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PROFESSIONAL CAREER ADVANCEMENT ISSUE

MAY 2007


gamedeveloper

THE LEADING GAME INDUSTRY MAGAZINE

» **A WHOLE LOTTA COLLADA**
STANDARD FILE FORMAT
FOR THE INDUSTRY'S SAKE?

» **MOVING ON UP**
GAME DEVELOPER'S ADVICE
FOR THE GREAT JOB HUNT

» **PRODUCT REVIEW**
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PROFESSIONAL CAREER GUIDE

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By Shingo Mukaitoge

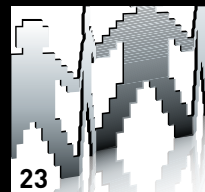
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By Rémi Arnaud and Kathleen Maher



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ONE-THIRD

IMAGINE THE FOLLOWING UNLIKELY SCENARIO:

the movie theaters of America are divided into three groups, each of which requires a different aspect ratio and delivery format for any movie showing in it. Perhaps the three different formats don't actually encourage easy conversion between them.

Just think what a chilling effect that would have on some filmmakers who wanted a shot at showing their independent movies nationwide.

Sure, independent filmmakers might be able to do fairly well with only one-third of the American market at their disposal, but what if a certain target market just wasn't able to get to a theater that played the right movie format for the film they wanted to see? Let's say only a third of all art house movie chains were actually equipped to show that film.

This scenario would force independent filmmakers to have much smaller budgets for their films since their chances of success are drastically reduced by 66 percent. Wouldn't it make more sense to have the movie available everywhere?

FATAL FLAW

The ham-fisted point I'm trying to make is that the same chilling effect is currently happening with downloadable games for consoles. While Microsoft has a clear outreach channel for independent games with Xbox Live Arcade, the company hasn't been working with Sony or Nintendo to create standards so that those games are available to PlayStation 3 and Wii owners.

In my view, an independent game studio should be able to make a downloadable game for the Xbox 360, sell 50,000 copies at \$10 each, convert it to PlayStation 3 and sell 50,000 more copies at the same price, and do the same on Nintendo's Wii. The incremental conversion costs should theoretically be much less than the cost of developing the game from scratch. This would all contribute to a much more viable downloadable games scene.

I understand that hardware manufacturers want to have exclusive games, but that doesn't stop them from making it easy for classic titles, or relatively platform-agnostic indie games, to appear on multiple platforms at the same time. This point is especially important for smaller and more independent developers because they ride a very fine line between viability and non-viability right now, since they pay their own development costs.

NEUTRAL IS AS NEUTRAL DOES

It seems that Sony's PlayStation 3 E-Distribution Initiative is keenly focused on first-party or second-party exclusives, such as SUPER RUB-A-DUB, FLOW, and BLAST FACTOR, which take advantage of the PlayStation 3 hardware in some way. These are all fine titles, but they're emblematic of a Sony-centric portfolio.

I want to see a mass of compelling indie titles, like WORMS or ALIEN HOMINID, making its way from PC or Xbox 360 to PlayStation 3. I'd even want to see completely independent titles emerging from scratch from non-Sony funded developers who are free to publish their games on multiple consoles.

Why isn't that happening? I can only presume it's because Sony has not set up a good mechanism for more loosely tied indies to easily and swiftly convert their games. Things are even worse in Nintendo's corner, where retro titles are spouting out by the gallon, but new downloadable games are completely absent as of press time.

My fingers are crossed that some developers are secretly working on downloadable Wii games, but as far as I know, there first needs to be an announcement and decision from the senior level within Nintendo before the company will commit to such titles; to which I say, come on, Nintendo. You're missing a great opportunity for a mass of awesome content from innovative people! I wouldn't even care if an indie game on Wii didn't use the motion-sensor remote in a unique way, as long as it worked well with a normal controller and cost \$10 or less.

THE YOKE

Oddly, both Nintendo's and Sony's reluctance to come out swinging in this area seems to be down to insularity or issues relating to corporate control. Why not relax a little and give the consumer a bit more choice and make indie development much more viable along the way?

Having a base of cool downloadable games would serve a couple of purposes. First, there would be a new non-retro download every week on all three next-gen console platforms. Second, it would empower indie game makers because they could get their games into all the console households in the country, not just a select one-third.

I don't see what anyone has to lose, as long as unique titles still stay on the console that they were more specifically developed for.



Simon Carless, editor-in-chief



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DEVBUMP.COM

www.devbump.com

DevBump.com is like the little web site that could. It may be small, but it's excellent at what it does. The site uses Digg-style functionality to collect and rank predominately technical stories specifically pitched toward game developers. Though it's still gaining momentum right now, DevBump.com, created by twin brothers and game developers David and Ian Marsh, has a smart community aspect and a fresh-looking design, and definitely addresses an under-served niche.



THE PLUSH APOCALYPSE, A BLOG BY BORUT PFEIFFER

www.plushapocalypse.com/borut

Borut Pfeiffer, a self-professed "programmer-designer-writer-entrepreneur" who is currently working at Electronic Arts Los Angeles on an undisclosed project, has a personal blog that looks at some of the thorny questions behind making games. Started in March 2007, the blog juggles some pretty crunchy issues, from games that make the player feel guilty to the politics of Rockstar defending GRAND THEFT AUTO's ethics in public. For another game developer to be thinking about and discussing these topics sincerely and in a public space can only be fruitful for other developers.



GAMEDEVMAP

www.gamedevmap.com

GameDevMap presents you with a map of the world, peppered with little clickable dots. Select one, and you'll find a list of every known game-related development studio, publisher, organization, mobile and handheld company, and online house in that location. What we like best about GameDevMap is its clean and unencumbered presentation of information, not to mention the useful barrage of links. From Johannesburg to Santiago to Reykjavik, it's fascinating to see all the places game developers call home—and to wonder fancifully about where the next dream job might be. Shiny founder Dave Perry has a similar site that leverages Google's searching and mapping powers (www.gameindustrymap.com); as of press time Perry's site was still in beta.



HALO EFFECT: AN UNAUTHORIZED LOOK AT THE MOST SUCCESSFUL VIDEO GAME OF ALL TIME

Glenn Jeffeth (Ed.), published by Benbella Books, Smart Pop Books series

Want to know everything there is to know about Bungie's HALO? For game culture fans, there are a number of fun essays in this anthology from the Smart Pop Books series, which published a similar tome about WORLD OF WARCRAFT. A chapter by Kevin R. Grazier, the "science advisor" for *Battlestar Galactica*, titled "HALO Science 101," includes mind-boggling calculations, such as the difference in velocity rate for water in a waterfall in normal gravity versus on a halo, and lots more insane planetary math based on the HALO mythos.



PUZZLE QUEST

www.infinite-interactive.com/puzzlequest

Genre melding is not necessarily new to the game world, but rarely does a company take two totally disparate genres and stitch them together in such an appealing way. Infinite Interactive and D3 Publisher's PUZZLE QUEST is perhaps the most successful union of two contrasting play styles (match-three and RPG) in a number of years. The game has a relatively deep, though unusually straightforward, storyline and also throws experience points, party members, and stat-boosting items into the mix. It's a recipe for addictiveness, and just goes to show that sometimes sticking your neck out with a little experimentation within given limits is all it takes to launch an original IP with success.

—Simon Carless, Jill Duffy, and Brandon Sheffield

DOUBLE FUSION PUSHES ADVERTISEMENT BOUNDARIES

IN-GAME AD FIRM DOUBLE FUSION HAS ANNOUNCED

a multi-title deal with major publisher THQ that grants the company in-game ad rights for "a number of THQ's highly anticipated titles," including games based on the JUICED, MX VS ATV, and STUNTMAN franchises. According to Double Fusion executives, the deal "will offer marketers the opportunity to reach players of THQ's leading properties by incorporating their brands into actual gameplay."

Dynamic advertising placements streamed from online servers are also included in the deal, allowing advertisers to "reach millions of gamers through real-time media buys."

The console rights for dynamic in-game advertising are currently somewhat tangled, thanks to Microsoft's acquisition of in-game ad company Massive in May 2006. It's now believed

(until Microsoft announces anything to the contrary) that all dynamic in-game advertising on the Xbox 360 will be conducted through Massive's servers and technology.

Talking to sister web site Gamasutra.com, Jonathan Epstein, president and CEO of Double Fusion, explained the exclusivity of the THQ deal. "We have the exclusive integrated product placement rights for all these titles across all platforms that they are shipped on, and pending Sony's approval, we have the exclusive rights to sell dynamic advertising on the PlayStation 3 SKUs of the titles that are involved," he said.

Epstein is particularly interested by the fact that the deal will allow for the support of 3D polygonal ads. "The market is just getting used to 3D—this is a new format for advertising," he said.

"[W]hat dynamic 3D ads allow us to do is combine the benefits of product placement and the use of a product in the game, whether it's by you or another major character," says Epstein, "and the ability to dynamically change out that product. The first major example of that—and it's starting to run now, it hasn't launched yet—is with one of the large automotive brands. We will use the technology to serve specific 3D models of specific car models into games and track—which you could have done in a fixed manner before—but now we're able to track the specific interaction that the user has with that object: proximity, average size, time on screen, number of sessions, those types of things. 3D objects allow us to add measurement to the previously unmeasurable [*sic*] area of product placement."

—Brandon Boyer and Simon Carless

The One-Stop Box

360 almost a living room PC

BY THE TIME YOU READ THIS, MICROSOFT'S

Windows Live Messenger service will be available on internet-connected Xbox 360s around the globe. This means users can chat with up to six friends on their PCs, other Xbox 360s, or Windows-compatible devices while playing games, listening to music, or even watching a movie. Though I personally don't want anyone interrupting me with links to "all your base" remixes while I'm watching *The Passion of Joan of Arc*, certainly there's an allure for some.

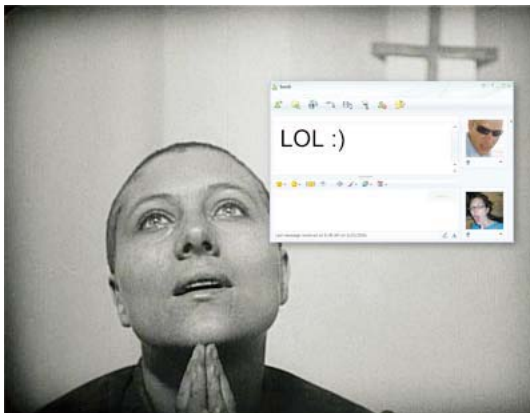
This announcement comes with a host of other updates to the Live service, such as Achievement

pop-ups that display that Achievement's name; a list of the Live Arcade games that friends are playing; enhanced family settings; and post-download shutdown for the console itself.

All of this, combined with the Xbox 360's existing access to downloadable games, music, and movies, seems to be inching Microsoft ever closer to that marketing dream of dreams: the one-stop entertainment box. Microsoft and rival Sony are in a mad dash to be the PC of the living room, and Microsoft's iterative approach seems to have attracted a wide audience.

The tactic seems to be one of getting people used to one service, such as downloading games through the console, and then introducing another, such as downloading movies—and when that goes well, instant messaging. Perhaps once text input has been established as feasible, through USB keyboards or Microsoft's new QWERTY controller-connected input device, we'll see web browsing, or Microsoft Office-like offerings.

This approach to the all-in-one media device really seems to be working for Microsoft. With every new feature, the company has



Microsoft's total integration approach to entertainment may leave users fighting off pesky interruptions.

CALENDAR

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Price: not available as of press time
www.edm.uhasselt.be/casa2007

added a natural extension from its PC offerings, without alienating the existing Xbox 360 console user base. Other approaches seem less directed at this stage, and it won't be too surprising if they wind up following suit. Apple's work with iTunes and iTV is compelling, but only skirts around games, which is still a major reason people turn on their television sets. Other companies and other boxes may offer an all-in-one approach in the future, but by that time, perhaps a "winner," if such a thing is necessary, will already have been decided. Let's just see who comes up with Call Waiting for consoles first.

—Brandon Sheffield



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» paul hyman



PROFESSIONAL
CAREER GUIDE



MOVING ON UP:

ADVANCING YOUR CAREER IN THE GAME INDUSTRY

THE REALLY GREAT NEWS IS THAT THE ENTIRE VIDEO GAMES industry—publishers and independent studios alike—seems to be hiring. But if you're out of a job, if you're bored with what you're doing, or if you need new employment pronto, you're not likely to find what you're looking for tomorrow. Job-hunting is time consuming, and the best time to have started your search was back while you were still happily employed.

That's the advice of a cadre of recruiting professionals, both independent headhunters and HR people at publishers and studios, who all recommend that game developers massage their networking opportunities now, not when the pressure is on to find work immediately.

To understand how to look for a new job most effectively and the best way to attract the attention of the pros, it's helpful to know how they go about trying to find you.

THE MULTI-PRONGED HUNT

Most large publishers use a multi-pronged approach to finding developer talent. Activision recommends that applicants first go to its corporate web site (www.activision.com) where open positions at all of its 12 domestic and 13 international locations are listed. At the time of this writing, 82 open positions were listed, from 3D modeler to web applications developer. Meanwhile, the company's HR people proactively seek new

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



faces at conferences and trade shows, and do quite a bit of on-campus recruiting as well, according to Suzanne Whelpley, a recruiter who has worked for Activision since 2005.

"If you don't see a position that interests you on our web site," she says, "don't shy away from submitting your resume so we can enter you in our applicant tracking system. Activision is always looking for people, especially those with very senior-level capabilities, and so we encourage you to send in your materials."

Ubisoft, too, admits to having an ongoing need to recruit. In 2005, the company announced that it intended to double the size of its 1,000-person Montreal studio. And just a few months ago, it revealed plans to further expand the studio to 3,000 employees by 2013.

That kind of growth demands creative recruiting beyond attending industry events and encouraging employee referrals. In September 2006, Ubisoft launched an initiative called "Too Much Imagination," which used contests and quizzes as a recruitment and screening method. Suzanne Boutin, director of staffing at Ubisoft's Montreal studio, explains: "We awarded prizes for the job candidates who had the best answers to 25 multiple choice questions and two developmental questions."

Boutin would not reveal how many of the winners were subsequently hired, but she recalls that Ubisoft's job site racked up approximately 40,000 more visits during the campaign than in the same time frame one year earlier. Months later, the company is still using the names it collected to fill positions, she says.

At Edmonton, Alberta-based BioWare, the talent

search isn't all that different from those of the multi-studio publishers, only on a smaller scale since the company employs about 340 people across its two studios, one in Austin and one at the Canadian headquarters.

"We're certainly at all the big industry events and have a recruiting booth at GDC," says Derek Sidebottom, director of human resources at BioWare. "We have lots of candidates coming to our web site. If we still can't fill a position, we'll talk to our employees, many of whom are well connected, to see whom they know in the industry. Networking is very, very important to us, especially for the more senior positions. The more senior you go, it's more and more about who you know."

WHO DO YOU KNOW?

More than 40 percent of Ubisoft's hires come from employee referrals—not from people answering want ads and not from people responding to web sites.

"Networking is an important element in any industry, but more so in the game industry where people tend to work on teams and get to know each other well," says Ubisoft's Boutin. "When there's an opening on a team, other team members are a great source of information about who can come in and add value."

That's not to say that you can't be successful just by sending a resume to a studio. But, "if you know someone inside, it certainly helps," notes Sidebottom. He recalls a time when an existing employee recommended a new job candidate without there being a specific job for that person. Sidebottom took a look at the person's background and skill set, and was so impressed that a new position was carved out for the candidate.

"I like to think that we are flexible enough that if we see someone we really like and they come recommended to us, we'll take a good look at them [to see] if they can add value," he says.

TIME TO INTRODUCE YOURSELF

Marc Mencher is president and self-professed "recruiter gone wild" at Fort Lauderdale-based GameRecruiter.com. He speaks with a fiery and impassioned voice and has an unmistakable sense of humor. He's memorable, even on the phone, which may be what makes his job as a recruiter in the game industry a

perfect fit for him. When he mentions that networking is more important than most recruiters will admit, you can tell he practices what he preaches.

GameRecruiter.com specializes in filling "strategically important and unadvertised game jobs," says Mencher.

"If you're just answering want ads, that is not job-hunting. Job-hunting is putting a plan together, getting on the phone, calling who you know, and telling them you're in the job market. That's the way you get jobs, not by looking at Monster.com." When developers don't yet know anyone in the industry, if they have no one with whom to network, then it's time to get out there and make themselves known, says Mencher.

If you're not looking for a job right now but sense that you could be in that situation in the not-too-distant future, now is the time to get a move on, says Activision's Whelpley.

"We get calls all the time from people who aren't actively looking but they just want to stay in touch should an opportunity arise at Activision," she explains. "Essentially, they just want to build a relationship with us—and we encourage that."

She suggests a quick email or phone call to her office or,

“ You have no idea how many times we've met people and thought 'Wow, this person would have been perfect for job X if only we'd known about them four weeks ago.' ”

• The rule of thumb for the average job hunt is one month per \$10,000 of salary.

• 40 percent or more of Ubisoft's hires come from employee referrals.



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better yet, stepping up at an industry conference and making an introduction.

"That's a great place [for job candidates] to give us a quick snapshot of their background so that we can add them to our applicant tracking system and, later on, arrange an interview with them," Whelpley says. If nothing else, she recommends bringing resumes to conferences and, if you're an artist or designer, perhaps a portfolio or demo reel that can be left behind. Programmers can follow up with an email and a code sample.

Whelpley also advises that future candidates send revised resumes as they are updated. "Keep in touch with us and let us know how your career is progressing. You're not being a pain if you ping us every other month or so."

BioWare's Sidebottom stresses the need to be aggressive. "We don't want to wait until the very last minute when we have a need to fill a position," says Sidebottom. "We want to turn on our radar early and make sure we are managing relationships upstream of our needs. But if we're not aware of you, it doesn't do anybody any good. You have no idea how many times we've met people and thought 'Wow, this person would have been

perfect for job X if only we'd known about them four weeks ago."

Timing is everything in the game industry, Boutin says. Since most developers like to see projects through to the end, it's important to have relationships with people in the industry so that, when the project is over, help is available to find that next challenge or different type of role.

"I'm always getting emails from people who just want to stay in touch for future opportunities," she says. "And that's fine. We don't just recruit for today, we recruit for the long-term. That's why we like developing relationships with good people."

At publishers with international studios, staying in touch with an HR person can mean finding opportunities not just near home, but around the globe.

"What's cool about Ubisoft is that we are always talking to our counterparts in other countries," Boutin adds. "If you call me and say you'd like a job in China, I'm aware of what opportunities exist in our China studio."

Activision also likes to tout its multi-studio structure, which offers employees the opportunity to pick up from one studio and move to another if that's in their interest.

“The people whose resumes rise to the top of the pile are the ones who have worked on great triple-A games and franchises.”

CONTINUED ON PG 12

counteroffers

HOW DO YOU KNOW WHEN TO TAKE up the issue of a counteroffer with your company? Some professionals claim asking for a counteroffer is a good way to bump up your salary when you're ready to move on but are willing to give your employer a second chance. However, asking for one is not without its risks. Here's what some human resources folks have to say about it.

Activision likes to take a methodical approach to the situation, giving the employee the benefit of the doubt, but also carefully weighing the viability of the second offer. It's certainly not a cut and dry decision, says Activision's Susan Whelpley. "If we have a current employee who presents another offer, what we do is try to collect as much information on that other offer and understand whether there is really anything we can do to keep that employee.

"In an ideal world, we would hope that [the employee would come] to us before they would actually have received an offer. But, in the scenario that they have an offer ... we recommend talking to their manager, talking to the human resources representatives who are at their studio, and discussing their situation so we can see whether there's something that can be mitigated or changed for them so we can keep them happy. We would do everything that we can to keep them at one of our studios."

Ubisoft's Suzanne Boutin is much more cagey in her response, preferring, she says, to nip problems in the bud before they ever surface. While her comments do not answer the question directly, overall she takes a prevention-as-cure approach.

"I hope we don't get to that point [of having to negotiate a counteroffer]. We like to keep our people before they decide to

leave, so we are more proactive on that stance where we will create an environment where people are happy, feel challenged, have opportunities, and are working with great teams—are part of great teams. We focus more on those types of things: creating a positive environment.

"We have open discussions with our people. For example, we have HR people who sit directly in the projects and who are accessible to employees. It's a very open environment here at Ubisoft, so people communicate and we make things happen so that they're happy."

Derek Sidebottom of BioWare is more forthcoming with specific information, perhaps due to the company's size and low rate of employee turnover.

"It's certainly easier to retain a candidate than it is to find a new one, so with that in mind we certainly respond [and make a counteroffer]. If the person is

a top performer, we make sure to let them know that. ... Quite often, it depends on why the person is leaving. If the person is leaving because they're having personal issues with their manager, quite often those sorts of things can be resolved fairly quickly and we can work through that. If it's a peer compensation issue, we can try to respond accordingly in a way that makes sense. If it has to do with the projects and which one they are working on and maybe they want to try something else, well, that's a career development issue and I'm hoping that we would have had the dialogue long before they've made up their mind to go. Our turnover is actually fairly low overall, which is a bit unusual for the industry. We feel that we've been pretty successful in [hiring] the people who come here. They like working here—they love BioWare and they really enjoy the products they are working on."

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CONTINUED FROM PG 10

"Each of our studios pretty much runs independently," says Whelpley. "Each has its own culture and way of doing things. If you're dissatisfied in one studio, if you want to work on a different sort of game or technology or in a different environment, another studio might be perfect for you."

HUNTING HEADS

Not all studios like to talk about it, but when there's a need to find a heavy hitter, they may turn to an outside headhunter who can scour the industry for just the right candidate. At Ubisoft, for example, only 1 percent of the hires come through headhunters—but those tend to be the higher-level or key jobs. BioWare also hires the occasional outside headhunter, preferring not to call into other studios and do any direct poaching themselves.

But at Activision, the HR staff tends to do the headhunting personally, regularly calling into other companies in hope of finding an appropriate candidate. Knowing whom to call and where, says Whelpley, is "part of the black magic of recruiting.

"Ultimately it comes down to looking at games that have been developed in the same genre as the one we are targeting," she explains. "For example, if we intend to build a first-person shooter, we're going to do the research and look at the strongest triple-A FPS titles out there and take note of the lead designers. We would then proceed to make a cold call to see if that person is interested in joining us."

Studios that are reluctant to take the reins in their own hands use external companies like GameRecruiter.com to do the headhunting for them. GameRecruiter.com's Marc Mencher likens the delicate process to an operation under the knife. "Companies come to us with their critical needs and we go out and surgically remove from a competitor the best person possible for that job," he says. "We've checked to make sure they are worthy of the job. If you are that person, you become one of two or three people who will interview for the job, not one of the 6,000 who have sent in their resumes. That makes a big difference. I also prepare the candidate for the interview; I coach them through the entire process."

However, how does a developer first put him or herself on the headhunter's radar?

Mencher says it requires the same sort of early efforts that HR professionals recommend. "Just call me up or email me and say, 'Hey, I'm in the industry and I want to introduce myself to you.' We'll interview you and see if you're the sort of person we can work with. Then we put together a strategy for how we're going to do the job hunt and whether it needs to be immediate or how I should notify [the candidate] down the road when the right job opens up."

Talk about bargains: For job candidates, a headhunter's services are all free. The paying clients are the hiring companies. "There's really no reason why a bright developer shouldn't call

me since it's not going to cost them anything and, down the road, I might have an opening for them," Mencher says. "You might be saying that, with seven years of programming experience under your belt, you don't need me to find a job. And that's true. But you don't know about the jobs I can get you after talking, not to the HR department, but to my contacts in C-level management."

A call to a headhunter should be made well ahead of the time one needs the services, he adds. The rule of thumb for an average job hunt is to give yourself one month for every \$10,000 you require in salary. Therefore, if you expect to make \$60,000, don't plan on sealing the deal for another six months.

"I will work with someone who is in crisis mode if I have to," Mencher says, "but it's never as much fun as when I'm working with someone who is absolutely not interested in a job right now. It's much easier to make good, intelligent decisions when you've got the time."

“ I will work with someone who is in crisis mode if I have to, but it's never as much fun as when I'm working with someone who is absolutely not interested in a job right now. ”

LOOKING GOOD

Regardless of how often or how early you contact a headhunter or HR professional, if you don't appear to have the chops for the job, you're not going to be hired.

At Activision, the human resources department typically looks for experienced and self-motivated people who have management potential and know how to meet simultaneous deadlines. Candidates need outstanding oral and written communication skills; most importantly, they must be smart, hardworking, and passionate about playing and creating games. The people whose resumes rise to the top of the pile are the ones who have worked on great triple-A games and franchises.

Whelpley recommends that artists accompany their resume with a portfolio or demo reel that demonstrates their strengths, but one that's limited to five minutes long.

Candidates also stand out when they show in their cover letter or interview how familiar they are with the company and its games—and when they demonstrate how their prior experience is directly transferable to that specific company and its titles. "If a person has only made, say, sports games and we're building action games, we're not necessarily going to shy away from them if they have the necessary skills, but if they have experience doing the type of game we're doing, that's definitely a plus," Whelpley says.



What really turns her off are cover letters and resumes that contain egregious grammatical or spelling errors. She strongly recommends candidates take the time to fully polish whatever they're sending in.

Candidates also ought to have a sense of what direction they would like to take, says Ubisoft's Boutin. If they don't know what career path they're on, it's that much more difficult to find a role for them in the company.

She, too, is anxious to see a demo and, when candidates have their own web sites, she strongly recommends that the demo be placed there, where it is easily accessible and won't get lost among paperwork. A demo that lives on a web page never gets misplaced. It's the candidate's job to simplify the process for the hiring team.

"Put yourself in the hiring manager's shoes and think through what they'd be looking for," says BioWare's Sidebottom. "All managers want bright people with the right skills to bring some great experience to the table, and they want team players who bring some energy and insight to the existing team. Knowing that, you've got to put on your marketing hat and sell yourself. The first impression you make when someone reviews your resume or when you walk through the door is all important. Make

it easy for the manager to see your best traits immediately."

Sidebottom also stresses the importance of acting naturally in an interview, being yourself. Candidates who put on an act don't often impress anyone.

"Before you come in, think about examples from your past that you're proud of and that you can discuss that show off your experience," he recommends. "We ask a lot of behavioral questions, like, 'Tell me about a time when you did such and such,' and you'd be surprised by how many people have never given that any thought. The people who come to the table with two or three examples already in mind tend to do better than the ones who have to sit and think something up."

Sidebottom recommends not only reading about the company and some of its products, but also having opinions about those products; he says he likes to hear critical thoughts.

"Tell us what you might have done to make our products better since that's what we focus on: continuous improvement of our products," he adds. "But you might want to be careful about how you put it. I would recommend being humble in your recommendations." ❖

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GOING FREELANCE

I'VE BEEN A FREELANCE GAME DESIGNER

for more than 10 years. I don't know of anyone else who has been doing it full-time for longer than that, but even if I've missed a few, there aren't many of us. There was one other I knew when I started, but he took a full-time job not long afterward.

I could probably name more than a dozen other freelance designers with slightly less experience, and I expect there are dozens more I don't know. "Freelance designer" is still a pretty rare job description in the game industry, but the 10- or 20-fold growth the job has seen in the last dozen or so years isn't bad.

Designing is one of the tougher jobs in the game industry to do on a freelance basis. There have been freelance writers, artists, and musicians working in film and TV for years before video games were around, and there are now thousands who move freely between those fields and the game industry. But game designers, game producers, and game programmers have professions unique to game development and so our numbers are smaller but growing as the game industry expands.

Certainly, it's a topic that comes up more frequently with time, as this issue of *Game Developer* evidences. And at the Game Developers Conference in March, Michael John, a fellow freelance designer, spoke about how having "free agents" in game development could completely alter (for the better, mostly) how business gets done.

FREELANCE FREEDOM, PAYCHECK TO PAYCHECK

Freelancers have the freedom to set their own schedules, both day-to-day and over long periods, taking vacations when they wish. Not only are the hours flexible, but so is the setting. For example, I prefer to take my laptop to local coffee shops and take part in a culture that one San Francisco newspaper recently referred to as "digital Bedouins." If the local coffee culture doesn't suit you, traveling abroad is also an option. The video game business is increasingly international; I've worked on five continents and have been to many fun and exotic locales for business.

Freelancers also see a variety and range of work that exceeds anything available in a single company. And because all the jobs are temporary, there's a mentality among some freelancers of seeing the work as providing an offbeat sort of job security. I never have to fret about a job change forcing me to uproot my home and move.

But the glorious and plentiful benefits of freelancing don't always trump the equally daunting and exhaustive list of challenges, which includes at the top: income uncertainty. This is the real biggie. Most of the people I know who leave freelancing do so in order to have a regular paycheck. Freelancers also put in a huge amount of extra work—and time—managing those irregular paychecks, handling all of one's own taxes, billing, and receivables.

Freelancers in the U.S. also have to carefully weigh their options for health insurance, which can easily cost more than \$1,000 a month when paid for out of pocket (you Canadians can just pipe down—there's no need to rub it in).

Another negative point for some game developers who decide to go freelance after a few years of working on tightly knit teams is that they find working on their own a lonely experience. Personally, I miss having a group of fellow game geeks to talk shop with around the water cooler.

Personality, of course, plays a large part in deciding whether you're ready to become a freelancing game developer. Aside from flying solo most days, freelancers have to be willing to sell themselves. If you're not an extrovert, promoting yourself can be an excruciating experience—even those who are good at it sometimes feel frustrated at having to do it over and over, in a continuous effort of finding new work while trying to accomplish what's already on your plate.

Freelancers are sometimes viewed by a company as having a lower "status" than full-time employees. Corporations often give their best jobs to full-timers and sometimes favor them in the credits as well. Occasionally, companies will try to short-change freelancers and leave bills unpaid, and it takes experience to avoid this.

A FREELANCE PERSONALITY PROFILE

If you've been thinking about going freelance, how do you know if you're cut out for it and ready to make the jump? Here's a short checklist of the sometimes contradictory mix of personal and professional traits and qualities you should have.

Specific expertise. Some people are drawn to independence because they've never found success in a company. But you attract work as an independent largely based on what you've done before. If you don't have an impressive track record to start with, you will find it very tough to get people willing to take a risk with you.

General expertise. It's hard to find work in one specialized area, but much easier if you have several areas of expertise. For example, I work primarily as a designer, but I also often work as a producer or project manager, and occasionally as a writer or business development specialist. You can't be great at everything, but having more than one

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GAME SHUI

area of know-how and a curiosity and willingness to take on new challenges is very helpful.

Contacts. If you know a lot of people in the industry, it's a huge advantage. Most jobs come from personal contacts and referrals, particularly when you're just starting out and don't have a reputation as being a successful freelancer. (For more about networking and referrals, see "Moving On Up," page 7.)

Passion for your work and confidence in your abilities. In the game industry in particular,

developers are in competition with a lot of people who love what they do. Freelancers have additional burdens of having to sell themselves in an industry that, unlike Hollywood, is primarily focused on full-time employees. If you don't really believe in yourself and love your work, you carry a tough handicap. When you're going through a dry period—and even the best, wildly successful freelancers I know have them from time to time—you must be able to believe you'll get through it or that first dry patch will send you back to a full-time job.

Extroversion balanced with introversion. Freelancers need to be able to be a salesperson where their own work is concerned, constantly networking; and at the same time they need to be able to go off on their own and get work done without the support of a bunch of fellow co-workers. As one can glean from the pros and cons above, if you are polarized toward one extreme or the other it may drive you back to full-time work.

Cash in the bank. Books I've read suggest that freelancers should keep at least six months of income as disposable cash in the bank. One thing I didn't realize at first was that this isn't only for getting through dry periods, it's also for getting through periods of spotty cash flow. I've seen moments when my checking account was headed toward zero even

though I had as much as \$50,000 in invoices waiting to be paid—and that was with companies that were operating in good faith. Big companies can be particularly slow in paying, and government agencies can be terrible. The rare client who actually sends me a check upon confirmation of our agreement, even before I invoice him, is invariably a former contractor himself.

A corollary to that last point is that freelancers need to have a supportive family environment. This can mean

works for you. When I began (mostly by happenstance) in this sort of circumstance, I was delighted to realize I no longer had to attend a lot of the time-wasting meetings, using that time instead to pursue other jobs or just become more efficient.

If you don't have that luxury, then getting the word out is paramount. Speaking at industry events is a great way to do that. Since you have some expertise already, teaching people about it at a conference or even local IGDA

gathering can show them what you know and perhaps get you a job.

Blogs are another option, particularly for skilled writers. Advertising and agents are not yet great methods for individuals in the game industry,

although with time I suppose they may grow into it. I was actually represented by a Hollywood agent for a while, and while there were great aspects to it, overall I never felt he was really worth 10 percent of my income (and many game agents now get 15 percent or more). It's a bit of a catch-22: If you're well known enough to attract a good agent, you're probably experienced and successful enough to do well making your own contacts and negotiating your own jobs.

“ When you're going through a dry period, you must be able to believe you'll get through it or that first dry patch will send you back to a full-time job. ”

understanding parents, but as freelancers are generally older than the average game developer, is more likely to mean an employed and understanding spouse or partner. A family trust fund is good too, although arranging to have one if you're not born into wealth can be, at best, problematic.

TRANSITIONING

So if all of this hasn't scared you off, how do you begin? One common experience I've found among many fellow freelancers is that they transitioned from a full-time job to freelancing within the same company on an existing project. A sympathetic CEO or executive producer might be willing to let you make that change. If you're bold enough and important enough to the company, you may even be able to persuade a reluctant boss to let you try this.

It can be a win-win situation. The company has the benefit of no longer paying for your office overhead, health insurance, time off, and so forth. They may even like the idea that after this project is done, they're not obligated to take you on to the next. And the same

THE FUTURE

I believe that free agency is a growing and healthy trend in the game industry. The larger our industry grows, the more feasible it is to make it as an independent. With size has come greater diversity too, both internationally and in sub-sectors like casual games, mobile games, and serious games. Each of those fields, lacking the large companies and history of the mainstream game industry, is using freelancers more and more frequently, and in my opinion, that is likely to be in the future for the core game industry, too. ❄

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ARTISTS AREN'T FAMOUS FOR THEIR

hard-edged negotiating skills or a relentless focus on the bottom line. Being an artist is fraught with enough creative insecurities that the financial ones often take a back seat. Thankfully, we're paid fairly well on the whole, especially considering that we can still land a job without years of postgraduate schooling. According to "Game Developer's 6th Annual Salary Survey" (April 2007), a U.S.-based artist with a couple of shipped games earns on average just over \$61,000. According to *Money* magazine, that's just a bit more than the salary of a microbiologist and a little less a funeral director's. Honestly, would you give up games to be a funeral director for an extra \$400 a month?

Of course, examples like this show how difficult it is to fix a price tag on a job. Although you might make the same salary as a bit actor on *Six Feet Under*, you're hardly interchangeable in terms of skills, interests, or temperament (or your tolerance for dead bodies, unless you worked on *DEAD RISING*).

Those survey numbers are averages. and mash together all sorts of work-related variables. What's not factored in is the cost of housing, local taxes, and perhaps most important to us, the likelihood of soul-crushing crunch times, all of which make the difference between having a comfortable lifestyle and barely scraping by.

In any case, numbers only tell the beginning of the story. You may be trading

a fat paycheck for the chance to work on your favorite game, or for a shot at startup glory, or for a freer hand in creative matters. Conversely, you might be pulling down big bucks at a job you loathe.

For whatever reason, the majority of us approach a very important facet of our careers—compensation—passively. But we shouldn't. Salary negotiation is just a part of a conversation you need to have regularly with your employers. The number on your W-2 is just a proxy for your role on the team and the shape of your professional life. Learning how to assert some control over it goes against a lot of artist stereotypes, but it's an important aspect of managing your career.

The not-so-gentle art of salary negotiation is a huge topic, and not surprisingly there are thousands of resources devoted to teaching you how to arm-wrestle every last farthing from an employer. If you're going to stake a claim, you should review more than a few of the many resources out there, with an eye on finding an approach that matches your personality and communications style. You'll find that most salary negotiation advice pitches the same basic strategies, but with a few variations. Here, I'm looking at the same collection of conventional wisdom as it relates to game artists.

BRUSHING UP

Surveys suggest that about two-thirds of the population doesn't actually bring up the subject of compensation in reviews. We wait for the news and take our lumps, but less than half of us actually make a counter-proposal or argue with what we're told is coming. Interestingly, the same surveys suggest that most employers (that is, two out of three) actually are prepared to negotiate compensation in annual reviews. Everything is negotiable—if you're actually prepared to negotiate. Before you think about negotiating, though, you

have a bunch of homework work to do.

To negotiate effectively, you need to have a good idea what people like you are paid at not only your company but also competing studios. You need to know if the hiring climate is good in your area and whether your employer has money to spare. Unfortunately, finding out these facts can take a lot of work.

Game Developer's salary survey article is a great starting point, but it's a high level overview that doesn't tell you much about your specific city or township, or your own company. More specific numbers are very hard to come by. Nothing makes employers more nervous than employees who start comparing their paychecks. Moreover, few people will violate social convention and actually tell you what they make, even outside of work, so the line between "doing your homework" and "snooping" can be pretty thin.

This is where it really pays to be involved in your local developer community. People won't talk about their own salaries, but they are always happy to say that company X pays really well, or studio Y will feed you a line about royalties instead of coughing up a decent per annum figure. The community tends to be pretty savvy about which studios are good to work for and which are tight fisted, so make the rounds at your local IGDA chapter or developer social events and keep your ears open.

An active social life can help you know the local environment, but your career (especially the financial part of it) will also be affected by global trends in the games business. Whether it's the opening of a new outsourcing house in Mumbai, the closure of a big studio in Montreal, or the runaway success of a new style of MMO, all sorts of news will shape your bargaining position. You don't have to become a junior Wall Street analyst, but you should know enough to deal with your employer on even footing. If the boss tries to tell you this year's

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PIXEL PUSHER

paltry raise reflects increased pressure from outsourcing to China, it's important to have some independent information about the real costs of doing business overseas.

KEEPING YOUR WITS

Of course, having a good grounding in the economics of development in Croatia isn't going to help you if you aren't well regarded on your own team. Alas, merely mastering the nigh-impossible work of building games isn't enough to guarantee you will get the recognition you deserve. Let's assume that you are competent and hard working; no matter how much pride you take in that, it's all part of the job description. If you're serious about trying to negotiate a salary boost, you have to offer some compelling reason beyond just showing up every day and doing more or less what you're told.

Your bosses are busy, and they don't have magical powers. Even if they sit one cube away, they only know a tiny fraction of what you really do each day. Check-ins on a spreadsheet or assets in the level review represent just a fraction of what you really contribute to your team. Every team has some artistic superstars, but also some less exalted people who are even more important to actually getting the job done. ("Nobody's exactly sure what his job is," one colleague told me of another, "but if he were run over by a bus we'd never finish the game.") Day-to-day problem solving, good decision-making, and other less tangible contributions are often overlooked or undervalued.

In an ideal world, all your contributions would be recognized and valued. Alas, for the classically introverted artist, they won't be fully appreciated unless you can lay them out clearly when you sit down for reviews. This is hard for us; we became artists to do work that speaks for itself, so we prefer letting the audience volunteer the oohs and ahhs. We make lousy cheerleaders. Unfortunately, the "audience" for your career isn't a bunch of attentive critics. They're busy people with lots to worry about and who don't have time reflect deeply on your individual merits. If you can't provide a

clear, compelling story about what value you bring to the team, you can't expect they'll make one up for you.

Is this embarrassing or awkward? Yes, sometimes. But it's essential. If you aren't recognized and valued for what you do, eventually your work and your life will suffer for it. Even we introverted artists care passionately about the way others see our works. How many painters are content to stage a show by just leaving a bunch of paintings lying around without show notes and a personal statement? It's up to you to find a style of telling your story that suits your personality and your audience. You must have a list of clear reasons why you've done more than just complete all your tasks. And you need to be able to make those reasons stick. If you can't come up with a list of all the good things you've done to deserve a raise, you certainly shouldn't expect one.

PLANNING THE GAME

The negotiation itself is the hardest part. One way to make it easier is to focus on the most concrete aspects—specifically, delivering your list of accomplishments clearly and persuasively.

If the meeting devolves into a power struggle it's not good for either side, so you and the employer both have an incentive to focus on some basic questions. Are you doing a good or a great job on your main responsibilities? How are you going beyond your "duties" and making a larger, more important role for yourself? What do you contribute that is unique and valuable? If you've done your homework before you walk into the room, this is much easier.

You also need to have already figured out the stakes, which boil down to three numbers: the salary you won't stand for, what you can live with, and what you want. Ideally, if you've done some thinking about your economic environment, you'll start off with reasonable numbers for the upper and lower bounds. If you've thought hard about your main list of accomplishments, you should be able to make a good case for being closer to the top than the bottom of that bracket. Drama and brinkmanship are fun for

Donald Trump, but for most of us the deal is about making a point and defending it reasonably.

One thing you don't want to do is turn the meeting into a contest of wills. Salary negotiation meetings are not the place to try out your bluffing skills. Don't threaten to quit or to take another job unless you're prepared to box up your action figures that afternoon. Even easy-going bosses don't enjoy threats—although they are just as bound by the laws of supply and demand as you are. When I was young and naive, I watched with awe as one of my co-workers, having learned that two other team members had just departed for jobs in Hollywood, strolled into the boss's office and negotiated a raise and a new title the same day.

DEALING IN GOODS

What if you do all your homework and you still get exactly what your boss had planned for you? This doesn't mean that attempting to talk money was a mistake. For one thing, there are other things to negotiate, such as extra vacation time, a new assignment, or performance-based bonuses. These perks are all valuable and often easier to extract. Even if nothing concrete comes of this meeting, your employer will think twice about next year's pay package if you made a serious effort to improve this year's.

If you've gone through several years of unsuccessful negotiations, you might want to think about a new job. If you and your employer consistently disagree about your value, you probably belong elsewhere. Still, you'll never know unless you try.

Artists in general are stereotyped as unworldly and introverted, but you shouldn't let that stereotype dictate your life. History is full of great artists from Rubens to Andy Warhol, who could swim with the sharks of the business world.

If you ever feel like game art is too mired in commercialism and you wish you could rise above the sordid money issues, just check out Bruce Cole's *The Renaissance Artist at Work*. At least you don't have to dicker for cartloads of rabbit skins to make gesso or haggle over the price of gypsum. ❖

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rémi arnaud and kathleen maher

COLLADA

CONTENT DEVELOPMENT USING AN OPEN SOURCE STANDARD

ADVANCES IN HARDWARE FOR PCS AND CONSOLES HAVE MADE

games more photorealistic than ever, with more characters, persistent worlds, and surround sound. New graphics processors and displays enable higher resolutions, high dynamic range imaging, shadows, and reflections. For game developers, there's a huge amount of pressure to produce more content and more complexity in every game. As the capabilities of PCs and consoles grow, so do players' expectations.

While developers have been struggling to keep up with heightened expectations, digital content creation (DCC) tools have also been trying to keep up with the evolution of game development and the new capabilities of consoles. These days, developers usually have to work with specialized middleware, and quite often their own custom solutions as well. Ideally, software vendors should combine their solutions into a set of tools that can be integrated. Smaller companies with specialized or innovative capabilities need to be able to integrate their tools into the pipeline, too.

Our solution to this is Collada—a way for developers to access content created in one program and use it in another throughout the development process. This article briefly explains how Collada came to be, what it is, and why developers should embrace it.

COLLADA'S ROOTS

The kick-off meeting for Collada happened at Siggraph 2003 in Los Angeles and included R&D engineers from Sony Computer Entertainment as well as representatives from Softimage, Discreet, and Alias.

One approach to the problem is to create vendor-proprietary APIs to support vendor-specific formats. This way, data exported from one application can be loaded into another provided the same API is available in both applications. Such proprietary APIs have been helpful but not widely available on all platforms and require agreements with the vendor's licensing terms. But this lack of an

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COLLADA

extensible, well-defined format makes innovation difficult.

The Collada group was looking for a way to help developers simplify their workflows by giving them the ability to exchange content between disparate programs. The idea wasn't just to exchange models between competing products, but rather to enable collaboration across platforms and disciplines.

To make this possible, we created a standard intermediate language. We realized we would also need the help of other companies and developers to create a design platform that could be used and refined by everyone who makes video games. In the early days, it helped that this effort was led by Sony Computer Entertainment, as the company already had good lines of communication with software vendors and didn't compete with any of them.

Immediately upon release of the spec tool, vendors and specialized third parties could provide professional quality exporters. However, exporters can introduce an element of uncertainty, and production-oriented content developers don't have time to waste on bad quality exports or tools that don't fit their specific needs. Therefore, in addition to the specification, the availability of professional quality tools was absolutely essential to get adoption of the technology.



FIGURE 1 Adobe Photoshop CS3 Extended introduced direct support for Collada documents. As a result, artists can edit the textures of a 3D model and see the result from within the same tool, which makes for a big productivity boost.

Because the software was designed to allow the end users to create additional content, it's great for players who enjoy modding. Since several tools exist or can be created by the community from the specification, game developers can share the same tools used to create the game with their community and to be assured that cheap or free tools will be available to create content for their game. Using Collada as the format for community-provided content is a growing trend.

Once Collada had been fully born, there was one last thing to do before it could really fly. It needed to become an open industry standard. It seemed logical to ask the Khronos Group to implement the standard because the organization is also the umbrella for the OpenGL and OpenGL ES APIs.

Immediately after the move to open the standard in January 2006, Collada 1.4 was released, extending the feature set with cross-platform programmable shader effects and common rigid body description—all features required for next-generation consoles. This prompted tool and middleware vendors, as well as Collada plug-in providers, to start offering better support for shader effects and game physics.



FIGURE 2 Google offers free 3D content that can be extremely useful for prototyping games. Google Earth 4 .kmz files, which can be created with the free SketchUp tool, are in fact .zip files that contain a Collada [.dae] file as well as all the associated textures.

Making Collada an open standard spurred some unexpected results. For example, Google signed up as a contributor to Khronos and decided to integrate the technology into SketchUp and GoogleEarth. Following Google's announcement came others from RealViz, Ballistic3D, 3D Nature, and content servers such as Warehouse 3D. More recently Adobe added Collada support in Photoshop CS3 Extended. See Figures 1 and 2.

MEASURING UP TO XML

Collada is an intermediate asset description format defined using XML schema and a specification document. As an intermediate format, Collada is not the native format used by DCC tools, nor is it the native format used by a given game engine on a given platform. It's the format used to transport information from the DCC tool to the game engine.

Collada-compliant applications can both read and write Collada content, so the end user can decide how to organize workflow, create specific pipelines for specific needs, and integrate new tools in its workflow at anytime. The Collada workflow is shown in Figure 3.

XML is the choice for most intermediate formats including U3D, X3D, XAML, XNA, and OpenOffice, because it is a standard language and many tools already exist for importing and/or exporting XML, as well as for creating a specialized interface in many programming languages direct from the schema such as XMLSpy, Microsoft visual studio and libXML. The Collada schema is expressed in XML, so the same description language can be used for the specification and the document itself. For example:

```
XmlDocument colladaDocument;  
colladaDocument = new XmlDocument();  
colladaDocument.Load(filename);  
root = colladaDocument.DocumentElement;
```

The schema also provides the ability to validate a Collada document using standard validation tools, enabling content conformance issues to be detected clearly. This ability comes in handy when content creation is outsourced. Most developers prefer to use XML because it lets them look under the hood and make modifications using a simple text editor.

Another benefit of using XML is that it enables unlimited accuracy for raw data, since a number can be written with as many digits as

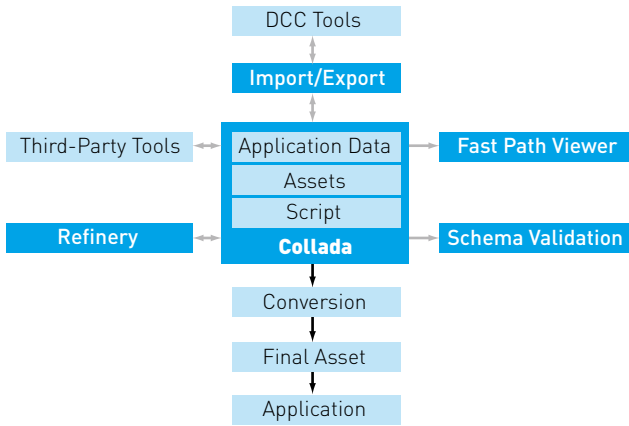


FIGURE 3 The Collada workflow model is depicted.

needed. There are pitfalls, though. If XML formats are not carefully designed they can be bloated and introduce a lot of unnecessary control flow. For that reason Collada uses a bare bones description for high frequency data, stored in arrays, for example:

```
<float_array id="positions-array" count="6324"> 315.16 849.43
386.38 32.73 ...
```

This code shows the example position content. A 10m cube is being expressed in centimeters, with 1/10mm accuracy. The overhead per element is minimal. The allocation can be done before the numbers are parsed since the count is provided as a parameter. In this example, seven bytes are used to represent floating points, which is smaller than the 64-bit float format used

by DCC tools, and less than twice the size of 32-bit floating point data used by most game engines.

Collada is organized in libraries that regroup elements of the same nature. Current specifications include libraries for animations, animation clips, cameras, controllers (for skinning and morphing), geometries, effects, images, lights, materials, nodes, physics models, force fields, physics scenes, and visual scenes.

In keeping with the goal of using an open industry-supported standard, Collada is using the World Wide Web Consortium standard universal resource identifier (URI) for most of its instancing mechanism. It's possible to reference either an object in the same document (using #id) or use a full URI to reference external files, or even use a complex http request to query a database system such as SQL.

How to organize one's data in separate documents is up to the user, in order to better fit individual workflows. A given Collada document can reference a number of libraries from other documents and create instances, which allows multiple artists to work on different aspects of the same asset in parallel with their preferred tools, while a DCC tool will be used to gather all those parts (such as geometry, effects, or animation) as instances.

Another advantage of external referencing is that Collada does not require that all the data be integrated within the XML document. For instance, it's common practice for image files to be saved in their own format and referenced by the 3D content, rather than be integrated into the same file as the geometry. The same principle is

LISTING 1 Collada DOM

```
// initialize the DOM by creating a DAE object
DAE *daeInput = new DAE();
// load a document. The document is specified as the first command line argument.
daeInput->load( documentFileName );
// iterate over all geometry elements
int geomCount = daeInput->getDatabase()->getElementCount( NULL, COLLADA_TYPE_GEOMETRY, NULL );
for ( int currentGeom = 0; currentGeom < geomCount; currentGeom++ )
{
    domGeometry *geom;
    daeInput->getDatabase()->getElement( (daeElement**)&geom, currentGeom, NULL,
        COLLADA_TYPE_GEOMETRY, NULL );
    // Get the geometry element's id attribute
    daeString geomID = geom->getId();
    // Check if the geometry is a mesh.
    // COLLADA also has support for splines and convex meshes.
    if ( geom->getMesh() != NULL )
    {
        domMesh *mesh = geom->getMesh();
        // COLLADA supports other primitive types
        // this example only checks for the number of triangles.
        int triCount = 0;
        for ( int i = 0; i < mesh->getTriangles_array().getCount(); i++ )
        {
            triCount += mesh->getTriangles_array()[i]->getCount();
        }
        cout << "Geometry: " << geomID << " has " << triCount << " triangles." << endl;
    }
}
// the DOM cleans up automatically when the last DAE object is destroyed.
delete daeInput;
```

Collada DOM is used to get the triangle count from the geometry. It shows how to initialize the DOM, load a document, iterate through elements of a single type, and gather some simple data.

LISTING 2 updating the 3D view

```
Void CMeshCollada::Draw( CrtMatrix *pGLMatrix )
{
    glLoadIdentity();
    glMatrixMode( GL_MODELVIEW );
    glPushMatrix();
    glMultMatrixf( (GLfloat *)pGLMatrix );
    CrtScene *pScene = m_pCrtRender->GetScene();
    pScene->Update();
    pScene->Render();
    glPopMatrix();
}
.../...

// Load as many COLLADA documents as necessary
CMeshCollada* pMesh = new CMeshCollada();
pMesh->Load( sMeshPath );
CMeshManager::Add( pMesh );

.../...

// in the main loop
// set the current camera and lights before this is called

CMeshCollada*pMesh = CMeshManager::GetFirst();
while( pMesh )
{
    pMesh->Draw( &gMatrix );
    pMesh = CMeshManager::GetNext( pMesh );
}
}
```

COLLADA

applicable to any other data in a Collada document. Raw floating-point data, for example, can be saved in a separate binary file. In most cases, document loading and saving will be faster, reducing the global size of the content.

COLLADA'S TOOLBOX

Collada comes with a number of tools designed to facilitate workflow, such as FCollada, Collada DOM, Collada RT, and a host of others. Plug-ins for 3ds Max and Maya are available in source code on the Feeling Software web site along with the FCollada open source API used by both plug-ins, and Softimage has incorporated Collada directly in XSI.

Collada DOM is a C++ API developed by Sony Computer Entertainment that simplifies the loading, creation, and manipulation of Collada documents. This API is automatically generated from the schema using an in-house tool, so the API matches the specification exactly. See Listing 1.

Refinery is a Java framework and user interface that enables the developer to create conditioning pipelines by connecting conditioners—a C++ function that processes data in-place-between inputs and outputs. A pre-viewer, based on Collada run time (RT), is embedded in the application, allowing the Collada content to be probed at any stage of the conditioning pipeline. Once established, the conditioning pipeline can be saved as a macro and can be called via the command line directly, so you can integrate it into the build process. See Figure 4.

Collada RT and the FX loader library are sample code for the PC, as well as for PlayStation 3 SDK. These libraries, developed by Sony, are designed to be used as sample code and enable a fast-path viewer for direct loading and display of a Collada model on the target platform. A fast-path viewer adds productivity because it does not require models to go through the complete content conditioning pipeline

and be converted to the game engine-specific format.

Some minor adaptations to Collada RT are necessary to integrate the program into a Windows application. For example, it's necessary to modify `CrtRender::Render()` in `CrtRender.cpp` to externalize the camera management. Also, in order to control animation from the application, it's important to manage the external `float` ticker outside the render loop. See Listings 2 and 3. Another way to use Collada RT is to make its internal structure the basis for creating an application-specific binary format based on the serialization of the `CrtRender` class, which contains the nodes, geometries, animations, materials and vertices information.

Collada FX is the first cross platform shader effect format. Every material in Collada is an instance of an FX, which can be described using the common profile or a profile that is specific to the target platform. Collada supports the rigging of the shaders to models and scene objects such as lights and camera, letting developers integrate the authoring of real-time shaders into the core of a complete 3D asset database.

RESOURCES

Collada forum, contributions plug-ins, and announcements
www.collada.org

Collada getting started guide
https://collada.org/public_forum/viewtopic.php?t=610

Refinery tool from SourceForge.net: use the included Coherency test to check Collada documents
http://sourceforge.net/project/showfiles.php?group_id=178682

Khronos Group: Collada Overview
www.khronos.org/collada

Collada test model bank
www.collada.org/owl

The Feeling Viewer, Feeling Software
www.feelingsoftware.com/content/view/40/66/lang,en/

Collada DOM API installer, Collada RT sample code, and other open-source projects
www.SourceForge.net

Arnaud, Rémi and Barnes, Mark. *Collada: Sailing The Gulf of 3d Digital Content Creation*. Wellesley, MA: A.K. Peters, 2006.

LISTING 3 Collada RT on Windows

```
BOOL CMeshCollada::Load(const char *sPath)
{
    // The DOM expect an URI
    // Convert Windows-style path to a properly formatted URI.
    char cleaned_filename[512],*out = cleaned_filename;
    const char *in = sPath;
    *out = NULL;
    // If the first character is a ", skip it (filenames with spaces in them are quoted)
    If (*in == '\\')
        in++;
    // if second character is a :
    // assume we have a path with a drive letter and add a slash at the beginning
    If (*(in+1) == ':')
        *(out++) = '/';
    int i;
    for(i = 0; i < 512; i++)
    {
        // If we hit a null or a quote, stop copying. This will get just the first filename.
        if(*in == NULL || *in == '\\')
            break;
        // Copy while swapping backslashes for forward ones
        if(*in == '\\')
            *out = '/';
        else
            *out = *in;
        in++; out++;
    }
    // Should throw an error if i >= 512
    if(i < 511) *out = NULL;

    m_pCrtRender = new CrtRender;
    GetCrtRender()->Init();

    // Load the file name provided on the command line
    if (! m_pCrtRender ->Load( cleaned_filename ))
        return FALSE;
    CrtScene *pScene = m_pCrtRender->GetScene();
    pScene->Update();

    return TRUE;
}
```

Loading a Collada document with Collada RT on Windows requires some filename manipulation since the DOM only accepts URI.

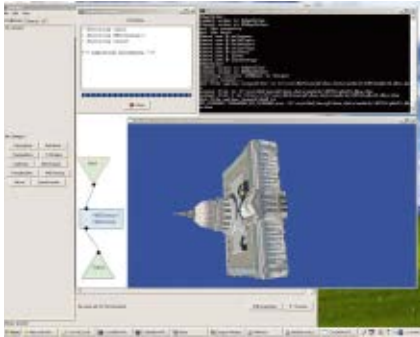


FIGURE 4 Refinery is used here to run the .kmz clean up conditioner, which corrects some of the non-conforming issues that the first Google SketchUp Collada implementation has. This is a good example of using a Collada-to-Collada conditioning pipeline.



FIGURE 5 Collada and Collada FX were central to the development of Nvidia's FX Composer 2.0.

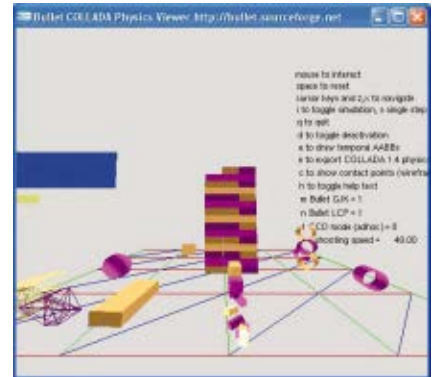


FIGURE 6 The Bullet engine's physics viewer shows the effect of the physics, which can be used as a tool by a developer, even if a different engine is used for the target platform.

Collada Physics allows for rigid body collision and physics to be created directly in a DCC tool, and exported in a standard format. Collada Physics is designed to be used with any of the many existing physics engines (Ageia, Havok, Bullet) or with an in-house engine. Collada Physics is supported by 3ds Max, Maya, and Blender, and soon Softimage XSI, as well as by the Feeling Software viewer. All this support allows for the transport of content and all its physical descriptions between many DCC tools.

In the realm of physics, Collada has freed developers from becoming dependent on one vendor's tool chain. And thanks to Collada's built-in extensibility, developers can add whatever specific features they need.

Both Bullet's and Ageia's physics APIs (see Figures 5, and 6) give users the ability to export a Collada Physics document at any time during the simulation. This document contains all the values at the specific simulation time, providing a full snapshot of the physics engine. Those snapshots are really helpful when debugging physics-related components of a game. Most bugs are the result of incorrect data, and that cause can be difficult to pinpoint without the Collada Physics snapshot and Collada Physics specialized viewers and tools.

Nvidia's FX Composer 2.0 has been designed around Collada and Collada FX to provide a full-fledged solution for users not only to write, tune, and optimize complex shaders, but also to integrate multi-platform shaders and materials. The level of integration goes as far as to bind shader parameters to animated scene objects like lights, cameras and scene nodes, and also process high-level full-scene effects that involve multiple render-to-texture passes and sharing the results across these passes. Complex effects such as rendering the scene once from the point of view of a light and sharing the resulting shadow map across multiple materials in a subsequent pass are fully supported. Such complex rendering setups can be captured via Collada.

The Bullet engine (bulletphysics.com) is an open source physics engine available for many platforms, including the PlayStation 3. It provides a physics viewer that displays only analytic shapes and shows the effect of the physics, which can be used as a tool by a developer, even if using a different engine for the target platform.

LIBERATED DEVELOPMENT

It's important to understand that having an open standard like Collada frees developers from being shackled to individual software programs and their upgrade cycles, encouraging them instead to use the best tool for each particular job. Collada and Collada FX have broken boundaries in order to facilitate an unprecedented 3D interactive art asset ecosystem.

Additionally, the standardization of the Collada asset description specification through the Khronos Group makes Collada the perfect candidate for innovative software tools vendors to reach out to a broad audience of developers who are ready to embrace advanced content in an open way. In the end, this means game studios can not only turn out better products, responding to the specific needs of their developers, but also increase the productivity of their teams. ❖

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KONAMI'S ELEBITS PLAY HIDE-AND-

ELEBITS IS AN ALL-NEW PROPERTY THAT KONAMI CREATED from scratch specifically for the Nintendo Wii. The game features little creatures that are hidden throughout the game world, typically behind or under different objects; the goal is to find the creatures by moving different objects in the world using the Wii Remote and collect the elebits. The more elebits a player collects, the bigger the object he or she is capable of moving.

Although Konami already has a number of recognizable game franchises, we felt strongly that a system as groundbreaking as the Wii deserved a new title that could highlight its unique strengths and capabilities. When we first learned what the Wii would be able to do, the initial concept for ELEBITS emerged from our most basic developer responses. With the understanding that we had some significant challenges ahead of us in harnessing this new hardware, we set out to create something that couldn't have been possible on any other system.

The Wii has incredibly broad consumer appeal, with easy-to-use controls and a diversified target audience. In developing ELEBITS, our primary focus was to ensure that the game appealed to all kinds of consumers—men and women, girls and boys, gamers and non-gamers alike. To that end, we decided to put all our effort into developing the gameplay first, going so far as to sacrifice graphics and other aspects as a result. While this approach was very unconventional for our team, it ultimately allowed us to achieve our initial design goal of maintaining a diverse audience.

The first thing we tackled was how to incorporate and use the Wii remote. For a game like ELEBITS, this was the most critical aspect of the gameplay that we absolutely had to nail if our game was to be

successful on any level. Although ELEBITS is a first-person game, we avoided a lot of the trappings found in shooters and other first-person games that make the controls cumbersome and inaccessible for a large segment of the game-playing population. Instead, we focused on making the game playable using just one button. While we did map more options to player movements in the end, it's entirely possible for a player to complete ELEBITS by only using the A button and gestural movements.

After we had a firm grasp of how the Wii Remote worked and its capabilities, we began to define the parameters of gameplay, taking inspiration from the extremely simple children's game of hide and seek. Because nearly everyone is familiar with the basic premise of hide and seek, it helped us keep our audience appeal broad; from there, we slowly added other gameplay hooks.

As mentioned, the initial focus in development was on gameplay that could use the Wii controller in a unique way. The gameplay for ELEBITS took shape only after we had established how the remote could be used. It was from there that we started to add details to our game world to answer some basic questions, such as, what are elebits? Why would the player want to capture these cute and harmless creatures? When we arrived at the idea that elebits were energy-generating creatures that have co-existed with humans for thousands of years, the final piece of the foundation for the game had been set. This is, of course, a progressive approach to game design, but we felt that working with the Wii hardware compelled us to put gameplay before everything else.

We wanted the game's artistic style to be unique as well, from characters to cut scenes. The elebits

SHINGO MUKAITOGE was producer of ELEBITS. He has also worked on such titles as the PlayStation 2 versions of the BEATMANIA DX SERIES, GUITAR FREAKS & DRUMMANIA series, and POP'N MUSIC series. Email him at smukaitoge@gdmag.com.



I T S

S E E K

GAME DATA

DEVELOPER

Konami

PUBLISHER

Konami

RELEASE DATE

December 12, 2006

LENGTH OF DEVELOPMENT

13 months: Oct. 2005–Nov. 2006

NUMBER OF DEVELOPERS

30

TOOLS USED

Maya, Photoshop, After Effects, C++, CodeWarrior, and others

LINES OF CODE

415,000

NUMBER OF "MINI-CHOCOLATE PIES" (A POPULAR JAPANESE SWEET) EATEN BY TEAM DURING DEVELOPMENT

2,500 pieces



themselves, being the focal point of the game, needed charming and inimitable personalities. They had to be iconic creatures that would resonate with the player, and we considered more than 100 character proposals before selecting the final designs. Since the game is played in the first-person perspective, we didn't finalize the design for the main character, Kai, until the very end of the design stage. For the cut scenes, we decided to move forward with hand painted images to give the game a sense of storybook wonder and build upon the workman-like in-game graphics. The style of the cut scenes is one of the game's most distinctive aspects, especially since so many titles today aim for photorealism.

To be honest, our development period up to E3 2006 was incredibly stressful. I faced a lot of self-doubt, wondering if we were making the right decisions. There was no frame of reference to tell us whether we were headed in the right direction. We just had to trust our instincts as game designers and hope that we were creating something original and compelling. Fortunately, many of our concerns were alleviated at E3 when the early build that was showcased was met with a very positive response. The game also received a Japan Game Award Future Division Prize from CESA at the Tokyo Game Show later that year, so we received valuable feedback that we should proceed full speed ahead with our initial designs.



WHAT WENT RIGHT

1 TOOK ADVANTAGE OF WII REMOTE.

When Nintendo unveiled the Wii controller at the 2005 Tokyo Game Show, I was as surprised as rest of the gaming community at the new interface. I was fascinated by the gameplay implications the remote offered,

and ELEBITS emerged from some of my initial brainstorming sessions. We placed a lot of importance on making full use of the Wii Remote when laying out our goals for the game. As we became more acquainted with the hardware, we continually discovered more things that the remote was capable of, such as twisting and pulling. I believe that the gameplay use of the Wii Remote is where ELEBITS was most successful. Without any pre-existing genres to conform to, we set our own parameters for the device and created an experience focused on these core mechanics.

2 PHYSICS SIMULATION. After finalizing the basic concept for ELEBITS, we realized that we needed a physics solution to make players feel as if they were actually in the game world,



Left to right: chief designer Hiroaki Sonobe, producer Shingo Mukaetoge, director Akihiro Ishihara, planner Kazuhiro Ogawa, and chief programmer Atsushi Suzuki.

interacting with the objects they come across. We took a rough first attempt at a physics program that gave appropriate weight to each object, but the results were very unrealistic.

After evaluating our alternatives, we decided that creating our own physics middleware would be the best course of action.

For a long time, the physics solution severely limited our frame rate, and there were a number of times we wanted to scrap it and start fresh. Finally, right before E3, we made some breakthroughs and implemented an advanced physics system that did not adversely affect the frame rate. When the team first saw the results of these optimizations, there was raucous applause all across the department as our hard work had finally paid off. It was incredibly challenging to get the system to work on the Wii, but we pulled it off and it is now a great showpiece for what the console is capable of from a physics perspective.

3 WIICONNECT24. There was a great deal of internal debate about whether we should attempt to include WiiConnect24 functionality (which lets users create and share their own content) in ELEBITS. To work with the service, we needed to develop our own WiiConnect24 libraries, which required a lot of work and testing parallel to our primary efforts of creating the game.

Since we had committed to releasing ELEBITS in North America and Japan within the Wii launch window, there was no margin for error or the functionality would have to be abandoned. We ultimately decided that allowing for player-generated content and increased community connectivity positively affect game design, so we opted to support the feature. From that point on, I became keenly aware of how difficult it can be to manage multiple processes under severe time limitations.

Through our Edit Mode, players can create their own stages and share them with friends via WiiConnect24. In addition to the main story mode, our WiiConnect24 functionality helped set the game apart from other launch titles by demonstrating just how robust our core game



mechanics could be. Just by browsing YouTube, I'm very impressed with some of the levels and scenarios players have created.

4 GAME VARIETY. Gamers often lament that titles released in a system's launch period are light on content. It can be disappointing to realize that the game you have been intensely anticipating for months doesn't provide a full-featured experience that delivers on the promise of your new system.

To combat this problem, we set out to create a diverse selection of content to keep players satisfied with ELEBITS for a long time. Rather than artificially lengthening the core single player mode, we implemented a wide range of features to keep gamers coming back to the game since there are so many ways to enjoy our core mechanics. In addition to the Story Mode and the Edit Mode, which I previously mentioned, we also included a Multiplayer Mode that lets up to four people play together and a Challenge Mode with special objectives for advanced players. For those who are drawn into our story and characters, we included an ELEBITS House Mode with all kinds of background information, artwork, and trivia.

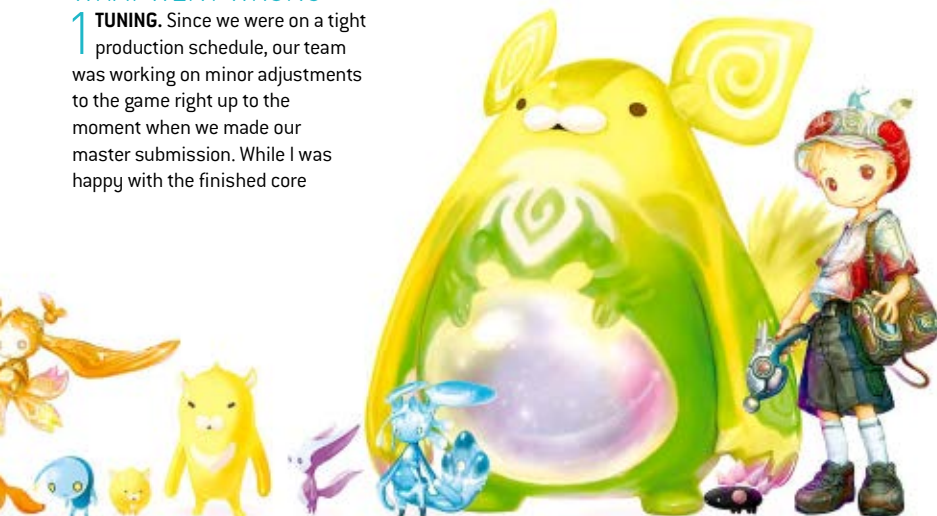
5 HIGH-QUALITY SOUND AND AUDIO EFFECTS. Although music and sound are often overshadowed by other game elements, I'm very proud of the audio in ELEBITS. In addition to creating an original soundtrack that gives the game personality, we spent a lot of time tuning our sound effects to make them stand out from a technical perspective. We adopted Dolby Pro Logic II and Low Pass filters from the Wii library to make our first-person player experience a sense of distance with each sound effect. This enabled us to reenact sounds with a variety of unique qualities by calculating the relative distance of the source from the player.

There is also a great deal of nuance for each sound based on the material that is putting it out. For instance, an elebit's movement underneath a frying pan would emit a distinct metallic sound. In this way our sound design carried over to our gameplay as players can listen for cues to determine where they can find the elebits.


There were a few effects we were not able to implement, such as reenacting indistinct sounds through solid objects like doors and walls, but the overall effort enhanced the gameplay experience for the user.

WHAT WENT WRONG

1 TUNING. Since we were on a tight production schedule, our team was working on minor adjustments to the game right up to the moment when we made our master submission. While I was happy with the finished core



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gameplay, I would have liked more time to perfect the physics and minimize the load times.

When I play the game, I see a lot of objects that react unnaturally or have the wrong amount of frictional resistance caused by the game's gravity. We had more than 1,000 unique objects that players can interact with in the game, so it was a major task to ensure that each of these items was working properly within the parameters we had laid out. It's not a major problem that hurts the game, but I'm a perfectionist so I'm bothered by these inconsistencies.

2 GRAPHICS. I'll be the first to admit that the graphics in ELEBITS are underwhelming. We were so focused on making use of the Wii controller and implementing our physics system



that we just didn't have enough time to focus more on the graphics. The Wii was an entirely new system when we began development, so our team had to struggle with a steep learning curve to build a new graphics engine, which explains why we were behind in terms of the visuals for much of the development cycle. I especially would have liked more time to refine our visual effects. It was heartbreaking for me to have to pass on adopting features that only next-gen hardware can

handle, such as normal mapping and depth of focus, but it just wasn't something we had the resources to do. We also had to pass up the opportunity to bring more personality to our characters through graphics—for example, we would have loved to include a scorched elebit popping out of a toaster.

If anything, I wish we could have been more visually consistent in the game world. Some of the 1,000 objects look much more refined than others, and this would have been our first task had we a bit more time to work on the game.

3 IMMERSION. Everyone seems to enjoy all the different ways that players can interact with the environment in ELEBITS. For example, you can pick up a slice of bread and drop it into a toaster; turn on the toaster and after some time you have a slice of toast along with a flurry of elebits. To be honest, we only scratched the surface with what we put in the game. We ideally wanted to create a lot more depth to the immersive game experiences, letting players create their own meals in the kitchen or use massive cranes in our outdoor areas such that players feel as if they could actually live in the game world. We wanted the game world to be a playground of interactivity, governed only by the players' imagination. These ideas would have been especially interesting given our Edit Mode and creative fans.

4 ELEBITS' AI. I wish we could have better refined the AI for the different kinds of elebits, seeing as they are essentially the main characters in the game. We were planning to include more action patterns, such as elebits helping each other, or playing together, or working together to escape in a variety of ways. We

were able to implement several emotional states and some basic personality traits, but it can be hard to notice them when the game is in action.

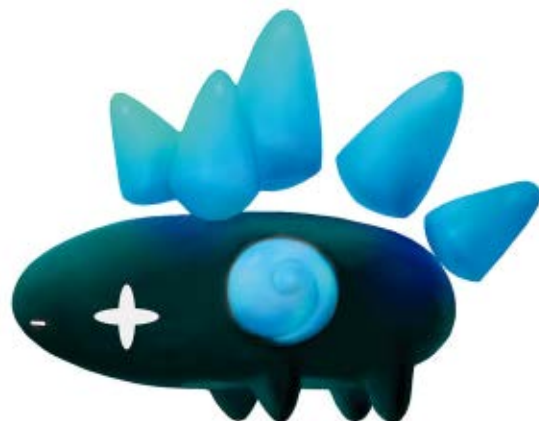
5 SPEAKER ON THE WII REMOTE. The one feature on the Wii remote we didn't take advantage of was the internal speaker. It's not that we didn't find it to be a worthwhile feature, but rather, by the time we came up with an interesting way to use it, there wasn't enough time to implement the idea. For a game like ELEBITS that emphasizes immersion, it can be incredibly helpful to make players feel like they are in the game and really interacting with objects. We also would have liked to use more sound effects for the capture gun, since that is essentially what the player is holding during play.

BITS VS. BYTES

In retrospect, the development of ELEBITS was an ongoing struggle between creativity and time. As you can see, most of the problems we encountered did not come from issues in team management, programming, or hardware, but rather in our commitment to ship the game within the launch window of the Wii. I'm still very proud of the final product and feel it remains one of the best showcases for what Nintendo's remote controller has to offer gamers and developers alike.

Since there is so much more for us to accomplish on the Wii from a technical and creative standpoint, we're using our next project, DEWY'S ADVENTURE, to implement a lot of the features we had to pass up for ELEBITS. We're going all out with the graphics for this game, using normal mapping and some advanced techniques that aren't commonly seen on the Wii. We're also refining our use of the Wii controller with context-sensitive controls along with tilt and motion sensing. I'd certainly relish the opportunity to make another ELEBITS game and fully realize my vision for the series, but I can't even begin to consider any other games until we finish DEWY'S ADVENTURE.

As a developer, I am tremendously attracted to the Wii. A console that can bring gamers' imaginations to life and introduce elements that would have never been possible in the past—that is a really powerful tool to let developers express themselves in new ways. ELEBITS certainly could not have been made on any other console, so I look forward to seeing the creativity and vision of the development community in their upcoming Wii titles. ❖





JESSE HARLIN

❖ AURAL FIXATION

AN INSIDE JOB

EVERY YEAR, GDC'S ANNUAL JOB FAIR

brings an array of sound designer candidates with a wide range of experience in front of a parade of potential employers. In the hustle and bustle of schmoozing, thousands of business cards and resumes wind up disregarded and unanswered, without any explanation for why they didn't make the cut.

Some of this boils down to not knowing what skills are required for an in-house audio employee versus a freelancer or contractor. Aside from certain common elements, the skill sets diverge into nearly as many descriptions as there are available jobs. I'll simplify things by breaking it down into two major camps.

THE OUTSIDER

For freelance designers, the most important attributes to have are a sharp business acumen, an entrepreneurial spirit, and networking skills. Nearly every sound designer begins his or her career as a freelance contractor. Whether an audiophile pursuing foley work in films or a composer who has to fill in by tweaking assets from a commercial library, few sound designers get their start in the game industry with staff positions.

A career as a freelance sound designer always develops from the ability to impress in person, out-demo the next candidate, and manage important small business tools such as invoices or marketing and promotional materials—anything that helps to get the next gig.

What that next job might be will often vary greatly, making a high degree of flexibility indispensable for the freelance contractor. Gigs will vary in scope from tossing a handful of UI sounds over the proverbial wall to delivering an entire weapon and impact sound set.

By and large, freelance designers can create their work however they see fit. While Protocols, Sound Forge, and Filemaker Pro are industry mainstays, freelance designers are largely free to employ whatever software they prefer so long as they deliver the necessary assets on time and in the format required by the development team. Because a freelance contractor's software and hardware palette is dependent upon personal preferences and wallet size, there's little in the way of global standards and practices for external designers. While this isn't typically an issue for freelance designers, it can cause some issues for sound designers who make the move to on-staff positions.

THE INSIDER

At a macro level, on-staff sound designers tend to fall into two main categories: the jack-of-all-trades and the special forces team member. The jack-of-all-trades—whose title is usually something like audio lead or senior sound designer—is typically at a smaller developer or part of a small audio department. In-house audio designers are responsible for the production and delivery of all facets of the game's audio, including sound effect creation, voice production, and music composition.

In addition to content creation, the audio lead is also tasked with handling everything audio tech-related. Audio leads are frequently responsible for researching and determining a game's audio engine needs, whether that means deciding to license middleware like Wwise or writing extensive documentation so that the engineering team has a blueprint from which to build the audio engine. Once content is created, audio leads are often tasked with handling all implementation and audio testing to ensure that the content plays back correctly. In this jack-of-all-trades role, the audio lead must determine which playback errors are

simple implementation mistakes and which are audio engine functionality bugs that must be reported to the programming team.

On top of everything else, as the sole point of contact for all things audio, staff audio leads must also function as the accessible face for the development team. This means making themselves available for frequent design meetings, updates with production staff and publishing staff, and regularly preparing materials and documentation to show how the audio development is progressing. This may also mean managing and contracting additional external sound designers as dictated by the workload of the project.

A special forces team member is typically going to be found at a mid- to large-size developer or publisher. These designers have a much more focused role and may only be in charge of a very small slice of the audio pie. Perhaps they're tasked with authoring looping ambient sounds or tagging foley sounds into animations. Maybe they fill the role of voice editor. Whatever their job, these sound designers typically answer to an audio lead and work more as a cog than as the entire audio machine.

Regardless of their level of responsibility, in-house sound designers are much more likely to require a very specific knowledge base when it comes to tools. In-house designers must be able to quickly learn how to use proprietary internal tech, team-specified nomenclature, and company-specific practices as they relate to workflow, asset delivery, and corporate culture.

KNOW YOUR ROLE

Whether in-house or freelance, sound design positions exist to suit the skill sets of all available sound designers. Knowing how your strengths stack up to the requirements of the given job will ensure that if you're looking to make that leap from freelance to in-house, you'll have an idea of how to position yourself. ❖

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.

COREL PAINTER X



STATS

Corel Corporation
1600 Carling Ave.
Ottawa, ON K1Z 8R7
Canada

PRICE

\$429, \$229 upgrade

System Requirements

See www.corel.com.

PROS

1. The Universal Mixer Palette is as easy as mixing creamed spinach and strained carrots (parents with young children will know what I mean).
2. Tools like the Divine Proportion are easy to use and give artists new ways to confidently compose, crop, and resize their work.
3. Enhanced Photo-Painting System is a gas to use, especially on normally staid screen shots.

CONS

1. The interface is due for simplifying, as users can quickly clog up the canvas with tools, settings, and menus without breaking a sweat.
2. Regardless of the plethora of tutorials, video links, and helpful hints, new users might feel like Alice inside the looking glass.
3. The Smart Stroke option swaps the user's selected brush type for one that is optimized for this feature, forcing the user to re-select the original brush.

COREL PAINTER X

BY TOM CARROLL

CONSIDERING THAT THIS MAGAZINE IS

called *Game Developer*, it would make my life as a reviewer much easier if Painter X (X as in Roman numeral for 10) were called something like "Texture Manufacturer X" or "Tile-based Flash Background Creator X," because then it would make an overt, apples-to-apples cost to benefit justification to video game developers everywhere.

But the package is called Painter X, so I'm sort of screwed.

Photoshop, the software choice of many game artists, sounds much more like "Texture Manufacture" than "Painter" does. However, for game professionals who actually paint as part of their work (concept artists, art directors, and many art leads) recent versions of Painter have more than justified the expense of purchasing this software, giving users valuable and unique brushes, the ability to duplicate various media types, and an intuitive color picker. Version X takes these strengths to a whole new level while adding more to boot.

PHOTO AND SCREEN PAINTING

The most noteworthy aspects of Painter X for game artists are the Photo and Screen Painting utilities. During the production phase of most video games, there comes a time when somebody has to sit in his or her cubicle for extended periods of time to find and manipulate the images that become the backgrounds of innumerable user interface screens. Frequently, the images are screenshots from the game itself. Painter X now incorporates an Enhanced Photo-Painting System so the aforementioned screen grabbers can produce automated paint-overs of originals with more control and automated intelligence than before. Working with this feature was fun and the results were genuinely quite pleasing.

SIMPLIFIED COLOR PICKING AND MIXING

Corel deserves a digital medal for finally making color picking and mixing intuitive with its new Universal Mixer Palette. While painting, whether digitally or in real

life, if I want to mix two colors, I want to *mix* two colors. In Painter, the user can just place daubs of paint onto the mixer's surface and ... mix them! This function is much more artistically intuitive than Photoshop's Color Picker. The Universal Mixer applies paint to the brush when the user picks the preferred shade of color within the mixed area. What a concept! It's so simple that it must have been hell on wheels to program.

PROPORTIONS THAT ARE DIVINE

Two brand new composition tools (based on centuries-old artistic study) have found their way into the Painter X release: Divine Proportion and the Rule of Thirds.

The Divine Proportion, also sometimes called the Golden Ratio, is based on a visual representation of the Fibonacci numbers and was most thoroughly explored by the Greeks, who revealed its presence in art, science, and nature. A zoologist sees the Divine Proportion in the spiral of a seashell. A physicist can

product news

TURTLE 4

ILLUMINATE LABS

Illuminate Labs recently released an updated version of its Maya plug-in rendering and baking tool, Turtle 4. Although in the past the software has catered more to the film and animation crowd, version 4 focuses a bit more on tools for video game artists. Turtle now has a Surface Transfer tool for creating normal maps, ambient occlusion, and other lighting techniques. This version also introduces the company's new Beast, a platform-independent baker that utilizes the .fbx format. Developers can try out Turtle

4 at no cost (see the web site for download).

www.illuminatelabs.com

MODO 203

LUXOLOGY

Modo 203, a free update to Luxology's 3D modeling, painting, and rendering software, now offers users innovations in UV editing and faster rendering times. Ray tracing, for example, is reportedly more than 1.4 times faster. Additionally, ambient occlusion and full light baking operations (to further accelerate rendering in game development) also benefit from the ray tracing speed improvement.

Irradiance caching has also been optimized. Modo ships on a single disc supporting both Mac OSX and Windows, and sells for a suggested retail price of \$895. A free 30-day trial is also available. www.moda3d.com

3DCONNEXION COM-BASED SDK FOR WINDOWS AND MACINTOSH OS

3DCONNEXION

In March, 3Dconnexion—which makes sleek mouse alternative devices, including SpacePilot and SpaceNavigator—announced the availability of a new SDK for developers of 3D design and visualization applications to easily

implement support for 3Dconnexion's line of 3D navigation devices, including SpaceNavigator. The SDK is currently available for free via download for both Mac and Windows. Program instructions, samples and support information are available to registered participants online. www.3dconnexion.com

SLICKEDIT 2007

SLICKEDIT

A recently released 2007 version of the code editor SlickEdit now gives so-called "power programmers" new core editing features to increase productivity by reducing repetitive tasks. The update

OUR RATING SYSTEM :



EXCEPTIONAL



GREAT



FAIR



POOR



UNFORTUNATE

find it in the behavior of light and atoms. Even mathematicians see it in the structure of a pentagram. Now you can see it in Painter X.

An artist can center the Divine Proportion's spiraling lines on a specific point of interest, then crop the artwork to take advantage of the pleasing proportions that result. See the image for an example.

The Rule of Thirds is a similar tool, but boxier. This rule states that an image can be divided into nine equal parts by two equally spaced horizontal lines and two equally spaced vertical lines. The four intersections within the composition can be used to align prominent elements; proponents believe that the resulting composition has more tension and energy.

With several clicks of the mouse, Painter X superimposes guidelines showing the Divine Proportions and/or the Rule of Thirds over the artwork on screen. The artist can resize, flip, or turn the overlaid lines to best align them within the workspace—all the better to focus on their benefits [or perhaps to contest their usefulness by purposefully avoiding their suggestions—take that, ancient Greeks!].

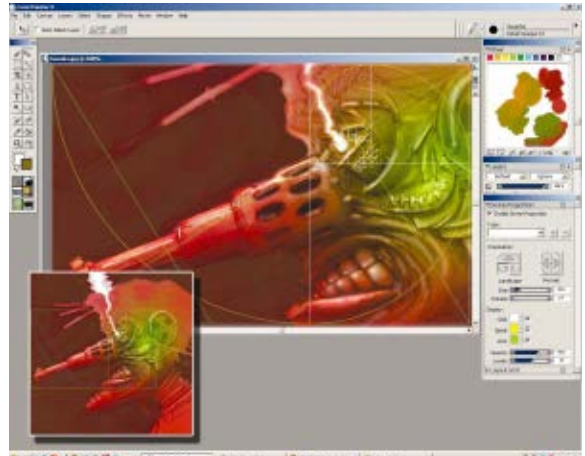
To test it out, I took an existing composition of a gun-faced man and re-cropped it to take advantage of the Divine Proportion. The results (shown) are quite pleasing.

For video game artists, the benefits of the Divine Proportion and the Rule of Thirds can be found in better concept art compositions, background paintings, screen shots, and even the renderings created for box art, marketing fliers, and other collateral materials.

RUFFLED BRISTLES

A less important, but still valuable feature of Painter X is the RealBristle Painting System, which makes the package's brushes even more responsive than they were before. I found that when using my Wacom Cintiq the brushes were much more fluid and fun to use, especially when I varied the angle of the stylus as I moved it.

Unlike me, however, anyone who experiences Painter X's new features is going to want to share them, perhaps even shout about them. And for game artists (and pesky reviewers), the lesson



Corel Painter X gives artists divine tools, like this Divine Proportion guideline that shows the most aesthetically pleasing composition of an image.

is that a Painter by any other name would not smell [or paint] so sweet.

TOM CARROLL is a video game artist, currently with Rockstar San Diego. He's also a contributor to Twonks and Plonkers, an online comic gallery. Email him at tcarroll@gdmag.com.

includes a new class tool window, XML/HTML formatting capabilities, a preview tool window, line ruler, and more. As a cross-platform and multi-language code editor, SlickEdit gives programmers the ability to code in more than 40 languages on 8 platforms. SlickEdit 2007 pricing starts at \$284 for new licenses. www.slickedit.com

OGRE 1.4.0

OGRE TEAM

Ogre, an open-source cross-platform real-time 3D rendering engine made by the Ogre Team, is now available in version 1.4.0. According to company literature, the tool is

“free for any purpose, including commercial applications, provided [the licensees] adhere to the terms of the LGPL. An alternative commercial license is also made available for those who for whatever reason cannot comply with those conditions.” Version 1.4.0 adds SSE/SIMD support, has more advanced lighting and shadowing techniques, and more. www.ogre3d.org

D'ARTISTE CHARACTER MODELING 2

BALLISTIC PUBLISHING

This new book from Ballistic, an Australian publisher focused on the digital arts

community, highlights the work of three artists and their character creation techniques. Featured prominently is Kevin Lanning and the team at Epic Games for their work on GEARS OF WAR. Lanning details the high- and low-polygon workflows that allowed Epic to create its game characters. As of press time, *d'Artiste Character Modeling 2* is scheduled to ship in early May for \$55. www.BallisticPublishing.com

VOXOVER

AUDIOFILE ENGINEERING

Audiofile Engineering has a new voice-over automation utility and batch-recorder for

multimedia and video game productions. Designed and built in consultation with large game companies, voXover is used specifically for projects that require large numbers of individual audio files to be recorded without error, replacing the multitrack recorder method. The tool lets the user write or import a script and rapidly automate the recording of that script. The script can be displayed on a provided teleprompter to voice actors via a wired or wireless network. <http://audiofile-engineering.com>



MICK WEST

» THE INNER PRODUCT

RUNNING IN CIRCLES

A PLAYER GUIDES HIS IN-GAME

character across a footbridge. A monster appears at the other end, so the player decides to turn and head back. Instead, he walks off the side of the bridge and falls to his death.

Who is at fault here? Was it the player for not mastering the controls? Was it the level designer for making the bridge too narrow? Was it the animator for making the walk stride too long? Was it the programmer who implemented the controls? Or was it the game designer for specifying the controls, bridge, and animations this way?

First of all, it's not the player's fault. He did not buy this game to enjoy mastering the tricky art of turning around on a footbridge. Second, assigning individual blame is not helpful. Everyone listed had a role leading up to this slight disappointment for the player, and the end result was caused by the interaction of all their efforts.

This article examines—mostly from a programmer's perspective—how to deal with these situations and discusses the responsibilities of the involved parties.

THIRD-PERSON MOTION

The type of game we are discussing is a third-person 3D action game with sections involving running or walking. This includes such games as ZELDA: TWILIGHT PRINCESS, GRAND THEFT AUTO, TONY HAWK, SCARFACE, HARRY POTTER, GENJI, TOMB RAIDER, and many other big name games. In these games, you see the character on screen, generally facing away from you, with the camera looking forward at a slightly downward angle. You (the player) control the character's movements by pushing the controller stick in the

direction you want to go. On PC games, similar control is achieved by pushing the WASD keys in the desired directions, sometimes with added control over the camera via the mouse.

Although we are talking about a 3D game, the problem is essentially two dimensional, as we are concerned with the player's movement across the ground. Since the camera moves up and down with the player, this essentially means we are dealing with motion in the x,z plane, which we can rename the x,y plane here to match the x,y coordinates of our control stick. Here, direction is represented by unit vectors, which is probably the most common method, although quaternions or Euler angles might also be used.

The basic code is very simple. There are three directions: the direction of the camera's forward view vector, the direction the player is facing, and the direction indicated by the player's controller stick (or simulated with direction keys such as WASD). Programmers have to convert these three directions into information that can move the player across the ground relative to the camera.

The simplest way to do this is to take the stick direction and rotate it by the camera direction and then use this new direction as a velocity vector for the player, ignoring for now the facing direction of the player. In two dimensions, this procedure trivially involves multiplying the x and y components of the stick direction by the view direction {view.x,view.y} and by the vector perpendicular to this {view.y, -view.x}. See Listing 1.

COMPLICATIONS

This is very simple so far. Where's the problem? Well, the problems occur when the programmer takes this "desired" direction and applies it to the motion of the character.

What we could do is simply take the desired direction and set the player's

velocity to this direction, which actually gives the player very accurate control over the character, with the ability to instantly change direction. However, it's not very realistic looking, as the character will instantly snap to any new direction the player indicates.

To fix this lack of realism, the program may reason that people walk in the direction they are facing, so logically, if they are moving, they should move along their facing vector. If the facing vector is not the same as the desired vector, then the facing vector should be rotated at a natural looking rate toward the desired vector.

This implementation sounds very reasonable, and in fact a large number of games use exactly this scheme. But it leads us to the small problem I mentioned at the start of the article: in some of these games, the player's character walks in a circle, and there are three reasons why this is a problem.

First, there is a disconnect between the player's intentions and what actually happens. What is the player trying to do by pushing the control stick in a particular direction? Perhaps he or she just wants to turn to face in that direction, but more likely the player wants the character to walk toward a specific point in the world (like the end of the bridge).

Instead, the character will turn, walking forward along the facing direction until the facing direction is parallel with the desired direction. The character walks in a circle and will end up perhaps six virtual feet to one side of the desired path. The player now has to correct the character's

LISTING 1

```
desired.direction.y=stick.y*(view.x, view.y)
desired.direction.x=stick.x*(view.y, -view.x)
```

Calculate the desired direction from the view direction and the stick direction.

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.

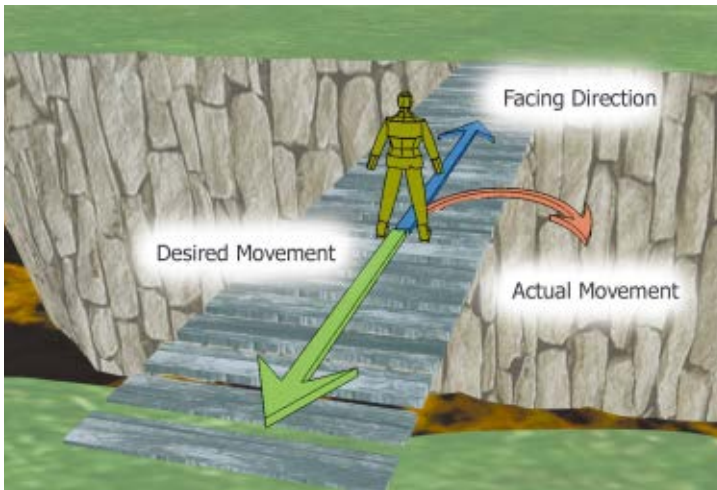


FIGURE 1 The player faces forward on the bridge, but then indicates a backward movement. Because movement is constrained by the facing direction, the player runs in a circle and falls to his doom.

direction again, pointing him toward the spot originally indicated. Even worse, this inadvertent movement to the side of the path could put the character in danger, perhaps dropping him off the side of a bridge (see Figure 1, for example).

Second, this solution introduces ambiguity. If the player's character is facing one direction and the player moves the stick to indicate 180 degrees in the other direction, then due to various imprecisions, the character might do his six foot circle to the left or the right, with no feedback as to exactly why this direction was chosen. You can demonstrate this in many games by simply attempting to walk back and forth between two specific points, or along a line. Notice the lack of control and the random nature of the turns.

A third reason this solution causes problems is because despite the underlying motivation for implementing it this way, it is actually not realistic. Try this experiment: Stand ten feet from your chair, with your back to the chair. Then turn around and walk back to the chair. Try it. Did you walk in a six foot circle and then correct your heading? No, you simply turned around, initially either by moving one foot backward and turning it outward 90 degrees and moving the other foot over it, or you moved one foot over the

other about 45 degrees to the side then moved the other one to face backward.

Try some more experiments to contrast what happens in real life with what happens in various video games. Walk back and forth along a line. Walk between two points. Run to a point and back. Humans do not walk in circles at constant velocity unless they are following a path. When a human decides to change direction, he or she does so abruptly, leaning and pushing with a leg to very rapidly pivot in a new direction.

When players quickly push the stick in a new direction, they want their characters to move in that direction, just like in real life. This is one of the moments in a video game when more physical realism would be a good thing.

CIRCULAR THINKING

Why does this problem occur? The answer could be that the game developers put the game together rather quickly and did not have time to improve the controls. That excuse might be valid for a little casual game developed over a couple of months, but what of much more expensive mainstream games that cost millions of dollars to make and are in development well over a year? How did they end up with this inaccurate, ambiguous and unrealistic player control?

The answer is complex, and will vary from game to game. But the bottom line is that player control is often a shared responsibility and the problem arises through a lack of clear communication regarding what is actually wanted from each person. The game design document probably did not specifically address this issue. There was probably a diagram showing that the player would control the character's direction of motion in a camera relative manner with the left analog stick, or the WASD keys—but there probably was no detail given beyond that.

Then the programmer and the animator come into the picture. The animator supplies idle, walk, and run animations. The programmer implements code that matches the animation to the movement of the character. The animator is insistent that there is no sliding, that the character's feet stay firmly planted on the ground during the walk cycle. Since turning on the spot in the walk animation results in sliding, the animator and programmer decide the way to solve this is to have the character always move along the forward facing vector, thus keeping the footsteps synced with the movement.

Perhaps instead the programmers come up with a very powerful scheme whereby the animators can fine-tune the movement and rotation for each animation, and the designers can implement movement by playing the animations. The designers get various turn animations, including turning on the spot. But despite the power of this system, it requires additional programming to actually implement swift turns for every situation, and the player is often left with ambiguous controls.

LETTING IT SLIDE

Why don't the designers, producers, testers, and even the players notice these problems? Why are they not addressed?

Different people involved have different goals. Programmers want to implement the specifications given to them and make the output bug free and efficient. Animators want their animations to look

good. Designers are concerned with a large number of issues. And the testers have their hands full looking for bugs. The end users, who have paid for the game, have enough invested in the game to keep playing long enough to get used to the clunky controls. They learn to correct their heading after turning around. They learn to turn around very slowly if within six feet of danger. They get used to their characters running around in little circles and figure eights.

But inaccurate and ambiguous controls suck the life out of a game. The disconnect between intention and action prevents the player from becoming fully engaged in the flow of the game. The constant annoyances of unintended actions add up over time and contribute greatly to the tipping point where the player, consciously or unconsciously, decides a game is not worth playing any more, and hence neither is the sequel—and nor will they recommend it to their friends.

PROGRAMMER RESPONSIBILITIES

What is the responsibility of the programmer here? I mentioned before that the causes of this problem are often shared; but the programmer is often in a unique position to do something about it. The control programmer has the deepest understanding of what is actually going on at the frame-to-frame level in the code. The programmer understands the interaction between the view direction, the stick direction, the facing direction, and the desired direction. The programmer should know exactly how the animation system ties into the movement of the character in relation to these four directions.

It's the programmer's responsibility to communicate this understanding to other members of the team in a way that allows them to deal with the issues in a

timely manner. The producers and the designers are responsible for making sure that the programmer does this.

Programmers sometimes work as if their only task is to implement the feature requests of the designers and technical directors. Programmers get a list of features, and they implement those features one at a time, ticking them off and going home happy. But games are complex systems. When you implement a feature, you are adding to the complexity of the system, and other features will inadvertently arise. When you implement "walk along the forward direction, turning

“ **Inaccurate and ambiguous controls suck the life out of a game. The disconnect between intentions and actions prevents the player from becoming fully engaged in the flow of the game.** ”

it toward the desired direction,” you're also implementing the "walk in circles" feature and the "make it difficult to walk to a point behind you" feature.

If a programmer is a step removed from the implementation of player control, then the situation is even worse. The programmer has created some system of defining player control with data or scripts and handed it off to a designer. The designer may simply implement the "walk in circles" method simply because that's the only option. Here, the programmer's responsibility is to continue to be available to explain and update the system after it has been implemented to the initial specification. The producer needs to allot time for improvements to the system for many months after its initial implementation.

CIRCLE THE ANSWER

I've kept this discussion as simple and non-technical as possible. In reality, the problem is really quite simple—and so is the solution. But time after time, games are released with this control problem.

Walking in circles is just one of many similar problems that crop up again and again. Players get stuck against lampposts, cameras snap oddly, players jump at the right time but still fall off the cliff, pressing a button a millisecond too early means the attack does not happen or you can't turn for a fraction of a second after an attack. I could list player control problems like this forever.

Players are frustrated by these problems, but they continue to play games and work around them. To a similar extent, so do the game designers. They don't really understand what's

going on within the code most of the time, and so it's unclear to them what's causing the problems. Or perhaps they don't really appreciate that there is a problem, since they can't see

how it might be addressed. Or maybe they see the problem, but their "solution" is to make the bridge wider.

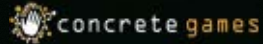
This is where the role of the programmer is of utmost importance. The programmer needs to communicate the way things work in a clear and concise manner that allows the designers to both appreciate the causes of the problem and find a solution. The programmer is also in a unique position to actually detect problems with the control implementation.

Players are very adaptable. They will work around a problem so intuitively that they will not perceive that there actually is a problem. Instead, they perceive a vague quality problem. The controls "don't feel right" or they are "sloppy." They can't say what the problem is. But a programmer, with unique insights into what's going on under the hood, at the vector level, and at the millisecond level, should be able to see these problems—and it is the programmer's responsibility to raise them as issues in the studio as well as suggest and implement solutions. ❖

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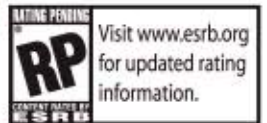
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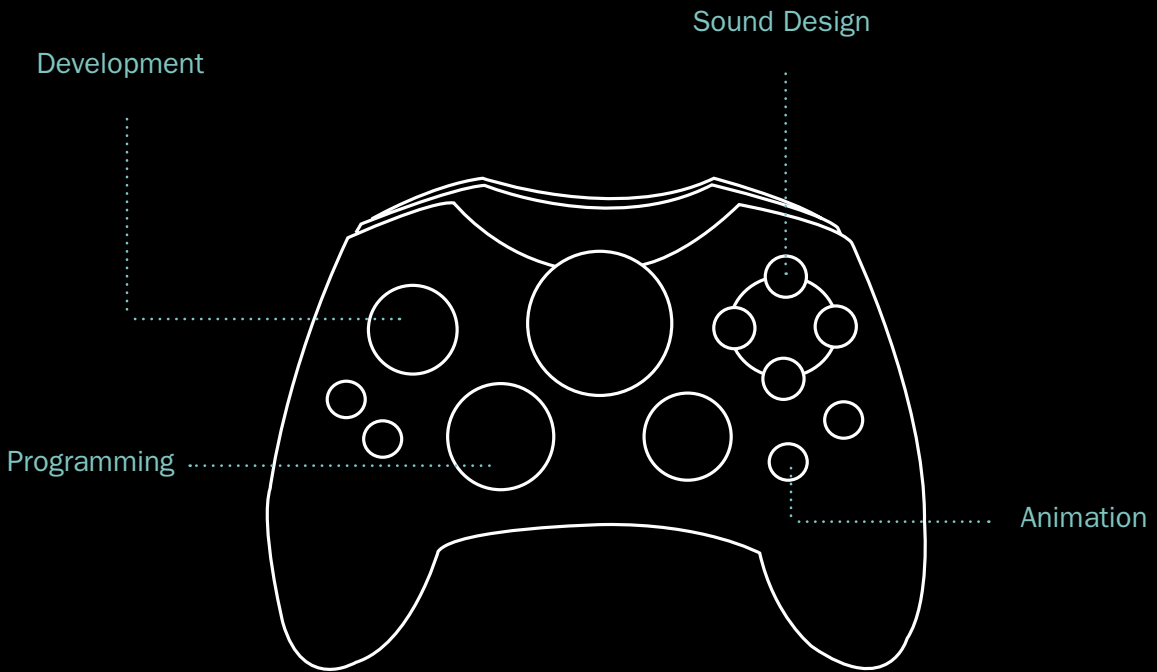
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REGULATING VoIP

GAME DEVELOPERS DON'T SPEND MUCH time worrying about telecommunications regulations, in general. After all, video games are entertainment, not a utility. But the growth of online multiplayer gaming presents new challenges, some of which may involve regulations not originally intended for video games. The reason is the Federal Communications Commission's evolving treatment of communications capabilities using voice over internet protocol (VoIP) technology.

These days, MMOs are hot properties. One of the key elements holding games like *WORLD OF WARCRAFT* and *SECOND LIFE* together is the ability to communicate in real time with other players. The communication may occur through a variety of means depending upon the game, but chat and VoIP are two common capabilities that game developers support in their games.

PROVIDERS AS CARRIERS

Most online game providers assume that the inclusion of chat and VoIP capabilities in their games will not make them FCC-regulated carriers. So far, that belief has held true. The FCC requires only a specific kind of VoIP—those services that allow calling to regular telephone numbers—to comply with its regulations. This encompasses Vonage's service and the Skype Out service, but online games do not typically (at this time) offer the ability to call to or from ordinary telephone numbers, so they are not subject to the FCC's regulations.

However, the FCC's policies are evolving in this area. In 1998, the FCC told Congress that it tentatively believed the

use of VoIP in computer-to-computer applications would not be regulated, while the use of VoIP in phone-to-phone applications would. Since 2004, the FCC has classified a handful of specific VoIP services while greatly broadening its jurisdiction involving VoIP services that connect to ordinary telephone devices. In essence, most of the "computer-to-phone" category has now been subsumed into the FCC's jurisdiction. Still waiting for decision is a 2004 proceeding that asks whether game-style VoIP should be regulated. So, are games definitely excluded from regulation as telecom carriers? Not just yet.

Looking to the future, what happens to a VoIP-enabled game's obligations when a gamer can reach persons not currently playing the game online? For example, many game companies are looking at ways to integrate gameplay across all the major platforms today—consoles, PCs and mobile devices. Suppose a role-playing game allowed a user to enter either from a PC or from a mobile phone. If the game allows other players to communicate with that user over a mobile phone, the functionality might fall within the definition of interconnected VoIP that is already subject to FCC regulation. Perhaps more interesting would be the addition of voice capabilities to a portable handheld like the Nintendo DS or Sony PSP. Does that make the DS a phone? What, after all, is the difference between a voice-enabled game device and a game-enabled phone?

TAPPING THE WIRE

Federal wiretapping obligations present the most serious short-term risk of regulatory-induced costs to game companies. Suppose, for example, that a criminal group wanted a secure, and private way of communicating. To such a group, the anonymity of communications in *WORLD OF WARCRAFT* or *SECOND LIFE* could be very attractive. In fact, one intelligence analyst recently warned in a blog that precisely this scenario is increasingly possible. The game industry might be

only a few well-publicized incidents away from government-imposed wiretapping.

Does your online game have the ability to monitor these communications if law enforcement presents a valid subpoena? Chances are good that it does not. One industry veteran with experience in MMO games told me that while various mechanisms are in place to protect players against harassment by other players, game companies would have to modify their systems to initiate real-time monitoring of a player's activity. Even where the provider maintains chat logs, time and resources would be incurred to search these records to comply with a subpoena request.

In the telecom world, carriers are required to make a series of extensive network modifications to accommodate an FBI or Department of Homeland Security subpoena, even before such a subpoena is presented. They also are required to provide reporting to the FCC and file certain documents outlining their procedures for handling wiretapping requests. As VoIP-enabled games become more robust, the FCC might not see as much of a distinction between a monthly subscription based game that offers communications capabilities and more traditional communications services. Thus, the FCC could extend its existing requirements, baggage and all, to all VoIP services.

A MATTER OF TIME

The FCC followed a similar path with interconnected VoIP services last year, essentially ruling that interconnected VoIP services were substitutes for traditional telephone services. Notably, the FCC imposed a wiretapping obligation even though VoIP providers claimed that significant technical obstacles hindered their ability to establish wiretapping capabilities. Interconnected VoIP providers are now dealing with extremely challenging issues to meet a May 2007 deadline for compliance with the new requirements. ❖



The FCC may eventually require that developers be able to monitor conversations over VoIP in games like *WORLD OF WARCRAFT*.

STEVE AUGUSTINO practices telecommunications law at Kelley Drye & Warren LLP. He recently established a games specialty to address telecommunications issues affecting game developers and publishers. Email him at saugustino@gdmag.com.



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