area where there is an abundance of developers," advises Roper. "It means not being too concerned if your studio folds and puts you out of work. When they shut down Blizzard North last year, for example, it was relatively easy for the people who wanted to stay and work in this area to find other jobs. Some started new studios; others went to the big development houses like EA, LucasArts, or Sega—which are always looking for quality talent. I don't want to trivialize it, but it's a simple enough matter for people who work at one company and want to move to another to do that here. As far as I'm concerned, that is a big plus for anyone who wants to stay in game development."

Bill Roper, Flagship Studios CEO.

IN THE EVERGREEN STATE: SEATTLE

While the earliest game developers in Seattle and the outlying area were probably Humongous Entertainment in 1992 and Sierra, which moved there in 1993, the real granddaddy of them all was Microsoft. The software giant released its Microsoft Flight Simulator 1.01 a decade before other game developers settled in the area, around 1982. That's after Bruce Artwick's company subLOGIC created a version of the program for the Tandy TRS-80 and then licensed an IBM PC version with CGA graphics to Microsoft.

Now, 24 years later, the notable developers in the area include Microsoft Game Studios, Valve Software, Zipper Interactive, Monolith Productions, Bungie Studios, Nintendo of America, Gas Powered Games, Amaze Entertainment, Zombie, and casual game developers PopCap Games, RealNetworks, and Big Fish.

While Valve has only been in existence for 10 years, Erik Johnson, a product manager, has lived in the area his whole life. Director of marketing Doug Lombardi, however, is a transplant from San Francisco.

"My wife and I wanted to settle down and, frankly, we couldn't afford anything in the Bay Area, so we headed up here," recalls Lombardi. "In Seattle, you're still on the West Coast, but nice

Doug Lombardi, director of marketing at Valve.

houses are more affordable than in San Francisco or Vancouver, and your money goes further. The taxes are certainly lower than in California. I think that's what lures a lot of developers to the area. Plus, if you need to visit either of those game development hubs, they are just a short flight away."

Johnson says that Seattle "is still affordable" despite the fact that salaries might be slightly lower than in San Francisco, where the cost of living is slightly higher.

"On the negative side, it sure does rain a lot, but not all the time as everyone thinks. When it's nice here, it's probably one of the most beautiful places around," he says.

When it comes to the game community, Washington state developers tend to socialize with each other more than in other locales and aren't wildly guarded about competition, according to Johnson and Lombardi at Valve.

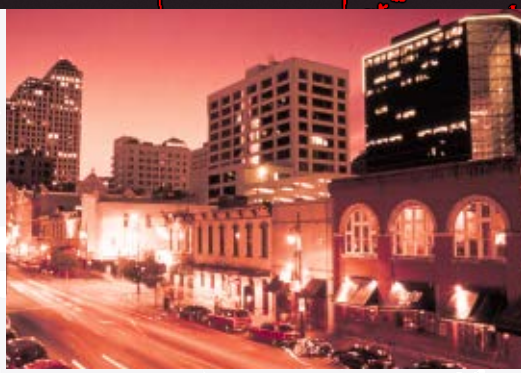
"We have local developers dropping by all the time to playtest our games and give us feedback, and we do the same with them," says Lombardi. "Every once in a while, we rent a movie theater for the evening to see some of the newer movies with the guys from Bungie, Gas Powered, and Monolith. It's amazing how friendly we've become. I think people would be surprised at how common it is for us to go over the technical details of our games with outside developers, especially on the engineering side. We've become quite a community."

Educational opportunities in the area include the University of Washington in downtown Seattle, which offers courses in computer development and programming, and the DigiPen Institute of Technology down the street from Valve. Johnson adds that Valve has hired some DigiPen-educated folks.

Because the sheer size of companies like Microsoft and Nintendo means they always have open job racks, developers would be hard-pressed not to find employment in the Seattle area, notes Johnson. "Microsoft probably has over 250 openings at its Game Studio right now. Here at Valve, we're never not hiring. Because there are so many developers in the area, once you're in any one of them, it's easy to transition to another without having to move your home," he adds. "That's why developers go out of their way to retain their employees; Valve, for example, has practically zero turnover.

Erik Johnson, a product manager at Valve.

"I believe that developers look for two forms of rewards: their compensation package and going home at night feeling like they're working on a winner," says Johnson. "At Valve, we try very hard to take care of both of those. Plus it doesn't hurt that, in a few weeks, we're taking everyone—and their spouses and kids—to Kona, Hawaii for a little company R&R."



Austin's famed Sixth Street.

THE STAR OF TEXAS: AUSTIN

The huge magnet that attracted game development to Austin, Texas was Origin Systems, which brothers Richard and Robert Garriott opened in 1982, two years after Richard created ULTIMA I.

Various development teams were created within Origin—the WING COMMANDER team, the ULTIMA team, and so on—and, soon, developers began splitting off to form their own studios. The Sony studio in Austin that built STAR WARS GALAXIES, for example, actually began as the WING COMMANDER ONLINE team at Origin until the project was canceled.

Similarly, Warren Spector left Origin to lead Ion Storm Austin. Mike McShaffry departed and is now studio head at BreakAway Austin. Billy Cain exited to form Austin startup Critical Mass Interactive. And Andy Hollis oversaw the development of ULTIMA X until it too was canceled and he left to become president of Fastlane Games.

Quoc Tran, an assistant producer on the core technology team at NCsoft, says his company is "basically the second coming of Origin, because a lot of the development team and the management structure that was Origin is in place here at NCsoft. I think it's safe to say that, in Austin, everybody is two degrees of separation away from Origin."

Developers call it the "restaurant effect": If you're a chef and are looking to open a new restaurant, where would you want to put it? Where there are other restaurants, of course, because that's where neighborhood people go to eat out. Similarly, if you want to hire the best developers, the place to open your studio is where the other studios are. In addition to the previously mentioned companies, Austin is also home to Amaze Entertainment, Aspyr Media, Cellien Studios, Edge of Reality, Game Titan, Junction Point, Kings Isle, Midway Austin, Multimedia Games, Online Alchemy, Retro Studios, Spacetime Studios, and Wolfpack Studios.

"There's a sense of security for developers in Austin," Tran notes. "If you decide to go to a startup, you know you're taking a risk, but not as big a risk if there are other companies in the

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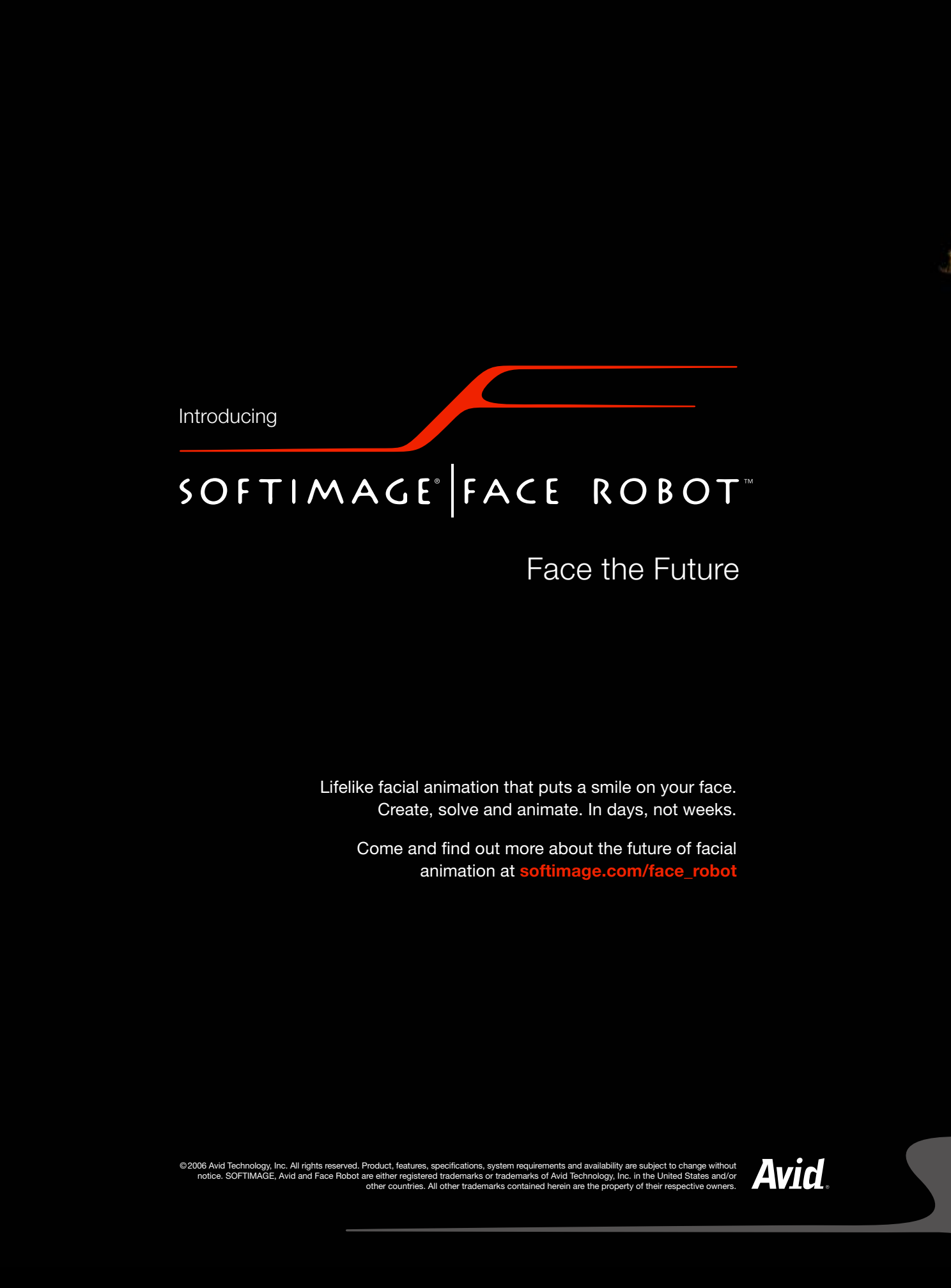
TEXAS IMAGES COURTESY OF AUSTIN CONVENTION AND VISITORS BUREAU.

NCsoft assistant producer Quoc Tran.



SOFTIMAGE®

Character building

CONTINUED FROM PG 21

area where you can go if the startup shuts down. That's one reason people come to Austin."

Tran describes the developer community as tight. "If you don't know someone, then you know someone who knows that someone. Everyone seems to hang out with everyone else, whether it's at periodic meetings of the local IGDA chapter or at one of the local game conferences, like the Austin Game Conference, the Game Writers Conference, or the Women's Game Conference."

Austin is a very different beast from the rest of Texas, and that's something you'll hear often from local developers, Tran among them. He points this fact out with pride to job candidates when they visit. "Whatever you think of as Texas," he says, "Austin isn't. Instead of cowpokes and tumbleweed, we've got lots of trees, several lakes, and a river running through the middle of downtown, which is also a very popular jogging destination. We're in the hill country, which makes for great mountain biking and explains why Lance Armstrong trains here."

Austin is also home to the University of Texas at Austin, with a prestigious Computer Science department from which grads frequently make their way into the game industry. In addition to the five or so other universities in the area, Austin Community College has a thriving game development program that local developers often teach; NCsoft's Richard Garriott is on the advisory board. The community college hosts monthly seminars, too, that feature guest speakers discussing industry issues.

Raphael van Lierop, associate producer at Relic Entertainment.

Compared to living in the San Francisco Bay Area, the cost of living is about half, according to Tran. "While finding a house for under $500,000 in California might be difficult, in Austin $500,000 will get you a manor. It's easy to buy a $100,000–$200,000 home in a nice part of town in a good school district. And if you choose to move to the suburbs, it's even cheaper especially because the tax rate is so much lower."

Salaries are said to run the gamut from $30,000 for a tester up through six figures for an executive. The average salary for a Texan game developer in 2005 was more than $71,000, making them the sixth highest paid developers by state. For that kind of money, it's very easy to live comfortably in Austin, says Tran. There are no state income taxes.

Job opportunities in the area are currently plentiful. NCSoft is looking for programmers and artists, and there are several startups that will be opening their doors soon. "So I think it's safe to say that hiring will be on the increase pretty shortly," he says.

The only downside of Austin, admits Tran, is the heat. "A parking spot in the shade is worth so much more than a parking spot next to the door," he says, "which is why people will fight over shade. But that's an issue that can be easily mitigated because, if you work in the games industry, you can easily come to the office wearing shorts."

SMALL TOWN APPEAL, BIG CITY FEEL: VANCOUVER

Distinctive Software (DSI—not to be confused with Destination Software, which uses the same acronymn) might not be a household name to U.S. game developers but it was likely the studio that started Vancouver's game industry. In the late 1980s, DSI was known for its ports and its racing and sports games, most of which were distributed by Accolade. In 1991, DSI was acquired by Electronic Arts and became EA Canada, now the largest single game development entity in the industry today, according to Raphael van Lierop, associate producer at Vancouver's Relic Entertainment.

IMAGE COURTESY OF THE CANADIAN TOURISM COMMISSION

Vancouver, British Columbia.

Other notable developers in the area—besides Relic, which was founded in 1997 and purchased by THQ in 2004—are Radical Entertainment (founded in 1991 and purchased by Vivendi Universal in 2005), Rockstar Vancouver (founded in 1998 as Barking Dog and sold to Rockstar Games in 2002), Backbone Entertainment (also known as Digital Eclipse, which joined several other independent developers to form the Foundation 9 conglomerate), and Propaganda Games (formed by ex-EA staff in 2005 and owned by Disney's Buena Vista Games).

Pursuing a game career in the Pacific Northwest makes a lot of sense, says van Lierop. "Vancouver and Seattle are just a two and a half hour drive apart, and with the sheer density of game development studios between the two cities, developer migration is very easy."

The city of Vancouver—with its quality of education, small population, and terrific lifestyle—is a draw by itself. According to a survey of 130 cities by the Economist Intelligence Unit, it tied Melbourne, Australia as one of the two most livable cities in the world.

"Aside from real estate being rather expensive, I have only positive things to say about Vancouver," notes van Lierop. "The climate is fantastic with warm summers and very mild winters, the people are very friendly, and the city is large enough to provide a

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By Canadian standards, Vancouver is a fairly expensive city to live in. Rent is quite high but more affordable than buying real estate, which can be prohibitively expensive; an average new home sells for over $500,000 CDN. However, the salaries seem to reflect this. "My quality of life hasn't suffered in making a transition from where I used to live in Montreal," van Lierop says.

Montreal and Vancouver are the two major hubs of game development in Canada, and each has its pros and cons. Montreal has a very European flavor and is a crossroads for many different cultures. "It has a lot to offer culturally, the food is amazing, and the city itself is full of history," notes van Lierop. "The people tend to be focused on socializing and enjoying good food and drink. But if you dislike hot, humid summers coupled with often brutally cold winters, you'll probably want to avoid Montreal. Vancouver has a much more Asian influence and the climate is considerably more temperate. People tend to be much more focused on a healthy lifestyle, usually including some form of regular outdoor activity. The two cities have very different atmospheres."

Taxes in Canada are fairly high compared to what most Americans are used to but, notes van Lierop, the health and education systems are without parallel in North America. "I cannot honestly think of a better city in which to raise a family than Vancouver," he says.

Vancouver boasts two universities—Simon Fraser University and the University of British Columbia—both of which have well respected computer science, technology, and traditional art programs. Several community colleges offer courses related to game art and design. The Art Institute of Vancouver has a program in multiple game development fields, and the Vancouver Film School recently started a game art and design track.

Aside from the local IGDA chapter, van Lierop admits he knows of few game developer-specific networking events. "But there are hundreds of informal lunches and gatherings that take place every week between colleagues where information is exchanged," he explains. "Honestly, the community has grown fairly organically and you rarely encounter developers here who don't have friends or co-workers at other local studios. The grapevine is definitely alive and well."

In terms of employment stability in the area, van Lierop describes it as "very stable. In fact, I can't recall ever hearing of studio closures or layoffs in Vancouver. If anything, the trend has been toward growth and publisher acquisition." Having said that, van Lierop quickly supplemented his comments with an email addendum several days later: "Oooops! Yesterday, EA Canada laid off about 200 people. I guess I spoke too quickly."

GAME DEVELOPER GLOBE TROTTERS

Although here we've only touched on four of the major North American game development hubs, there are plenty of others out there. In other areas of California, for example, Los Angeles continues to be a gigantic base for game companies, with firms such as Pandemic Studios, Electronic Arts, Neversoft, and a host of others making solid homes there. San Diego also has a number of significant developers, including Sony, Sony Online, and Rockstar offices, showing why by far the most 2005 Game Developer Salary Survey respondents were from the Golden State.

In addition, New York, though not the largest base for developers, continues to operate as the headquarters for companies such as Atari and Take-Two, and also has new development studios such as THQ's Kaos and indie stalwarts such as GameLab. There are a number of other important development pockets throughout the U.S., too, from original Westwood location Las Vegas through the development community that Microprose built in Maryland (which includes Firaxis and Big Huge Games), as well as significant "serious game"-related firms pooling close to Washington, D.C.

Outside the U.S., and already referenced in the Vancouver section of this article, Montreal continues to provide for major studios from Electronic Arts and Ubisoft, as well as a number of smaller developers, such as A2M. And the rest of Canada has a number of important creators, like BioWare. In other words, although North American game development is certainly concentrated around major centers, there's opportunity for any of the fifty states (and all the Canadian provinces) to produce hits and developer contentment, just as well as a game developer located slap bang in the middle of the Bay Area.


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POSTMORTEM

UBISOFT'S PETER JACKSON'S KING KONG

XAVIER POIX *of Ubisoft Montpellier was the producer of* PETER JACKSON'S KING KONG: THE OFFICIAL GAME OF THE MOVIE *and currently serves as studio director for the Paris and Montpellier studios. Email him at* ***xpoix@gdmag.com****.*

UBISOFT MONTPELLIER'S PREVIOUS PROJECT UNDER producer/designer Michel Ancel was BEYOND GOOD & EVIL, a game that received notable critical acclaim and the appreciation and respect of one very important gamer: triple Academy Award winner Peter Jackson (*The Lord of the Rings: The Return of the King*). Jackson picked Ancel and the Ubisoft Montpellier team to work on KING KONG because of Ancel's experience making BEYOND GOOD & EVIL and the team's ability to tell an engaging story, develop strong characters, and make a compelling yet innovative game that's fun to play.

In an interesting twist to the collaboration, when Ancel was first approached to work on the project, he hesitated to accept the job because he had never worked on a licensed title and wasn't sure what to expect. From a creative and development standpoint, most licensed titles are traditionally met with trepidation due to strict guidelines in regard to gameplay mechanics and direction, short timelines, conservative budgets, and having to negotiate with the licensee over virtually every aspect of the development process.

One important element of the development process was the high level of collaboration between our studio in Montpellier and Peter Jackson and his team at Weta Ltd. Jackson came to the pre-production meeting with a list of 10 key elements and attributes he wanted to see incorporated into the KING KONG game.

With this list in hand, we tackled the challenge of creating a game design that would work with Jackson's vision of King Kong as a game experience while still capturing the mood, tone, and experience of the movie.

The game was scheduled for release in November 2005, before the movie debut, so we needed to begin development even before the film's production.

In February 2004, Ancel and members of our Montpellier team visited New Zealand for the first time to meet with Jackson and his team at Weta to discuss the game and learn more about the new vision of King Kong. We were all very excited and it was an outstanding first meeting that fostered mutual respect between the members of our development team and the Weta staff, who were familiar with Ubisoft's BEYOND GOOD & EVIL and FAR CRY. Members of the Montpellier team visited New Zealand five times in total and kept in touch with Jackson in between these visits via email and phone. We also sent builds of the game for him to play throughout the development period.

For PETER JACKSON'S KING KONG: THE OFFICIAL GAME OF THE MOVIE, it was Jackson's idea to have players play

GAME DATA

RELEASE DATE
November 22, 2005, December 13, 2005 (PSP)

PUBLISHER
Ubisoft

GENRE
First-person/third-person action/adventure

PLATFORMS
PlayStation 2, Xbox, GameCube (Ubisoft Montpellier); Xbox 360, Game Boy Advance (Ubisoft Montreal); PC, PSP (Ubisoft Romania); Nintendo DS (Ubisoft Casablanca)

PROJECT BUDGET
Approximately $15 million

PROJECT LENGTH
2 years

GAME SCRIPT
3,000 lines

PEAK TEAM SIZE
80 in Montpellier, 200 total in other studios

TOOLS USED
PCs, platform dev kits, Jade engine

TRIPS TO NEW ZEALAND
5

VOICE OVER TIME
50 hours

NUMBER OF TIMES JACK BLACK TOOK OFF HIS PANTS
1 (unfortunately)

KING KONG's in-game art had to match concepts developed at Weta in New Zealand.

and experience the narrative from two perspectives: King Kong's and protagonist Jack Driscoll's. Thus a dual gameplay mechanic was implemented. Additionally, Ancel and Jackson wanted to create a game that would appeal to both a mass-market audience as well as hardcore gamers—one of the biggest challenges to date for licensed video games. Games for "gamers" can be too difficult for casual players, but games targeted toward the mass-market are often viewed by the hardcore bunch as being too dumbed-down and not worth playing.

WHAT WENT RIGHT

1 **VOICE ACTING.** The team was thrilled to have the entire cast, including Adrien Brody, Naomi Watts, Jack Black, Evan Parke, Colin Hanks, and Jamie Bell participate in voice over sessions and provide their likenesses for the game. Our internal scriptwriter, Jacques Exertier, worked directly with *King Kong* co-writer Philippa Boyens, who made sure the game script followed the same direction and tone as the movie. Boyens sat in during the majority of the voice over sessions to coach the actors and rewrite the script as needed. Having Boyens in the studio was great because she was also on set and remembered how the actors performed particular scenes for the movie. She could tell the actor to "do it like that second shot from that one scene," and since she had knowledge of movie script changes, she could chime in when the game script needed to be updated, too. Her expertise and direct connection to the film from a production standpoint was vital.

The actors did an outstanding job with their voice over sessions and approached them seriously, as they considered the game to be an extension of the movie. For most of the actors, it was also their video game debut. The voice over sessions were great once the talent was on site, but it was a bit of a juggling act scheduling the actors, as they were often in New Zealand and elsewhere; studio recording took place in both New Zealand and Los Angeles.

Another challenge was keeping Jack Black focused on the task at hand, as he's always moving at a thousand miles per hour. He did an excellent job, though, and even won a Spike TV award for his performance.

2 **WORLDWIDE PREMIERE.** KING KONG was slated to be the single biggest launch in Ubisoft's history, becoming available on all consoles on the same date worldwide in mid-November 2005. This meant that the game needed to be developed for or adapted to the Xbox 360, Xbox, PlayStation 2, GameCube, PC, Sony PSP, Nintendo DS, and Game Boy Advance in what would be a worldwide collaborative effort internally for Ubisoft.

As a company, Ubisoft has the second largest third-party internal development studio, so we needed to flex our development muscles to be both diligent and timely in regard to production. Our Montpellier studio developed the game for PlayStation 2 as the lead platform (as it has the largest marketshare). Then, the game was ported to the Xbox and GameCube internally. Ubisoft Montreal tackled the Xbox 360 and Game Boy Advance versions, Ubisoft Romania executed the PC and Sony PSP versions, and Ubisoft Casablanca handled the Nintendo DS version.

Sharing the work among a strong network of internal development studios allowed our team to focus on creating the core game. We would then oversee the development of the game across the other platforms with each studio to ensure it maintained quality and thematic consistency, much like a script supervisor would do for a movie. It would have been physically

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***Chris Bruno**, QA Manager, Eidos Interactive*

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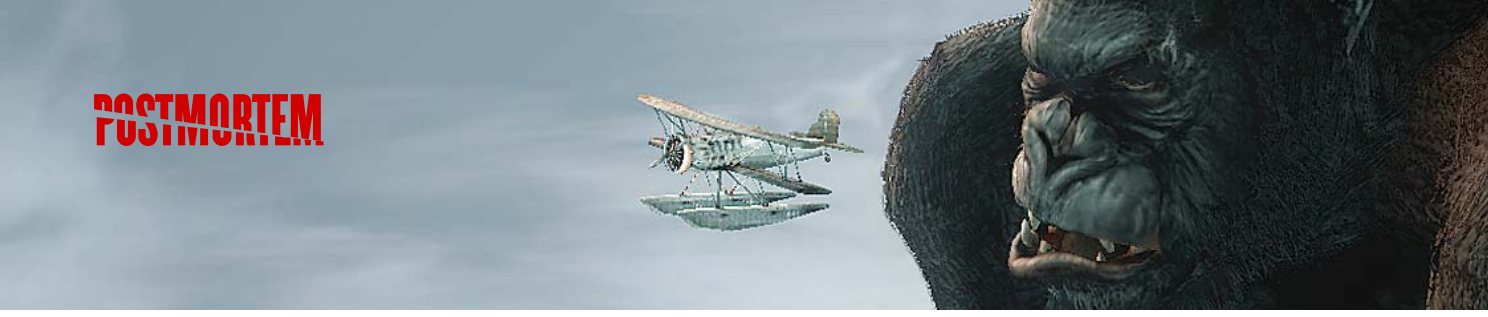


impossible for us to develop every single version of the game in our studio due to the number of people needed to complete each project.

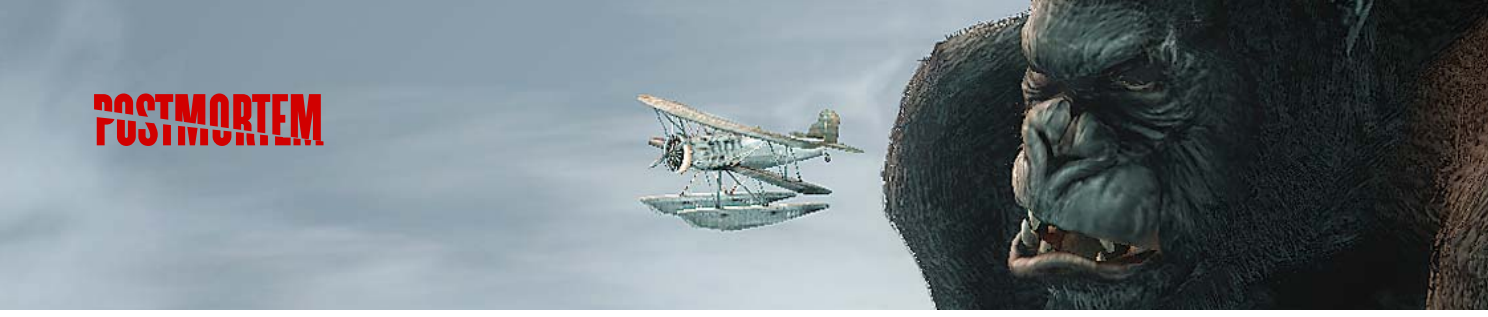
3 **CREATING REALISTIC ENVIRONMENTS.** Skull Island is a desolate and dangerous place, so making use of the creatures in a fully interactive environment was a key design element. We wanted to create a realistic environment where creatures would follow natural predatory rules of nature, so we set out to develop AI that would make this possible.

Much of the game is played as Jack Driscoll, from a first-person perspective.

We gave aggressive creatures AI such that if a player was near two beasts that are natural enemies, the animals might attack each other and leave the player alone. Or perhaps, a player could lure one creature to another area or away from members of the expedition team using bait found in the environment, be it a dragonfly, grub, or salamander. Testing showed that some players would always use the food chain whenever possible, others would only use it when absolutely necessary, and yet others would go without using it at all. Getting the AI to work correctly here was of utmost importance to ensure that the game played differently each time and gave the player unique and multiple ways to play through various maps.

We took our proprietary Jade engine and modified it to increase the AI and adapted it to the dual gameplay mechanic. The advantage of working with the Jade engine is that it acts as both a game editor and an engine, so we're able to develop within the engine itself, which includes the ability to add the animation, AI, level design, and art. Virtually everything that goes into the game is poured directly into the engine and then manipulated. This is good from a game design standpoint because it helps speed up development and removes guesswork about stability, framerate, and play mechanics. We're able to work while testing along the way, which saves us time, energy, and money.

4 **XBOX 360 PORT.** For the Xbox 360 version of the game, the Montreal studio had the unique challenge of taking the core game from the PlayStation 2 and turning out a beautiful port that didn't compromise the game play, but would change the game enough to take full advantage of the high level graphic power of the system. The Montreal team created their own displacement tool for graphics, which helped them import and



translate the PlayStation 2 information, to which they would then add more details and graphical upgrades.

For example, the team would make one pass with several texture stages: start with a base texture, add a moss texture (which was a big part of the lush jungle environment), add the specular map, then the normal map, followed by a more detailed normal map, which all worked together to create a more detailed bumpy look as well as the "shiny" effect. The final part of the pass was the shadow.

Another terrific element the Montreal studio was able to implement, which is exclusive to the Xbox 360 version, is a fully realized and dynamic "wet" environment. In maps with rain, the specular component was dynamically altered to make the environment look shinier over time. To stop the rain's effect, they simply inversed the process and the environment slowly dried, becoming less shiny.

The KING KONG game's core creative team: Jacques Exertier, game scriptwriter; Michel Ancel, creative director; Peter Jackson, movie director; Xavier Poix, producer and studio director (L–R).

5 **NO HEADS UP DISPLAY.** The lack of a heads up display wasn't entirely new to the game industry. The MYST series was one of the first to adopt this technique of fully immersing the player into the game world and story. However, video games by design need to help lead players through the experience to a certain degree, whether through directions or quick access to key information, such as ammunition on-hand, inventory, or health level. The development team looked at each of these facets that are usually relegated to the HUD and used their HUD-less implementation as an opportunity to immerse the player even further into the experience. For example, rather than having an ammunition gauge on screen, players simply push a button and the character provides an audio cue with the information such as "I have five magazines on backup," or "I'm dry."

The team decided that on Skull Island there's no need to have an inventory; we made it more practical by only allowing the player to carry one weapon at a time, though the player always has the option of grabbing a spear or bone to wield, too. In regard to a health meter, audio and visual cues were used instead, which further immersed the player in the game world. When the player is attacked by a predator, the screen becomes blurry and flashes red, the heart beat becomes audible, and a fateful chorale begins to build.

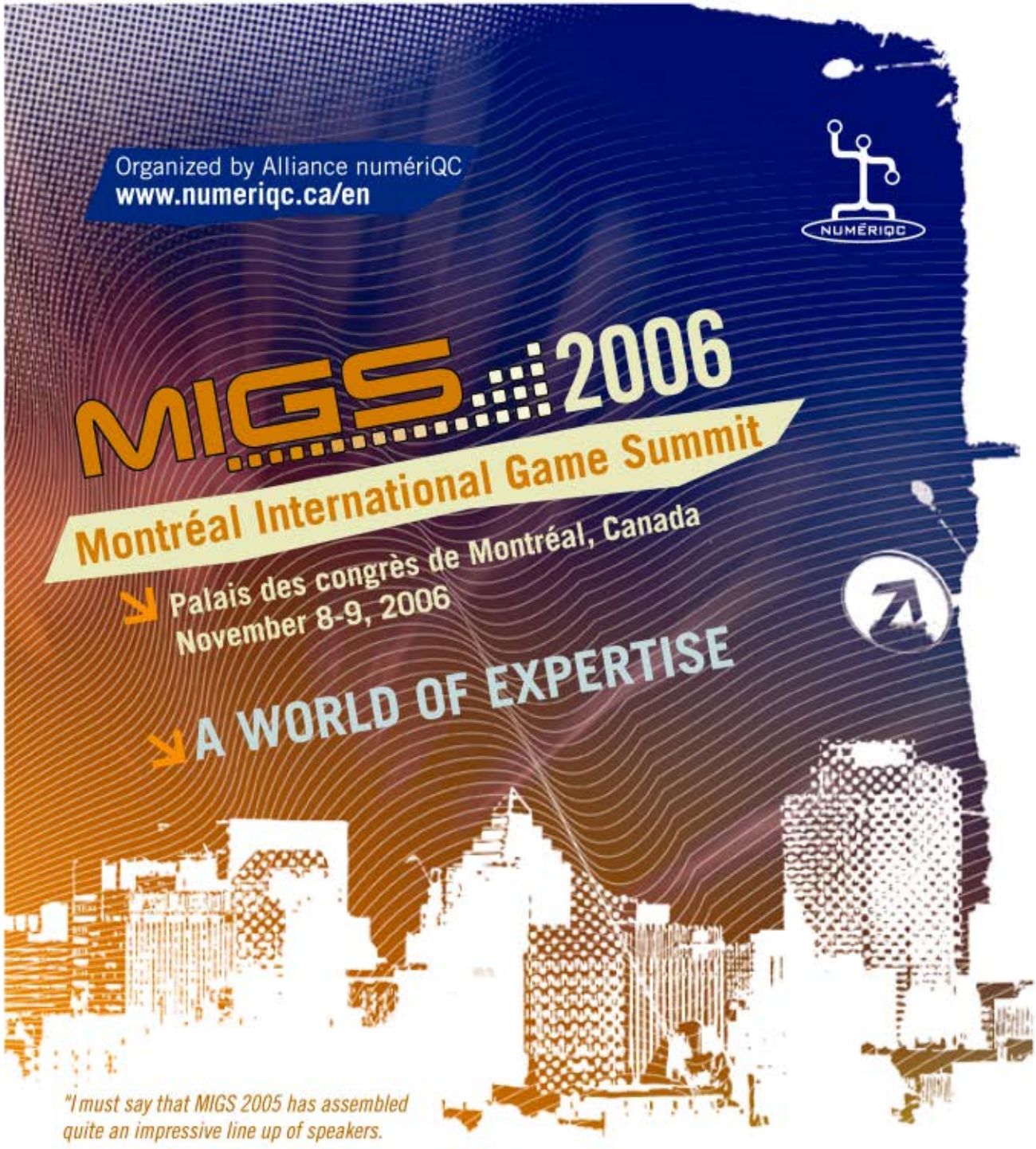
WHAT WENT WRONG

1 **KONG-SIZE DEVELOPMENT TEAM.** As the saying goes, "Your greatest strength can also be your greatest weakness." In the case of creating KING KONG, coordinating simultaneous worldwide development was extremely challenging and may have caused some compromises in the final product. As mentioned, the creative lead for the console and PC titles was the Montpellier studio located in the south of France. The other studios had to wait on an ongoing basis for Montpellier to provide them with assets, internal approvals, and updates. We didn't have the bandwidth to give them the attention they needed to ensure their particular projects were meeting expectations in terms of timing and quality.

While it was everyone's goal at each studio to create an outstanding game for each of their titles, deadlines, as well as being so spread out, made it nearly impossible to keep things as tightly wound as a single studio project would have been. There was definitely a crunch time as with any project, but the crunch on KING KONG was pretty intense, and due to timing and budgets the only real solution was to work weekends and long hours the last month or so of the project.

2 **THE WAITING GAME.** Creating a game based on a movie is always a complex process with a firm release date. On top of that, creating and developing multiple versions of the same game in France, Canada, Romania, and Morocco, while also waiting for approvals from both Los Angeles and New Zealand made the process extraneously difficult. Montpellier would wait for script changes, directives, and input from New Zealand before moving forward, and they we would resubmit for approvals from New Zealand and Universal in Los Angeles before finally providing the approved section(s) to the other development studios.

The Ubisoft Montreal team had the additional challenge and pressure of making the game a launch title for the Xbox 360, a platform whose dev kits came out a bit later than anticipated.



"I must say that MIGS 2005 has assembled quite an impressive line up of speakers.

Dare I say the most significant non-GDC/E3 line I've ever seen?"

- **Jason Della Rocca**, Executive Director, International Game Developers Association

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At key points, players get to control King Kong himself.

The Montreal studio was forced to do a lot of guesswork as far as the actual power of the system, hardware stability, and ways to keep a high framerate, while still making the game look amazing. Their displacement tool made the process much quicker and more efficient, but there was still a two-week lag time from when they received the initial code from Montpellier and completion.

3 **KING KONG CLOSE UP.** The game is called PETER JACKSON'S KING KONG for good reason: it isn't a story focused on Skull Island or New York but rather Kong himself and the dynamic encounters with the characters once the Venture runs aground on the island.

When the game was less than two months from going gold, we received word that Peter Jackson had altered the ape's jaw and that the change would need to be reflected in the game.

Although we knew that the change would not be apparent to the naked eye—even less so for players—we had a contractual obligation to meet Jackson's wishes. And besides, we wanted to make sure the Kong represented in the game was as close as possible to his big brother in the film. We spent long hours fixing what needed to be reworked while still maintaining the pre-determined development schedule. We couldn't just push back our deadlines a week or two—it just wasn't an option. In the end, only those extremely close to the project could see the difference, but as a team we knew we did the best job we possibly could.

4 **DIFFERENTIATION FOR THE PSP.** The Sony PSP version of the game underwent a number of design document changes, which led to an extremely difficult path to making this game. At first, we wanted to create a game which was very similar to the PlayStation 2 version but had a few exclusive features for the PSP. Sony requested that more be added to the game to make it seem less of a port and more of a unique PSP experience. The team set out to meet this goal.

However, during the development process, it was determined that the design of the game was a bit too ambitious for the capabilities of the PSP. We realized we needed to adjust the game to make it playable yet still evoke the same experience as its console counterpart. We had to pitch the new design to Sony, and basically create a game that was very similar to our initial pitch but with exclusive features for the PSP. We added a multiplayer mode, but for the most part we had to find ways to shape the game so it would work for the PSP, which included removing some levels and changing some of the character interactions with other characters into a more cutscene approach, which limited the players' experience when compared to the console versions.

The PSP game was the only version that did not ship on November 22 in the U.S., but we did our best to present a worthy title by the time it reached consumers in early December.

5 **THE BIG FINALE.** One of the toughest jobs for movie directors is editing, which is why we have director's cut DVDs. For KING KONG, we really wanted to have an alternate ending in which Kong lives.

There was much discussion about this alternative path, which is fairly typical for adventure-type games, but it was eventually decided that the special ending would be the final unlockable feature that players could earn only after they completed the game and accumulated 250,000 points, rather than having the alternate ending be something you could find by simply playing differently.

Making the alternate ending less accessible to the average player was only a slight disappointment, but we understood the reason for this change, which was that there could be some confusion or thoughts from the media or consumers that the movie may have an alternate ending too—remember that the game came out November 22, well before the movie debuted on December 14.

EIGHTH WONDER OF THE WORLD

Creating and developing PETER JACKSON'S KING KONG: THE OFFICIAL GAME OF THE MOVIE was a lot like the movie itself: an adventure to an uncharted island full of challenging obstacles and a Kong-sized beast of a project to tackle!

From collaborating with the wonderful Peter Jackson, working with Philippa Boyens and the principal cast, and successfully completing the largest single launch in Ubisoft's history, we can proudly say that the experience was one we'll never forget, and the memories and lessons learned will be with us forever.

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Image created by: Morph Studios (Maya) and Caroline Delen (3ds Max)

THE WRIGHT STUFF

WILL WRIGHT ON LIFE, THE UNIVERSE, AND EVERYTHING

BRANDON SHEFFIELD *is associate editor of* Game Developer. *He enjoys pressing the "disaster" button in* SIM CITY *as early as possible. Email him at* ***bsheffield@gdmag.com****.*

WILL WRIGHT IS CHIPPER, PRECISE, and swift of tongue. In this exclusive *Game Developer* interview, the Maxis co-founder varies between intensely practical and intelligently theoretical discourse on his career, his game design philosophy, and the influences that make him tick.

1989's SIM CITY and 2000's THE SIMS are just two of the largest accomplishments under Wright's belt, and each is large enough to sustain a career on its own. But there's no rest for the weary, as Wright currently has his sights set on the buzz-worthy SPORE—a universe simulator many other creators might deem impossible to realize.

Aside from games, Wright has been hard at work with his Stupid Fun Club, an organization which, at present, creates robots, and then unleashes them on the unsuspecting public, recording the results. But most importantly, Wright is now one of the world's few game creators who has been given almost complete carte blanche to do as he wishes. How he takes that freedom and applies it is just one of the fascinating topics covered in this extended interview.

Wright spoke with *Game Developer* via phone from Maxis' headquarters in the San Francisco Bay Area in February.

Brandon Sheffield: *THE SIMS series seems to straddle the line between casual and hardcore, and has the unique ability to build hardcore players out of casual ones. Is this something you planned, or a happy coincidence?*

Will Wright: Well, we kind of realized that we needed to get through the hardcore gamers to get to the casual players. But we didn't realize how effective that would be, because once we got to the casual gamers, we got a lot of lateral transmission. A lot of these people had never played a game before.

If you remember back to the first time you played a computer game, it was kind of an exciting thing, and so you would spend a lot of time talking to your friends about it, and then your friends would start playing it. Or it might be a mother talking to a daughter, or whatever. But it's kind of interesting that amongst that group—because they don't play a lot of games, and there still haven't been a lot of other games catering to that group—they treated THE SIMS more as a hobby than as a disposable entertainment experience.

A lot of gamers treat games kind of like movies. They'll buy a game, play it for a couple of weeks, put it away and buy the next game. For our SIMS players it's more like a model train set. It's more like a hobby they pick up, and they can play it month after month, year after year, which is why I think we ended up with such a high tie ratio on our expansion packs. It was because these people didn't really have any other games that they wanted to play,

PHOTO BY ROBIN DIAL

INTERVIEW: WILL WRIGHT

so every few months they could just dust off that copy of THE SIMS, get the expansion pack, and play it some more.

BS: *So it's sort of an infinite shelf life for these games?*

WW: Yeah, they have a very long active period. I think it's again because casual gamers don't have a lot of alternative, that when they play these games they tend to play them for a long, long time. And it's not like they're playing it five hours every night—they might play it a couple of hours a week, but they do it over a much longer period than other gamers. Because they're not switching games every couple weeks, they meet friends and talk to them about what they're doing, and they tend to talk about this over a longer period of time, which increases the exposure amongst that group.

BS: *That seems really contrary to the general view of games as disposable entertainment, an idea which seems to be rampant in the industry these days.*

WW: Yeah. I think that by catering to the same circle for so many years, we've forgotten what it's like for someone to play their first game. And we're catering to those [same] people over and over, especially with the sequelitis. In other words, if I do a sequel, if it's WORLD OF WARCRAFT 2 or 3, or CIVILIZATION 4, the general idea is "let's take the last one and add more features." And for the people who played CIV 1, 2, and 3, that's OK—that's just what they want. But at some point you're closing the door to new players, because you forget how much there was to absorb [in CIV 1]. If you jump right into CIV 4 having played very few games, it's a pretty damn daunting experience.

If you compare that to going to see *Star Wars* in the theatre or watching something on TV, they don't have that filter or gate. The viewer may not know all the characters, but it's still much easier. You know, you've got handicapped access into that front door for a particular media form, whereas with games we have this gauntlet that you have to climb through in order to enjoy our product.

Rooster Teeth created THE STRANGERHOOD machinima using THE SIMS 2.

BS: *What is your aim now with the games that you're making, such as SPORE? Do you have any kind of message that you want to impart to people?*

WW: There are a couple of things. First, regarding topic, I want players to have a deeper appreciation for both how complex and how elegant the universe is, on all these different levels, and how they interconnect. So that's kind of just the "our piece of the universe" awareness, which I think computer games are in a very special position to communicate. It's very difficult to communicate in a book or a movie or a linear format.

Underlying that kind of thematic message in SPORE, we're really trying to push the idea of players being creative, being the ones who build the world rather than the game designers. I think at the end of the day, I want people who have played SPORE to feel as though it really surprised them with how creative they could be. And we do that by giving the players a lot of tools that, as they use these tools for a while, they're making creations that are just astounding to them, and they're surprised by their own creativity in that sense. That is kind of the other underlying message: anyone can be creative with the right tools, and the results of that creativity surprise you and come alive and become your world that you play in.

BS: *You generally operate in the "sandbox" arena, but what do you think would make a good linear, single-player experience?*

WW: I think we all have linear aspects ... but if linear is implying that the user isn't directing that experience—that the player has no effect, or they're put into a groove or a funnel—then we're throwing away our biggest asset. It's basically like saying, "Oh, why don't you go watch that movie blindfolded?" You could probably still follow the movie from the sound, but it's throwing away the biggest single asset of that medium.

BS: *You seem to be in a pretty singular position of power at EA where you can really make a 'Will Wright' game. Was that a natural evolution, or did you have to fight for it?*

WW: Yeah, I think the EA people have always put a lot of trust in me, and that's needed for me to build what I want to build. But still within EA there's a pretty Darwinian process where every step of the way you have to give people confidence that you know what you're doing, and that you actually have a goal in mind, that what you're building is buildable. And really it's a sales job at every level. And the hard part for me for something like SPORE wasn't really selling it to the executives, it was more selling it to my team.

As I brought SPORE to my team I had to convince them that what I was thinking of was buildable, because you know, at first glance it sounded crazy. And they would point out very big holes in what I was thinking, and then we'd go back and address those. It's like you start with a very small team of very smart people, like three of four people, convince those people it's doable, and then you bring in more people and convince them it's doable, and then every new group of people that comes in has a different perspective and sees different problems. So I think to me that was the big sales pitch. Kind of

Tina Blaine (Bean) | Masters of Entertainment Technology, Carnegie Mellon University | Media Interactivist, Carnegie Mellon University Entertainment Technology Center, Pittsburgh, Pennsylvania | 5-year SIGGRAPH attendee

Doug Roble | PhD, The Ohio State University | Creative Director of Software, Digital Domain, Venice, California | 1998 Technical Achievement Award, Academy of Motion Picture Arts and Sciences | 14-year SIGGRAPH attendee

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INTERVIEW: WILL WRIGHT

telling my team that what they were doing was actually, you know—sane.

BS: *Actually that was going to be my next question—namely, does anyone even question you anymore?*

WW: Yeah, I get more of those questions from my team than the execs, as I mentioned. The execs come in and say, "How's it going?" I say, "Great." They say, "Fine," and then they leave, whereas my team members every day say "Are you crazy?" Especially when it comes to adding new things to the game. They think they've understood it, and then I say, "Oh, I forgot to tell you about this!" But it's good. The perspective I get from the people I work with every day is kind of like tempering steel. Every amount of skepticism I can evoke from the people who are actually building allows us to kind of successively zero in on something that's both cool and buildable.

Wright's upcoming SPORE is a universe simulator.

BS: *So do you start with an established core design and work from there or is it much more conceptual?*

WW: It seems to be much more iterative, where at first it's just this rough idea. Usually what I try to do is identify from the outset what the biggest challenges are. Those challenges might be aesthetic, they might be technology, they might be design, or even production. And on something like SPORE, the biggest issues at first were technology. There were certain technologies I realized we needed that did not exist at all. And so the very first people on the project were kind of deep research people, to try to solve these problems that weren't even solved in academic areas. And once we got close to a solution on those, I'd say, "OK, that is solvable. Now what are the next problems."

The next problems turned out to be more design problems, and now we're transitioning into production problems: How do we build the pipeline? And so at every stage of the process, there's always the question of what's the biggest risk of the project. And that risk can be across any of these dimensions. And then you figure out for every one of these risks, what plan can I implement that will mitigate that risk.

BS: *How long do your projects generally take in pre-production stage, as far as prototyping?*

WW: As far as prototyping, the projects I work on tend to be very long, but usually the first year or two of that is me doing a lot of research. For SPORE, I started that process over five years ago ... actually longer than that, more like six years ago. After that, there's a lot of prototyping on the front end. And I mean a lot. In SPORE, we generated somewhere between 200 and 300 totally separate little prototypes of every aspect of the technology—the graphics, gameplay—for us to put a rough boundary around the design. I probably—more than anyone else I know—go way into prototyping. We did that a lot with interns I had work for me over the summer, and I'd just have them prototype little, very specific ideas.

Usually at the end of the day only about 20 percent of what we prototype actually ends up in the game, but it's very important to know what to leave out. There's an old Japanese saying, "Your garden is not complete until there is nothing else which you can remove." It's just to say the hard part isn't adding stuff, it's hard knowing how much you can take out and have a nice representation of what you wanted to say.

BS: *What was your inspiration for the pod system of workflow and how has it been working out for you?*

WW: It's working out really well! I think that whenever you get to about 20 to 30 people, it's really the only way to go if you want to keep your people enabled, motivated, and leveraged. Especially for a game like SPORE that kind of naturally segments into these different kinds of little groups, it works well. For some projects, it's more problematic, if they have a lot more cross-integration.

It really almost has more to do with the kinds of people you hire and the team chemistry. Whenever you put 10 or 15 people into a group, at that point you're really starting to hit the diminishing returns on how they're going to spend their time. Basically they'll spend a lot more time communicating than working. If you can keep it down to maybe five or six people, the communication efficiency goes way up. In general when you work on a very small team, and I've worked on teams of like 10 or 15 people, you feel like you spend about three hours working for every hour you spend meeting. But on big teams like with 100 people, it feels more like you spend three hours meeting for every one hour working.

BS: *In what direction do you see the game industry going?*

WW: The game industry is at what feels almost like a painful transition point, where we're just on the verge of being mass-market, but not quite. On the other hand, time is on our side there. The people who are not playing games are getting older every day and are going to start dying off. The average age of players goes up about four to six months every year. I think that's going to happen, and at this point it's kind of irreversible. In the mean time, a good bit of the industry has rat-holed itself into sequelitis, and that makes games more complex every year, which is artificially shutting out a lot of new players that we should be bringing in.

I think we're going to see experiments like the Revolution, or are people going to buy Xbox 360 to play DVDs, or the Sony [PlayStation 3] to be their [Blu-Ray] player—we're going to see a lot of hardware issues changing that battle. We're going to see demographic issues of players playing longer and longer. As we get older and older players, they're going to want more and more mature games, more interesting games that probably involve more than just shooting everything in sight. And that's kind of a chicken and an egg. Same with women: As we get more women in the market, we're going to need more games that appeal to women. I think this is a battle that's happening on many fronts at once.

BS: *Is the Reality Robot and Stupid Fun Club still going on?*

WW: Oh yeah. We're doing a lot of stuff. The gist of it is that we're doing a lot of social experiments with intelligent machines. We're not trying to enhance the state of robotics or anything, but we're trying to basically build all these experimental contraptions so that we can test how people are going to relate to intelligent machines in the future, whether it be a robot or appliances or whatever. It kind of starts as playful experimentation in a social dimension, and where it goes from there, it kind of takes on a life of its own.

BS: *Have you had any interesting findings from that so far?*

WW: Oh lots, yeah. One of the things we tend to do is we have various robots we've built, and we take them out to Berkeley and just have them interact with people unexpectedly. Somebody turns a corner and there's a robot talking to them or it goes into a restaurant and orders a meal and we have cameras on board the robot. Just studying how people react to these things is kind of fascinating. We're noticing things like gender differences and age differences and the context of the situation. One of the things I've been curious about is when people interact with these machines, they put them into some category in their mind. It's always curious to me. Are they going to interpret this as an appliance or a pet or a slave or a friend or what? And you can kind of see people put them into different pigeonholes conceptually.

SimsVille, an uncompleted project, set out to combine the designs of The Sims and Sim City.

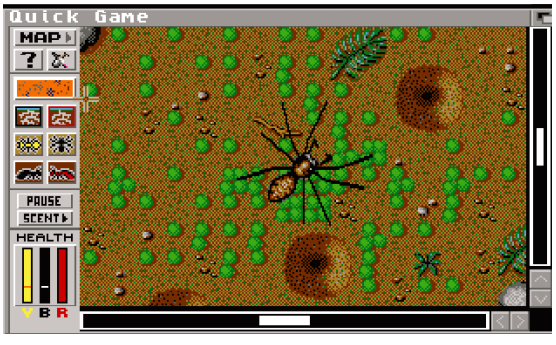
BS: *What group has been most receptive so far?*

WW: It depends on what you mean by receptive. One thing that we've found is that women get very interested in redesigning [the

robot], in general. They look at our design decisions and say, "Oh I wish it were softer, I wish it were more colorful," and they'll get into this long involved discussion of how we could improve it and make it more friendly or more attractive. Men in general tend to focus in on how it works. "How is that controlled? Where are the motors?" and on like that. It's more like men want to reverse-engineer it and women want to redesign it.

BS: *What are your other interests outside of games, aside from what you've already mentioned? If you weren't making games, what would you be doing?*

WW: Before I got into computers, I was very much into racing actually—pro rally. I used to do that, and I would one day love to take a year off and go do the Baja. Robots would really be the other big thing. That's kind of the other passion in life. Robots and Russian space hardware, of all things.



BS: *I feel like in a way game developers are starting to push science fiction into science fact, like John Carmack with his rockets and you with robots.*

WW: All these things kind of reflect our fascination with the world around us and how it works. With games, you're building models of the world that players can play with, and if you're building robots or rockets, you're building other kinds of models yourself. There's something deeply satisfying about building stuff out of atoms after you've spent so much time building stuff out of bits. Part of it reflects that at the end of the day, it's kind of nice to go and do something with your hands and real matter, as opposed to manipulating information with your brain.

BS: *It seems like people who are this good at creating virtual worlds would certainly have a lot to say about the real world, depending on how much difference you think there is.*

WW: The interesting thing about robots is that they're an attempt to recreate human abilities. For me, "robots" is all about another way to learn about humanity. Until you try to build a human hand, you have no idea how wonderful that thing is.

Whenever you try to replicate some human ability in a machine, it makes you reflect on these things that we take for granted, or which we think are easy. Even if it's software—like if I'm trying to create AI that makes little characters seem intelligent—it gives you brand new insights into how amazing our cognitive and perceptual abilities are relative to these very advanced machines.

BS: *I've actually seen some criticism of Honda's Asimo robot in terms of its being just a recreation of human beings, not doing something different or advanced.*

WW: Yes, but there are a lot of things that we build into machines ... we just don't call them robots. Like a freight train for instance, can do something that a person can't begin to do, but because it doesn't mimic a natural human ability we don't really think of it as a robot, even though it's moving material from point A to point B like you might do with your hands. It's those things that come closer to intersecting human abilities that we tend to interpret as robots. The less it has a human form—like if it looks like an ATM, which is in fact a robotic bank teller—we still don't think of it as a robot because it doesn't do it the way a human would do it.

BS: *Here's something that's been bothering me lately: Who would win in a mental battle, you or Stephen Hawking?*

WW: [Laughs.] I don't think there's any contest there. Hawking is the kind of guy that I use as source. If you look at any game I've done, in some sense they've always been built on the backs of these great thinkers.

SIM CITY was actually in some sense inspired by the works of Jay Forrester [author of *Urban Dynamics*, which used computed data to chart urban decay/prosperity]. SIM ANT was inspired by the work of Edward Osborne Wilson [zoologist and author of *The Ants*]. SIM EARTH was inspired by the work of James Lovelock [pioneering environmentalist and author of *The Gaia Theory*]. THE SIMS was inspired by Christopher Alexander [architectural theorist and author of *The Nature of Order: An Essay on the Art of Building and the Nature of the Universe*], Abraham Maslow [psychologist and originator of the hierarchy of needs theory and author of *Toward a Psychology of Being*], and a few others.

SPORE is kind of somewhat Frank Drake [creator of the Drake Equation, which offers a possible number of civilizations in the universe] and somewhat Charles and Ray Eams [famed designers who believed in modern design as a vehicle for social change]. So in fact I really mine these great intellectual giants extensively and try to basically repackage things that they were trying to say in a form that everybody can understand and enjoy. I think Stephen Hawking would inspire me to go and do something, so he's several leagues above me.

BS: *So in a way these games are a method through which to deliver these kinds of ideas?*

WW: Well, yeah. I love reading, and I read a lot of academic stuff that, well, it takes a while to get through the language barrier. Because they're academics, the first thing they do is build a wall around themselves of language that no one understands as a way of inflating themselves. But what they talk about, like the essentials of urban dynamics, is really cool and interesting, but not out of a textbook.

If you take urban dynamics and turn it into a little toy city that you can poke and prod, kind of a guinea pig/lab rat kind of thing, it can be really interesting. I try to find these things in academia that I think are just fascinating and I become basically a translator. ⁘

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THE QUICKENING VS. THE DEADENING

HOW DO YOU PERCEIVE YOURSELF WITH regard to the rapidly advancing pace of technology, especially as it relates to technology that's used to develop video game art and assets?

The title of this column is inspired by a theory called The Quickening espoused by Art Bell, a prominent late night radio host. Part of his theory is that "New technologies ... emerge at a rate faster than social and economic systems can absorb them."

FREEZE, Tom Carroll's first game art endeavor.

Pretty spot on, and actually pretty tame when compared to a quote from *The Law of Accelerating Returns* by Ray Kurzweil, where he notes: "Technological change is exponential ... so we won't experience 100 years of progress in the 21st century —it will be more like 20,000 years of progress ... chip speed and cost-effectiveness also increase exponentially. There's even exponential growth in the rate of exponential growth. Within a few decades, machine intelligence will surpass human intelligence, leading to The Singularity—technological change so rapid and profound it represents a rupture in the fabric of human history."

It all begs the question with regard to technology and art: Do you feel quick or are you, well, quickeninged?

You may already be saying to yourself that it would be very difficult to clock out on technology within the hyper tech-intensive field that video game art has become. And I do, in fact, agree that it would be just about impossible to be completely tech dead in a field that supports concept artists, texture artists, 3D artists, animators, and even technical artists, all using sophisticated hardware and software. But it is certainly possible to be resistant to the steadily increasing flow of hardware and software replacements, revisions and updates. To me, this resistance feels a bit like when Tolkien's Treebeard character from *The Lord of the Rings* says, "Most of the trees are just trees, of course; but many are half awake. Some are quite wide awake, and a few are, well, ah, well getting Entish."

NOT DEAD YET

As for me, I'm definitely more on the quickened or Entish side of things: not as quick as I used to be, but not dead either. Don't get me wrong. I enjoy putting new technology through its paces, but I usually only go the distance if doing so is a job requirement or if there is a monetary figure attached. The pursuit of new technology—commercial releases of hardware and software, not to mention plug-ins and downloads—is never ending, not to mention expensive, and consumes so much time that I have a self imposed technology barrier that keeps this pursuit from following me home. Try it yourself; it's easy. My home computer is only powerful enough to run my email account (barely) and any software that's optimal on Windows 95. READER RABBIT anyone?

My curmudgeonly attitude toward new technology may seem a bit odd considering how long I've been around it, though that actually may explain a lot. The first game I helped develop was FREEZE, an extremely forgettable arcade title developed by Cinematronics and released in 1984.

State of the art then wasn't anything like state of the art now. Dan Viescas, the company's art director, issued me a pad of graph paper and a pencil on my first day so I could plan out individual colored sprite blocks and then connect them together to form the game's mazes. The game allowed for 32 individual colors, and it was a continual battle to try to make them appear where you wanted them. It required a data entry person to translate the graphed color numbers into a machine-readable format, and then the resulting data had to be burned onto a chip before anyone could view the in-game results.

This Rube Goldberg-style arrangement was fraught with error and you can imagine the wonderment when it was replaced by a Z-80 processor-based art station handmade by Alex McKay, the company's hardware engineer. Since then, I've had to learn Deluxe Animator, Photoshop, LightWave 3D, 3ds Max, and my present package, Maya 6.5. I learned them all on the job for specific games and applications.

I was curious to know how other artists got their start. What packages did they learn first, what do they use now, and how do they perceive their ability to grow with new software? Plus, does the technology used in game art preclude an artist from taking a break from the industry? Is it possible to jump right back in the game after spending time elsewhere? Some of my artist friends told me their stories.

SOME WHO ARE QUICK

Joe Simanello, 24, recently was hired as an associate environment artist at The Collective, a developer based in Newport Beach, Calif., and now part of Foundation 9. Simanello graduated recently from the Art Institute of California—San Diego and cut his teeth on 3ds Max, UnrealEd 2003, and Photoshop. He's enthusiastic about new technology and pushing the envelope, especially on the job.

"I just got into the industry and have shown my peers that I have a knack for learning new skills. I'm finally up to speed with normal mapping and advanced texturing." Simanello says.

Unfortunately, he doesn't foresee

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Artists who were lucky circa 1985 got to develop on the graphically complex Amiga 1000. Others had to do it the hard way.

taking any long vacations from the industry. "If I were to take a year off, there would be twice as much for me to learn after coming back."

Unlike Simanello, Brad Constantine isn't new to the industry. He's now a senior animator for Sony Online Entertainment and started animating 10 years ago in 2D with Deluxe Animator and Autodesk Animator Pro. Now, he's a Maya user.

"You can solve just about every kind of visual problem you encounter with these [3D animation packages], and they can be used to do everything from games to film. A lot of the restrictions were—and are—based on the capacities of the game engines that the art runs on, but even that is constantly changing." Back in the days of 2D, he says, "the amount of memory allotted for art in games was much less, so you had to be very clever in the way you created the art. The same is true today, but you get much, much more memory to work with."

Constantine thinks that at some point in the near future games will be able to run graphics that equal film quality. "In the old days, we created characters that were more like marionettes, where the arms and legs were all separate shapes connected at the joints. Today you can set up a character with an outer skin, lots of shaders, full facial setups, and incorporate things like dynamic cloth simulation and real time physics. Amazing."

SOMEWHAT ENTISH

When I asked Dok Whitson, a senior artist on EVERQUEST products at Sony Online Entertainment, to think back on the technology that was available when he first started in the industry, he actually chortled. "Rocks and sticks mostly," he says. "I'd try to draw something good with the stick and if I failed my boss would hit me with the rock."

More seriously, though, Witson adds, "With the earliest introduction of micro computers we'd all stand around with mouths agape and stare at all eight colors ... but in the game you couldn't display all eight at once, of course."

He also remembers using an early Apple computer and Superpaint at a friend's house. "It was disgusting. My first employer in the arcade game industry provided us with Amiga 1000s. They didn't have hard drives, but they did have Deluxe Paint, which was a vast improvement. Then the first PCs were dropped on our desks because the programmers wanted us to use them. And the wonders of DOS opened up like a keyless strong box with cement inside. They had a stripped down version of Deluxe Paint—no animation at first—but once the graphics were imported into the undocumented development tools, it got even more restrictive and outright arcane. It sends shivers down my cerebral cortex just thinking about it. The quickening wasn't near quick enough then."

Although Whitson is enthusiastic about new 3D software and better in-house proprietary tools, he still creates most of his concept work traditionally and scans it. He also says that larger projects and larger teams mean "you just have to dive in somewhere and keep up as best you can in the areas that really matter to you. I sure wish there were a quantum leap in working with UVs and character rigging, the onerous stuff. But the only area I wish would slow down is time itself."

NOT DEADENED, BUT THE TOPIC'S BEEN DISCUSSED

Scott Holty, an artist who has enjoyed stints at Interplay Entertainment, Shiny, and Atari, is glad that technology is moving at the pace that it is, but understands the downside, too. "Running fast keeps things from becoming stagnant. Companies constantly have to reinvent themselves just to stay with the current trends. It keeps the industry from plateauing," he says.

"On the flip side, it's very expensive to be moving at the rapid pace that we are. You buy a computer, for instance, and it starts to become dated six months later. Plus, every six months there's a new iteration of the software package that you're using, and roughly once every year, a brand new version."

The march of technology isn't as much of a problem for people who take a break from the industry as is simply justifying that they deserve a spot to return to, Holty says. "Companies seem to have a 'What have you done lately?' mentality about people. A good artist can overcome this with a strong portfolio, but companies like looking at someone's resume to see what they have been working on and to be sure that they can work at the same frenetic pace as the industry. I guess this is because companies want to make sure that their investment of time and money in an individual will pay off."

PRETTY MUCH DEADENED

Christian Bradley took the time off route. Former academic director of game art and design at The Art Institute of California—San Diego, now an instructor at the same school, he left in-house game development roughly six years ago to pursue his own business providing game development art as a contractor. During the first three of those years, he worked on more than 30 games, creating textures, models, and consulting.

"While it was a strange time for me, the career move paid off because the industry was at a place where it was just starting to accept contractors," Bradley says. "My next career as an instructor and academic director enabled me to see how much tougher it has gotten to attract an employer's attention. Ten years ago you were a star if you knew a little 3D and could draw well. Now you have to have great 3D skills, be a great artist, and know three to six other expensive software programs just to be in the running for a job."

One other colleague I spoke to, who prefers to wear the cloak of anonymity (for reasons that are all too clear), derives solace from the days of the Sega Genesis. "Teams were small and everybody knew what everybody else was doing," he says. "Cartridge games had a limited amount of content so there was an end target. Games today are so open-ended they can hardly be planned properly, leading to impossible schedules. Unfortunately, the industry has the consumers brainwashed that this is the price of admission. If a

The newly-released U.S. Genesis RPG conversion BEGGAR PRINCE—the past may not be as dead as we think (www.beggarprince.com).

movie was created like a video game, it would cost $500 million and not be done until the day before it's supposed to be released to the theaters."

And it's not just the games and consumers that bother my anonymous friend. He finds even less joy in the creation of and technology behind game art. "I hate upgrading to new software. I do not as yet know why I'm using Maya 7 when nothing in it affects my current job needs. Usually, the company assumes that we are all so interested that we will all use our illegal cracked versions at home to learn about the latest new spine binder clamp in the new 3D package. I don't care about it because I don't know what a spine binder clamp is and I doubt it has any impact on my job. The company selling us this stuff should send us representatives to talk about what's important, like they used to. Now training is all online and it's so sterile.

"If I were to leave [the game industry], I would not come back. I like the money and the fact that I can continue to do this work. Currently, I do the dirty jobs that the kids don't want to do; this assures me a place where I am. If I left and came back, I wouldn't have the skills. What's the tipping point? I guess it's coming soon. There are many things I would rather do with my time; however, they don't pay enough to compete with game work. I don't get much satisfaction out of computer game art because it is transitory, and very little of it is art. I smile at the youngsters who have never really done any art and yet are now in the business. I have heard supervisors state that it's better to just get a job with your computer art skills than get art training. The world has indeed turned upside down."

JOLENE SPRY

BUSINESS LEVEL

LEVERAGING PR AS AN INDEPENDENT DEVELOPER

THERE SEEMS TO BE A TERRIBLE misconception about what the term public relations means, what it can do for a company or individual, and how it is accomplished. It isn't marketing, it isn't advertising, and it's not a combination of the two—though advertising is part of the overall marketing plan, and public relations is often part of that as well. Confused? You're not alone.

In the past, I have been retained by several clients who hired me as a public relations consultant but expected me to be their marketing guru. They constantly referred to marketing activities with the words "public relations" thrown in at will. Coming from a marketing background, I fared well, but it's frustrating to be hired for one job and yet be expected to perform a semi-related job that's not in the job description. It's also not very cost effective for the company to hire someone based on what they think they might need, without really knowing what that position entails. After all, you wouldn't hire a chef to fix your refrigerator, would you?

PR DEFINED

In order to figure out what PR is, it's important to first figure out what it isn't. Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to satisfy customers. In other words, you research to find out what the customer wants—and how much they will pay for it—and then determine how to get these customers interested in your product or service and how to best deliver it. Advertising and PR are both part of that bit about generating interest. The difference between them is that advertising is paid content and PR generates free content in most cases.

The average person really is not sure where news comes from. They simply assume that it's the media's job to seek out stories. Certainly the media does find its own stories, but much of the content you see has had a PR pro on the other end of it.

PUBLIC RELATIONS VERSUS PUBLICITY

Most people use the words "public relations" and "publicity" as if they were interchangeable, but they actually mean two entirely different things. Public relations has less to do with actual media relations and is more of a generalization for all the activities that may go on during a promotion. These include coordinating speaking engagements and events, releasing assets to the press, and other activities of that nature. On the other hand, publicity refers to working with the media to build and manage an image or reputation. Any time there's a Hollywood scandal, there's a publicist releasing statements and managing what is published in the media.

MAKE A NAME FOR YOURSELF

Many developers feel daunted by the thought of taking on a big endeavor such as studio promotion. However, you can start small by working with the PR folks at your publisher to ensure that your name is mentioned in their press materials and media relations. Next, speaking appearances and industry engagements are always great ways to get your studio name out among the industry folks. As for consumers, it's best to build a well thought out plan geared toward the demographic that your games are built for. In the end, it really comes down to who you have running the show. PR is all about relationships, and the person you choose to run your PR needs to have those relationships with the media before they start pitching. Even if you decide to retain the services of an agency, there should still be someone in-house to lead the overall strategy, guide their efforts, and monitor their progress.

THE PIXAR MODEL

We can all learn a lot from animation industry giant Pixar. Well, at least before they were purchased by Disney. More than 10 years ago when *Toy Story* was first released in theaters, very few people outside the animation industry had any idea what Pixar was. Had it not been for the incredible reputation of Disney and its considerable marketing dollars, the film likely would not have generated $362 million in worldwide box office receipts. While that may seem like a negative on the surface, it's a positive in other ways and relates to our industry. Independent developers can utilize the power of their well-known publishers to leverage their names throughout the industry and into the hearts and minds of consumers.

Ten years ago, no one would have seen a Pixar movie based on the name alone. Today, the Pixar name attached to a project garnishes huge interest from both the industry and the movie-going public. Video game developers can utilize this same formula. Quality titles along with getting your name out there can mean bigger deals and greater success in the future.

After all, if consumers know who your studio is and they like your titles, why wouldn't they seek them out in the future?

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JESSE HARLIN

SMART COMBAT MUSIC

GOD OF WAR'S hydra battle marks a turning point after which lesser enemies will not be joined with musical tension.

SINCE PONG, THE VAST MAJORITY OF video games have been adversarial in nature, pitting the player against either human or AI opponents. As such, whether your game has boss fights, fist fights, or fire fights, a large percentage of the music written for it is action-oriented combat music. These days, interactive music is a hot topic, as evidenced by at least three different panels devoted solely to the subject at this year's Game Developers Conference—and "linear gameplay" is quickly becoming the new dirty word in game development. This means composers and audio implementers need to look at interactive music more as a necessity than a novelty.

As games continue their evolution into an ever-more cinematic experience, so too must combat music evolve to keep pace with the changing needs of interactive gameplay.

PLAYING TO THE CROWD

Interactive music is nothing more than a broad concept and does not necessarily constitute cinematic music implementation. Cinematic music moves the audience because it's indivisibly linked to the drama being played out on the screen. As such, the difference between interactive music and cinematically interactive music comes down to a simple question: Are you correctly scoring the drama from the player's perceived situation?

Far too often, the answer is "No." Perhaps the most common combat music interactivity scheme used in games today is an enemy AI-based combat awareness mechanism. In short, combat music is triggered when the enemy AI detects the player's presence and continues until the player has defeated all enemies, evaded all enemies, or died. It's an approach that gamers have heard time and time again in everything from RESIDENT EVIL 4 to KINGDOM HEARTS to SLY COOPER.

The inherent problem with combat awareness audio is that it doesn't take the player's awareness into consideration. By its very definition, this approach to interactive music scores the perceived tension level of the enemy AI, not the player's. If the player runs away or hides, the music returns to a neutral state because the enemy AI no longer perceives a threat, regardless of the knowledge the player has that enemies are still lurking nearby. Additionally, there is no musical feedback in this mechanism should the player spot the enemies before their attack state is triggered.

What can result is an awkward interactive combat music system that's constantly starting and stopping music cues, switching back and forth between two different dramatic musical statements with only a few seconds devoted to each.

GUIDING TENSION

The opening tutorial level of GOD OF WAR, on the other hand, is an exceptional example of smart combat music interactivity. The score's greatest attribute is that it's widely dynamic, constantly scoring the perceived threat to the player with an appropriate tension level. The very first battle Kratos has with a group of the undead is very tense, and a suitably frenetic action cue spurs the player along through the challenge. After that, the music continues to build throughout the level climaxing at the first hydra battle. The really important part to observe is how the next battle with a group of undead beings is scored. The tension level is significantly lower. Here the game is saying through its music, "No need to be too concerned. You can take these guys. After all, stud, you just killed a giant serpent."

The score to GOD OF WAR recognizes a very important point in interactive game scoring. After the first introductory battle, small skirmishes will never hold the same level of dramatic tension because they only represent a small obstacle to the player. As such, any game endeavoring to cinematically score combat needs to have a minimum of three different tension levels: neutral/non-combat music, low-tension/small threat combat music, and high-tension/large threat combat music.

THE ART OF WAR

Because game engines vary so widely, it's difficult to offer a simple catchall solution to the issue of smart combat music. The most important point to bear in mind is that no single interactive music mechanism is enough to smartly emulate a cinematic experience. If the engine uses an enemy-detection radius to trigger a combat state, consider implementing two different radii. The first is a CombatOn radius set relatively close to the enemy itself. The second is a CombatOff radius that is set extremely wide. So long as there are enemies or non-exhausted spawn points located within the second CombatOff radius, combat music continues.

Another possible option is the addition of a ForceCombat script into the music engine that overrides any AI-dictated conditions and mandates a combat music state. Any simple in-game event can then be used to turn the ForceCombat script off and return functionality to its normal state. The most important point is to take the time to spot through each level in terms of mood, tension, drama, and pacing and implement dynamically different interactive combat music in such a way as to augment each of these elements as they relate to the player at all times.

The next generation of console games holds the promise of great steps forward with interactive gameplay, and interactive music is poised to become the new standard in game scoring. With some careful planning and a smart approach to implementation, composers will find themselves action heroes in their own right as they deliver the interactive heart and soul of the game's soundtrack.

VIDEO GAMES LIVE

If you're interested in orchestral game music, the most grandiose concert series in the U.S., Video Games Live, co-produced by Tommy Tallarico and Jack Wall, will take place at this year's GDC in the San Jose Civic Auditorium on Friday March 24. The concert will feature game music ranging from HALO to SONIC THE HEDGEHOG.

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

NOAH FALSTEIN

EMERGENT COMPLEXITY

AS FOND AS I AM OF USING RULES AS helpful game design tools, there are certain concepts or principles that are difficult or awkward to express purely through declarative statements. "The Flow Channel" (see Resources) investigated one such concept, and now I cover another: emergent complexity.

Emergent complexity—sometimes called simply "emergence"—is what happens when a set of simple principles or rules affect each other in a rich and complex interaction, resulting in a system with consequences and behaviors that cannot be extrapolated by the designer. Chess and Go are board games with emergent complexity. Their rules can be learned in an hour or less, but people devote entire lifetimes to mastering the subtleties of the games.

In the electronic game arena, THE SIMS, CIVILIZATION, and WORLD OF WARCRAFT (or indeed, any MMORPG) show emergent complexity. Old games like PAC-MAN, or classic adventure games were notable for their lack of emergence. Most of those retro games had one basic optimum path to success, sometimes with a few variations, but virtually all the possible interactions were pre-scripted.

Many single-player RPGs like DIABLO II, most modern platform games, action-adventure games, and the GRAND THEFT AUTO series blend some pre-scripted storyline and framing devices with more open-ended player character skills, weapons, and abilities to produce hybrids, using scripting for some aspects and allowing emergent behaviors in other areas.

WHAT'S IN A CHOICE?

Used well, emergence serves to provide the player with interesting and meaningful choices—interesting because the results are not immediately apparent, inviting experimentation, and meaningful because the interaction and feedback loops that cause one choice to preclude or enable another can change the desirability of other choices.

It's particularly hard to use rule-based responses with AI characters to enable conversations that feel as if you are talking with another human. The resulting emergent behavior may be complex, but the characters often seem inhuman or even insane. At best, they can be adequate when restricted to very constrained roles like a single-minded and dimwitted shopkeeper. MMO games introduce emergence simply by letting real people interact and talk to each other.

One of the key decisions a designer must make throughout the course of creating a game is whether to pre-script a situation, scenario, or consequence, or create some basic game mechanisms that should theoretically be able to handle it and hope for the best. At its best, emergent complexity can create a game that's different every time it's played, creating a compelling play experience. Earlier 400 Project rules apply here, like "Emphasize Exploration and Discovery" and "Make Your Game Familiar, Yet Different" because emergent complexity always presents something new to discover. However, it does so within familiar rules that can gradually be mastered to progress through the game.

BUILD IN LAYERS

So how does one create a game with emergent complexity? This is where rules can come in handy. Marc LeBlanc in his 2000 Game Developers Conference presentation ("Formal Design Tools: Emergent Complexity, Emergent Narrative") talked about some good basic principles, many of which overlap with rules published previously in this column.

LeBlanc's formula for emergence looks like this:

Mind Control Software's OASIS (co-designed by Marc LeBlanc and Andrew Leker) built complex strategies out of simple rules.

- create multiple systems
- keep individual systems simple (see May 2003 in Resources)
- create interactions (or "cross-terms") between systems (see April 2002 in Resources for one way that this can be done)
- focus on system interaction, not system complexity.

LeBlanc also suggests using a tiered system structure, introducing rule systems in layers:

- create a few solid "foundation" systems
- build a second tier of cross-term-inducing features [his example is CIVILIZATION's tech tree layering on top of the basic city growth/unit movement and combat systems]
- the foundation remains fixed, while the second tier grows over development time.

Finally, LeBlanc suggests using negative feedback to keep emergent systems from spinning out of control (see October 2005 in Resources), positive feedback to keep them from becoming stagnant, and urges developers to prototype early, and playtest often.

Those last points deserve emphasis. Since emergent complexity by definition includes some unanticipated consequences, heavy testing is the only reliable way to catch possible flaws. And liberal inclusion of feedback loops provides the dials and safety valves designers need to make sure the game engine runs smoothly.

RESOURCES

For more information, see the following *Game Developer* articles:

"The 400 Project Continued: Providing Parallel Challenges," April 2002.

"Simplicity," May 2003.

"The Flow Channel," May 2004.

"Negative Feedback," October 2005.

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

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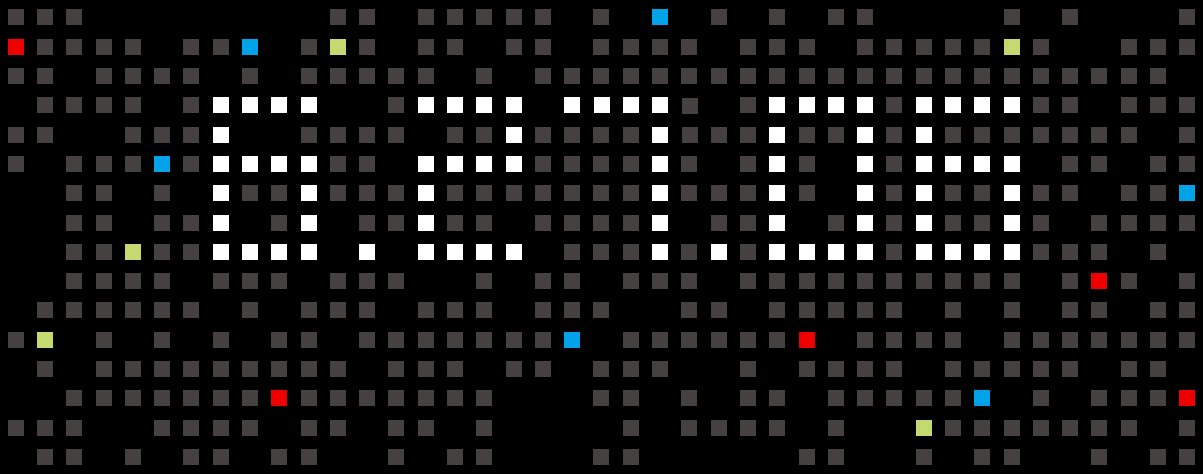

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MICK WEST

PARTICLE TUNING

Optimizing a particle system for multi-core architecture

IN MY FEBRUARY COLUMN I DISCUSSED the various ways you might extend a game engine to take advantage of multi-core architecture. One method mentioned was to fork from a single thread. In this month's column I'm going to discuss how this method is implemented in practice to speed up the processing of a particle system. I'll present the code needed to get multi-threaded processing working, and then benchmark various approaches and configurations.

PARTICLE SYSTEM

Particle systems are very common in games. They consist of a large number of small objects, each of which has a low memory and processing overhead, allowing you to get a very large number of those objects on screen. Particle effects are used to simulate fire, smoke, explosions, and various other physical effects.

In the sample code (available online at www.gdmag.com) I implement a simple 2D particle system that nonetheless performs a significant amount of processing per particle, including a collision check to allow the particle to interact with the environment. The test case simulates 80,000 particles.

My test machine has a 3.2 GHz dual core Pentium 4 Extreme Edition with hyper-threading enabled. This configuration gives us four hardware threads. In theory, the machine should enable us to run code up to 2.6 times as fast as a single core, non-hyper-threaded CPU. I say 2.6 times as fast based on a theoretical 100 percent speed increase from using two cores, followed by a 30 percent increase from hyper-threading. In real-world tests, I actually saw speed increase 3.0 times over, slightly better than expected.

THE CODE

I have attempted to make the code duplicate what you might find in a real game engine. There's a particle class, which has an update() function. There's an array of particles and a count of particles. To update the position of the particles, the particle manager code simply iterates over them and calls their update() function (see Listing 1).

The update code itself moves the particle, checks for collision with the environment, and updates the color of the particle based on the speed (see Listing 2). This is a fairly significant amount of code to be executed per particle.

This type of processing is an ideal candidate for parallel processing. The order in which the particles are processed is unimportant since they do not interact with each other. The particle processing does not use any common resources. The method of processing by stepping through an array can easily be broken into sub-sections of the array.

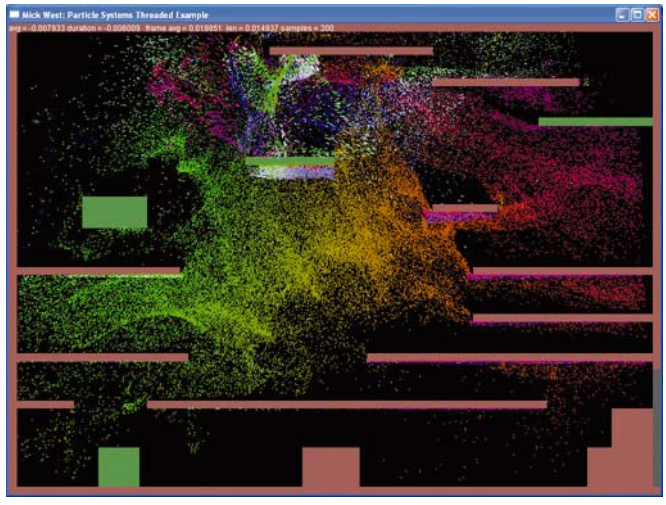
LISTING 1
Normal update loop

```
for (int i=0;i<n;i++)
{
    mp_particles[i].Update(update_time);
}
```

LISTING 2 Particle update logic

```
void CParticle::Update(float time)
{
    m_old_pos = m_pos;
    Vector2 pos2 = m_pos + m_vel * time;
    Vector2 to = m_pos - Vector2(x,y);
    float force = 1000.0f/to.Length2();
    m_vel += to * force;
    m_vel -= m_vel * 0.03f;
    m_color = 0xff800000 + (int)m_vel.Length();
    if (whisker.CheckCollision(m_pos, pos2))        {
        m_pos = whisker.GetPoint() + 0.01f * whisker.GetNormal();
        m_vel = m_vel - 2.0f * DotProduct((m_vel),whisker.GetNormal()) * whisker.GetNormal();
    } else {
        m_pos = pos2;
    }
}
```

MICK WEST *was a co-founder of Neversoft Entertainment. He's been in the game industry for 17 years and currently works as a technical consultant. Email him at mwest@gdmag.com.*



The sample 2D particle system with 80,000 particles.

FORKING

I first wanted to try forking threads to process the particles in groups. To do this, the particle manager's update loop changed from Listing 1 to Listing 3.

As a result, MAX_THREADS threads are created, which immediately begin executing. The main thread then waits at the call to WaitForMultipleObjects until all the threads are finished.

The value in MAX_THREADS should match the number of hardware threads your system is capable of supporting. In our case, the optimal value is four, but we will perform tests with one, two, three, and four threads.

The thread that's created calls the function thParticleUpdate, shown in Listing 4. The particles are divided into chunks based on the thread number. With four threads, the first thread processes particles 0 through 19,999, the second 20,000 to 39,999, the third 40,000 to 59,999, and the fourth 60,000 through 79,999.

WORKER THREADS

Since creating a thread incurs some overhead, it's best not to create threads every time we need to fork. Instead, we can get functionally the same results by creating the threads upon program initialization and then using events to signal the thread to start and to indicate when it has stopped. This approach is known as using "worker threads." The particle manager update function then just reduces to signaling the thread start events, and then waiting for the events to finish (see Listing 5, page 58).

The threads themselves are initialized at startup, along with the arrays of events used to signal a thread to start, and for the threads to signal that they have completed. See Listing 6, page 58.

Then the function thParticleUpdate needs to be modified so that instead of being a one-shot function, it becomes a loop that continually executes the same piece of code whenever the thStartThreading event is set. See Listing 7, page 58.

In order for the tests to be more realistic, I also wanted to run them as if there were a physics engine taking up the majority of the processing time in a single thread. So I added another thread that just constantly multiplied two numbers together and stored the result (see Listing 8, page 58).

This code was then run in a separate thread. It's not an ideal test, as it just

LISTING 3 Forking and joining

```
for (int t=0;t<MAX_THREAD;t++) {
ThreadIndex[t] = t;
thThread[t] = CreateThread(NULL,0,thParticleUpdate,(LPVOID)
            &ThreadIndex[t],0,&threadId);
}
    WaitForMultipleObjects(MAX_THREAD,&thThread[0],true, INFINITE);
    for (int t=0;t<MAX_THREAD;t++) {
        CloseHandle(thThread[t]);
    }
```

LISTING 4 Dividing the particles per-thread

```
DWORD WINAPI thParticleUpdate(LPVOID p)
{
    int thread = *(int*)p;
    float time = update_time;
    int n = g_ParticleManager.m_num_particles;
    int step = n / MAX_THREAD;
    int start = step*thread;
    int end = step*(thread+1);
    if (thread == MAX_THREAD-1) end = n;
    for (int i=start;i<end;i++)        {
        g_ParticleManager.mp_particles[i].Update(time);
    }
}
```

LISTING 5 Starting the worker threads

```
for (int t=0;t<MAX_THREAD;t++)
    SetEvent(thStartThreading[t]);
WaitForMultipleObjects(MAX_THREAD,&thStopThreading[0],true, INFINITE);
```

LISTING 6 Startup event creation

```
for (int t=0;t<MAX_THREAD;t++){
ThreadIndex[t] = t;
    thStartThreading[t] = CreateEvent(NULL, FALSE, FALSE, NULL);
    thStopThreading[t]  = CreateEvent(NULL, FALSE, FALSE, NULL);
thThread[t] =
CreateThread(NULL,0,thParticleUpdate,(LPVOID)&ThreadIndex[t],0,&threadId);
}
```

LISTING 7 Worker synchronization

```
DWORD WINAPI thParticleUpdate(LPVOID p)
{
    int thread = *(int*)p;
    while (1)
    {
        WaitForSingleObject(thStartThreading[thread],INFINITE);
        /* ... BODY OF FUNCTION ... */
        SetEvent(thStopThreading[thread]);
    }
}
```

LISTING 8 Dummy physics thread

```
float dummy_a = 1.1f;
DWORD WINAPI DummyThread(LPVOID p)
{
    while (dummy_a != 0)
        dummy_a *= 1.00001f;
    return 0;
}
```

constantly does work rather than a fixed amount of work. But it roughly simulates the case in which you can keep a thread busy for an entire frame.

RESULTS AND ANALYSIS

I tested three software configurations: forked threads, worker threads, and worker threads plus physics. Each of these configurations was tested with one, two, three, and four processors, and the results were converted into a percentage of the time taken to update the particles in the normal manner (see Listing 1). The code was timed for how long it took to both update the logic (columns L1, L2, etc), and execute a whole frame (F1, F2, etc). Smaller numbers indicate less time taken—hence faster.

After running three different software configurations, I tried three different hardware configurations. The test machine allowed me to disable both dual core and hyperthreading via the bios, so I tested with all three possible combinations. The results are shown in Table 1.

As expected, the fastest execution occurred with four worker threads. The particle system is updated in one-third of the time taken by the unthreaded approach. The framerate is almost doubled—although in this test, the particle system takes up two-thirds of all CPU time.

The difference between using forking threads and using worker threads is very striking, with the worker thread approach being about 12 percent faster than the forked threads. This is presumably due to the overhead in creating a new thread. Whenever a thread is created, it needs memory allocated to it, including a default 1MB for the stack. This, and other overhead, makes constantly creating and destroying threads a drain on resources.

With the dummy physics thread in the mix, we see some slowdown, but really not as much as you might think, considering the dummy thread should be hogging 100 percent of one of the cores, leaving just 30 percent hyperthread capacity and the other processor. So why do we only see a slight drop in performance?

The answer is that the Windows scheduler is attempting to spread the work evenly among the threads, which means that it will constantly preempt the dummy thread in order to let the worker threads (and the main thread) execute. That's why a simple loop is not a good test load. A more realistic dummy physics load could be created if you execute the loop a fixed number of times and have the main thread stall until the dummy thread finishes each frame.

LESS IS CORE

Generally, the fewer cores, the lower your performance. One initially surprising result was that by disabling hyper-threading, the performance of the single-threaded version actually improved slightly, with the framerate increasing 4 percent. This shows that if code is not specifically written with hyperthreading in mind, then enabling hyperthreading can actually hurt performance slightly. Some PC vendors let you opt for your PC to be shipped with hyperthreading disabled for just this reason.

But it's unfortunate, as the potential is there for hyperthreading to greatly improve performance, and it would be a shame if users switched it off just because some games ran slower when it was enabled. Indeed, with a single core and hyperthreading enabled, we get a very significant 24 percent improvement in framerate with two threads.

One interesting result is whenever there are two logical CPUs (either single core with hyperthreading, or dual core with no hyperthreading), the performance drops drastically when moving from two threads to three threads. Why? Because we can now only execute two threads simultaneously. Since the execution time of a single

worker thread is short, the task scheduler will not be able to share the work evenly, and so the first two threads might run to completion before the third thread even starts. It then runs with one CPU idle, giving a 25 percent decrease in performance. If the task were one that ran much longer, then the overhead of having three threads for two CPUs would be much less. Running four threads is only slightly slower than two threads, as the work can be evenly divided.

UNTIL THERE WERE QUADS

Optimizing simple systems for multi-core and hyperthreaded machines is very straightforward and yields very impressive results. Using worker threads instead of forked threads means that there's very little overhead when splitting up a task, and performance increases can be had even on systems with a relatively small number of objects.

The Windows task scheduler usually does a good job of farming out the work to available processors. While you can force a particular thread onto a particular CPU using the SetThreadAffinityMask function, I didn't see any performance gain from doing so. It might still be worth looking into though, depending on how your engine is structured.

Particle systems are just one of several potential factors that could be optimized in this way. Anything that deals with a reasonable number of independent data objects is a candidate, such as skinning, debris physics, flocking, or speech recognition. With appropriate synchronization methods, the multi-threaded approach can be extended to the updating of more complex interdependent objects, such as AI and game logic.

The best performance is gained by scaling your threads to match the available CPUs. On a fixed platform like the Xbox 360, you can specifically target six hardware threads. On the PC, you can attempt to determine the number of CPUs available, but if in doubt, then four threads will generally work well.

However, you should consider that some day there will be quad-core hyperthreaded (such as Intel's "Tigerton") machines, giving us eight logical CPUs. Ideally your engine should scale to the appropriate number of threads and not introduce overhead on a single logical CPU machine.

Table 1

	L1	F2	L2	F2	L3	F3	L4	F4
Forked	106%	104%	62%	76%	48%	66%	45%	63%
Worker	100%	100%	55%	71%	43%	63%	33%	57%
Worker + Physics	104%	96%	66%	75%	50%	63%	46%	61%
Dual Core, no HT	99%	96%	50%	68%	64%	77%	52%	69%
Single Core, HT	100%	100%	64%	76%	72%	81%	66%	77%
Single Core, no HT	102%	101%	101%	100%	100%	99%	101%	99%

The percentages of time taken for logic and frame update for one, two, three, and four threads are shown.

RESOURCES

AMD Corporation's multi-core site:
http://multicore.amd.com/en

Boer, James. "Multithreaded Audio Programming Techniques," in *Game Programming Gems 5*. Hingham, Mass.: Charles River Media, 2005.

Intel Corporation's multi-core articles:
http://intel.com/software/multicore

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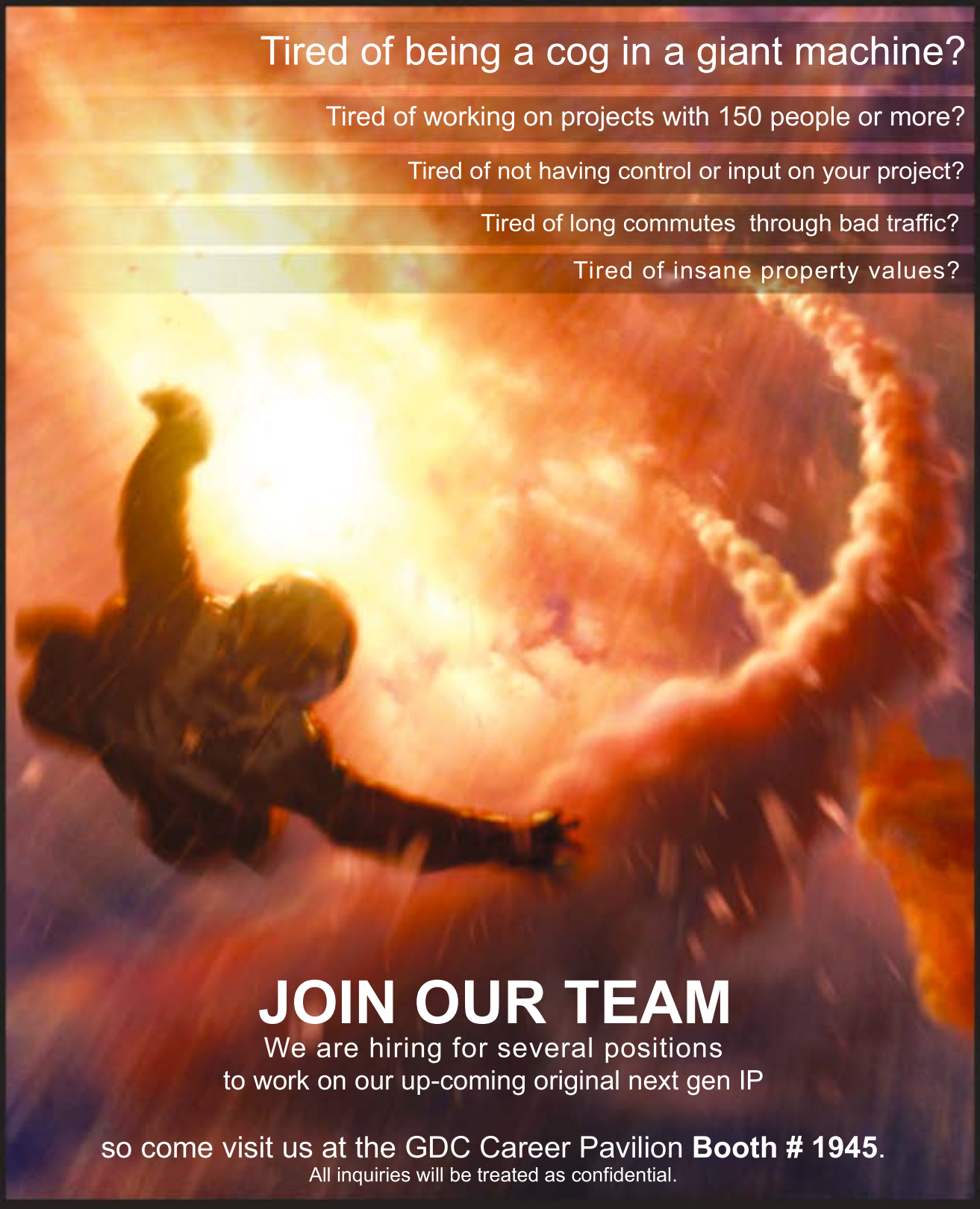

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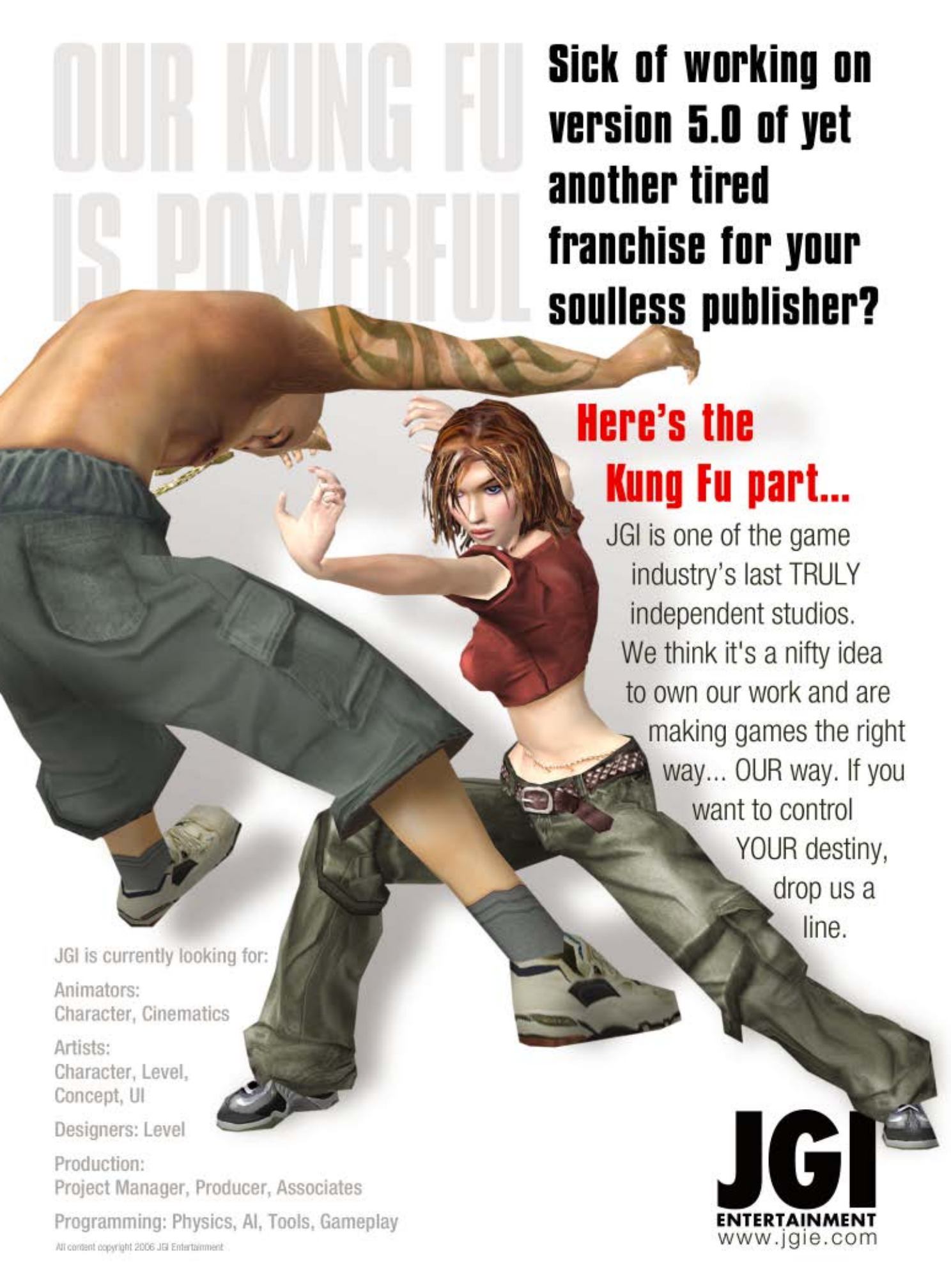
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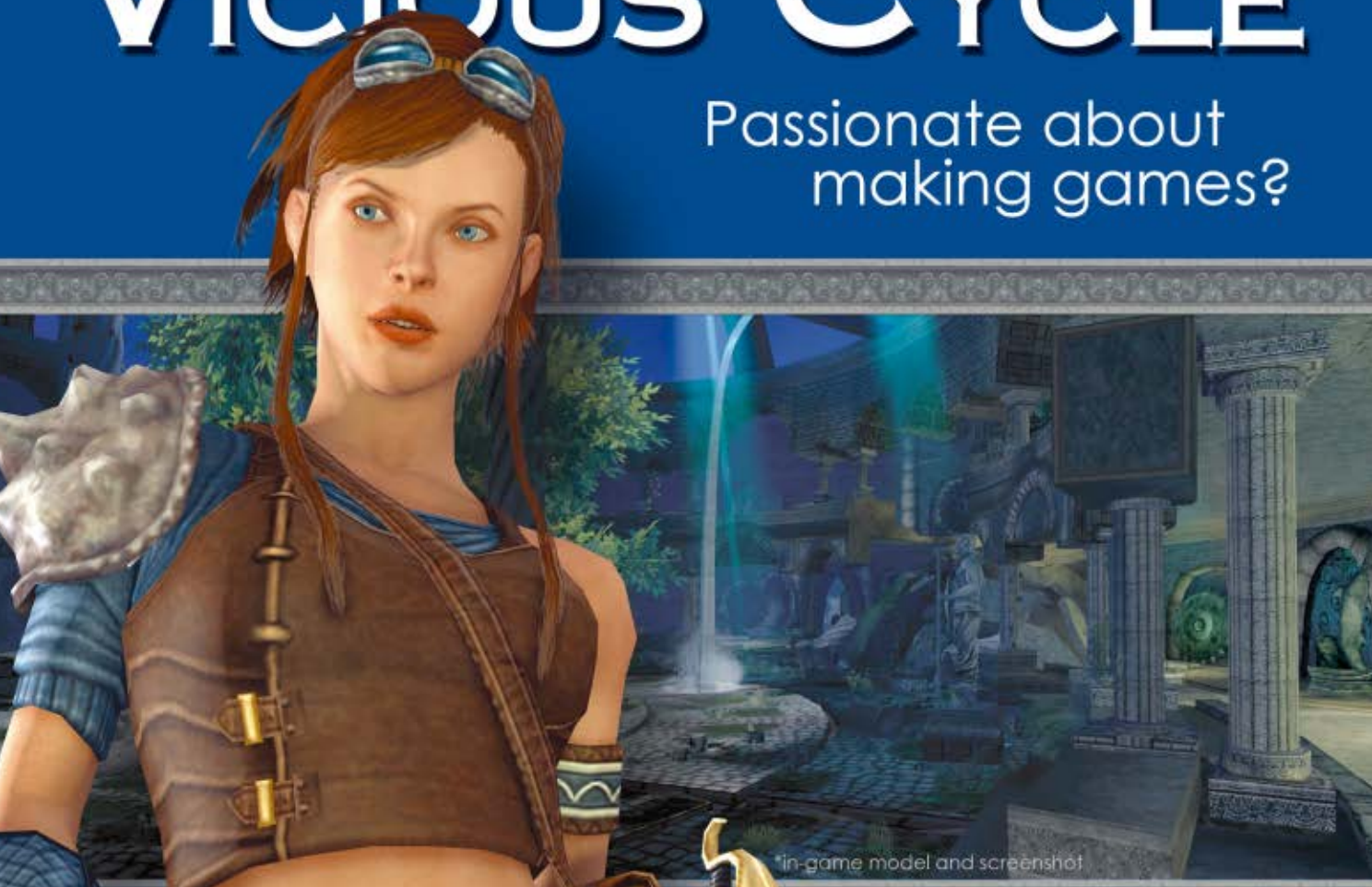

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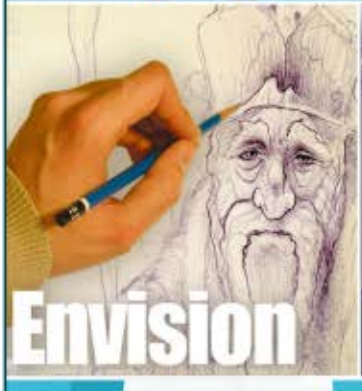

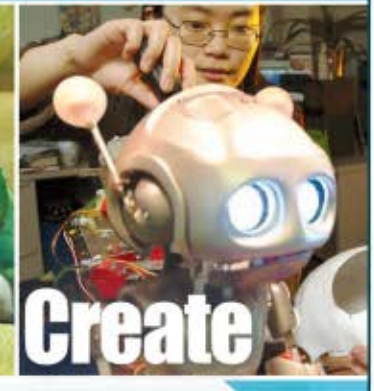

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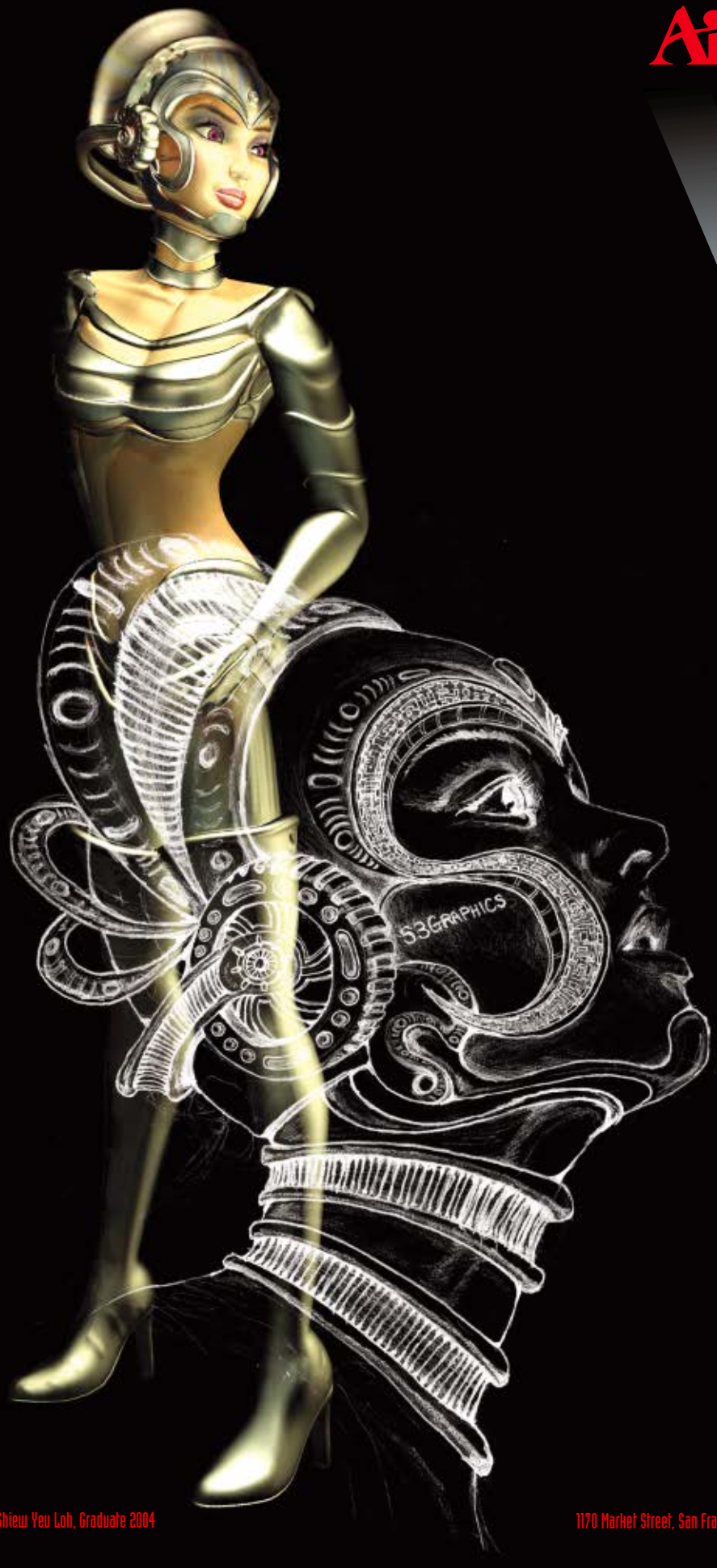

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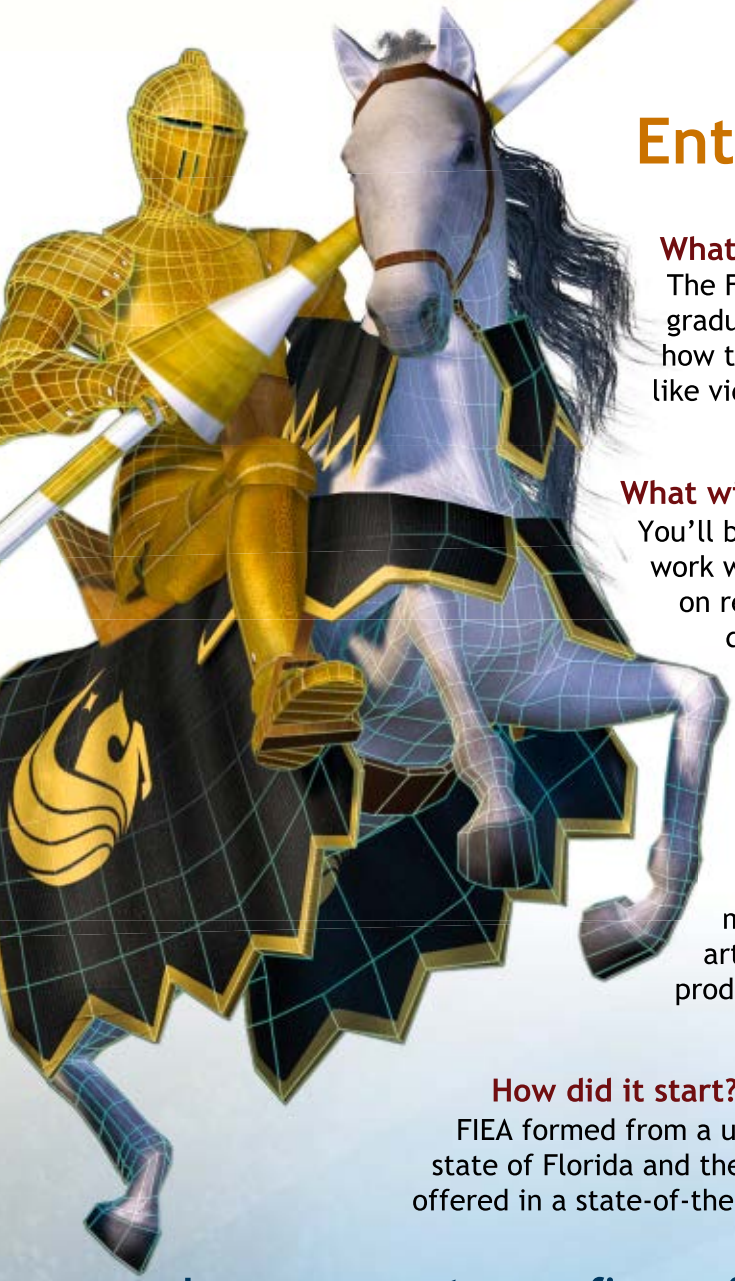

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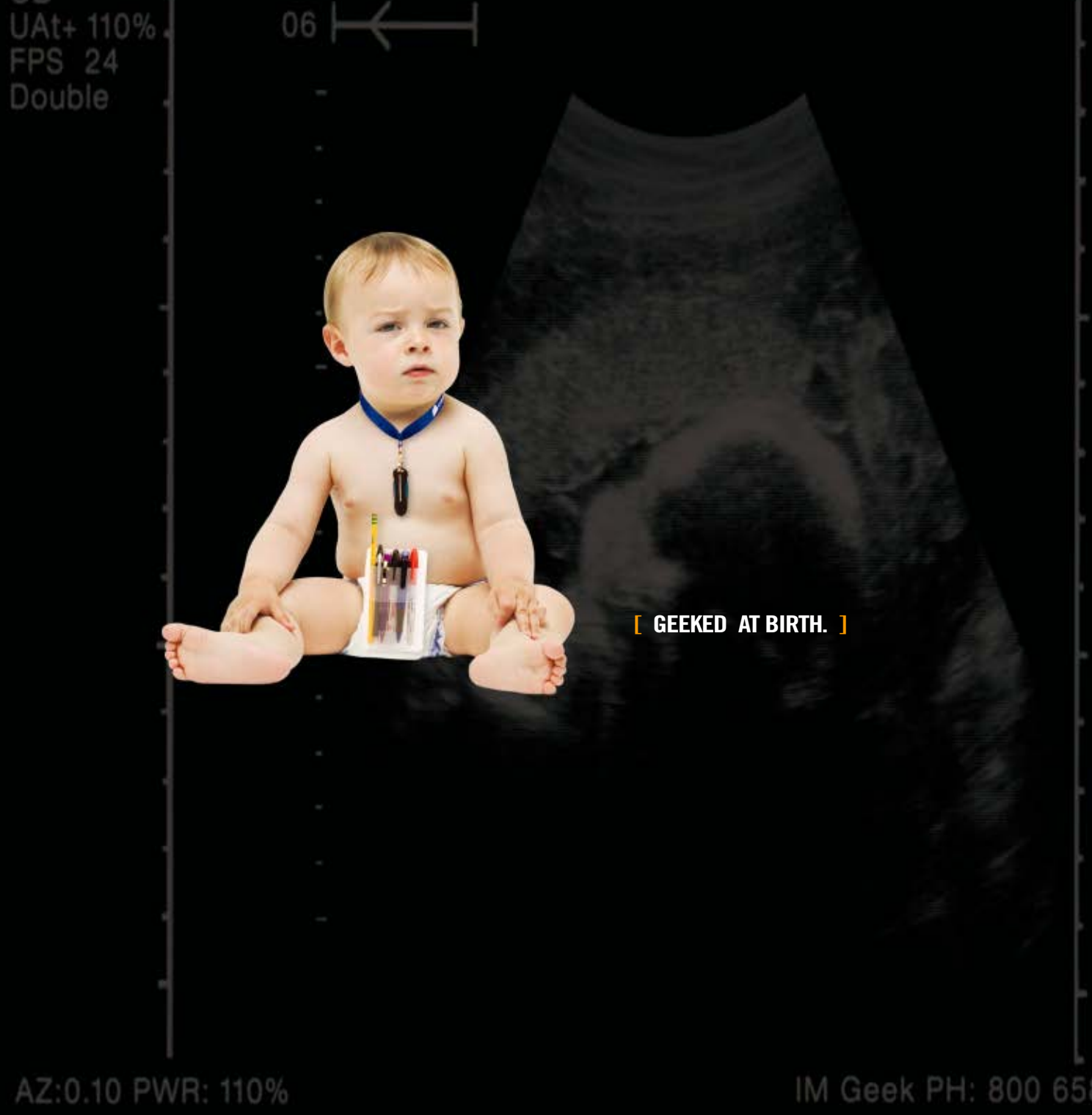

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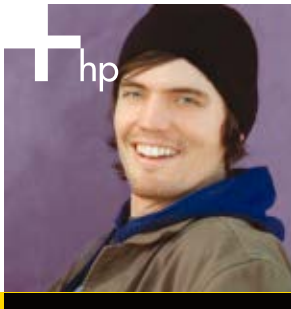

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THE WRIGHT STUFF

WILL WRIGHT ON LIFE, THE UNIVERSE, AND EVERYTHING

BRANDON SHEFFIELD *is associate editor of* Game Developer. *He enjoys pressing the "disaster" button in* SIM CITY *as early as possible. Email him at* ***bsheffield@gdmag.com****.*

WILL WRIGHT IS CHIPPER, PRECISE, and swift of tongue. In this exclusive *Game Developer* interview, the Maxis co-founder varies between intensely practical and intelligently theoretical discourse on his career, his game design philosophy, and the influences that make him tick.

1989's SIM CITY and 2000's THE SIMS are just two of the largest accomplishments under Wright's belt, and each is large enough to sustain a career on its own. But there's no rest for the weary, as Wright currently has his sights set on the buzz-worthy SPORE—a universe simulator many other creators might deem impossible to realize.

Aside from games, Wright has been hard at work with his Stupid Fun Club, an organization which, at present, creates robots, and then unleashes them on the unsuspecting public, recording the results. But most importantly, Wright is now one of the world's few game creators who has been given almost complete carte blanche to do as he wishes. How he takes that freedom and applies it is just one of the fascinating topics covered in this extended interview.

Wright spoke with *Game Developer* via phone from Maxis' headquarters in the San Francisco Bay Area in February.

Brandon Sheffield: *THE SIMS series seems to straddle the line between casual and hardcore, and has the unique ability to build hardcore players out of casual ones. Is this something you planned, or a happy coincidence?*

Will Wright: Well, we kind of realized that we needed to get through the hardcore gamers to get to the casual players. But we didn't realize how effective that would be, because once we got to the casual gamers, we got a lot of lateral transmission. A lot of these people had never played a game before.

If you remember back to the first time you played a computer game, it was kind of an exciting thing, and so you would spend a lot of time talking to your friends about it, and then your friends would start playing it. Or it might be a mother talking to a daughter, or whatever. But it's interesting that amongst that group—because they don't play a lot of games, and there still haven't been a lot of other games catering to that group—they treated THE SIMS more as a hobby than as a disposable entertainment experience.

A lot of gamers treat games kind of like movies. They'll buy a game, play it for a couple of weeks, put it away and buy the next game. For our SIMS players, it's more like a model train set. It's more like a hobby they pick up, and they can play it month after month, year after year, which is why we ended up with such a high tie ratio on our expansion packs. It was because these people didn't really have any other games that they wanted to play, so

PHOTO BY ROBIN DIAL

WILL WRIGHT

every few months they could just dust off that copy of THE SIMS, get the expansion pack, and play it some more.

BS: *So it's sort of an infinite shelf life for these games?*

WW: Yeah, they have a very long active period. I think it's again because casual gamers don't have a lot of alternatives. When they play these games, they tend to play them for a long, long time. And it's not like they're playing it five hours every night—they might play it a couple of hours a week, but they do it over a much longer period than other gamers. Because they're not switching games every couple weeks, they meet friends and talk to them about what they're doing, and they tend to talk about this over a longer period of time, which increases the exposure amongst that group.

There's actually an interesting thing in epidemiology—if you're tracking something like how much a disease will infect a population, one of the things you look at is the contagious period. If you have the flu, are you going to be able to spread that flu to somebody else over the period of a week, or two weeks, or however long? If you look at the length of contagious time, against how much of the population it will eventually infect, it's a totally non-linear response curve. In other words, if you double the length of the contagious period—let's say from one to two weeks—it'll end up infecting five times more people—60 percent of the population instead of 10 percent. So just by getting somebody to play a game for twice as long, the compound effect is that they'll end up exposing it to a lot more people, much more than twice as many.

BS: *That seems really contrary to the general view of games as disposable entertainment, an idea which seems to be rampant in the industry these days.*

Rooster Teeth created THE STRANGERHOOD machinima using THE SIMS 2.

WW: Yeah. By catering to the same circle for so many years, we've forgotten what it's like for someone to play their first game. And we're catering to those [same] people over and over, especially with the sequelitis. In other words, if I do a sequel, if it's WORLD OF WARCRAFT 2 or 3, or CIVILIZATION 4, the general idea is "let's take the last one and add more features." And for the people who played CIV 1, 2, and 3, that's OK—that's just what they want. But at some point you're closing the door to new players because you forget how much there was to absorb [in CIV 1]. If you jump right into CIV 4 having played very few games, it's a pretty damn daunting experience.

If you compare that to going to see *Star Wars* in the theater or watching something on TV, they don't have that filter or gate. The viewer may not know all the characters, but it's still much easier. You've got handicapped access into that front door for a particular media form, whereas with games we have this gauntlet that you have to climb through in order to enjoy our product.

BS: *Why doesn't EA use the Sim X branding anymore, in terms of things like Sim Theme Park and whatnot?*

WW: In terms of SPORE, I had thought of various SIM brands I could use. At one point I wanted to call it SIM EVERYTHING. But on the other hand, I want it to feel like a clean, new thing, and the SIM brand has a lot of associations for people which would, in fact, fit SPORE pretty nicely. In fact it was my lead artist—when we were trying to think of a codename for the project—who said, "How about SPORE?" and I said, "Oh, it sounds great!"

We really thought about every different level of the game, how you're making these little genetic things that get transmitted out to other players. SPORE is such a perfect fit as a name. And at that point none of us on the team could imagine it being called anything else. So in terms of that game, it wasn't so much that we were dropping the SIM brand as that we all fell in love with the name SPORE. That's not to say we won't be using the SIM brand on other titles. It's a brand that has tremendous value and has a lot of meaning to a lot of players.

BS: *What is your aim now with the games that you're making, such as SPORE? Do you have any kind of message that you want to impart to people?*

WW: There are a couple of things. First, regarding topic, I want players to have a deeper appreciation for both how complex and how elegant the universe is, on all these different levels, and how they interconnect. So that's kind of just the "our piece of the universe" awareness, which computer games are in a very special position to communicate. It's very difficult to communicate in a book or a movie or a linear format.

Underlying that thematic message in SPORE, we're really trying to push the idea of players being creative, being the ones who build the world rather than the game designers. I think at the end of the day, I want people who have played SPORE to feel as though it really surprised them with how creative they could be.

We do that by giving the players a lot of tools that, as they use these tools for a while, they're making creations that are just astounding to them, and they're surprised by their own creativity in that sense. That is kind of the other underlying message: anyone can be creative with the right tools, and the results of that creativity surprise you and come alive and become your world that you play in.

BS: *You generally operate in the "sandbox" arena, but what do you think would make a good linear, single-player experience?*

WW: I think we all have linear aspects ... but if linear is implying that the user isn't directing that experience—that the player has no effect, or they're put into a groove or a funnel—then we're throwing away our biggest asset. It's basically like saying, "Oh, why don't you go watch that movie blindfolded?" You could probably still follow the movie from the sound, but it's throwing away the biggest single asset of that medium.

BS: *A lot of single-player games seem to be necessarily combative. Many of your games seem to be relatively violence-free, barring the occasional Godzilla attack. How do you think games should handle violence?*

WW: Taking violence in isolation is kind of tricky because it has a lot to do with the context. Several of the games I play and enjoy would be considered fairly violent, like BATTLEFIELD 1942 or GRAND THEFT AUTO. One of the issues is that games up until now, at least in our culture, have been perceived as an adolescent medium, very much like comic books used to be, and still are by a lot of people. So when we see games that deal with more mature themes, we're naturally thinking, "Why are we exposing our kids to this?"

But in fact, look at how violent movies are! Some of them are the most critically acclaimed movies out there, like *The Godfather* for instance. We accept the fact that in these other mediums, we want to have stuff that's more appropriate for kids, and stuff that's more mature and deals with more serious themes. So I think that having violence in the games isn't the issue. It's more like—if there's violence in games, how does it support the underlying message, or theme, or direction that that statement wants to make? I would like to see games evolve to a point where we can have very mature interactive experiences, maybe more clean to the adolescent experiences, and the whole variety of expression that we already enjoy in books and movies and TV.

BS: *You mentioned earlier that there's a daunting barrier in terms of getting people into games. Can you share your thoughts about Nintendo's ideas with the Revolution?*

WW: I haven't actually played with one at all; I've just seen what's been made publicly available. But it looks intriguing to me! I love the idea that there's a novel way to approach the input, and also that you might in fact enable a class of games that are just inherently more approachable to the average person. So I'm kind of rooting for them, and I like the direction, especially relative to where I think Sony and Microsoft are going.

Early code can be buggy—as this unfortunate baby learned the hard way. EA released screenshots of THE SIMS 2 code-based errors as a promotion in the U.K.

BS: *You seem to be in a pretty singular position of power at EA where you can really make a 'Will Wright' game. Was that a natural evolution, or did you have to fight for it?*

WW: The EA people have always put a lot of trust in me, and that's needed for me to build what I want to build. But still within EA there's a pretty Darwinian process where every step of the way you have to give people confidence that you know what you're doing, and that you actually have a goal in mind, that what you're building is buildable. And really it's a sales job at every level. The hard part for me for something like SPORE wasn't really selling it to the executives—it was more selling it to my team.

As I brought SPORE to my team I had to convince them that what I was thinking of was buildable, because you know, at first glance it sounded crazy. They would point out very big holes in what I was thinking, and then we'd go back and address those. It's like you start with a very small team of very smart people, like three or four people, convince them it's doable, and then you bring in more people and convince them it's doable, and then every new group of people that comes in has a different perspective and sees different problems. So to

me that was the big sales pitch—telling my team that what they were doing was actually, you know, sane.

BS: *That was going to be my next question—namely, does anyone even question you anymore?*

WW: Yeah, I get more of those questions from my team than the execs, as I mentioned. The execs come in and say, "How's it going?" I say, "Great." They say, "Fine," and then they leave, whereas my team members every day say "Are you fucking crazy?" Especially when it comes to adding new things to the game. They think they've understood it, and then I say, "Oh, I forgot to tell you about this!" But it's good. The perspective I get from the people I work with every day is kind of like tempering steel. Every amount of skepticism I can evoke from the people who are actually building allows us to successively zero in on something that's both cool and buildable.

Wright's upcoming SPORE is a universe simulator.

BS: *Do you start with an established core design and work from there or is it much more conceptual?*

WW: It seems to be much more iterative, where at first it's just this rough idea. Usually what I try to do is identify from the outset what the biggest challenges are. Those challenges might be aesthetic, they might be technology, they might be design, or even production. And on something like SPORE, the biggest issues at first were technology. There were certain technologies I realized we needed that did not exist at all. The very first people on the project were kind of deep research people, to try to solve these problems that weren't even solved in academic areas. Once we got close to a solution on those, I'd say, "OK, that is solvable. Now what are the next problems."

The next problems turned out to be more design problems, and now we're transitioning into production problems: How do we build the pipeline? At every stage of the process, there's always the question of what's the biggest risk of the project. That risk can be across any of these dimensions. Then you figure out for every one of these risks, what plan can I implement that will mitigate that risk?

BS: *How long do your projects generally take in pre-production stage, as far as prototyping?*

WW: As far as prototyping, the projects I work on tend to be very long, but usually the first year or two of that is me doing a lot of research. For SPORE, I started that process over five years ago ... actually longer than that, more like six years ago. After that, there's a lot of prototyping on the front end. And I mean a lot. In SPORE, we generated somewhere between 200 and 300 totally separate little prototypes of every aspect of the technology—the graphics, gameplay—for us to put a rough boundary around the design. I probably—more than anyone else I know—go way into prototyping. We did that a lot with interns I had work for me over the summer, and I'd just have them prototype little, very specific ideas.

Usually at the end of the day only about 20 percent of what we prototype actually ends up in the game, but it's very important to know what to leave out. There's an old Japanese saying, "Your garden is not complete until there is nothing else which you can remove." It's just to say the hard part isn't adding stuff, it's hard knowing how much you can take out and have a nice representation of what you wanted to say.

BS: *Do you think more games should go through that process?*

WW: I think more games could be a little bit better by taking out parts of them than by adding things to them.

BS: *What is your work day actually like?*

WW: Typically, I come into the office around 10:30. Usually about a third of my day is spent in meetings—various design meetings primarily, dealing with my design team. Probably a third of it is spent playing the current build of the game, getting a sense for how it's developing, where the rough areas are, and a third of it is spent on totally random stuff, like maybe press, or dealing with music, or dealing with project management, or hiring. It depends a lot on what stage of the project we're in. So in the early stages of a project it's much more about prototyping, blue sky kind of design ideas, lots of open-discussion brainstorming. As we get toward the middle of the project, it's more about how we build the team, the infrastructure of the team, what the work and groups are, what the milestones are. As we get toward the end, it's much more about polish, tuning, and marketing.

BS: *Speaking of teams, what was your inspiration for the pod system of workflow and how has it been working out?*

WW: It's working out really well! I think that whenever you get to about 20 to 30 people, it's really the only way to go if you want to keep your people enabled, motivated, and leveraged. Especially for a game like SPORE that kind of naturally segments into these different kinds of little groups, it works well. For some projects, it's more problematic, if they have a lot more cross-integration.

It really almost has more to do with the kinds of people you hire and the team chemistry. Whenever you put 10 or 15 people into a group, at that point you're really starting to hit the diminishing returns on how they're going to spend their time. Basically they'll spend a lot more time communicating than working. If you can keep it down to maybe five or six people, the communication efficiency goes way up. In general when you work on a very small team, and I've worked on teams of like 10 or 15 people, you feel like you spend about three hours working for every hour you spend meeting. But on big teams like with 100 people, it feels more like you spend three hours meeting for every one hour working.

BS: *So did the idea come from that observation?*

WW: Partially, that and a number of other sources. With the pod structure, in my experience we managed to keep it at a pretty reasonable one to one ratio, so we never spend more than an hour communicating for every hour working, which isn't necessarily ideal, but I think it's pretty much necessary once you get to a team of a certain size.

BS: *You came from a place of independent development at one time—do you think there's still a place in the market for that?*

WW: There are niches for that, but there's a big gap between that and a large professional development organization. It depends on your aspiration. If your aspiration is to get into the Independent Games Festival, then yeah, it's a good starting point. Or if you're coming out of a university setting and you want to have experience on your resume, or if you just want to be a shareware developer and want to just pay your utility bills off of that. If you want to become the next GRAND THEFT AUTO, I think that's maybe not realistic. So it kind of scales with your ambitions. There's probably a bigger gap, or at least as large a gap right now between what you might call the independent development community and the professional community, as there is between the independent filmmaking community in Hollywood.

BS: *In what direction do you see the game industry going? It may be an issue of survival at some point, because the market has to expand, and niches have to be filled.*

WW: The game industry is at what feels almost like a painful transition point, where we're just on the verge of being mass-market, but not quite. On the other hand, time is on our side there. The people who are not playing games are getting older every day and are going to start dying off. The average age of players goes up about four to six months every year. I think that's going to happen, and at this point it's kind of irreversible. In the mean time, a good bit of the industry has rat-holed itself into sequelitis, and that makes games more complex every year, which is artificially shutting out a lot of new players that we should be bringing in.

I think we're going to see experiments like the Revolution, or are people going to buy Xbox 360 to play DVDs, or the Sony [PlayStation 3] to be their [Blu-Ray] player—we're going to see a lot of hardware issues changing that battle. We're going to see demographic issues of players playing longer and longer. As players get older, they're going to want more and more mature games, more interesting games that probably involve more than just shooting everything in sight. And that's kind of a chicken and an egg. Same with women: As we get more women in the market, we're going to need more games that appeal to women. I think this is a battle that's happening on many fronts at once.

BS: *Who do you see as the next visionary for the game industry? Is anyone really pushing the medium forward, or does anyone have the capacity to?*

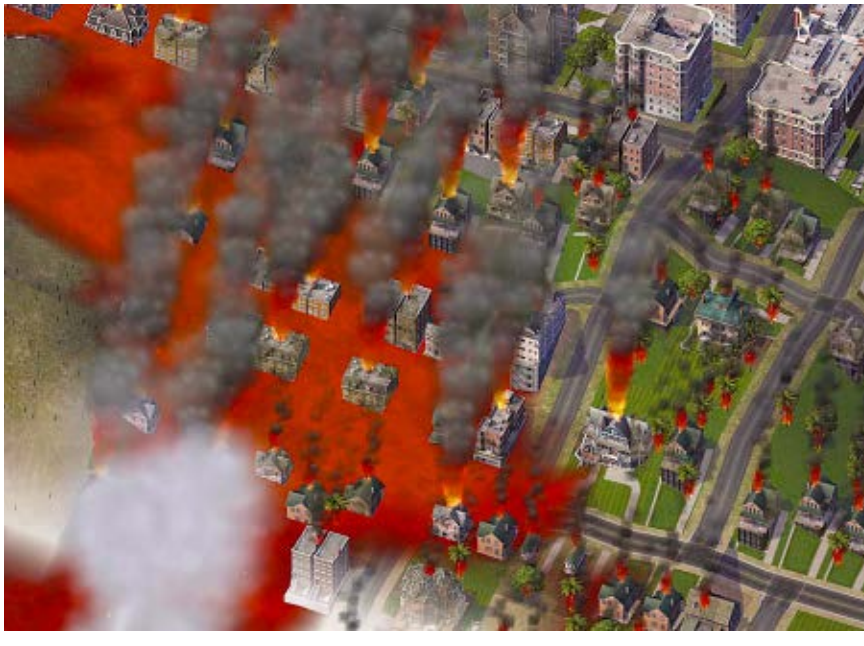
SIMSVILLE, an uncompleted project, set out to combine the designs of THE SIMS and SIM CITY.

WW: Well that's an interesting question. There are a few people who are pushing it in interesting directions, but there are a couple of factors. One is somebody who's creative and can look at the industry from a totally different perspective, and the other is somebody who's actually in the position to make meaningful changes or do meaningful things. Those are frequently two roles—not too many people that I know of are in both positions.

I think that other designers like myself who kind of creatively have the opportunity, and who you expect to be pushing the industry in interesting directions, are people like Shigeru Miyamoto or Peter Molyneux. Then there are people more at the business level, like maybe J. Allard or even Satoru Iwata at Nintendo with the Revolution. They're in positions where they have the opportunity to make bold experiments and see how they work out.

BS: *You touched on this earlier, but what games do you play personally?*

SIMCITY 4 had some impressive disasters, such as the volcano.



WW: It depends. It kind of comes and goes depending on how much work time I have. Lately I've been traveling a lot, and for some reason my travel game is still ADVANCE WARS on my old GBA, which I love. I just love the old GBA for some reason. I have a Nintendo DS, and I have a PSP, but I still love my little GBA SP. When I'm at home I've been kind of on and off playing BATTLEFIELD 2 a lot. I've been playing a few of the Xbox 360 games, so it kind of varies. I've been meaning to play CIV 4, but I'm kind of afraid to pick it up because I know once I start playing it I won't stop.

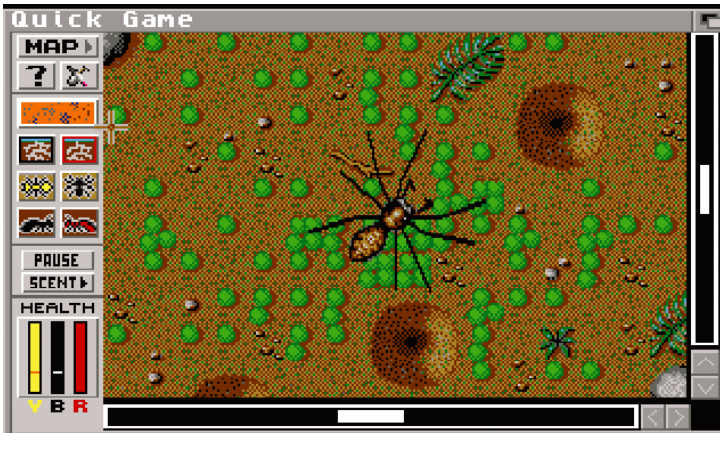
BS: *Is the Reality Robot and Stupid Fun Club still going on?*

WW: Oh yeah. We're doing a lot of stuff. The gist of it is that we're doing a lot of social experiments with intelligent machines. We're not trying to enhance the state of robotics or anything, but we're trying to basically build all these experimental contraptions so that we can test how people are going to relate to intelligent machines in the future, whether it be a robot or appliances or whatever. It starts as playful experimentation in a social dimension, and where it goes from there, it kind of takes on a life of its own.

BS: *Have you had any interesting findings from that so far?*

WW: Oh lots, yeah. One of the things we tend to do is we have various robots we've built, and we take them out to Berkeley and just have them interact with people unexpectedly. Somebody turns a corner and there's a robot talking to them or it goes into a restaurant and orders a meal and we have cameras on board the robot. Just studying how people react to these things is fascinating. We're noticing things like gender differences and age differences and the context of the situation. One of the things I've been curious about is when people interact with these machines, they put them into some category in their mind. It's always curious to me. Are they going to interpret this as an appliance or a pet or a slave or a friend or what? And you can kind of see people put them into different pigeonholes conceptually.

BS: *What group has been most receptive so far?*



WW: It depends on what you mean by receptive. One thing that we've found is that women get very interested in redesigning [the robot], in general. They look at our design decisions and say, "Oh I wish it were softer, I wish it were more colorful," and they'll get into this long involved discussion of how we could improve it and make it more friendly or more attractive. Men in general tend to focus in on how it works. "How is that controlled? Where are the motors?" and on like that. It's more like men want to reverse-engineer it and women want to redesign it.

BS: *What are your other interests outside of games, aside from what you've already mentioned? If you weren't making games, what would you be doing?*

WW: Before I got into computers, I was very much into racing actually—pro rally. I used to do that, and I would one day love to take a year off and go do the Baja. Robots would really be the other big thing. That's kind of the other passion in life. Robots and Russian space hardware, of all things.

BS: *I feel like in a way game developers are starting to push science fiction into science fact, like John Carmack with his rockets and you with robots.*

WW: All these things kind of reflect our fascination with the world around us and how it works. With games, you're building models of the world that players can play with, and if you're building robots or rockets, you're building other kinds of models yourself. There's something deeply satisfying about building stuff out of atoms after you've spent so much time building stuff out of bits. Part of it reflects that at the end of the day, it's kind of nice to go and do something with your hands and real matter, as opposed to manipulating information with your brain.

BS: *It seems like people who are this good at creating virtual worlds would certainly have a lot to say about the real world, depending on how much difference you think there is.*

WW: The interesting thing about robots is that they're an attempt to recreate human abilities. For me, "robots" is all about another way to learn about humanity. Until you try to build a human hand, you have no idea how wonderful that thing is.

Whenever you try to replicate some human ability in a machine, it makes you reflect on these things that we take for granted, or which we think are easy. Even if it's software—like if I'm trying to create AI that makes little characters seem intelligent—it gives you brand new insights into how amazing our cognitive and perceptual abilities are relative to these very advanced machines.

BS: *I've actually seen some criticism of Honda's Asimo robot in terms of its being just a recreation of human beings, not doing something different or advanced.*

WW: Yes, but there are a lot of things that we build into machines ... we just don't call them robots. Like a freight train for instance, can do something that a person can't begin to do, but because it doesn't mimic a natural human ability we don't really think of it as a robot, even though it's moving material from point A to point B like you might do with your hands. It's those things that come closer to intersecting human abilities that we tend to interpret as robots. The less it has a human form—like if it looks like an ATM, which is in fact a robotic bank teller—we still don't think of it as a robot because it doesn't do it the way a human would do it.

BS: *What technology do you personally use in your daily life? Do you have a Blackberry, for instance?*

WW: I don't have a Blackberry. I have a cell phone which I don't use that much. Let's see, I have a little PDA which I just use for meetings. I have a pocketknife that I use a lot. I love my pocketknife. I've had the same pocketknife for 17 years, and I love it and I sharpen it every other night. That's probably my most valuable tool. I have a laptop that I use, but that pocketknife, boy that's handy.

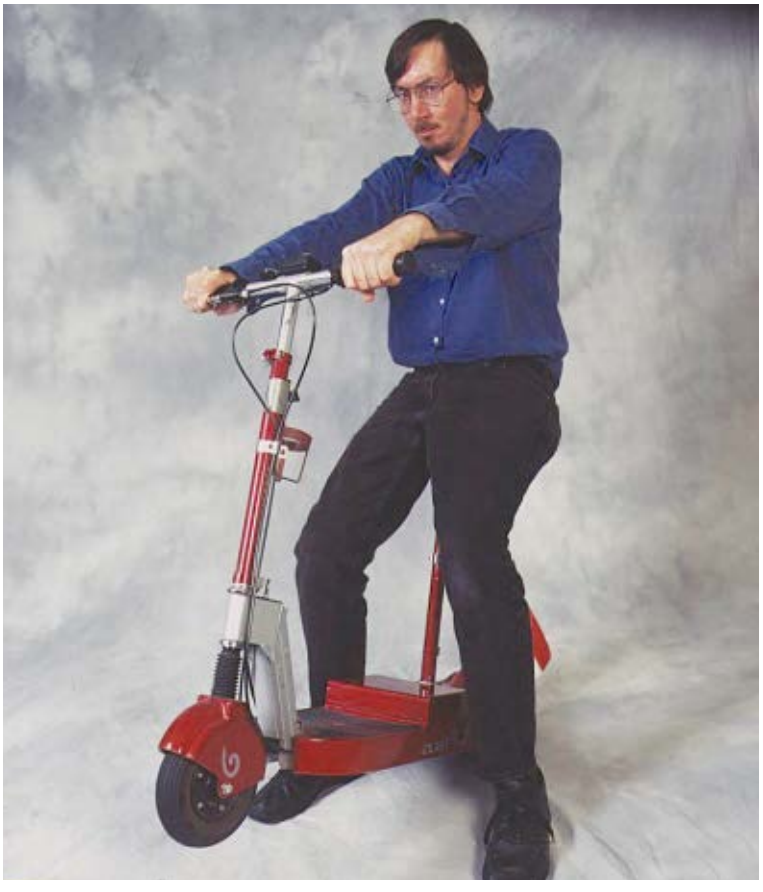
BS: *Here's something that's been bothering me lately: Who would win in a mental battle, you or Stephen Hawking?*

WW: (Laughs.) I don't think there's any contest there.

BS: *Oh no?*

WW: No. Hawking is the kind of guy that I use as source. If you look at any game I've done, in some sense they've always been built on the backs of these great thinkers.

SIM CITY was actually in some sense inspired by the works of Jay Forrester [author of *Urban Dynamics*, which used computed data to chart urban decay/prosperity]. SIM ANT was inspired by the work of Edward Osborne Wilson [zoologist and author of *The Ants*]. SIM EARTH was inspired by the work of James Lovelock [pioneering environmentalist and author of *The Gaia Theory*]. THE SIMS was inspired by Christopher Alexander [architectural theorist and author of *The Nature of Order: An Essay on the Art of Building and the Nature of the Universe*], Abraham Maslow [psychologist and originator of the hierarchy of needs theory and author of *Toward a Psychology of Being*], and a few others.



In his younger years, Will Wright enjoyed pro rally racing. In fact, he still does.

SPORE is somewhat Frank Drake [creator of the Drake Equation, which offers a possible number of civilizations in the universe] and somewhat Charles and Ray Eams [famed designers who believed in modern design as a vehicle for social change]. I really mine these great intellectual giants extensively and try to basically repackage things that they were trying to say in a form that everybody can understand and enjoy. I think Stephen Hawking would inspire me to go and do something, so he's several leagues above me.

BS: *So in a way these games are a method through which to deliver these kinds of ideas?*

WW: Well, yeah. I love reading, and I read a lot of academic stuff that, well, it takes a while to get through the language barrier. Because they're academics, the first thing they do is build a wall around themselves of language that no one understands as a way of inflating themselves. But what they talk about, like the essentials of urban dynamics, is really cool and interesting, but not out of a textbook.

EXTENDED INTERVIEW: WILL WRIGHT

If you take urban dynamics and turn it into a little toy city that you can poke and prod, kind of a guinea pig/lab rat kind of thing, it can be really interesting. I try to find these things in academia that I think are just fascinating and I become basically a translator.

BS: *What have you found valuable recently in that area?*

WW: Oh god, I don't even know where to start. There are things at different levels, that are very specific subject matter. Like in astronomy, over the last 10 years we have learned tremendous amounts about the way galactic dynamics, star evolution, and planetary formation occur. That was all guesswork 15 years ago. We learned just about 15 years ago the fate of the universe, which is a pretty remarkable achievement for humanity. I mean, we're pretty sure right now how the universe is going to end. The fact that it was discovered in our lifetime is amazing, and the fact that nobody heard about that is even more amazing. Such a fundamental discovery that most people couldn't care less about. But I think if it were presented in the right format, they would. They'd understand what a remarkable achievement that was.

New stuff is happening every day. What's happening in genetics and biotech is unthinkable compared to where our understanding was in 1940. You know, the discovery of DNA that we almost tripped over, that Francis Crick came across, is going to end up being a fundamentally incredibly enabling technology.

BS: *Back to mental prowess, do you think the brain will ever be able to understand itself?*

A whirlpool in SIMCITY 3000.

WW: Well that's the age-old paradox. I think probably not. I think that we will have leveraged tools though. I think that what's going to happen is that our computers are fast becoming prosthetics for our brain, so we're able to understand things through our tools—the symbiosis of our brain with the right computer tools will allow us to [achieve what we previously could not], because that will make us 10 times smarter.

BS: *An interesting thing in neurobiology is the mapping of the brain, with different areas corresponding to different emotional or physical responses, and it seems like there are potential cybernetic applications possible there.*

WW: I tend to think the brain is operating under a very specific set of constraints, which primarily have to do with the way that neurons behave and the chemical limitations. But as we're building machines with metals, they're not under the same constraints that organic biology is. Our AIs are not going to necessarily reflect those constraints, and therefore they probably will be much more efficient architectures, but they will hold the same organizational principals of cognition. Because it's running on different hardware, it'll be the difference between a bird's wing and an airplane's wing. They're both relying on the same principles of airflow and pressure, but a bird's flapping versus the airplane's [application of] Bernoulli's principle, are each uniquely suited to that technology.

The box art for the Amiga version of SIMEARTH.

BS: *Would you imagine that computerized brains would be more efficient at certain tasks?*

WW: I think that they'll always have their specialties. But human brains aren't really getting any better over the last several million years. The human brain has only gotten a little bit bigger, whereas computer brains are going to be improving every year. So there's going to be some point where these things just shoot right past us. And even though at that point when they shoot right past us they're going to be better in some ways and worse in others, 10 or 20 years later, the areas in which they're worse, they'll probably exceed our abilities.

BS: *It's pretty exciting and frightening at the same time.*

WW: I know, but it's basically just going to be an extension of us. We tend to think of machines as separate from us, but really humans right now cannot be understood in the absence of our technology. So our computers, our cars, our roads, and our telescopes are our equivalent of the hermit crab shell.

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