

GAME DEVELOPER MAGAZINE

THE LEADING GAME INDUSTRY MAGAZINE VOL 19 NO 6
JUNE/JULY 2012 INSIDE: TOP 30 DEVELOPERS!

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post mortem

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Haunted houses are scary, but not as scary as the prospect of making a Kinect XBLA game that has to appeal to both casual and core audiences, has zero marketing support, and requires cross-lingual coordination between a Japan-based developer (NanaOn-Sha), a UK-based developer (Zoe Mode), and an American publisher (Microsoft). How'd they do it? Read the postmortem to find out how HAUNT devs nailed the Kinect controls, endured countless cuts, and got an assist from Double Fine Production's Tim Schafer. *By Dewi Tanner*

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The editors of *Game Developer* and sister publication Gamasutra have teamed up once again to bring you another yearly installment of our Top 30 Developers list, where we give shoutouts to the devs that did something new, or better, or both. *By Staff*

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We demand photorealistic vistas and more-real-than-real particle effects from our games, but we still settle for subpar locomotion. Your game won't look real until you understand how you can use weight, momentum, and body mechanics to inform your character animation. *By Jason Sanmiya*

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GAME DEVELOPER MAGAZINE

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WHEN DIGITAL DIES

WHEN YOUR GAME GOES OFFLINE, DOES ANYONE CARE?

I play a lot of Xbox Live Indie Games (XBLIG). They're like the iOS games of the console world: targeted, often bite-sized experiences that can be had for around a dollar. Because XBLIG lends itself to a single-mechanic experience that appeals to me, as well as odd experimental titles like the avant-garde VIDIOT GAME, I have amassed well over 100 of these games—and I want to keep them. But it's not entirely up to me.

In order to play XBLIG, you have to have an internet connection and an Xbox Live account, even if the game doesn't support any sort of online content. With rumblings about a new console from Microsoft on the horizon, what is going to happen to the many hours and dollars I've put into these games, if the Xbox 360's online services are no longer supported? On top of that, Microsoft has asserted that Windows 8 will not fully support XNA, the SDK used to make most XBLIG. XNA is almost universally loved by its userbase (which is rare for Microsoft). But the company is essentially killing it off. Five years from now, if I want to play an XBLIG that I've purchased, what can I do about that? Sure, Microsoft may come up with a stopgap solution—but what about 20 years from now?

The problem balloons exponentially larger with multiplayer games that depend on private servers. Most games have some content that is only accessible through multiplayer, and when those private servers shut down, that functionality is forever lost. MMOs that shut down tend to give players credits toward future games, which is a small concession (I say, if I paid 40 cents for a Purple Sword of Smiting, I want to keep it). But then there are games like EA SPORTS MMA, which came with an online pass that players needed to access the game's online content. It came free with new

boxed copies of the game, but if you bought it used, you had to buy an online pass in order to gain access. When the EA SPORTS MMA servers were shut down in March, content people paid for was lost forever.

Beyond the cries about consumers' wasted money, this is also a preservation issue. Developers worked hard on these games, and if consumers lose access to that content, how much can we really say we care about our art? How much do we value our hard work? If we had anywhere near the preservation efforts seen in other industries, I would be able to play EA SPORTS MMA 20 years into the future if I wanted to. Instead, preservation has largely been left to well-intentioned hackers, ROM-dumpers, and emulator devs. There are private groups like OnlineConsoles.com, for example, which continue to maintain multiplayer servers for games from the Dreamcast and PS2 eras. But scalable cloud servers are affordable now, and our history is important. We can—and should—be making a stronger push to preserve our online digital history. With every game that stops getting served, and with every service like XBLIG that gets taken down by a console shift, hundreds of hours of developer work get tossed aside like so much trash.

I LIVE STILL!

» Not two months ago, I went to a showing of Abel Gance's *Napoleon*, a silent film from 1927. It's a nearly 6-hour-long epic, scored by a live orchestra. The finale is shown across three separate screens, creating a panorama view, complete with different tints on each screen—a sensory overload unheard of for the time. Huge sections of this film were presumed lost forever, until they were found in the 1980s and restored. Since those formative years, the film industry has learned a lot about preservation, and has started

several organizations that work together to preserve and restore older works. These organizations have set up preservation guidelines, so we never have to worry about losing even the least interesting films, years into the future.

Napoleon is a difficult experience to replicate. You need a full orchestra to perform the score live, and a theater with three projectors running the film at the right speed on three screens. But because the film industry cares about its history, in 2012 I was able to watch this film in almost the same way an audience in 1927 might have. Can we say the same for games? 20 years from now, I should be able to take a group of friends and play *ULTIMA ONLINE*, or learn first-hand about the roots of microtransactions in Korean online games, or see what 3D looked like on the 3DS for myself.

SAVE OUR SOFTWARE

» The problem of preservation only grows more important as we move to an increasingly online industry. We may not need to preserve every game out there, but then again, who knows what will be perceived as important in the future? How many painters were underappreciated in their time, only to be lauded later? Van Gogh was laughed at in his prime, but I can look at his paintings with ease today. If I want to play *PHANTASY STAR ONLINE* on the Dreamcast, which was acclaimed but had a limited audience, it's not so easy.

I assert that an organization that already gets funds from large publishers and developers—such as the ESA or IGDA—should be leading the preservation charge by defining best practices, collecting games, and figuring out how to serve them at low cost. If not, we will forget our history. Consider this: Would anyone still care about Van Gogh if his work were only spoken of, never seen? 📺

—Brandon Sheffield
twitter: @necrosofty



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FREQUENCY MODULATION FUNK!

SOUNDSHOCK 2: FM FUNK TERROR

The hills are alive with the sounds of frequency modulation synthesis ("FM synth"), thanks to a free compilation album called SOUNDSHOCK 2: FM FUNK TERROR (yes, with four Rs) that pays homage to the splendid soundscape game enthusiasts remember from the Sega Genesis days. First things first: Go to www.ubiktune.org and download the album. While you're waiting for it to download, read on for a Q&A with Ubiktune netlabel founder Dmitry "C-jeff" Zhemkov on how he made it happen.

Patrick Miller: Tell me about Ubiktune.

Dmitry Zhemkov: Ubiktune is an online label that distributes its music through digital audio formats. I started to write music myself back in 2001 on a ZX Spectrum computer. Somewhere in 2004 I was invited to AY Riders, a virtual ZX Spectrum music band, and took part in their third album, 8 Bits Is Enough. The album and all their previous stuff was released as archives with MP3s. The original Spectrum songs may only take up a few kilobytes, but I still couldn't handle them well with my slow dial-up Internet connection back then.

In 2006, I finally switched to an ADSL line and realized it made it easier to get chiptunes. It made it more accessible to people; you didn't need tons of plug-ins, players, emulators, and so on if you just wanted to listen to the music. The main goal of Ubiktune was to release the original ZX Spectrum music albums. By that time I almost finished my first album, Konami, so we already had one album to release.

PM: How'd you come up with the idea for the SOUNDSHOCK album series?

DZ: The initial idea was suggested by [chiptune artist] zinger. I always liked funk music as well as the FM sound, so I thought that it would be awesome to have a special line for this kind of release on Ubiktune.

PM: What tools did people use? Were there any restrictions?

DZ: There were not any particular requirements aside from the main genre and the base of FM sound. So people used a lot of tools for both albums, including VST plug-ins VOPM, FM7, Thor, Octopus, and Helix, older Sharp computers like the X68000 and X1, AdLib cards, and so on. The full list of tools is available on the SOUNDSHOCK 1 and 2 release pages at Ubiktune.org.

As there were not too many FM-related albums released in the recent years, both lineups were very exciting. We had great musicians participate and support us, and we had Tsuyoshi Shimokura, a brilliant artist who drew both of the album covers. The whole project became a pretty natural thing.

PM: Who worked on SOUNDSHOCK 2?

DZ: For the first album, SOUNDSHOCK: FM FUNK MADDNESS!!, zinger



himself selected and contacted lots of FM musicians all over the world. For SOUNDSHOCK 2, we split the work between us.

At first, we invited already-familiar names, like our old friend Kulor, legendary video-game music composer Keishi Yonao, no-less-legendary Jake "virt" Kaufman, and our special weapons from Sweden: Bomb Boy, Louis G, and Simon Stålenhag. We also included many musicians that weren't on the first album, including master of funk Joshua Morse, who is well known in the OverClocked ReMix community; Japanese composer naruto and singer Aya Futatsuki; coda of the yogurtbox duo, who released a hit tribute to Japanese eroge music called TREE OF KNOWLEDGE last year; Manwe of the Russian demoscene and music group The SandS; the piano wizard Shnabubula; dj.tuBIG/MaliceX, who created a spectacular opener; an absolutely new guy named Eric Ahl; and Moot Booxle, a man whose religion is funk. Zinger, his friend bacter, and I all contributed songs as well.

PM: What's next for Ubiktune?

DZ: We are going to celebrate our 50th release this year with a special team album in more of a progressive rock/metal direction. Also, Megus and I are working on our second cooperation album, which will be available later this year. The first one was Around Past, released back in 2010 (<http://ubiktune.org/releases/ubi012-teleidofusion-around-past>). Of course, SOUNDSHOCK 3 is in the plans, as well as other solo and team releases. That's what I can say for sure.

For more news about Ubiktune, follow @ubiktune on Twitter or visit the Facebook page (www.facebook.com/ubiktune). 

—Patrick Miller

SAVE THE PRINCE!

PRINCE OF PERSIA CREATOR JORDAN MECHNER AND ARCHIVIST JASON SCOTT ON PRESERVING GAME HISTORY

Jordan Mechner (PRINCE OF PERSIA, KARATEKA) recently released PRINCE OF PERSIA'S source code to the public, with the help of Internet Archive archivist Jason Scott, who assisted with the process of rescuing source code from a set of 22-year-old floppy disks. *Game Developer* spoke to Mechner and Scott about the importance of preserving game history while you're making it.

Patrick Miller: *Why did you keep everything? What do you plan to do with everything you've kept?*

Jordan Mechner: I've always been interested in other people's creative processes. For me, it's a natural step from appreciating a creator's finished work to being curious about how it was created. I like reading biographies and memoirs because they give insight not just into someone's personal creative journey but also into the time and place and cultural context that made it possible. So it felt natural for me to keep my own notes and journals. I started keeping a journal as a freshman in college. It was a private thing; I never intended for anyone but myself to read it, and ironically, I think that rawness is part of the reason it's interesting to reread today.

I published *The Making of Prince of Persia* because it felt like there was a story there that could have value to others, and enough time has passed that we can view that era with perspective and a bit of nostalgia. I included the parts of the journal that were relevant to the game development story, and [I] only left in a bare minimum of personal stuff around the edges to provide context. It's funny, because the personal stuff often seems to be what people respond to most. But trust me, most of what I wrote in my journal in my 20s you don't want to read. At least, I don't want you to read it.

PM: *What do you think a developer could learn from the PoP source code these days?*

JM: I'm pleasantly surprised by how well the PoP source code holds up and how readable it is. If you'd asked me 15 years ago, I wouldn't have imagined that anyone in 2012 would have

the slightest use for old 6502 assembly code. But in fact, the technology has changed so fast in our lifetime that even coders who weren't born then can be curious about how things were done in that era, before engines and libraries and compilers, when games were more handmade.

Jason Scott: Jordan has said that PRINCE OF PERSIA'S source code and development documentation was especially complete, as he was preparing to make the source code easier for porting by other developers at Broderbund. In fact, the code is really remarkably clear. A person even tangentially familiar with 6502 assembly will be able to read the comments and documentation and gather a lot of how the whole thing was done. Assembly language is extremely difficult to write in, especially in a system as resource-limited as an Apple II, so to see how Jordan works around these limits and creates things, like the mirror version of the protagonist and the level editor to create the maps, stands as a great education of how to approach similar limits in mobile applications and consoles.

PM: *Preserving work on old games isn't quite common sense yet. What do you think every dev should hold on to?*

JM: As far as physical storage, there's a limit to how much space I want to allocate to keeping stuff. In general I try to curate as I go, keep the things that have most value per cubic foot of storage—although it's always a bit of guesswork as to which those might be, and sometimes I guess wrong.

JS: It's a sad truth that the current game industry developer is under pressure from two sources: enormous swaths of crunch time that do not give much time for



Jordan Mechner (PRINCE OF PERSIA, KARATEKA).

considering the future historical interest in their work, and a mass of NDAs and workplace security paradigms that discourage taking mementos or even extensive notes about what was done during the production. As a result, the end of a game's development usually marks the beginning of a new game and a removal of what came before. Game preservation is a growing discipline that finds and will continue to find itself behind the curve of all the historical documentation and code that is lost or dismissed over the natural course of a company's fortunes and interests.

A light of hope, however, exists in indie game development. The creators tend to keep what they make, and they're not under strict orders to shred or delete materials on a regular basis. For those groups, I suggest something as simple as a plastic box with a simple printed or handwritten note about the contents, locked and put on a shelf at least a few feet



Jason Scott.

PHOTO BY RACHEL LOVINGER

off the ground. While it'd be great if developers recorded themselves talking about the project that led to all these artifacts and notes, just having the materials in one simple place, ready to send to one of the growing computer game archives around the world, is a step in the right direction, and an easy one besides. Just, please, use at least a few floppy disks to store them! 📀

—Patrick Miller



UNREAL

ENGINE NEWS

CYBERTRON TRANSFORMS ONCE AGAIN WITH THE POWER OF UNREAL ENGINE 3

With three Transformers games under their collective belt, it's safe to say that High Moon Studios is well versed in the worldwide blockbuster phenomenon. The development team is behind not only the prequel game set before Michael Bay's latest movie incarnation, *Transformers: Dark of the Moon*, but also original titles that delve deeper into the Hasbro toys' mythology.

Andrew Zaferakis, lead programmer on the newest installment in the series, *Transformers: Fall of Cybertron*, credited the studio's familiarity with Unreal Engine 3 with allowing them to hit the ground running and creating prototypes of new game ideas from the very first day of development.

"The engine has definitely gone through a large number of changes over the years," said Zaferakis. "We were one of the early adopters of UE3, starting with work on *The Bourne Conspiracy*. Over the years Epic has made tremendous improvements to the engine that we have integrated."

Matt Tieger, game director on *Fall of Cybertron*, said one example of this custom engine work is apparent in the presentation of metal in the game, of which there is a great deal. "Some of the changes we made have to do the way metal looks on the Transformers' home planet of Cybertron," he said. "Because we are taking players to an all-metal world it was important for us to get it right."

Fall of Cybertron may be the studio's most ambitious undertaking to date, as it's a direct sequel to the critically acclaimed and commercial hit, *War for Cybertron*, the highest-rated Transformers game ever. Story wise, the game is more richly steeped in official canon, revealing more of the history of the Transformers before they land on Earth. To bring this epic war between good and evil to life, the High Moon Studios team chose Unreal Engine 3.

"We rely heavily on Kismet for all of our level script-

ing," said Zaferakis. "It provides our content creators with a toolbox that allows them to build interesting interactions for the player. Kismet is easily extended to provide custom tools specific to Transformers, giving our designers even more control over the game. Matinee is used extensively throughout our in-game cinematics and intricate scripted events during gameplay."

The landscape of Cybertron is in much worse shape that it was in *War for Cybertron*. Huge sections of the planet have simply shut down, and only the Decepticon controlled areas are fully functional. The variety of environments is something the team is very happy with, as each setting has its own unique style. The environmental accomplishments are even more impressive when taking into account that the game was developed with a smaller team than any of the past Transformers games.

"I'm most proud of our ability to work smarter instead of harder when faced with a smaller team," said Tieger. "We have implemented technology that allows us to change code while the game is running, seeing results immediately instead of having to quit and restart."

Zaferakis said with each new endeavor, the studio builds on the knowledge and code base from the previous games; the team worked hard to identify the feedback the reviewers and community were saying about *War for Cybertron* and to implement changes from the start instead of resorting to guesswork.

With the newest installment in the franchise, High Moon Studios drew inspiration directly from Transformers characters and their iconic abilities to build gameplay features and environments. Jazz, for example, was known for having a grappling hook in the comics and cartoons. The team felt that was an important component of Jazz's character and personality, and they worked long and hard to convey the experience of grappling in gameplay.

"The major new feature for *Transformers: Fall of Cybertron* is character customization in multiplayer," said Zaferakis. "Fans can create their own Transformer with far more personalization options than ever before,

and battle against other players online. To accomplish this task every Transformer had to be re-authored for disassembly. Part of the re-authoring process involved improving the textures and shaders on all of the characters, which has a significant improvement in visual quality."

Along the way, Zaferakis said his team used Epic's Unreal Development Network (UDN) as a knowledge base to draw on when tackling difficult problems. He added that the UDN community has always been a great resource to answer questions and help other developers in need.

The final product is the most immersive Transformers game experience yet, enabling players to control of the Transformers themselves, choose sides, and engage in multiplayer action against a stunning, war torn Cybertron backdrop. These revisited and redesigned Transformers incorporate the latest technological advances available, their imposing and memorable presences brought to life by High Moon Studios and Unreal Engine 3.



Canadian-born **Mark Rein** is vice president and co-founder of Epic Games based in Cary, NC. Epic's Unreal Engine 3 has won Game Developer magazine's Best Engine Front Line Award seven times along with entry into the Hall of Fame. UE3 has won four consecutive Develop Industry Excellence Awards. Epic is the creator of the mega-hit "Unreal" series of games and the blockbuster "Gears of War" franchise. Follow @MarkRein on Twitter.

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TOP 30 DEVELOPERS

OUR PICKS FOR THE TOP
GAME DEVELOPER STUDIOS

THE GAME DEVELOPER AND
GAMASUTRA EDITORS HAVE
TEAMED UP TO LIST OUR TOP
30 DEVELOPERS OF THE PAST
YEAR, FROM THE INDIES TO
THE BIG BOYS. THIS HONOR
IS RESERVED FOR TEAMS OF
DEVELOPERS WHO ARE DOING
SOMETHING NEW, SOMETHING
DIFFERENT, SOMETHING
BETTER—OR, MORE OFTEN
THAN NOT, ALL OF THE ABOVE.



ARROWHEAD GAME STUDIOS

SKELLEFTÅ, SWEDEN

/// It's not every day that a group of student developers decides to drop out of school and work

full-time on a class project, as Arrowhead Game Studios did with *MAGICKA*. But even more than that, Arrowhead gets the nod for taking a disastrous release and turning it into an opportunity to show just how dedicated the team is to its craft.

MAGICKA launched with a lot of bugs, including hardware incompatibilities, networking issues that made Internet multiplayer almost impossible, and plenty of show-stopping bugs and hard crashes that made the game experience more frustrating

than fun. "Even though the game had so many problems, we had a large amount of gamers playing and loving it. Many expressed their sadness that the game was nearly unplayable," said Arrowhead CEO Johan Pilestedt in a *MAGICKA* postmortem for *Game Developer's* sister publication, *Gamasutra*. "At that point, we made a split-second decision that we'd patch the game every day for two full weeks, just because we knew that if we had bought a game in that state, we would have expected the same."

Arrowhead gets extra credit for sticking to its guns and creating a game characterized by offbeat humor, chaotic action, and plenty of other design elements that wouldn't normally make it out of focus testing. But it's Arrowhead's insistence on making *MAGICKA* work that earned it a spot in our top 30.



BIOWARE AUSTIN

AUSTIN, TEXAS

/// If finishing an open-world RPG is the game industry equivalent of climbing Mt. Everest, making an MMORPG meant to go toe-to-toe with *WORLD OF WARCRAFT* must be akin to climbing Everest, finding another Everest-sized mountain on top of Everest, and saying, "Might as well—we're already here."

Developing *STAR WARS: THE OLD REPUBLIC* is impressive for a few reasons. It takes guts to build a subscription-based MMO in a time when free-to-play is the standard for practically everyone but Blizzard and a few other holdouts. It takes even more guts to try to do that with



the Star Wars license, considering the previous *STAR WARS* MMO, *STAR WARS: GALAXIES*, never quite took off. Star Wars is one of the most beloved science fiction licenses out there, and *THE OLD REPUBLIC* is quite

BETHESDA GAME STUDIOS

ROCKVILLE, MARYLAND

/// Bethesda Game Studios game director Todd Howard dropped an amazing statistic during his DICE 2012 keynote: *THE ELDER SCROLLS V: SKYRIM* had over 10 million players worldwide, and Steam statistics showed PC players had an average play length of over 75 hours.

Game Developers Choice Awards). It's amazing any work got done in game companies around the world, as most of our developer friends were over 100 hours deep into *SKYRIM* within a week.

With *SKYRIM*, Bethesda managed to raise the expectations for open-world role-

physics] that turned into unintentional viral advertisements for *SKYRIM* on YouTube. Three months after the game came out, Bethesda even built a modding tool called the *Skyrim Creation Kit* and released it for free to anyone with a copy of the PC game and a Steam account. More recently, Bethesda added Kinect support for *SKYRIM*, with over 200 voice commands (including dragon shouts, of course). These additions were built during a week-long internal game jam that saw developers concepting everything from new monsters and weapons to rendering techniques and kill-cams.

In short, the team at Bethesda not only pushed the boundaries of open-world games but also its own development boundaries, while simultaneously opening up the system a bit to future content creators.

playing games in almost every facet possible. *SKYRIM* was significantly less buggy at launch than most big RPGs are a year after release, and many of the bugs that were present were funny quirks emerging from the game's system (such as freezing bears and rolling them down a mountainside until they break the game's



If that Steam average is indicative of the majority of *SKYRIM* players, humanity has collectively spent approximately 85.5 millennia wandering the open world of *SKYRIM*. Really, that says more about the game than its numerous awards and accolades (which include Game of the Year from the 2012



BIG HUGE GAMES

TIMONIUM, MARYLAND

/// Big Huge Games has gone through some big huge changes over the last few years. Its open-world RPG *KINGDOMS OF AMALUR: RECKONING* began life as an RTS, and the company changed hands twice during the development process: THQ bought Big Huge in 2008, and then 38 Studios bought it in 2009.

The fact that Big Huge Games finished *KINGDOMS OF AMALUR: RECKONING* at all is impressive. More impressive is that *KINGDOMS OF AMALUR: RECKONING* managed to stand out among a crowd of established fantasy RPGs, such as *SKYRIM* and *DRAGON AGE 2*, thanks to its novel combat system and creative involvement from fantasy veteran R.A. Salvatore and comic book legend Todd McFarlane. Finding focus amid the chaos and releasing a quality product puts Big Huge on our list.

possibly the most expensive game in development history. The game had more content than all of the other BioWare RPGs combined, after all, so it's easy to see how Star Wars: THE OLD REPUBLIC could have turned into a big-budget unwieldy mess.

But it didn't. Instead, BioWare Austin made a remarkable game that hit 1 million subscribers in the first three days, put an acknowledged dent in WORLD OF WARCRAFT'S customer base, and raised the bar for storytelling in online role-playing games.



CD PROJEKT RED

WARSAW, POLAND

/// These are days in which a game company's anticonsumer practices can earn it the dubious honor of Most Hated Company in America (as EA did), beating out a bank that was at the center of the recent financial collapse. In that light, CD Projekt RED seems to understand its business model entirely too well: Make games that make people happy, and when something about that game makes people unhappy, fix it so that the people are happy again.

THE WITCHER 2: ASSASSINS OF KINGS has sold over 1.5 million copies since its initial PC release in May 2011—definitely not bad for a relatively obscure developer making a game based on cult series of short stories. What distinguishes CD Projekt RED from other developers, however, is the way it has devoted itself to its fans. When players found that the SecuROM DRM in THE WITCHER 2 caused the game to perform poorly, the developers pulled it out and made it DRM-



free. When the developer built an Enhanced Edition with hours of new gameplay and content, it was offered free to existing buyers instead of sold as a DLC or an expansion pack. Listen up, devs: If you want your game to be given to President Obama when he visits your country, as THE WITCHER 2 was in Poland, this is what you have to do.



EIDOS MONTREAL

MONTREAL, CANADA

/// Nothing says "trial by fire" quite like forming a new studio and immediately going to work reviving one of the game industry's most beloved franchises. That is exactly what Eidos Montreal did with DEUS EX: HUMAN REVOLUTION.

Making the third game in the DEUS EX trilogy could very well have been a no-win proposition for Eidos Montreal. Even if DEUS EX: HUMAN REVOLUTION turned out to be an above-average game, it wouldn't match series fans' rose-tinted memories of the original, much less exceed them. If the game failed, Eidos Montreal would be credited with putting the final nail in DEUS EX's coffin after its sequel,

DEUS EX: INVISIBLE WAR, failed to impress. But in the end, Eidos Montreal developers took the best elements from the original DEUS EX and made a game that is truly a new, modern DEUS EX in every way.

"Building DEUS EX: HUMAN REVOLUTION was not always a smooth ride," game director Jean-François Dugas said in his postmortem for *Game Developer* (January 2012). "This is the most ambitious project that most of us have ever embarked on, and it made us grow as a team, as people, and as



CAPY GAMES

TORONTO, CANADA

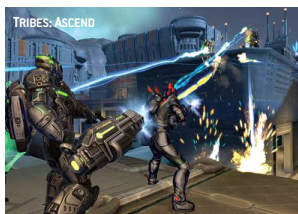
/// If there is a poster child in the development community for making the games you want to make, it must be Cappy. After all, when you're normally working on games like MIGHT & MAGIC: CLASH OF HEROES and CRITTER CRUNCH, it can be easy to let your quirky iOS "videogame-type-thing" fall by the wayside in favor of more dependable projects. But Cappy held the line with SUPERBROTHERS: SWORD & SWORCERY EP, which went on to win the Game Developers

Choice Award for Best Handheld/Mobile Game of 2012 and Apple's runner-up iPad Game of the Year, among other accolades.

Awards aside, SUPERBROTHERS: SWORD & SWORCERY reinvented the classic point-and-click adventure game by cleverly playing to the iPhone/iPad's strengths, wrapping it in decidedly inspired art (by Superbrothers) and sound (by Jim Guthrie), and above all, tossing out pretty much everything we thought we "knew" about game design.

Simply finishing a game like that is praiseworthy; that this "niche" title has sold over 350,000 copies to date on the App Store at a comparatively high price (\$3 for iPhone, \$5 for iPad) is downright inspirational. And considering how Cappy's award-winning run-n-gun platformer SUPER T.I.M.E. FORCE is coming along, with publishers like Microsoft lining up to publish it, we wouldn't be surprised to see Cappy show up in a few more best-of lists here and there.

professionals who take their craft seriously." Thanks to DEUS EX: HUMAN REVOLUTION, one can't help but take Eidos Montreal extremely seriously.



HI-REZ STUDIOS

ALPHARETTA, GEORGIA

/// With TRIBES: ASCEND, Hi-Rez Studios faithfully resurrected a beloved action game franchise,

garnered stellar reviews from press, peers and players, and deftly implemented the free-to-play business model in a way that's good for fans and good for business.

Hi-Rez does a great job of catering to non-paying players in order to convert them into paying ones. The studio knows that in order for free-to-play to work, especially in the West, pay-to-win schemes, unbalanced gameplay, and restrictive paywalls need to be thrown out the window. TRIBES: ASCEND shows that when a developer puts engaging gameplay before the business model, players (even hard-to-please online FPS fans) will be receptive.



DOUBLE FINE PRODUCTIONS

SAN FRANCISCO, CALIFORNIA

/// Double Fine Productions is something of a fan favorite when it comes to game developers, thanks in part to a legacy of cult titles like *PSYCHONAUTS* and *BRÜTAL LEGEND*. It has been relatively prolific over the last year thanks to *STACKING*, *IRON BRIGADE*, and *SESAME STREET: ONCE UPON A MONSTER*, but the achievement that earns the company a spot in the Top 30 isn't actually for a game that has already been developed. Instead, it's for the absurdly successful Kickstarter campaign that funded the upcoming *DOUBLE FINE ADVENTURE*

(working title).

Odds are good that anyone who reads this magazine is already familiar with Double Fine's Kickstarter success story, so we'll keep it brief: Double Fine announced a Kickstarter to fund the development of a new 2D adventure game—since no publisher wanted to risk sinking money into a “dead” genre—and set the funding goal at \$400,000. Within nine hours, the project had hit the funding goal. Within 24 hours, the project broke \$1 million. By the time the project closed, it was funded to the

tune of \$3.45 million from over 87,000 backers. Dead genre, indeed.

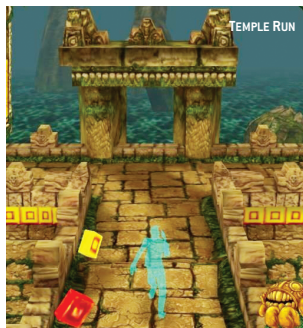
Double Fine was able to use its popular goodwill to break Kickstarter records, get some serious money behind a relatively niche project, and trigger a wave of niche Kickstarter revivals for *SHADOWRUN*, *WASTELAND*, *LEISURE SUIT LARRY*, and other long-forgotten franchises. Among a field of excellent developers, Double Fine stands out for being so good it can disrupt the industry's dominant publishing model.

IMANGI STUDIOS

WASHINGTON, D.C.

/// At first glance, the three-person Imangi Studios doesn't immediately come to mind as an obvious candidate for our top 30 list. Statistically speaking, though, you're more likely to have played Imangi's flagship game *TEMPLE RUN* than any of the other games mentioned within this list; as of this writing, *TEMPLE RUN* has over 50 million downloads between the iOS App Store and Google Play.

TEMPLE RUN is a fine game, but what makes Imangi Studios stand out is its business acumen. The



game launched as a paid \$0.99 game on the App Store, made it into the Top 50 Paid Apps chart, and started to slump in sales from there. Fortunately, Imangi had

anticipated that would happen. “We had little to lose, so we decided to try going free, which is the option we had in our back pocket from the start,” Imangi cofounder Natalia Luckyanova it in an interview with Gamasutra. “If nothing else, we figured we'd have more people playing the game. If the revenue is similar, it's always better to have more players.” And since *TEMPLE RUN* had already been built with a robust in-app purchase system, Imangi ended up pulling in about five times as much revenue once the game went free.

Releasing an Android version was another unusual contributor to Imangi's success; while many mobile developers shy away from porting their games to Android because they're worried about developing for such a fragmented platform, Imangi Studios decided to try its hand at an Android version. The result? Over 1 million downloads in three days. Take note, mobile devs: You shouldn't ignore Android for the right project.

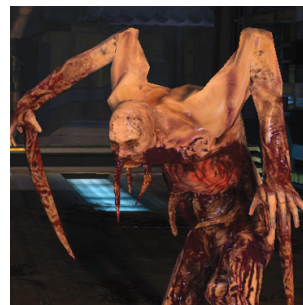


IRONMONKEY STUDIOS

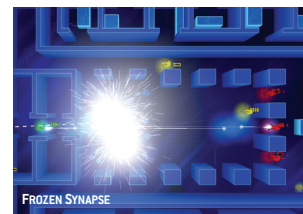
MELBOURNE, AUSTRALIA

/// Not many mobile developers are making games that aim to re-create a high-quality console experience on a phone or tablet, but IronMonkey Studios did just that with *DEAD SPACE* for iOS and Android, a mobile-only *DEAD SPACE* side story that looks and feels every bit like it belongs on a proper game console (and won Apple's iPad Game of the Year).

Between *DEAD SPACE* and *MASS EFFECT: INFILTRATOR*, IronMonkey has consistently managed to push players' expectations of what their mobile devices can do. And as our smartphones and tablets continue to get more powerful, major console publishers ought to consider taking a page out of Electronic Arts's



playbook and acquire their own IronMonkey Studios equivalent to make high-quality mobile adaptations of their major releases in order to expand their audience. “We saw people in user reviews saying, ‘This is awesome; I'll get the console game now,’” IronMonkey design director Dave Trudgen said in an interview with Gamasutra. “[*DEAD SPACE MOBILE*] was their first exposure to *DEAD SPACE*, so we benefit the console guys too, expanding their audience.”



MODE 7 GAMES

OXFORD, ENGLAND

/// Mode 7 Games makes our list for *FROZEN SYNAPSE*. The company doesn't necessarily stand out in one given area, but they made a solid game, with a bunch of surrounding solid ideas. Designing a game roughly described as a turn-based, top-down cyberpunk version of *COUNTER-STRIKE*. Selling preorders with beta access to make sure developers could finish the game the way it deserves to be made. Perhaps most interestingly, the company included two game keys with each purchase so players could give one to a friend (who will presumably tell his friends about it).

Taken together, all those decisions indicate that Mode 7 Games understands its audience at a very fundamental level. Its philosophy: Make good games that you would want to play yourself, and make it easy for people to play

FROM SOFTWARE

TOKYO, JAPAN

/// Many in the game industry think Japanese development is behind the times. But can some throwbacks become strengths? While triple-A developers this generation have mostly concentrated on ironing out all the wrinkles in their games and giving players a smooth, Disneyland-like ride from Press Start to The End, From Software has gone in the opposite direction.

DARK SOULS is hard—notoriously so—but the interesting thing is that it rewards the player for persistence, effort, and learning. That is the premise at the core of its design and what ties the whole experience together.

Through practice, players are rewarded with mastery over the gameplay. By paying attention, players are rewarded with secrets and bonuses. By exploring, players are rewarded with entire vistas they never knew existed. And while the structure is exacting and a bit retro in its appeal, its interesting use of players invading each other's game worlds (or not!) established an entire new genre concept: mingleplayer. Something old filtered through something new—that's how progress is made.



DARK SOULS

your games. Do these two things and you don't have to worry about designing clever ways to take your customers' money.



XENOSAGA

MONOLITH SOFT

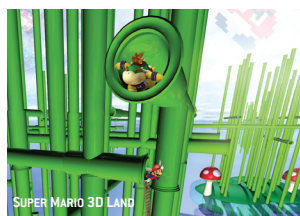
TOKYO, JAPAN

/// When Nintendo acquired Monolith Soft in 2007, it seemed like a strange match. The developer was best known for the slow-paced, cinematic, and complicated XENOSAGA series. None of its subsequent games made a big splash for quite a while, and none of its products for Nintendo reached North American audiences. Just what was happening?

Then came XENOBLADE. While Square Enix and Microsoft had tried

and failed to bring the Japanese RPG into the current generation with FINAL FANTASY XIII and LOST ODYSSEY, XENOBLADE promised to be the title that fans of the genre had been waiting for.

Unlike many Japanese teams this generation, Monolith has clearly absorbed the best ideas for game design from all around it, releasing a streamlined, modern, and intelligently made game while retaining the soul that drove the popularity of the genre in the 1990s. The result is a game that's polished, engrossing, deep, accessible, inventive, and appealing to Westerners, many of whom tired of the genre's conventions years ago. That's an achievement.



SUPER MARIO 3D LAND

NINTENDO EAD TOKYO

TOKYO, JAPAN

/// Kyoto has been the home of Nintendo since its inception, but one could argue that the soul of Nintendo now resides in Tokyo. SUPER MARIO GALAXY and its sequel were impressive, but SUPER MARIO 3D LAND had to save the 3DS, justify its 3D display, and reimagine what it means to play Mario in 3D by rolling the game design back to its 2D roots.

Director Koichi Hayashida's words at this year's GDC were inspirational. "Enjoying making something leads to making something enjoyable," he said during his talk—a very simple idea, but one that should be

at the core of game development. Too often the industry struggles to remember this as the complexity of game development and outside pressures take their toll on the process. The results, however, are made clear by this studio's output.



PLAYFISH

LONDON, ENGLAND

/// Playfish's THE SIMS SOCIAL proved that there is room in the social-game market for established franchises to survive, thrive, and attract more players.

With THE SIMS SOCIAL, Playfish took some of the fundamental elements from THE SIMS and wove them into a core social game every bit as



LEAGUE OF LEGENDS

RIOT GAMES

SANTA MONICA, CALIFORNIA

/// Most developers don't get included in a Top 30 list for a game they released almost three years ago. Then again, most developers don't grow their competitive community to the point where a tournament has a \$50,000 grand prize or 1.69 million unique viewers, either. Riot Games gets the nod for taking LEAGUE OF LEGENDS, the free-to-play multiplayer online battle arena (MOBA) title inspired by classic WARCRAFT III mod DEFENSE OF THE ANCIENTS, and growing it into a proper eSports every bit as competitive as tournament giants like STARCRAFT 2: WINGS OF LIBERTY.

Riot Games's free-to-play business model and emphasis on customer and community has paid off in the numbers; by the end of 2011, Riot reported LEAGUE OF LEGENDS had 11.5 million active monthly players, 1.2 million higher than WORLD OF WARCRAFT's reported player base at the time. Riot is putting its money where its mouth is, too. The second major competitive "season" for LEAGUE OF LEGENDS started in November 2011 with \$5 million in prize money from Riot Games itself, \$1 million of which is set aside specifically for community-organized tournaments. It's not often a developer takes its competitive players as seriously as the players take its games.

compelling (and addictive) as the best Zynga or any other established social game developer had to offer. And THE SIMS SOCIAL got results: One month after launch, it managed to become the second-most active Facebook game (measured in terms of daily active users), surpassing FARMVILLE and coming in second to CITYVILLE (both Zynga games). As the social game space continues to grow, we anticipate that more developers will be eagerly looking to find clever ways to adapt existing core game IPs.

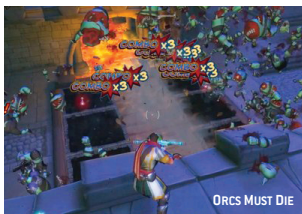
ROBOT ENTERTAINMENT

PLANO, TEXAS

/// Over the last year, we've seen Steam and XBLA continue to showcase great games from smaller independent developers, and we've found out first-hand that free-to-play games with turn-based multiplayer are great for extracting cash out of pretty much anyone with a phone and a pulse. Few developers stand out in both areas quite like

Robot Entertainment, responsible for ORCS MUST DIE (Gamastutra's No. 8 game of 2011) and HERO ACADEMY—two titles that blend core game dynamics with a casual-friendly aesthetic and a decidedly forward-looking business sense.

Both games started out with a relatively established genre—tower defense for ORCS MUST DIE; tactical-RPG for HERO ACADEMY—and applied a solid coat of Robot Entertainment polish and innovation to make something more than another me-too. In order to make it on this list, a developer usually needs to do something either very new or very well; that Robot Entertainment pulled it off on two separate platforms in one year made its inclusion a no-brainer.



ORCS MUST DIE



ROCKSTEADY STUDIOS

LONDON, ENGLAND

/// We don't envy anyone the task of making a game that lives up to the Batman legacy, but Rocksteady Studios managed to perfectly capture the essence of The Bat in BATMAN: ARKHAM CITY, which is nothing short of amazing. Consumers agreed, too: ARKHAM CITY sold 1.5 million copies in its first month and 6 million copies in 2011, which made it the seventh-best selling game in 2011, according to the NPD Group.

Sales data aside, we're impressed by Rocksteady's capability to make great decisions early in the dev process that make the most of its strengths. During a DICE 2012 talk,

Rocksteady founder Sefton Hill said that the team made a key decision to make "the world's smallest open-world game," which is undoubtedly what let it pile on the polish in every nook and cranny. With BATMAN: ARKHAM CITY's excellent use of the Unreal Engine to create a seamless open-world experience and its focused design and evocative writing, Rocksteady is more than deserving of its accolades.



ROW SHAM BOW

ORLANDO, FLORIDA

/// In 2011, a group of EA veterans formed Row Sham Bow, an independent company looking to find success in the increasingly popular

social market. And despite entering a space dominated by multimillion-dollar companies like Zynga, Wooga, and Rovio, the small team put out a game whose quality stands among the best on the platform.

That game—WOODLAND HEROES—takes the basic gameplay mechanics of the classic board game Battleship and frames them within a persistent game world through which players buy new weapons, conquer territories, and fight their way through a far-reaching single-player campaign. These additional subsystems keep the game fresh, as scenarios and opponents change by the minute.

WOODLAND HEROES doesn't exactly focus on the "social" elements of the Facebook platform, but its simple, tactical design makes it a great strategy game for novices and experts alike. Row Sham Bow's first title showcased some exciting, underexplored ideas on the Facebook platform and has been praised by social and traditional game developers alike.



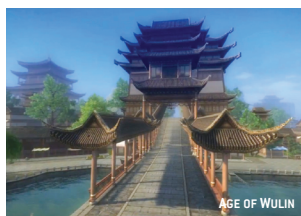
SMILEGATE

SEONGNAM, SOUTH KOREA

/// When you've got the No. 1 game in China, there's a lot to celebrate. SmileGate's CROSSFIRE held that honor in 2011, and it boasted 3.5 million concurrent users in China alone. Even though the game was served by Neowiz, this success still managed to shoot Seongnam-based SmileGate up the charts to become one of Korea's top-10 grossing game companies, according to www.thisisgame.com. In fact, it's the only developer on that list; all the rest are publishers, portals, or some combination thereof.



While SmileGate will likely remain a developer, there are rumblings that the company, now under director Jung-Pil Park (who helped launch other successful free-to-play FPSes such as SUDDEN ATTACK and SPECIAL FORCE) has set its sights on the publishing space. The company recently licensed the Unreal Engine for two new triple-A online games that it hopes will help diversify its CROSSFIRE-reliant revenue stream. You don't get to the top by accident, which means these new projects will be worth watching, at the very least.



SNAIL GAMES

SUZHOU, CHINA

Snail Games is a rising star in the Chinese game market, though it's already known for games like HEROES OF GAIA and MINISTRY OF WAR. While most Chinese game companies and portals are linked to larger electronics giants (Tencent is a huge Internet provider, for example), Snail is a game developer through and through. Most recently, the company has been putting its new title AGE OF WULIN (AGE OF WUSHU in North America) through the paces in Chinese betas.

Though the game itself is interesting (if unproven), Snail is more notable for throwing its hat into the game serving and publishing arena, with its Woniu.com portal. Woniu.com is a developer-served portal instead of one that builds on an existing Internet service, which shows that Snail thinks a little differently. While this may sound par for the course in the Western markets, in China, where your capability to serve games online is contingent on your relationship with the government, this is no small feat.



THATGAMECOMPANY

LOS ANGELES, CALIFORNIA

Thatgamecompany never ceases to amaze us, partially because it makes emotionally evocative, experimental games, and partially because it manages to build a successful business in doing so. Case in point is JOURNEY, thatgamecompany's early 2012 release that walked players through a roughly 2-hour sojourn of discovery, camaraderie, sorrow, and joy—and broke sales records to become the fastest-selling

PlayStation Network title to date.

JOURNEY'S most notable design element is the behind-the-scenes multiplayer matchmaking function, which simply slips another player into your game, without any acknowledgment whatsoever, as long as you're logged into PSN. With another player, you can travel through JOURNEY much more quickly, but your interaction is limited to a button that lets you "chirp" at each other—you can't even see the other player's PSN handle until you finish the game. The end result is arguably one of the most engaging "art"

THECHINESEROOM

BRIGHTON, ENGLAND

When thechineseroom debuted its HALF-LIFE 2 mod DEAR ESTHER in 2007, the U.K.-based indie team took some real risks in interactive storytelling. The game featured almost no interactivity and simply let players explore a lonely world fueled by an ambiguous, enigmatic narrative.

In 2012, the studio re-created DEAR ESTHER as a full-fledged retail release and further pushed the boundaries of interactive storytelling by presenting an atmospheric, almost ethereal environment that has no true

equal anywhere else. With this title, thechineseroom showcased the power of a well-realized virtual world. Without characters, goals, or even real interactivity, the game managed to

as a "game" in the traditional sense, but thechineseroom's approach to aesthetic design should serve as a lesson for developers in all genres and disciplines. And considering it



create an emotional experience that communicates everything through its aesthetic and style. Sure, DEAR ESTHER might not qualify

managed to turn a profit within six hours of its Steam release, DEAR ESTHER might have some business lessons to teach, as well.

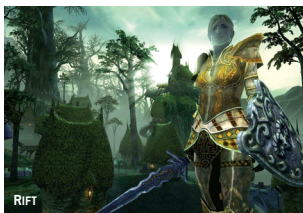
games to date (and certainly the most civil multiplayer game ever). And now that JOURNEY marks the last title in thatgamecompany's three-game exclusive contract with Sony, we're excited to see what current and former thatgamecompany devs have on their horizons.



THREE RINGS DESIGN

SAN FRANCISCO, CALIFORNIA

/// Free-to-play has made major strides into the world of core players over the last year, and Three Rings Design's SPIRAL KNIGHTS is no exception. Spiral Knights landed multiple achievements since its release last year; it was one of the first free-to-play games on Steam, it pulled in 1 million registered accounts within two months of its launch, and it landed the Best Online Game Design award from GDC Online 2011. Perhaps the highest praise is the fact that Three Rings Design's success with SPIRAL KNIGHTS got the company purchased by Sega late last year.



TRION WORLDS

REDWOOD CITY, CALIFORNIA

/// Adding 25 percent more content to your MMO after it launches is seriously impressive, but for Trion Worlds and RIFT, however, that's simply business as usual. Rift developers built the game from the bottom up to make it easy to push more and more to hooked subscribers. Trion Worlds CCO Scott Hartsman described the platform built for RIFT as "a service that completely evolves around

the player, and evolves with time, constantly gets better, mines the data, understands what people want, and gives them more of what they need." It's that kind of tech that won them Best New Online Game and Best Online Technology at last year's Game Developers Online Choice Awards.

But RIFT's technology is more than just buzzwords and bullet points; it enables the developers to build in more unpredictable, world-altering events that force players to interact with each other in ways they wouldn't in a more static MMO, which causes them to create connections with other players that they wouldn't normally make. It's a great example of better technology enabling better design.



UBISOFT MONTPELLIER

MONTPELLIER, FRANCE

/// There's something to be said for heritage. While Ubisoft's massive Montreal studio creates many of the games that have come to define the company in recent years—notably, the studio is the heart of development for the ASSASSIN'S CREED series—the parent company, founded in France in the 1980s during the first personal computer boom, is a living legacy.

What's lovely to see is that this spirit still lives in the best games the company released this year. The studio nurtured the wildly inventive FROM DUST, which gave Another World creator Eric Chahi a forum to explore left-field gameplay innovations and make a surprising success. And its ADVENTURES OF TINTIN game is the best licensed game you didn't play this year.

Ubisoft Montpellier gets a special nod for letting RAYMAN creator Michel Ancel come back for another round with RAYMAN ORIGINS, which made it on Gamasutra's Most Overlooked Games and Top Games of 2011 lists. More than the generous and lush art and gameplay, the project is impressive for its creation of a framework with which others can make high-res 2D games.

TOYS FOR BOB

NOVATO, CALIFORNIA

/// With the SPYRO license available, Toys for Bob could have just dialed in yet another sequel. It could have decided to reboot the franchise entirely with a gritty, bloody, "mature" SPYRO. Thankfully, neither of these happened (though the latter almost did). Instead, Toys for Bob came up with SKYLANDERS:

SPYRO'S ADVENTURES, an ambitious new take on SPYRO that integrated a set of RFID-equipped

action figures that could unlock new characters within the game.

Fact is, many less-

such an expensive, risky gambit. We're not just impressed that Toys for Bob successfully pulled



confident developers would undoubtedly shy away from asking parent company Activision to back

SKYLANDERS off—it sold massively, after all—we're impressed by how ballsy it was to begin with.



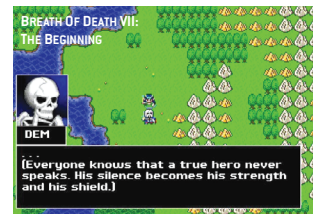
VALVE SOFTWARE

BELLEVUE, WASHINGTON

/// Valve was plenty busy in the last year, particularly with PORTAL 2 and its related ARG. However, PORTAL 2 isn't why Valve made the list this year.

Some developers decide to test the waters of a new business model with a new game or a side project connected to a larger IP. Last year, Valve tested the free-to-play waters with a 4-year-old game that started life as a boxed, triple-A title—TEAM FORTRESS 2—and between the item store (read: hats), frequent content updates to retain its current player base, and an influx of new players, it ended up boosting monthly revenues from TF2 by a factor of 12.

Of course, making TF2 into a free-to-play game was simply one part of a larger strategy involving user-made content. Leave it to Valve to find out how it can make a previously paid game into a free game that makes more money.



ZEBOYD GAMES

LAKE ARROWHEAD, CALIFORNIA / HOUSTON, TEXAS

/// The Xbox Live Indie Games section is a great place for new devs to show what they can do with an Xbox title and get some real-world experience, but that "experience" is often "soul-crushing disappointment" when they realize that no one is seeing their game, much less buying it.

That's why we're happy to see the success of RPG developer Zeboyd Games, a two-man team consisting of Robert Boyd and Bill Stiernberg (BREATH OF DEATH VII and CTHULHU SAVES THE WORLD). The duo turned its irreverent RPGs into a gig for Penny Arcade's ON THE RAIN-SLICK PRECIPICE OF DARKNESS: EPISODE 3. That an indie game developer can make it on parody RPGs is a heartwarming story; that said indie game developer can get a chance to work with some major game industry figures is a success story. ☞



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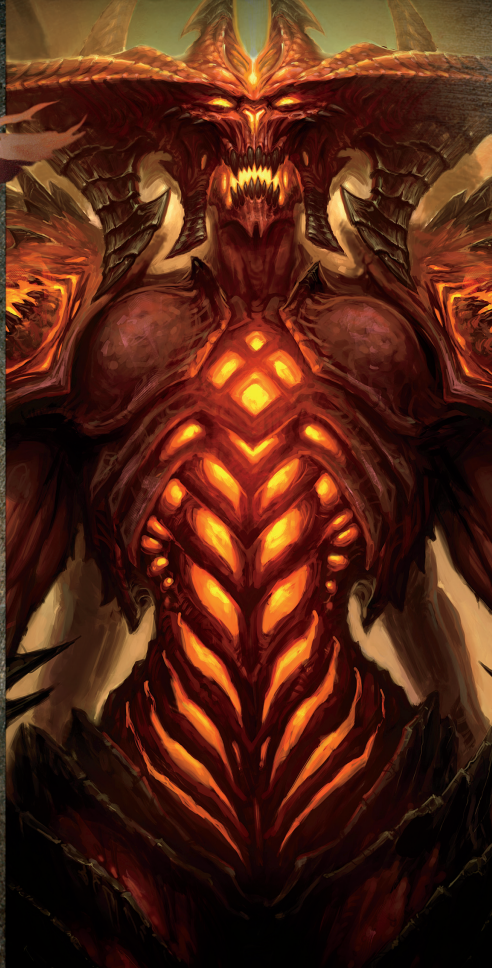
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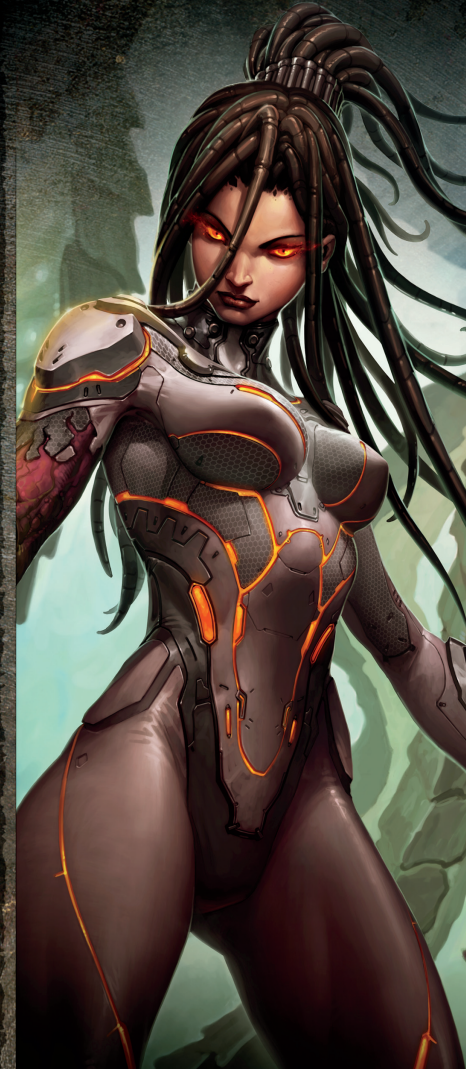


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J A S O N S A N M I Y A

MOVE OUT O F T H E UNCANNY VALLEY

TO HIT THE HEIGHTS OF REALISM IN GAMES
YOUR CHARACTER ANIMATIONS
NEED TO LOOK REALISTIC

ONE CRITICAL ELEMENT IS LOCOMOTION

When you compare your game to reality, where does it first break a player's suspension of disbelief?

My hairstylist visited the EA Canada office a while ago, while we were working on FIFA STREET. I'm not sure why she wanted a tour; perhaps game development is more fashionable than we think. But I'm glad she came, because she's not a gamer

We're always showing our games to gamers, and gamers have been conditioned not to notice problems that occur in every game. My hairstylist will notice these things because she's comparing my game to reality, not another game.

And when my hairstylist started running her character around, little alarms fired in her brain and the illusion was broken. "Uuu-wa!" she said, "I'm running

like a crab!" My heart sank. She accepted the environments and the sounds, and she loved the vibe of the intro videos. But the moment she started to move, she was reminded that this was just another video game.

Later I had to confess that I was in charge of making the characters run around, which was a strange feeling for me. Animation is a strength in our games despite the rare crab walk,

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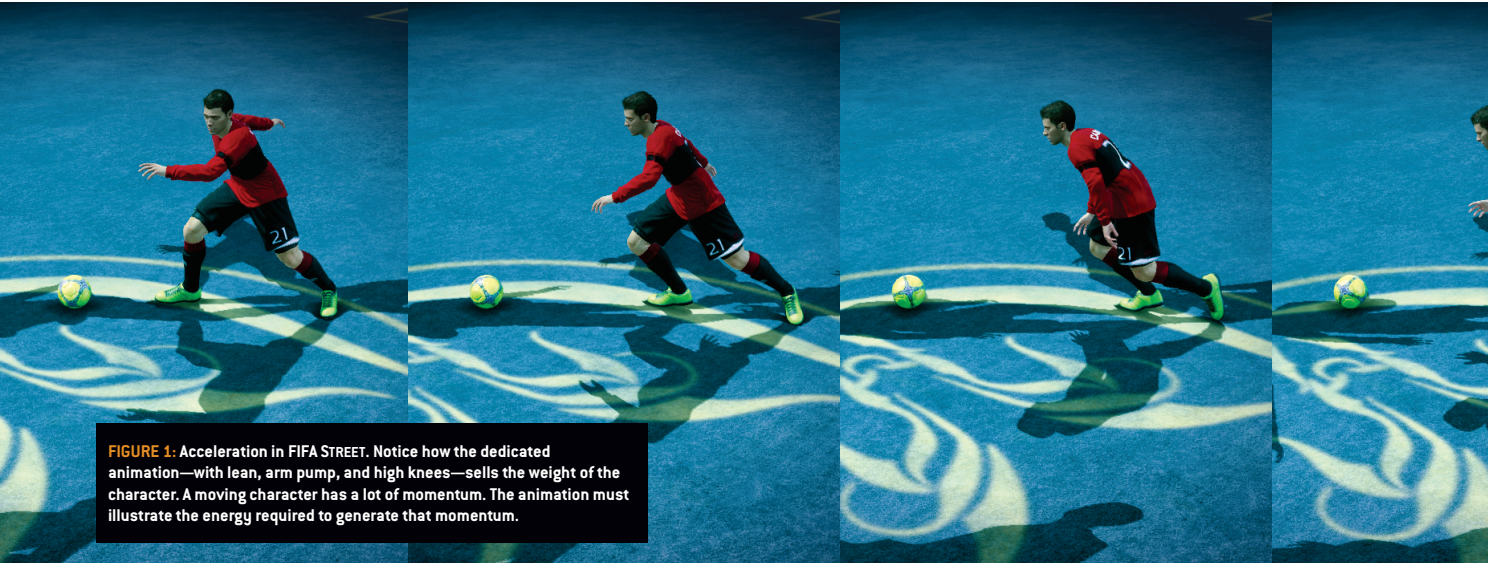


FIGURE 1: Acceleration in FIFA STREET. Notice how the dedicated animation—with lean, arm pump, and high knees—sells the weight of the character. A moving character has a lot of momentum. The animation must illustrate the energy required to generate that momentum.

and we're proud of the advances we've made over the past few years. Yet we clearly haven't come far enough. Animation in the game industry as a whole hasn't come far enough.

Consider a majestic mountain vista in *THE ELDER SCROLLS V: SKYRIM*. The artistry is sublime. Now consider how you reached the top of that mountain. You didn't climb, because you can't climb in *SKYRIM*, and for steep mountains, you probably didn't walk. You hopped. You hopped all the way up the cliff, and it looked ridiculous.

Consider too that "treadmilling"—jogging against a wall but not going anywhere—is still common in triple-A games. Many of these triple-A games have animation that is otherwise beautiful. We don't bother fixing treadmilling because it's a problem that's been around so long that most gamers don't complain about it anymore. But it's the first thing my hairstylist will notice. And it's a silly problem that's easy to fix.

Suspension of disbelief, by nature, requires

the viewer to forgive certain limitations of the medium. But we can do better. It's easy for us to do better. There's an orchard of low-hanging locomotion fruit, and I'm going to show you how to pick it in this article.

RESPECT MOMENTUM

/// I grew up playing hockey. When I was a kid, my dad told me that I could play in the NHL one day. Now, my dad's an honest guy, but that was a whopper. No one on either side of my family has ever grown taller than 5'8".

But I learned something as a small guy playing hockey: People are heavy. It takes a lot of energy to get us going, and it takes a lot of energy to slow us down. This concept is fundamental to locomotion. When a character accelerates, decelerates, or turns, his pose must show that he is expending energy.

When your character transitions from a stand

to a jog, he needs a dedicated start animation where he leans forward and pumps his arms to accelerate. If he just pops straight from a stand animation to a jog animation, he will feel light, like a puppet. To add credibility to your character's movement, keep his perceived and actual energy expenditures in line, as in **Figure 1**.

The same principle applies when a character is turning. The turn animation will begin at a certain speed, which may or may not match the current speed of the character. You should modify this turn animation to match the current speed. Otherwise, your character will suddenly speed up or slow down at the beginning of the turn, and it will look as though he was moved by an external force.

You can speed match this animation in three ways. You can start the animation part of the way in, compress or expand the distance traveled by the animation, or scale the playback rate of the animation itself.

For a turn animation, the first option makes the most sense, since you would expect to turn sooner from a slow jog than a fast one. In other contexts, the second and third techniques might make more sense. (I'll discuss those two below in the "separate movement and pose" and "play with time" sections.)

Note that speed matching is most important during efficient motion, like jogging. More energetic motions, like jumping and punching, can still look realistic if the momentum changes significantly. For example, in *FIFA Street*, we need to be more careful of momentum when receiving the ball than when kicking it, since receiving requires much less energy.

INTERRUPT AFTER THE SQUASH

/// You may have beautiful start, stop, and turn animations, but you're going to need to interrupt them in response to user inputs and





AI commands that aren't willing to wait for your animation to finish.

The key to interrupting an animation is to do it at the right time. Most animations can be broken into “squash” and “stretch” phases. In locomotion, the squash phase is when the character is catching his body weight, as in **Figure 2**. There's no way to interrupt such a motion, except perhaps to make the character fall on his bum.

But at the start of the stretch phase, the character is coiled up and ready to spring in any direction. At this point, you can interrupt with a new animation that lifts the feet off the ground, resets the center of gravity, and resquashes the character. If the input keeps changing, you can repeat that animation as often as you need.

You may be concerned about this wait.

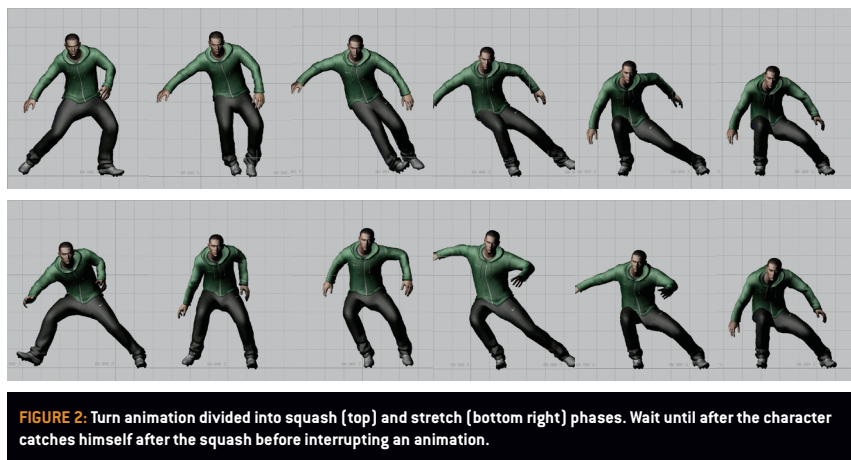
Doesn't waiting translate into a lack of responsiveness? In this case, it does not. Responsiveness is not about reacting right away: It's about reacting as soon as it's natural to react. You have to wait for the character to catch himself—that is, for the squash to complete—before you throw him in another direction.

That said, the next technique will help you increase perceived responsiveness when you can't interrupt.

LEAD WITH LIMBS

/// Unresponsive locomotion is pad-breakingly frustrating. If you tell a character to go left, and it looks like he can go left immediately, you'll notice even the smallest amount of lag.

Some games solve this by forcing the character to move immediately in the requested direction. This solution is a bit extreme. You'll lose momentum preservation and realism, and if you spin the left stick in circles, you can make your character pirouette. Few things break suspension of disbelief more than a character spinning on



the spot while playing a jog animation.

The key to solving this problem is to realize that responsiveness is not about executing the user's request immediately but about acknowledging the input immediately.

Imagine you made a game where you steered the Titanic around icebergs. The Titanic couldn't exactly stop or turn on a dime, so when the player presses left, the ship shouldn't turn immediately. However, you don't want the player to wonder whether his input is being registered or not. If you don't animate the ship carefully, the player will press harder and harder on the pad, get frustrated, and get a sore thumb.

The solution is to animate the ship so that it looks like it's trying to turn. You can exaggerate the movement of the rudder and the lean of the hull. As long as the user feels that the vessel itself is responding immediately, he'll accept that the ship's motion has lag.

We can use the same technique with human motion. Your body doesn't have a rudder or a hull, but you do have a head and arms. When we turn

left, we first look left. When we rotate our hips, we first rotate our shoulder and arms, as in **Figure 3**.

You can use this to acknowledge the user's input immediately. The head is relatively easy to animate procedurally, so be sure to have your character look in the direction he wants to go, even if he can't start moving there right away. The shoulders and arms require more care when animating—see “keep the head still” below—but the same principle applies.

AVOID CYCLES

/// The “run cycle” is possibly the most evil concept in locomotion as we understand it today. Only marathon athletes run in a cycle. The rest of us, especially over the first few steps, will change our gait with every stride.

Sprinting requires a lot of technique. Not many of us can execute that technique, but we all recognize it. You won't fool anyone by adding a little procedural lean to a run cycle. But you can do something much less complicated—just use a



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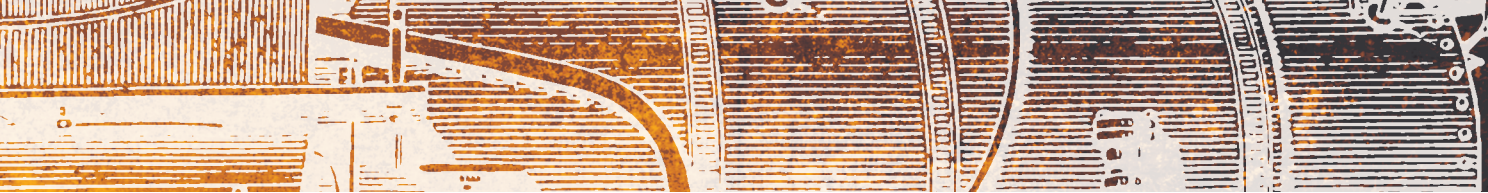


FIGURE 3: Changing direction while walking in *ASSASSIN'S CREED*. Altair's locomotion is slow and smooth, yet it still feels responsive because his head turns immediately, followed quickly by his shoulders, and then finally by his hips.

dedicated animation when your character starts to run (as we do in **Figure 1**).

So, how do you avoid marathon running after those first few steps? Naughty Dog developers figured out that they could use additive animations to make the character look around. They maximize the length of this summed animation by ensuring the run cycle and additive animation have lengths that are relatively prime. As long as your additive animation is sufficiently extreme, you end up with something that doesn't feel like a cycle anymore (see **Reference 1**).

If you're going to use additive animations, keep this mind: Your mileage will vary depending on the intensity of the underlying run cycle. If the

shoulders are swinging wildly, you're not going to be able to add on much extra shoulder movement.

AVOID SUSTAINED BLENDING

/// Blending is the chocolate cake of animation: It's fantastic at the right time, but you shouldn't try to make it your bread and butter. Suppose you have a jog animation, a sprint animation, and a character who needs to travel at a speed somewhere between a jog and a sprint. What do you do?

Maybe you start by blending the jog and sprint animation together. Intuitively, this seems like a good idea. Indeed, if you gradually ramp up the blend percentage as the character accelerates from jog to sprint, you'll have a sort of infinite variety in your animations. But this idea falls short for a few reasons.

First, in order to support sustained blending, your jog and sprint animations must be similar. However, jogs always touch the ground heel-toe,

making them closer to toe-heel, toe-heel. When jogs and sprints are blended together, you end up with a gait that is neither heel-toe nor toe-heel. At best, your character will lose his sense of weight. At worst, his feet will float above the ground.

Second, accelerating from a jog to a sprint is different than jogging or sprinting alone. Accelerating requires an extra burst of energy, which you can show with more upper-body movement and more leaning. If you want to show a person accelerating, it's best to have a specific acceleration animation.

Third, you can tell a lot about people by their gaits. Try sitting in a park and watching strangers pass by. You can guess a person's mood or personality just by how they walk. All walks have the same basic motion, but each has an incredible amount of nuance that your eye is trained to spot. By blending two gaits together, you lose that nuance. Blending two animations together

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smoothes them out. A spry old man may lift his shoulders on every step, but if you blend that 50-50 with anything else, he'll only lift them half as much, and the animation will lose character.

Note that a quick blend from jog to sprint will look fine. Problems arise only when the blend is sustained for several steps or more.

Despite these problems, the concept of sustained blending seems to have permeated modern animation systems. At our office, we've seen these problems so often that we've given them a collective name: "Brangelinas." Take two beautiful people—Brad Pitt and Angelina Jolie, for instance—and morph their faces together. What does this blend give you? It gives you a face, for sure, but don't plan on taking that face to Hollywood.

Instead of relying on sustained blending, you can separate the movement itself from the pose and play with the animation's playback rate to make these movements look more realistic. I'll describe how these methods work in the next two sections.

SEPARATE MOVEMENT AND POSE

/// A fast jog and a slow jog are slightly different movements: The fast jog will extend the legs farther and swing the shoulders more than the slow jog will. But the differences are subtle, and the underlying muscle movements are identical.

So, if you take a slow jog, and simply translate it at the speed of a fast jog, only the most nitpicky animators will notice. That is to say, the easiest way to vary the speed of your character is to simply ignore the speed of his underlying animation and move him at your prerogative.

For this jog-and-sprint example, you can add extra translation to the jog animation as the character accelerates. After a certain threshold, you can do a quick blend to the sprint animation, from which you will subtract some translation. You'll want to ensure you have different thresholds when accelerating and decelerating so that your character doesn't oscillate between jog and sprint animations.

You may think this solution is less desirable because you have a discrete transition instead of a smooth, gradual one, but when it comes to animation, discrete transitions are usually preferable. When an athlete decides to sprint, he doesn't gradually transition to his sprint technique over several steps—he starts to sprint immediately. Jogging and sprinting are two distinct skills that have been drilled into his body. His body does one or the other. There's no hybrid.

If you do use this technique, make sure you maintain the foot plants. If a jog step is translated an extra 10 inches, and the character's weight is on his left foot for the first 20 percent of the step, then the left foot will move 2 inches while the character has his weight on it. This is the animation equivalent of putting the nose on upside down. You need to detect when the feet are planted, and use inverse kinematics (IK) to

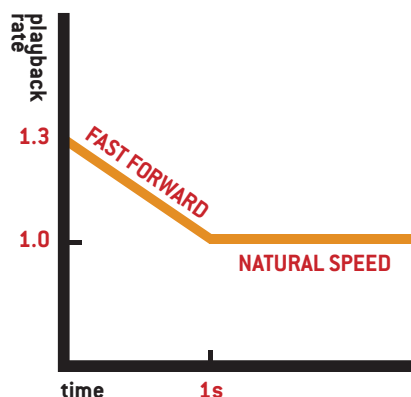


FIGURE 5: Speed matching using playback rate. When your character is moving faster than your animation, you can maintain momentum by playing back the animation in fast forward. Gradually reduce the playback rate to the animation's natural speed to avoid comical motion.

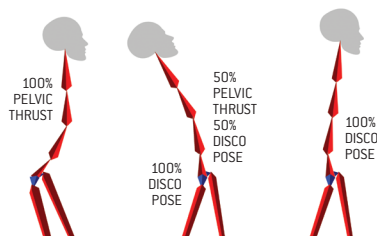


FIGURE 6: Different blend times along the bones to the head can result in head thrashing. (a) The spine counter-rotates the hip motion to keep the head still. (b) When blending to the disco pose, we take more time to blend the upper body; the hips have reset, but the spine is still counter-rotating. (c) The head snaps back as the upper body blend finishes. Head pops are very noticeable glitches.

keep the foot solid while the body moves the extra distance (see [Reference 2](#)).

This technique works well for turning animations, too. You use similar muscle movements whether you're turning 180 degrees or 135 degrees, so there's no need to have separate animations for those two turns. Just pick one, and warp the character's positions to give you the desired turn angle.

Taking this a bit further, if the movement request changes midway through the animation, you can rewrap your 180-degree animation to turn 135 degrees on the fly (again, see [Reference 2](#)).

Note that IK isn't a panacea—it has a tendency to overextend your joints, which can create some ugly poses. Using IK for walking animations can cause problems, since both feet are sometimes planted at the same time. To overcome such difficulties, you can try the next technique.

PLAY WITH TIME

/// Walking around downtown Vancouver, I've noticed two things about pedestrians: First, there are a lot of smaller women, and second, most of

them walk faster than me. This phenomenon still surprises me, because even though I'm a pretty short guy, a lot of these girls are significantly shorter. So, how do they do it?

They simply take more steps than I do. Their walk animation is playing in fast forward (or my walk animation is playing in slow motion). Either way, the lesson is clear. For walking, there is a wide range of natural playback speeds.

If you'd like to make your character walk 30 percent faster than your walk animation, simply play back that animation 30 percent faster. You'll avoid the foot-planting issues caused by extra translation, and you'll avoid a Brangelina blend.

There is a limit at which your character's movements will start to look comical, but even so, you should experiment with playback rate. Mathematically, it's a one-dimensional function, which makes it the simplest tool in your toolbox. And it's more flexible than you may think.

You can use the playback rate to preserve momentum. If you have an animation that starts too slowly, try playing it in fast forward for the first few frames, and then gradually reduce the playback speed to normal, as in [Figure 5](#). The gradual change in playback rate will cause a gradual change in speed, which looks better than a sudden speed drop.

Animations often have a moment of stillness. In tennis, these moments occur when your body is coiled and ready to explode into a swing. In locomotion, these moments occur when a character is crouched and ready to spring out of his turn. In conventional animation terms, the stillness happens at the boundary between the squash and the stretch (as in [Figure 2](#)).

Playback rate lets you play with these moments of stillness. By shortening these moments, you can make a character feel much more agile. By lengthening them, you can give a character more weight. And because these are special moments in the animation, you can take the playback rate to extremes. You can almost stop the animation or play it in double-time, and it will still look reasonable.

Playback rate is a robust variable. You don't have to smooth out your playback rate using splines. Even discontinuities will look fine, as long as they preserve your character's momentum. Make your life easier by using piecewise linear functions.

KEEP THE HEAD STILL

Golf is one of those games where you can provide your own color commentary as you play. The best commentary comes when I play with my dad, who's a master at finding fresh ways to say, "Keep your head down." It's a cliché in golf, but this advice is true for pretty much any sport. Hockey, soccer, bowling—if you want precision, you need to keep your head still.

This is a problem in animation, because the

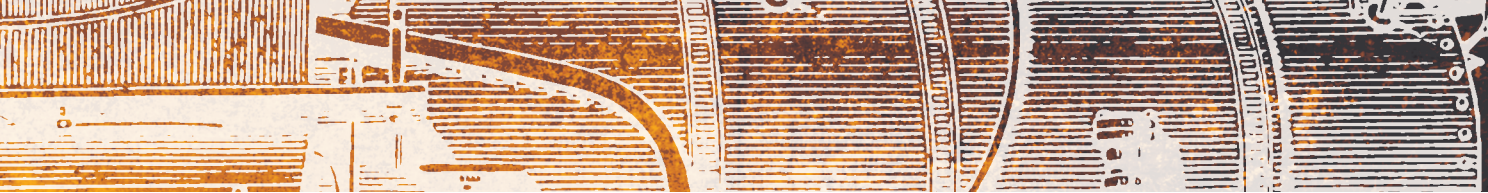


FIGURE 7: Avoidance in FIFA STREET. We added avoidance-specific animations to our core locomotion system. This was much more effective than trying to avoid using existing locomotion animations.



head is generally a long way from the root bone. Small movements in the hips or the lower spine can result in big movements in the head. Your source animations are carefully constructed to avoid excessive head movements, but once your source animations start blending together, all bets are off.

Occasionally you'll see this problem with animations that rotate and counter-rotate the bones of the spine. See **Figure 6a**, where the animation is dancing by thrusting the hips back and forth. Even though the hips are translating and rotating quite violently, the other bones in the spine compensate to keep the head still.

Now suppose the character blends to a disco pose, as in **Figure 6b**. Because the pose is so drastically different, we want to blend the upper body for quite a long time. The lower body has to keep the beat, so we blend it quickly. The hips are included with the lower body

blend, since otherwise the feet won't touch the ground properly. But this causes a problem: The hip thrusting will blend out before the spine counter-rotates, and the head will end up thrashing backward, as in **Figure 6c**. This is a very noticeable glitch.

When using different blend rates on the bones between the hips and the head, you need to watch out for jerky head movements. If your animation set is neutral on the hips and spine, you may not have a problem. But pelvic thrust motions and their ilk appear in surprising diversity—these bones move for a reason—so you need to be careful.

If your game depends on separate upper and lower body blend times, you may want to duplicate your hip bone. One hip will attach to the upper body skeleton, and the other hip to the lower body skeleton. Both hips can be driven by the same

source data channel, but they will be free to blend independently, which should solve your problem.

For a more mundane example, consider the situation in which your character is accelerating hard, and he is leaning forward. Suppose the pad input changes, and your character must now break hard. The break animation will have him lean backward. No matter how long a blend you use, your character's head will pop up before it comes back down. This is another jarring glitch that everyone will notice.

There are several ways to fix this. You can reduce the amount of lean—though that won't look as good—or you could disallow the deceleration until the character is upright, which would make the controls less responsive. Instead, consider adding a specific animation to break from a forward lean. This isn't as lazy as it might first seem—stopping when your center of gravity

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is already low is a very different movement from stopping when your center of gravity is high. I'll discuss this more in the next section.

ANIMATE SITUATIONS, NOT STATES

/// When we rewrote the FIFA series' gameplay engine back in 2006, we took a holistic approach to locomotion. "We need animations for this speed range, facing any direction, and between this cadence and that cadence," we said. "Simple. It's a three-dimensional space. Let's just populate the space and start blending." Soon enough, we had an animation system that solved the problem space.

But our solution was missing something. When you accelerate to sprint, you don't start at a walk, progress to a leisurely jog, and become gradually more intense. A sprint from stand is a special situation where each step leads into the



The UNCHARTED series does a great job of animating to the situation. When Drake runs behind a pillar, he doesn't just run behind a pillar. He plays a run-behind-pillar animation.

next. This situation cannot be reproduced by a sequence of static run states.

Our mistake was in how we defined the problem space. In locomotion, as with the rest of animation, you need to define the problem space in terms of key situations for your character. Does your character need to accelerate quickly? Duck into cover? Run while looking behind? If so, make sure your locomotion system excels for these situations. Avoid the temptation to generalize multiple situations into a single state. The more situation-specific animations you have, the better your locomotion will look.

For FIFA STREET, our key locomotion problem was avoiding other characters. The initial plan was to avoid using our existing locomotion system—just run in an arc. This would have worked, but it would have looked silly. Avoidance is more than physically not colliding. When you avoid, you twist your body to get out of the way. You jump over legs. So our final solution was to include avoidance-specific animations in our core locomotion system, as in **Figure 7**.

The UNCHARTED series does a great job of animating to the situation. When Drake runs behind a pillar, he doesn't just run behind a pillar.

He plays a run-behind-pillar animation.

This is what contextual animation means. It's not about sticking your arm out when you get near a wall. It's about identifying gameplay situations for your character and giving him specific animations for those situations.

ADD ENERGY

/// Locomotion is more difficult than kung fu—in the animation world, at least. Locomotion moves the body efficiently, and efficient movement must always consider a character's current state. As we saw in the previous technique, a character can't suddenly transition from a leaning-forward jog animation to a leaning-backward stop animation. His center of gravity needs to travel in a straight line for maximal efficiency.

Kung fu, on the other hand, moves the body energetically. Energetic movement resets the center of balance. From any given kung fu move, you can transition to any other move. Essentially, the energetic movement resets the character's state.

You can use this principle to get yourself out of tough situations. Suppose your AI sends you crazy inputs, requesting your character to change direction many times in quick succession. Your smooth, efficient turn animations are going to get you into trouble. Either your character's feet will get tangled or his movement will appear sluggish and unresponsive.

To escape from this bind, try playing an energetic animation that pops the feet off the ground and resets the center of gravity. From this pose, your character is balanced, free of foot planting, and able to go in any direction. Essentially, it's the locomotion equivalent of a kung fu kick.

Energetic movement can help you deal with uneven terrain, too. When your character is running over uneven terrain, his center of gravity tends to bob up and down with the bumps and holes underfoot. This is unnatural. A real person will bend his knees more or less to keep his center of gravity flat, even if he is running with one foot higher than the other.

It's a bit of work to handle all the possible situations that a character can get into with uneven terrain. If you use IK to adjust the bend of the knees, you're likely going to end up with some strange poses. If your run animation already has fairly straight knees, IK might end up locking out the knee when you step in a puddle.

An energetic—that is, inefficient—run animation can help sell movement over uneven terrain. If your knees are naturally bent, they'll be able to reach down farther. And if your center of gravity is already bobbing up and down, a little extra bob isn't going to be as noticeable.

MAKE THE MOVEMENTS LESS FAMILIAR

/// Most of us practice locomotion quite a bit—such as every time we get off the sofa to grab

another bag of potato chips. After facial animation, locomotion is the form of animation we are most familiar with, which means the quality bar is high. Put another way, the "uncanny valley"—the point at which an animation starts to look so realistic it is unnerving—for locomotion is deep. You can't fool your users with half-baked locomotion the way Keanu Reeves fooled most of us with his half-baked kung fu in *The Matrix*.


But the good news is that you can cheat. If normal walking is tough, make your characters walk funny. If efficient movement is difficult, give your characters an abundance of energy.

If you went for a walk one day and walked past someone moving like Nathan Drake from UNCHARTED or Frank West from DEAD RISING, you would wonder if you had stumbled into a bad part of town. Their locomotion is stylized. It's abnormal. But because many of us have been raised on a healthy diet of cartoons, their locomotion is still within the bounds of our suspension of disbelief.

This is the target you're looking for. Stylize your locomotion as much as you can. Bring it as close as you dare to the edge of our suspension of disbelief. This will make the movements less familiar and push your animations safely from the brink of the uncanny valley.

DO THE LOCOMOTION

/// We've played games for so long that we forgive bad animation. We're used to treadmilling against walls and hopping up mountains. Right now, there is a real opportunity to make a game that stands out. I'm sure you can think of several games from the past few years that wowed you with their animation.

You can do the same (or at least raise your animation bar significantly) without too much effort. Some locomotion fruit hangs so low you'll have to reach down to pick it. On your next game, try shelving that even-more-amazing rendering feature and spend some time instead improving your locomotion a little. A little effort could make a big difference. 

JASON SANMIYA has worked on FIFA SOCCER at Electronic Arts since 2005 as a lead animation programmer. He developed the locomotion system used in some of EA's biggest games, such as FIFA, MADDEN, and BATTLEFIELD 3. His most recent project was the reboot of FIFA STREET. He loves Japanese enka, butterscotch ice cream, and his wistful cat, Professor Truffles. email him at jsanmiya@ea.com.

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HAUNT mansion owner
Benjamin "Benjy" Muldoon.



HAUNT

27

DEWI TANNER

In September 2009, Microsoft Studios approached us at NanaOn-Sha (PARAPPA THE RAPPER, VIB-RIBBON) with a request to make something with a wacky, universal appeal using its new Kinect motion-control technology. We put five pitches together (each more wild than the last) before they informed us that they were most interested in HAUNT, a light-hearted first-person adventure game set in a haunted house. It took us about nine months to get from that initial pitch to signing the project, by which time the core concept of the game had changed significantly. And since NanaOn-Sha doesn't keep any full-time programmers or artists on the books, we also brought U.K.-based

development studio Zoe Mode onboard to implement the project. What followed was a 12-month development cycle jam-packed with blood, sweat, and tears—unlike what any of us had ever experienced before. Was our mission successful? Well, that depends on what criteria you judge success by—but there are certainly plenty of aspects of HAUNT that we can take pride in, and some real takeaways to share.

WHAT WENT RIGHT

1 / successful multinational collaboration

With so many parties involved, it was hard to maintain a coherent vision for HAUNT. In effect,

we had three creative centers—us in Tokyo, our publishing team in Washington, and the Zoe guys in the U.K. One of NanaOn-Sha's guiding philosophies is that in order to have games with cross-cultural appeal, you need to have staff from different backgrounds (PARAPPA's character designer was American, as was the lead programmer for VIB-RIBBON), and this project certainly fit the mold—indeed, it was our most ambitious yet in terms of multinational collaboration.

Of course, this approach isn't without its downsides. HAUNT's development was anything but smooth sailing, and we faced creative disagreements at every milestone. This may sound like more hassle than it's worth, but we really believe that creative conflicts are a great way to tease out unique products with that elusive "universal" feel. Also, we had been reading a lot of articles about failed

HAUNT



Publisher: Microsoft Studios

Developer: NanaOn-Sha and Zoe Mode

Release Date: January 18, 2012

Number of Developers:

Around 20 full-time and three contractors at the project peak

Length of Development: 12 months

Budget: Similar to most premium XBLA titles

Lines of Code: 997,000 (in all, including game runtime, game tools, "Fabric" engine)

Development Tools: Custom Editor ("Spooky"), Visual Studio, Maya, ZBrush, Photoshop, Perforce, Wwise, Hansoft

Skype problems: Too many by half!

collaborations between Japanese and Western studios, so we were determined to prove that when done correctly, a multinational partnership can make a game better.

Looking at the final product, we really feel that HAUNT comes across as a "borderless" title. HAUNT doesn't feel specifically Japanese, American, or British, and it has its own vibe as a result. From the very start of the project, we knew that the game wasn't realistically targeted at the Japanese market, so anything overtly Japanese would have been a big risk. We did actually sound out several

Japanese studios to collaborate with before settling on Zoe Mode, but we weren't convinced that any of the other developers could grasp what a Western audience would expect from a "haunted house" experience. We needed our development partners to be able to synchronize creatively with us in Tokyo and understand what our U.S. publishing partners would expect. Zoe nailed it on its first pitch, which meant that we could focus on implementation issues instead of endlessly debating core philosophies.

From a practical perspective, there were several things that

helped us pull this off. First of all, we hired a Japanese-English translator who translated almost all of our email into each language for the entire project. This meant staff wouldn't lag behind on certain issues, because they wouldn't have to read in their second language. Second, we held frequent video conferences, because face-to-face contact helped ensure subtle things didn't get lost in translation. We also visited Zoe Mode whenever possible to make an effort to get to know each other and understand our cultural differences. Finally, we made sure that we "clicked"—if you don't have good chemistry with your partners, it's harder to keep everyone on a unified course.

2 / robust navigation system

When we were pitching the game to Microsoft, two crucial issues came up: the camera and the navigation system. We were pretty confident that for a game that relies on atmosphere and spooks, a third-person camera just wouldn't

cut it. For us, Kinect was an opportunity to get players closer to the screen, experiencing things firsthand. If your avatar looks scared when you aren't scared, it kind of spoils the immersion.

Navigation was an altogether different beast. We ended up with an implementation very similar to our initial vision, in which the player uses his arm to point his flashlight and pan the screen, and walks in place to move forward. Navigation has been a tricky issue for Kinect, even after 18 months on the market, but we were convinced that in order for HAUNT to be a spooky, immersive experience, players needed to physically drive the in-game movement themselves. Every movement forward is a step toward a potential scare, and we really wanted players to feel that anxiety, which we felt would be stripped away by any automove alternatives.

Designing and developing a system in which the player walks in place and points with his arms might sound simple, but it ended up dominating HAUNT's development,



and took up about 15 percent of our total resources.

Microsoft was concerned that players would find walking around corridors a chore, so we tackled this in a few different ways. We balanced the parameters so that a minimum amount of movement was necessary to drive the player forward; we implemented an "autoturn" option so that the camera would automatically turn around corners, which was much more complicated than it sounds but definitely worth the effort in the end; and we increased the amount of distractions, such as small scares and wandering ghosts, to break up the monotony of wandering around empty corridors.

Despite all this effort, which we hadn't planned for in our initial budget, we were never able to fully convince our publishing partners that our navigation system was the best it could be, and every time they saw a different first-person Kinect title that used alternative methods, we would feel pressured to follow in line. It was a big risk and a big creative judgment call on our part to stick with it, but we feel that this has been justified by the number of reviews praising the system compared to the equivalent scorn poured on HAUNT's peers. Indeed, I've yet to come across a review that knocks HAUNT's navigation system, and considering the generally harsh approach to reviewing Kinect games by the traditional game press, this praise was hard-earned.

3 / aesthetics defined early

Just one week after we had signed the contract, we were informed by Microsoft that HAUNT would be featured at the 2010 Tokyo Game Show, which was just three weeks away—and that we needed a video for the announcement. It was a great marketing opportunity that we didn't want to pass up, but coming up with a high-quality video that would be reflective of the final product in just over two weeks was a real challenge. However, it really served as a catalyst for all of us to define the aesthetics of the title very early in development, and after TGS we seldom had any concerns about the

visual style of the game.

During that period, we held Skype meetings with Zoe almost daily. Microsoft wanted HAUNT to have a "Disney's Haunted Mansion" feel to it, and given that brief we attempted to forge a visual identity that was charming yet with a cheeky darkness to it. Our influences included the classic Italian horror director Mario Bava, *Twin Peaks*, and *Pan's Labyrinth*, which were all pretty "serious" properties. But we knew that as long as the content was sufficiently mild, the game wouldn't be too scary for our target market.

The only disadvantage to our aesthetic choice was the cost. It took a lot of resources to get the visuals to release-quality levels, and even then the rooms in HAUNT are relatively bare. We now understand why most Xbox Live Arcade titles are 2D or controlled-perspective 3D; when players are playing through a first-person perspective, they can't help but compare you to mainstream retail titles, even if your art budget is minuscule by comparison.

4 / modularized approach to Kinect scanning

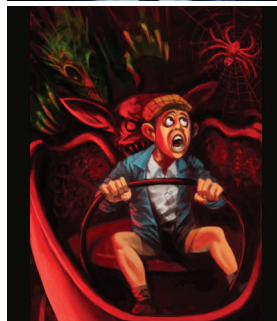
By choosing Zoe Mode as our development partner, we were choosing a team with a long experience in camera games, due to their work with Sony's EyeToy. This turned out to be a massive advantage. After some early experiments, the tech and design teams determined that in order to get the most out of Kinect, we should modularize input systems, rather than layer them.

HAUNT has very few occasions in which you can do more than one interaction simultaneously. Most of the time, you either do a specific gesture, or you don't. As soon as things get more complicated than this, Kinect gets into slippery territory. Sometimes the player will run into false positives, where the system thinks that the player has done a specific gesture he didn't do, or false negatives, where the player thinks he's done a specific gesture but the system doesn't register it.

These issues tormented us when we developed MAJOR MINOR'S MAJESTIC MARCH for Nintendo's Wii,

but we handled it much better in HAUNT by managing the number of inputs scanned at any one time and then doing whatever we could to reinforce the results to the player. The more plural and complicated the gestures are, the more likely false negatives and positives will frustrate players. This is made doubly dangerous in first-person games, where players don't have onscreen avatars to visually synchronize their movements with.

The one major exception to this in HAUNT is navigation; the system simultaneously monitors feet and knees (to move players forward) and arms (to point the flashlight and access the Xbox Guide). These actions are mapped to different halves of the body, so we could treat them as separate modules instead of layering them and relying on the system to distinguish them.



Some of HAUNT's in-game paintings.

Kinect is a paradox. It's labeled a "natural user interface," but many issues prevent most ideas from being implemented in a straightforward manner. We had to do all kinds of hacks to make things feel natural, or as close to natural as possible, and taking this modular approach meant that we were able to test them in isolation.

Problems that might ruin your amazing Kinect idea may stem from technical, cognitive, or cultural issues. Our technical issues generally involved balancing lag and smoothing—Kinect's skeleton tracking jitters heavily, but the more you smooth it out, the more lag you get—and inaccuracy (the false positives problem mentioned earlier, as well as the large percentage of players who don't calibrate their Kinect properly). Cognitive issues came up when Kinect was unable to map things 100 percent to the real-world equivalents due to various limitations—such as the fact that you can't walk forward much when playing Kinect because you'll run into the TV. Our hack was to have players walk in place, but as this isn't a 1-to-1 implementation, players are bound to experience some cognitive confusion.

Finally, there are cultural issues; players can interpret things in different ways. We found that many American players wanted to perform walking with minimum effort, with tiny real-world footsteps amounting to large game-world footsteps, so we implemented the minimum footstep height possible given Kinect's granular accuracy. If the distance is too small, we'd get false positives, and the camera would move forward in the game even when players were standing still. By the middle of the project we were pretty savvy about Kinect's capabilities, and we could eliminate ideas that sounded great on paper but would have been crippled by its limitations.

In the future, technologies like Kinect will (hopefully) become more accurate and reliable; from a player's perspective, there's a massive difference between 90 percent reliability and 99 percent. If that happens, game developers will be free to create more action-oriented, high-octane experiences.

HAUNT

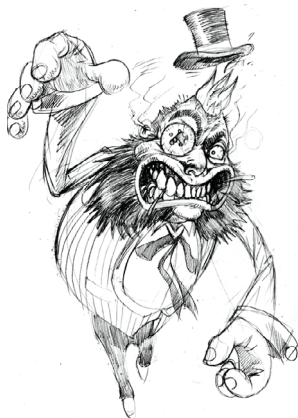
But for a spooky game like HAUNT, which encourages slow, deliberate movements, the current technology was a sufficient match.

5 / and introducing...Tim Schafer

Looking at the legacy of NanaOn-Sha titles, one of our hallmarks is the way we use voice talent. For the PARAPPA titles, we used musicians, not actors, to voice the characters. Their performances were never going to win any Academy Awards, but their flat deliveries had a certain charm—and the character models in PARAPPA were technically flat, too!

For HAUNT's vertical slice stage, we were using the partner of a Zoe staffer to voice our game's only speaking character, mansion owner Benjamin Muldoon. The actor was very gifted, and gave a thespian, ultra-English performance with some gusto that many on the dev team were quite proud of.

However, for NanaOn-Sha founder Masaya Matsuura and me, something wasn't quite right. Benjamin Muldoon—or "Benjy," as we called him—is a grubby



old geezer who came to riches by surreptitious means. And he's trapped inside a painting. He has intentionally crude animations—his mouth flaps open and his pupils roll, much like a Terry Gilliam talking head in Monty Python. It was pretty cheesy, and we loved it. Sadly, the crude, flat Benjy character just didn't match the hyper-animated performance of our thespian friend, but we weren't sure what to do until one day, when we were talking with (Double Fine founder) Tim Schafer at a GDC party in 2011.

Tim invited us on a tour of Double

Fine's studio the next day, and after the party I suggested the notion to Matsuura of Tim playing the part of Benjy for HAUNT. He loved the idea, and it really seemed like a NanaOn-Sha thing to do. After the tour the next day, we popped the question to Tim, and after some moments of wild, inner panic, he said "Sure! Fuck it. Let's do it!" and we never looked back.

We're very happy with Tim's voiceover—his dry, flat performance is a perfect fit to the 2D painting his character inhabits. But it was a real challenge to get the performance just right; working with nonprofessionals requires that you focus the workload on their strengths and minimize the weaknesses.

The first thing we did was allow Tim to rewrite the voiceover script. The original was written by British game designers (myself included), so in order to get a natural-sounding performance, we knew the script had to be in his voice. He wasn't required to do any accent or place his vocabulary in a certain time or place. It was 100 percent Tim, with the freedom to take on Benjy's malevolent mindset—which he tackled with relish.

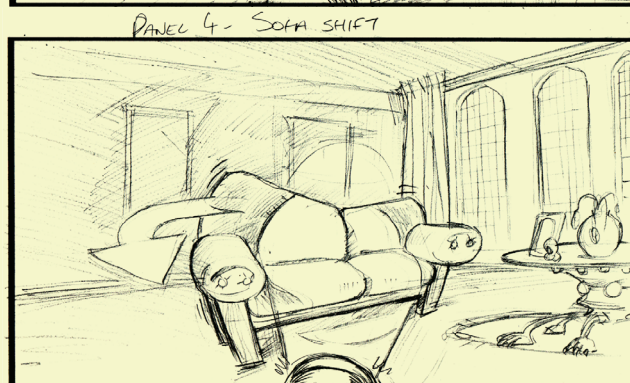
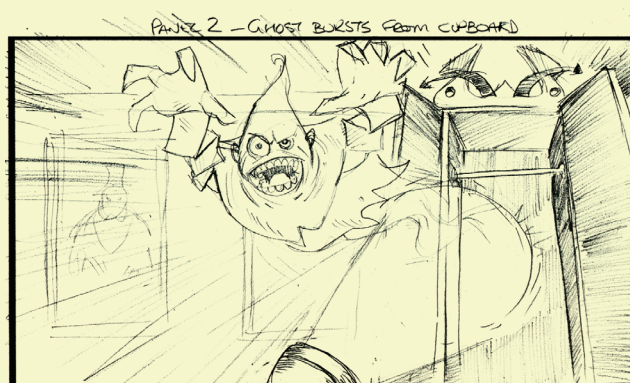
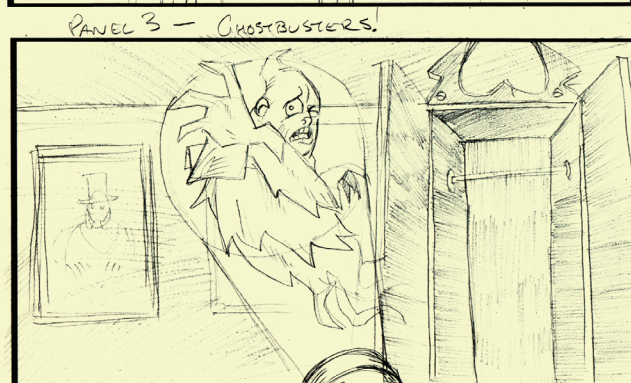
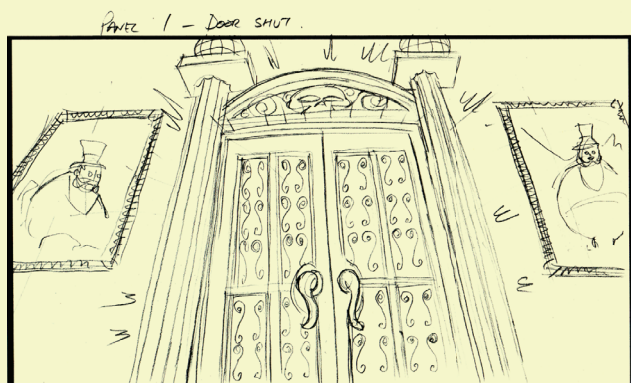
The second key element is that we had to do a couple of re-recordings—Tim would tire as the day went on, and the more we tried to cajole him into tapping into more energy, the more tired his performances became. Doing re-recordings not only gave him a chance to re-energize but also allowed us to check the lines in isolation and weed out required pickups (of which there were plenty!).

Third, we found that the recordings went much better when someone 100 percent familiar with the game was able to attend the session and give some direction. This isn't easy on an XBLA budget when 5,000 miles separate parties, but we managed to time a session to coincide with E3, which was truly worth its weight in gold.

WHAT WENT WRONG

1 / flawed communications pipeline

There was one point of contact at Microsoft, Zoe Mode, and NanaOn-Sha, and generally this worked well. Having one point of



Early HAUNT storyboards.



After the tour the next day, we popped the question to Tim [Schafer], and after some moments of wild, inner panic, he said "Sure! Fuck it. Let's do it!" and we never looked back. ¶¶

contact helps to focus discussions, but sometimes it would clog up development.

We would get feedback from our publisher's top-level management, but by the time it had reached the coder or artist responsible for the implementation, it would have gone through up to five middlemen. This led to a feeling that the feedback was practically an order, rather than a suggestion or topic for debate. In the other direction, when we had to explain certain contentious development decisions—such as our choice of navigation system—we were never really able to take full control of the issue, and subsequently no parties ever felt satisfied.

This was compounded by several management changes at the publisher during development, many of whom we never had an opportunity to meet with, speak to, or even email directly. We had to re-justify our navigation system decisions several times during development, but even then we could tell that the top brass weren't satisfied. Having to repeatedly make the same arguments proved to be a real distraction, and there was a real sense of frustration and helplessness about not being able

to control our vision. We should really have flown to the publisher HQ to communicate our vision and passion for the project and just hammer out these differences, but in the end we never visited and instead these troubles festered throughout the latter half of development.

Our failure to resolve these differing opinions on the navigation system really shook the publisher's confidence in the project, which ruined any chance we had of getting marketing support at launch.

2 / survival by a thousand cuts

¶ When we first pitched our projects to Microsoft in 2009, we did not distinguish between retail and XBLA. Microsoft liked our concept for HAUNT and suggested that we pitch it as an XBLA title. The problem was that our initial HAUNT pitch was envisaged as a title focused around user-generated content, with players creating their own haunted houses, doing their own monster animations via motion capture, and so on.

By the time the project was signed, we'd scaled this down massively but were still promising

"unlimited replayability" as one of our core pillars as a legacy of that initial concept. Half way through production we were forced to cut that pillar, and the end product features almost no replay value whatsoever. We cut tons of items from our burn list at several points, since it was the only way we could hit the quality bar with the resources available.

This was a major letdown, and most reviews specifically point out that HAUNT is a short experience with low replayability, which has cost us some Metacritic points for sure. At the time, we were hoping that games such as LIMBO had made the prospect of quality-over-quantity titles more acceptable, but this ended up not being the case for us.

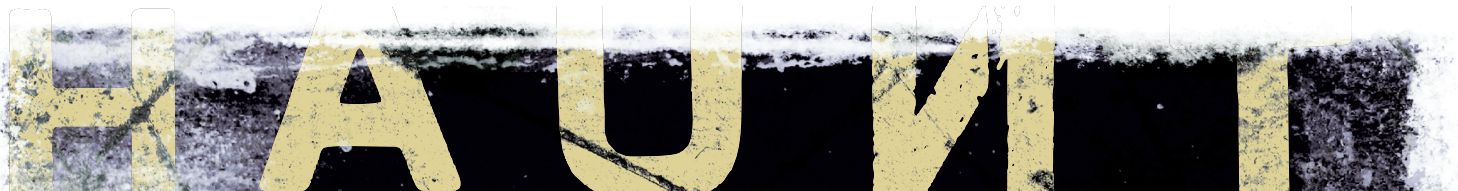
From the start, we were committed to using Kinect not as a tool to emulate Wii party games but as a way to bring the players into deeper experiences. For Kinect titles, where a significant amount of resources will be spent on refining the input methods, perhaps this "deeper" form is better off for retail titles, because on our limited XBLA budget, we found that three hours of quality left us with zero room for replayable features.

Perhaps the only thing saving HAUNT from utter disaster was Zoe Mode's use of Scrum. Throughout development we were able to rapidly reprioritize our focus and iterate on things until they felt right. The scope kept on dropping, but the quality remained high.

I would definitely suggest that any dev team embarking on its first Kinect project plan to at least double the usual contingency into its budget. There's no avoiding the fact that to make an idea work with Kinect, all kinds of tweaks and workarounds will be required. In order to make room for this we had no option to cut, cut, and cut again.

3 / moving goalposts and target market confusion

¶ HAUNT was something of an experiment on several fronts. It was originally part of an initiative to get Japanese creators involved with Kinect, but our specific brief was considerably wider. As was the case with PARAPPA, Microsoft hoped that HAUNT would be a title that appealed to both core and casual gamers. During development, the primary focus shifted like disturbed tectonic plates. At the initial pitching phase the goal was clear—get casual Kinect owners to



"dip in" to XBLA—but at kickoff, in order to fit in with Microsoft's keynote theme for Tokyo Game Show 2010, we were announced as one of a batch of titles intended to appeal to "core" gamers.

It was never clear which group we should specifically target, so we did our best to appeal to both, and we ended up making HAUNT easier than core gamers preferred. Having said that, we're pretty happy that the game does indeed have "universal appeal," but upon releasing the title, it was evident that XBLA was truly the domain of core users. Should HAUNT have been targeted more at those core users? Should it have been a retail title and marketed specifically to the mainstream? We never really addressed these issues by the time the game shipped. Instead, we were hoping that the game would create a new market, but we hadn't done any spadework to create that niche.

there was actually room for some marketing assistance, but to be brutally honest, HAUNT faded almost completely out of the public mind after that initial showing.

I'm not sure if people in the West are really aware of this, but it's very difficult to gain mindshare in the West from an office in Tokyo. Out of sight, out of mind. HAUNT was never really a part of the conversation in the Western press. Our only real chance to recapture some mindshare was TGS 2011, but we bungled the opportunity. Not only was this TGS notable for its scarcity of Western press, but we had only a single booth that we had to share with two other titles, and most of the time, it didn't even have a HAUNT sign. Furthermore, our demo featured a level from the middle of the game that was too difficult for newcomers, and the atmosphere of the title was drowned out by the din and glaring lights of the show floor.

something as analogous as Kinect. How you initially envision the game, how it's implemented, how Kinect reads players, and how players perceive what they're doing is all part of an opaque game of telephone in which you'll inevitably have to make tweaks and additions to make the game as user-friendly as possible.

Sadly for us, our attempts at usability and playtesting were too few, often flawed, and occasionally detrimental.

Our first usability session came after we produced our vertical slice five months into the project. It took place in Washington, and none of the dev team were able to attend, which was a real shame, because certain problems arose that we didn't anticipate. We didn't instruct the session manager to calibrate the Kinect sensor before the session, so the Kinect mic didn't register any sounds by the player, which broke parts of the level. It was so frustrating to watch the videos and be unable to do anything about it. But we took what lessons we could from the experience.

Perhaps the biggest lesson from this session was that you cannot take for granted players' understanding of text prompts in the game. Some were interpreted in ways we would never have imagined; one of the attack gestures is labeled "thrust," meaning players should stab at the ghost to hit it, but one player interpreted it as a pelvic thrust! You can imagine this issue worsening once it was localized, so to hedge the problem we included 3D arrows indicating direction of action for all gestures. Even with this, some players were still performing unexpected gestures, so we also added body-pose silhouettes where we could. Ideally we'd have animated these for maximum clarity, but it was beyond our scope.

After that usability session, we brushed ourselves off and thought, "Never mind, we'll be more thorough in our preparations for the next one." Unfortunately, that was to be our first and last true usability session of the entire project. We were unable to secure further access to the usability team, so in the end we resorted to doing impromptu sessions ourselves

using staff, friends, and family. It was better than nothing, but by the time we got around to this, there wasn't really enough time to make changes based on the results.

During the same period, in lieu of any true usability or playtesting, we received occasional feedback from assorted Microsoft employees in Redmond, but it never seemed to correlate with our own data. In the end, usability ended up becoming a political tool for our debates on the navigation system, when it would have been far more useful to focus on the minutiae of the game to improve the moment-to-moment experience.

A HAUNTING EXPERIENCE

From a purely selfish perspective, we're quite happy with HAUNT. We managed to release a charming title, with a unique control scheme and a memorable voiceover, and we did it all in just one year.

Our biggest mistake was a failure to convince our client that the final product was worthy of marketing support, and our inability to compensate when they didn't come to that conclusion themselves. Now that the product has been on the market for a few months, and the Metacritic score is comparatively high for a Kinect title, we're starting to see those reservations thaw. The next step will be to talk about where HAUNT fits in the overall strategy, because as a digital title, there is still plenty of time for promotions, and some exposure around Halloween could still reap some dividends.

Any title that is unique—and doesn't fit logically into your client's portfolio strategy—will always be a risk, and only the customers can decide the outcome of HAUNT's destiny. In the meantime, I'm certain that NanaOn-Sha will continue to make innovative, trend-bucking video games. After all, that's what publishers always ask us for! 🎮

DEWI TANNER was the producer for HAUNT while working at the Tokyo-based boutique game studio NanaOn-Sha, which he now works for in a freelance capacity from his office in Melbourne, Australia.



4 / nonexistent marketing and community management

At NanaOn-Sha, we don't have any aspirations to self-publish. We focus on making games, and we're happy to let our publishing partners take care of marketing and community aspects.

HAUNT wasn't specifically envisioned as an XBLA title, and we never really adapted our mindset to developing an XBLA game. Microsoft told us on a couple of occasions during development that it wasn't responsible for marketing XBLA titles, but I don't think we ever fully took that to heart. The fact that just weeks into the project we were being showcased at TGS perhaps gave us the impression that

Overall, we were semi-aware that marketing was kind of our responsibility, but a number of issues stopped us from really tackling it. We had no in-house expertise in this area, and we all preferred to spend our time making games. Also, we hadn't budgeted for it, so we couldn't afford to bring in any specialist resources to help. Finally, any marketing that we wanted to do had to be vetted by the publisher. Put all these together and we had a genuine heads-in-the-sand issue that truly came to bite us when the game was eventually released.

5 / poor use of usability testing

Usability testing and playtesting is vital when you're working with

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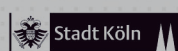
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FAST CAVES!

EASILY MODEL CAVES WITH SHAPE GRAMMAR AND MORPHING

If you've ever modeled caves for a game, you know one thing: Realistic-looking caves take a lot of time and manual tweaking. However, you can build a decent-looking cave in a fraction of the time if you know the right automated techniques. I'll explain how you can use a hybrid shape grammar/morphing system to build caves faster.

MIXING SHAPE GRAMMAR AND MORPHING

» Shape grammars were originally developed for aesthetic and design theory in the visual arts, to describe paintings in 2D and sculptures in 3D. Shape grammars in computation are a specific class of production system that generates geometric shapes, and they have been studied in at length in computer-aided architectural design. A shape grammar system has a working area used to display the geometry it creates, and tends to be most useful when confined to a small, well-defined generation problem such as housing layouts or structure refinement. The next important element, morphing, is used to animate an object's transformation into another in a 2D or 3D space [see **Figure 2**]. This technique is mainly used in cinematography, digital entertainment, and simulations.

My cave modeling system uses some key elements from the classical shape grammar approach. We start with a set of shapes (a base shape and a recently added shape), a set of rules (classical and morphic), and an initial shape (empty shape-point). When we begin generating the cave, we want to make sure that we limit the range of system workspace using a minimal cuboid spanned on two points in three-dimensional space. Each shape is described by a

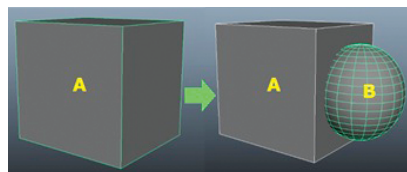


FIGURE 1: An example of shape grammar adding two shapes together.

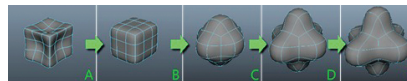


FIGURE 2: An example of 3D morphing between two shapes in five frames.

function, and we need to define a minimal search area to operate the method close to real time.

Next, we combine a base shape (such as a sphere or a box) with an empty shape as in **Figure 1**. All operations in our hybrid system are described using functions and their assemblies, so we need to make our morphing function discrete, which we have in classic shape grammar. In our case, two input shapes are treated as an object that is transformed into the final structure.

In our system, we can designate the percentage contribution of two input shapes. The structure of the virtual scene is described using a

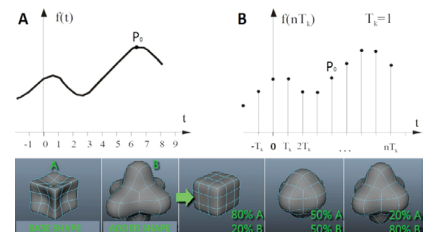


FIGURE 3: Top left: A continuous function describing morphing. Top right: A discrete function describing shape grammars. Below: A discrete morphic transformation.

tree, where rules are nodes and shapes are leaves. The modeling process is based on expanding the tree structure using selected shapes, rules [operations], and their position in 3D space. Classic shape grammar can perform Constructive Solid Geometry (CSG) on solids through sum, difference, and intersection. The innovative element of the algorithm is how we introduce the morphic rules based on a morphing parameter.

I suggest you use this linear interpolation, which allows you to define the percentage contribution of the two shapes connected by a single input node. This operation will determine the shape of the base, which will undergo further deformation. The morphing process is described by a continuous function, and shape

LISTING 2 /// MORPHING AND BOOLEAN OPERATIONS

```
// morphing operation
// FFactor - morphing parameter
// result - designate morphing of two functions FFunctionA and FFunctionB
// Distance - distance vector
// aPosition - point in 3D space, which is sampled
// v3d_sub - subtraction vector
// FPosition - point in the middle of a shape described by function

function TMorhingCSG.Distance(const aPosition:Tv3D): Single;
var
    pos : Tv3D;
begin
    pos := v3d_sub(aPosition, FPosition);
    result:= FFunctionA.Distance(pos)*(1-FFactor)+FFunctionB.Distance(pos)*
    FFactor;
end;
-----
// union operation
// result - designate the sum of two functions FFunctionA and FFunctionB
// Distance - distance vector
// aPosition - point in 3D space, which is sampled

function TOperationCSG.Union(const aPosition: Tv3D): Single;
begin
    result:=get_max(FFunctionA.Distance(aPosition),FFunctionB.Distance(aPosition));
end;
-----
// difference operation
// result - designate the difference of two functions FFunctionA and FFunctionB
// Distance - distance vector
// aPosition - point in 3D space, which is sampled

function TOperationCSG.Difference(const aPosition: Tv3D): Single;
begin
    result:=get_min(FFunctionA.Distance(aPosition),-FFunctionB.Distance(aPosition));
end;
-----
// intersection operation
// result - designate the intersection of two functions FFunctionA and FFunctionB
// Distance - distance vector
// aPosition - point in 3D space, which is sampled

function TOperationCSG.Intersection(const aPosition: Tv3D): Single;
begin
    result :=get_min(FFunctionA.Distance(aPosition),FFunctionB.Distance(aPosition));
end;
```

LISTING 3 /// DEFINING BASIC SHAPES USING FUNCTION DESCRIPTION

```
// sphere
// FRadius - sphere radius

function TSphereCSG.Distance(const
aPosition:Tv3D): Single;
begin
    result := -(v3d_
Distance(aPosition,FPosition)-
FRadius);
end
-----
// box
// Tv3D - vector in 3D space with
starting point in the beginning of
coordinate system

function TBoxCSG.Distance(const
aPosition:Tv3D): Single;
var
    sabs:Tv3D;
begin
    sabs := v3d_Sub(v3d_abs(v3d_
sub(aPosition, FPosition)), v3d_
Scale(FSize,0.5));
    result := -get_max(sabs.y, get_
max(sabs.x, sabs.z));
end;
-----
// cylinder
// FRadius - cylinder radius

function TCylinderCSG.Distance(const
aPosition:Tv3D): Single;
var
    dir : tv3D;
    sabs:single;
begin
    dir := v3d_Sub(aPosition,FPosition);
    sabs := abs(dir.y)-FHeight*0.5-0.01;
    dir.y := 0;
    result := get_min(-sabs,-(v3d_
Length(dir)-FRadius));
end;
```

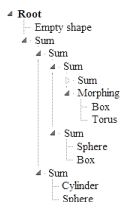


FIGURE 4:
An example tree of
operations for our
virtual scene.

In order to start building this construction hybrid system, we have to implement the main CSG function, which is shown in **Listing 1**, only available online at: gdmag.com/resources/code. Our modeling process is based on building a tree of operations for the virtual scene, which is shown in **Figure 4**.

grammars are controlled by a discrete function, so in order to make our morphing function discrete, we'll need to make a new shape based on the contribution percentage of the base shape and added shape, as shown in **Figure 3**.

Once the main class of algorithm is defined, we have to implement Boolean and morphing operations.

We use this linear interpolation to calculate a morphing operation:

$$f(P) = f * g = f(P) * (1 - a) + g(P) * a$$

In order to calculate a sum operation, we use this equation:

$$f(P) = f \cup g = \max(f(P), g(P))$$

For a difference operation, we use the following:

$$f(P) = f - g = \min(f(P), -g(P))$$

We use this equation to calculate an intersection operation:

$$f(P) = f \cap g = \min(f(P), g(P))$$

All the operations implemented in these hybrid algorithms are presented in **Listing 2**.

All basic shapes are also defined using functions as in the case of operations. This lets us create 3D geometry in a fully automated manner [we use a large database of objects and rules] and leaves us free to determine our preferred level of mesh detail. We use functions to define the space in which the shapes exist based on a distance function, so for each point in a 3D space, we can determine whether it is on or outside of a solid surface.



LISTING 4 /// CREATING A SPHERE SHAPE

```
// sphere shape
// FRadius - sphere radius
// FBox.vMin - minimum cuboid
(sampling area)
// FBox.vMax - maximum cuboid
(sampling area)

constructor TSphereCSG.Create;
begin
  FMode := fmSphere;
  FRadius := 1;
  FBox.vMin := v3d(-FRadius,-
FRadius,-FRadius);
  FBox.vMax := v3d(FRadius, FRadius,
FRadius);
end;
```

To define a sphere shape, we use this equation:

$$f(P) = P.x^2 + P.y^2 + P.z^2 - r$$

In this equation, P is a point in 3D space, {x, y, z} are coordinates, and r is a radius.

We've included an example of how we implemented a few primitive shapes in **Listing 3**.

In order to create a shape, we need to provide parameters that are characteristic for a specified structure. **Listing 4** shows an example of how we created a sphere shape.

For any selected point in 3D space, the distance from the resulting function in our example (sphere and box) is calculated by designating the distance from this point to the surface of a new shape, which is assembled with a sphere and box:

```
Distance = Operation.Distance
(TSphereCSG.Distance(), TBoxCSG.
Distance())
```

```
B=(P,D)
```

The label [L] is one possible way to combine two shapes by using appropriately selected bonds. Two bonds make a label when the points P are overlapping and directions D are opposite. This can be interpreted as gluing together two walls facing each other only when they're oriented toward opposite directions, which lets us exclude some unnecessary connections.

```
L = (B1, B2) <=> (B1.P = B2.P and B1.D=
-B2.D)
```

Also, this algorithm can create a label with any other bonds if that bond does not have a direction (D = [0, 0, 0]). Switching points are fixed and defined without any algorithm (see **Listing 6**). For example, this cuboid shown in

LISTING 5 /// SWITCHING POINTS FOR THE MESH

```
// combining shapes
// FNormal - determines the direction of connection
// FPositionLocal - specifies the position vector in local coordinates
// FPositionGlobal - specifies the position vector in global coordinates
// Fused - determines whether the connection point has been already used and
whether you can join it

TConnectorCSG = record
  FNormal: Tv3D;
  FPositionLocal : Tv3D;
  FPositionGlobal : Tv 3D;
  FUsed : boolean;
end;

...
procedure TFunctionCSG.AddConnector(aNormal,aPosition:Tv3D);
begin
  Inc(FConnectorCount);
  SetLength(FConnectorList,FConnectorCount);

  with FConnectorList[FConnectorCount-1] do
  begin
    FNormal := aNormal;
    FPositionLocal := aPosition;
    FPositionGlobal := aPosition;
    FUsed := false;
  end;
end;
```

LISTING 6 /// THE CUBES LOCATED ON THE SURFACE OF THE SHAPE DESCRIBED BY A FUNCTION

```
// mesh model generation
FModel.BeginCreate;
if FFunctionObject <> nil then
begin

  // drawing mesh triangles
  glBegin(GL_TRIANGLES);
  minX := Round(FFunctionObject.BBox.vMin.x * FGridSize) - 1;
  minY := Round(FFunctionObject.BBox.vMin.y * FGridSize) - 1;
  minZ := Round(FFunctionObject.BBox.vMin.z * FGridSize) - 1;
  maxX := Round(FFunctionObject.BBox.vMax.x * FGridSize);
  maxY := Round(FFunctionObject.BBox.vMax.y * FGridSize);
  maxZ := Round(FFunctionObject.BBox.vMax.z * FGridSize);

  for px := -2 to 1 do
  for py := minX to maxX do
  begin
    if ProgressBar1 <> nil then
      ProgressBar1.Position := Round(100 * (px - minX) / (maxX - minX));
    for pz := minZ to maxZ do
      for pz := minZ to maxZ do

  // drawing boxes (sampling cubes) on the solid surface
    DrawSimpleBox(px, py, -pz - 1);
  end;

  // exiting and mesh compilation
  FModel.EndCreate;
  FGeneratingTime := GetTickCount()- fnow;
end;
```




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LISTING 7 /// DECLARATION OF PARAMETERS FOR THE SAMPLES [CUBES]

```
Type

// point on the grid in 3D space
PGridPoint = ^TGridPoint;

// declaration pointer to point

TGridPoint = record

// point position
Pos: Tv3D;

// normal vector at the point
Normal: Tv3D;

// distance from the point to the plane

Value: Single;

end;

// grid on which the point is located
Δ the cube have 8 vertices
TGridCube = record

// array of points of the cube
GridPoint: Array [0 .. 7] of
PGridPoint;
end;
```

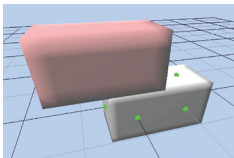


FIGURE 5: Switching points for two cuboids in shape grammar and morphing editor

Figure 5 has points that are dependent on shift in the x, y, and z axis [sx, sy, sz parameters].

BUILDING THE MESH ALGORITHM

» For each point in 3D, we can estimate its distance from the surface of the output shape associated with the CSG tree graph. This makes it easy to determine whether that point is inside, outside, or on the surface of the shape volume (Listing 6).

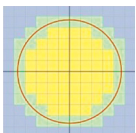


FIGURE 6: Cross-section distribution of cubes intersected by a solid. Green color depicts the selected cubes.

Our algorithm samples all points at a constant distance to create a scalar field. From this scalar field, we can determine whether a point is inside or outside the solid (or on its side surface). However, if we want to view this block plane, we can't select all the points that are placed exactly

LISTING 8 /// EDGE INTERPOLATION

```
with GridCube do

if (edgeTable[CubeIndex] and 001) <> 0 then
    Interpolate(GridPoint[0]^, GridPoint[1]^, VertList[0], Norm[0]);
if (edgeTable[CubeIndex] and 002) <> 0 then
    Interpolate(GridPoint[1]^, GridPoint[2]^, VertList[1], Norm[1]);
if (edgeTable[CubeIndex] and 004) <> 0 then
    Interpolate(GridPoint[2]^, GridPoint[3]^, VertList[2], Norm[2]);
-
/*rest of the code (if needed) */
...
if (edgeTable[CubeIndex] and 2048) <> 0 then
    Interpolate(GridPoint[3]^, GridPoint[7]^, VertList[11], Norm[11]);
end
```

on the surface, because the sampling density will be too large. Instead, we find an approximate sample by taking a cube and sampling its eight vertices (Listing 7).

Next, we have to check which sampled cubes are on the solid surface and whether our points are there:

```
/*rest of the code (if needed) */
// checking whether the cube is outside
the object
if edgeTable[CubeIndex] = 0 then
    exit;
...
// testing whether all points are inside
or outside the object
if (inside = 0) or (inside = 8) then
    exit;
/*rest of the code (if needed) */
```

In order to find the points where the cube collides with the plane of the drawn object, we have to check each edge of the cube and interpolate the vertices so we can accurately determine the intersection points of a solid cube. That solid cube will be used to display the triangles of the three-dimensional structure of the solid. Listing 8 shows a selection of these intersection points.

When there are at least two vertices that have the opposite sign for the distance, it is drawn on the screen. At this stage, our algorithm checks whether the surface intersects the solid cube (or whether the cube is entirely inside or outside of the solid). If the solid crosses the cube block, then we can display it (Figure 6).

We use cubes to partition space. When we determine all the boxes that intersect with the shape, we can read the incidental edges that collide with the surface of the shape volume. Using linear interpolation, we can choose the exact point of intersection between the solid and each edge of the cube separately. The system reads the triangles that form the points of intersection from a previously prepared table of 256 possible intersection combinations, displays

them, and then the algorithm gives an accurate approximation using the CSG-dependent density sampling. This way, we can generate shapes that cannot be achieved by standard methods of modeling. The outline of the algorithm is shown in the following (Figure 7).

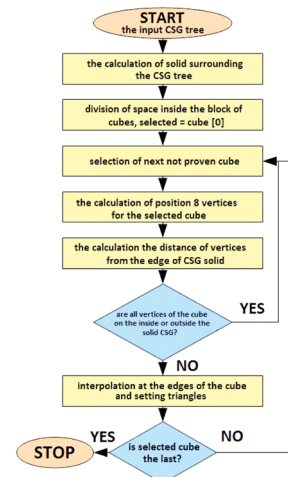


FIGURE 7: Mesh generation algorithm

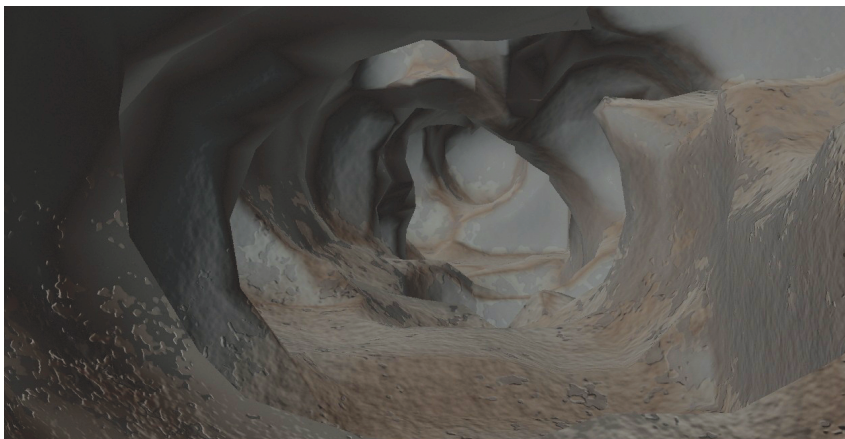
MODELING ISSUES AND PARAMETERIZATION

» With this cave modeling technique, you can generate several types of caves and tunnels. You can build very simple structures using only classic productions without shifting the labels or morphing, but these structures will have a similar cubic topology. If we want more complex caves with rocks and arches, we'll need to use a high level of morphic production, a high level of morphing, and a high label-shifting rate [see Figure 8].

By modifying the level of detail (LOD), we can make the caves smoother. It is possible to set this parameter from 1 to 32 (level of sampling). Figure 9 shows an example of a cave generated with the level of detail set to 5, and Figure 10 shows a cave at the highest LOD [32].




FIGURE 8: Top; classic productions without a shift in the labels. Middle; classic and morphic productions with a small shift of the labels. Bottom; maximum shift of labels is shown, using morphic productions with a high morphing rate.



CAVE-IN!

» **Figure 11** shows a summary of our algorithm's main idea and general functionality.

With our hybrid algorithm, we can completely model caves automatically. By using shape grammar and morphing functions for generating caves, we can model a wide spectrum of virtual caves, tunnels, and grottos. What's more, it can build different kinds of caves based on the scene's level of detail, amount of classic and morphic productions,

labeling direction [X, -X, Y, -Y, Z, -Z] with random shift, morphing parameters, and level of morphing between shapes. Hopefully, it will let you build the great-looking caves you want with just a few parameter tweaks. 

TOMASZ ZAWADZKI completed a Ph.D. in 3D Computer Graphics from the University of Zielona Gora, Poland, and is currently working as a freelancer. For more information, email him at t.zawadzki@weit.uz.zgora.pl

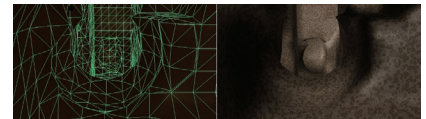


FIGURE 9: Grid model and render with the LOD set to 5.

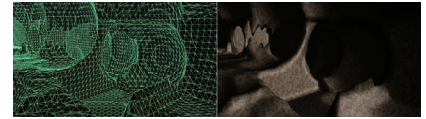


FIGURE 10: Grid model and render with the LOD set to 32.

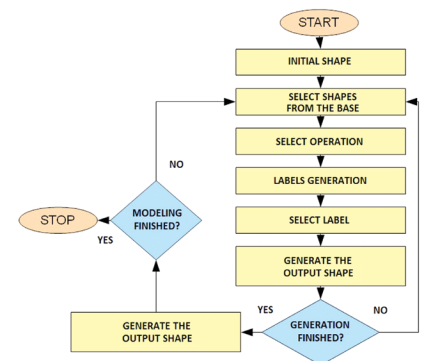


FIGURE 11: Structure of the algorithm.

references

For further information, take a look at these resources. Expanded diagrams and full code listings from this article are available at: <http://gdmag.com/resources/code>

Cui, J., Chow, Y.W., and Zhang, M., "A Voxel-based Octree Construction Approach for Procedural Cave Generation," *International Journal of Computer Science and Network Security*, 2011 Vol. 11, No. 6, pg. 160-168.

J. Lander, "The Ocean Spray in Your Face," *Game Developer*, July 1998, pg. 13-19.

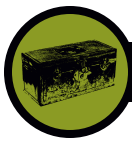
Cui, J., Chow, Y.W. and Zhang, M., "Procedural Generation of 3D Cave Models with Stalactites and Stalagmites," *International Journal of Computer Science and Network Security*, 2011 Vol. 11, No. 8, pg. 94-101.

Peytavie, A., Galin, E., Merillou, S., and Grosjean, J., "Arches: A Framework for Modeling Complex Terrains." In *Eurographics 2009 Proceedings*, Eurographics Association.

Stiny, G., and Gips, J., "Shape Grammars and the Generative Specification of Painting and Sculpture," *Information Processing 71*, 1972, pg. 1460-1465, North-Holland Publishing Company.

Warszawski, K. "Ground from Smoke: Using Particle Systems for Terrain Modeling in C#," *Game Developer*, March 2009, pg. 15-21.

Procedural caves: <http://code.google.com/p/cave3d>



TWO LIVES LEFT CODEA

BY NOEL LLOPIS

I grew up with 8-bit computers. When you turned them on, they greeted you with a cheerful “Ready.” That happy, blinking cursor was an open invitation to explore, control, and eventually master your machine. Things are different today. We’re in an age of connectivity and information we could have only dreamed of years ago. Kids are blessed with instant access to all of the information they could possibly want. Yet at the same time, they’re missing out on the hacker-friendly machines available back then. Today’s machines, with their shiny GUIs, are closed, and designed to keep you out. Writing programs are usually complicated and require additional complicated tools.

Codea for the iPad is a breath of fresh air and a throwback to the openness of 8-bit computers. Codea doesn’t try to re-create BASIC on a modern platform. Instead, it’s a re-envisioning of instant and accessible programming for the iPad.

Codea uses Lua as its programming language, which makes a lot of sense. Lua is simple enough to be a great first language, but it’s also a popular language with many real-world uses—for example, Lua is the scripting language in many games and tools.

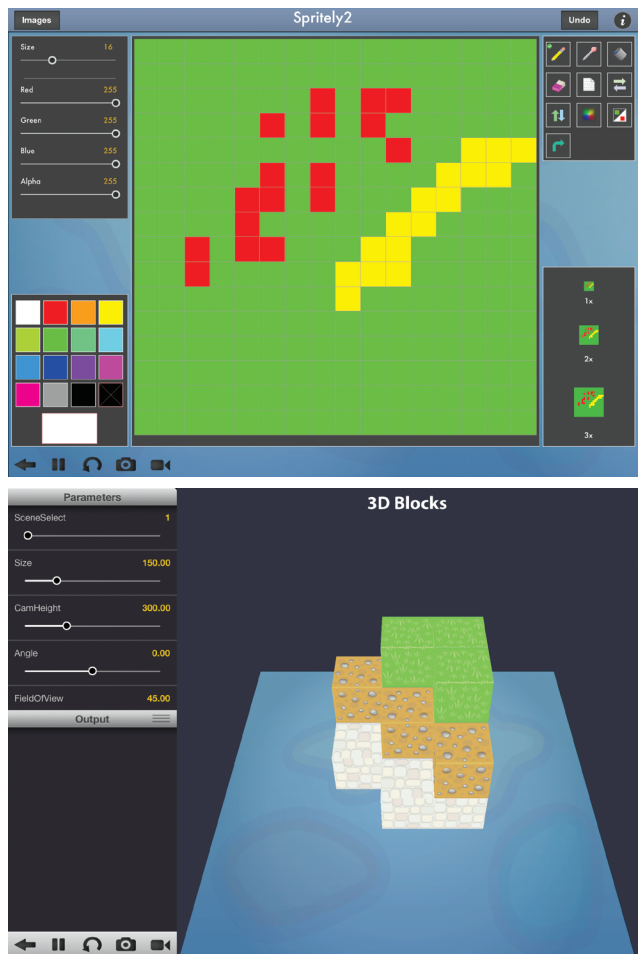
Some people might criticize Lua for not being a robust language with fancy engineering

features. It’s certainly not the language I would want to use to write huge games with large programming teams. But it’s a great language for starting projects, quickly changing things, and experimenting—which is perfect for Codea.

The fun part of programming games is when you’re actually moving things around the screen, playing sounds, and making actors come alive. Codea comes with a full set of simple libraries to do all those things. You can start drawing shapes and animating them without much setup.

For graphics, you can display whole sprites or draw elements individually with lines, rectangles, circles, and other primitives. It has some more advanced libraries, including physics and 3D meshes, so you can even venture into 3D games.

All of this output without any input is terribly unexciting, though. Codea gives you full access to multitouch input as well as the accelerometer on the iPad. This means you can take full advantage of the iPad’s capabilities. You could create a jumping game by tilting the device, or design complex interactions between objects that make the player use multiple fingers on the screen at once. You could potentially build a multiplayer game played on the same device with multiple people touching the screen at the same time.



Top: A sprite editor written in Codea. **Bottom:** You can use Codea to develop 3D projects.

I learn by doing and by example. Codea does an excellent job of catering to people like me, because it provides more than 20 sample projects to learn from, and these sample projects cover almost every aspect of Codea. They range from some extremely basic projects that demonstrate a simple feature in isolation (such as drawing lines or detecting touches) to some quite complicated programs that put everything together (a Breakout-style game or a 3D rollercoaster). Just about anybody can learn something, and I found myself routinely referring to these sample projects instead of reading the documentation. Codea also contains extensive documentation on all of its functions as well as the Lua programming language, in case you prefer a more formal approach to game development.

You’ll likely spend most of your time in Codea at the editor screen. It’s a simple tabbed editor displaying all the Lua files for a project. Two Lives Left spent a lot of time trying to make sure this experience is as smooth as possible and takes advantage of the touch interface whenever it can. When you enter a color in code, you can touch over it and get a color picker onscreen. Or you can simply change a constant by sliding your finger left and right. Whenever part of the code refers to a sound or a sprite, tapping on that part lets you pick the sprite or the sound effect. Little touches like this really play to the iPad’s strengths.

Unfortunately, the code screen is also Codea’s greatest weakness, due to the nature of the device it’s on. Typing on the

TWO LIVES LEFT CODEA

<http://itunes.apple.com/app/id439571171>

PRICE

\$9.99

SYSTEM REQUIREMENTS

iPad (any model)

PROS

1. Great intro to game development.
2. Lots of samples to get started.
3. Best prototyping tool if you don’t have a laptop handy.

CONS

1. Typing on the iPad is a chore, even with the extra shortcuts.
2. Can’t publish games online or even easily share games with other Codea users.
3. Limited debugging functionality.

iPad is just plain slow, inaccurate (especially for uncommon words), and cumbersome. Codea has some extra buttons to help fix this (tab/untab buttons, increment shortcut, completing parenthesis, and so on), but it's still a painful experience compared to typing code on a computer with keyboard and mouse.

Projects also start getting unwieldy once you get past 8 to 10 files per project. At that point, you start missing real IDE features, such as search or better file browsing.

Codea's debugging features are quite limited. You can pause the game execution at any point, and you can display the value of some variables by setting up watches ahead of time, but that's about it. Codea lacks a real debugger that lets you inspect any variables on the fly, modify data, or even do single steps over code lines. It's not a deal-breaker, since that's not

the primary focus of Codea, but it would have been nice to have. One feature I would dearly love to see is the capability to type Lua commands while the game is paused and have them execute on the fly. It would double as a simple debugger and would make learning about programming even more interactive and effective.


Once you have this fun little game you created, what do you do with it? You'll certainly want to send it to friends to have them play it, and that's the way it used to be hobby computing days. Unfortunately, Apple decided to apply its approval rules a bit too stringently, and Two Lives Left was forced to remove the sharing feature. How anyone benefits from that decision is a mystery, but if you're on the App Store, you need to play by Apple's rules. If you want to share your masterpiece, you need to either copy the source, paste it into an email, and send

it, or you must access the project files from a computer and copy and send those. The person on the receiving end needs to do the same operation backward and then run it in Codea. This is quite a downer. I can only hope Two Lives Left finds a way around this—or that Apple realizes how silly this particular case is and extends its approval rules to accommodate creation tools like this one.

Codea has a very active community, with forums and a wiki, all linked from the main page in the app itself. The developer is also extremely active in the community, and is constantly answering questions and gathering feedback to improve the product. You definitely won't be alone while you're using Codea.

Codea is by far the best environment I've seen for learning to make games. It's not something that lets you make games by dragging and dropping

some blocks visually, but an environment that encourages you to understand what's going on underneath. It's the perfect first step for anyone interested in games, young and old alike.

For those of us who already know how to make games, Codea is also a pretty good rapid prototyping tool. It may not be as convenient or fast as your favorite codebase and IDE on a computer, but if you're away from a keyboard, this is a great way to prototype. If nothing else, you'll probably relive that childlike enthusiasm you felt so many years ago over your first BASIC program. It's well worth it for that reason alone. 

NOEL LLOPIS is a game-industry veteran turned indie-game developer. He avoids violence in his games and instead relies on creativity and sharing. His latest games include CASEY'S CONTRACTIONS and FLOWER GARDEN.

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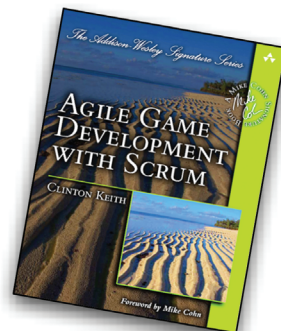


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— Michael Timothy Doyle, EA

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Enlighten is the only real-time global illumination technology proven to deliver fully dynamic lighting on today's consoles. Enlighten has helped define the look of some of the most iconic titles to be released and has established itself as the gold standard within the industry. Enlighten technology is behind the lighting in the award-winning *Battlefield 3*; *Need for Speed: The Run*; *Eve Online* and *Quantum Conundrum*. Enlighten has been licensed by many of the top developers in the industry, including EA DICE, EA Bioware, THQ, NCSOFT and Square Enix.

Advanced Cross-Platform Technology

The Enlighten runtime is lightweight and has been heavily optimised for all games platforms. The runtime is available for Microsoft® Xbox 360®, Sony® PlayStation®3 and PlayStation®Vita, Nintendo® Wii U™, PC (CPU and GPU modes), iOS and Android. The runtime is fully multi-threaded and optimized to extract maximum performance from the hardware. Enlighten has separate lighting paths for static and dynamic objects, and is easily integrated into your game engine.

We are constantly innovating and launched a range of next-gen technologies at GDC 2012. All Enlighten customers receive the latest updates to guarantee that your game stands out at launch.

A Complete Solution for all Lighting Requirements

Enlighten's runtime technology is smoothly integrated into the suite of pipeline tools supplied in the SDK. This ensures the artist receives real-time feedback on changes they make to a level, revolutionising the lighting and texturing workflow for developers.

Enlighten is a complete solution for all types of game lighting. It supports fully dynamic lighting; can be used to bake out high quality lightmaps; and offers a range of possibilities between these extremes. These new 'hybrid' lighting models are unique to Enlighten and enable developers to pick and choose from a spectrum of options without ever losing real-time feedback and control.

Tools to Empower Artists

Enlighten is technology to empower artists, not inhibit them. We provide a range of controls and options that allow the artist to precisely tailor the look of a level. From the hyper-realism of *Battlefield 3* to the cartoon look of *Quantum Conundrum*, the artist will always be able to realise their creative vision. New ways of working with light and colour, including the ability to make any surface into a glowing area light, dramatically expand the toolbox that artists can employ.

Artists can view the results of Enlighten in their own engine, or in the Maya viewport. The latter enables artists to preview the results of Enlighten without leaving the Maya environment. Lighting conditions and textures can be experimented on and finalised before exporting to the game engine.

Find out more about Enlighten at www.geomerics.com.

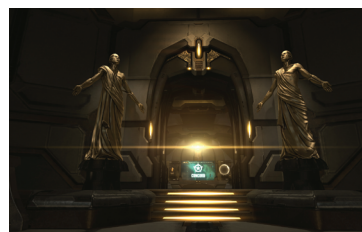


Battlefield 3, © 2011 EA Digital Illusions CE AB



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Eve Online, © 2011 CCP Games



Need for Speed: The Run,
© 2011 Electronic Arts

"You guys are awesome."

— Halldor Fannar, CTO CCP Games

"Enlighten has given us unparalleled productivity on *Need for Speed: The Run*."

— Alex Ferrier, Lead Graphics, EA Black Box

"Once players step out of that troop carrier and see the sun shining in their eyes like never before — once they see the light — they'll understand what a special game *Battlefield 3* is."

— Gamespy review of *Battlefield 3*

HARMONIX™

Positions are open in the following:

- + Animation
- + Art
- + Design
- + Engineering
- + Finance
- + Production
- + Web

www.harmonixmusic.com/jobs

////////// Harmonix is one of the world's leading independent game development studios, and we are busy doing what we do best – creating groundbreaking and fun interactive experiences. We are actively hiring innovative artists, engineers, designers and more to make games that people love to play.

Harmonix is an incredible place to work, buzzing with passionate and talented game developers who have made the company a breeding ground for awesomeness. We have a creatively charged and collaborative work environment, and it shows in our employees' enthusiasm and the quality of our games.

tl;dr: Working at Harmonix is amazing. We are looking for the best. You should probably apply. www.harmonixmusic.com/jobs

FIND US HERE:

www.harmonixmusic.com

Facebook: www.facebook.com/HarmonixMusic

Twitter: @Harmonix

DANCE CENTRAL 2





Who we are

With more than 75 million players from nearly 200 countries, InnoGames is one of the leading worldwide developers and publishers of Massive Multiplayer Online Games. Our products (TRIBAL WARS, THE WEST, GREPOLIS, FORGE OF EMPIRES, LAGOONIA, and others) are available in more than 30 languages. Our headquarters is located in Hamburg, northern Germany. We also have a subsidiary company in Seoul, Korea.

The Business Principle

Our users have the option of playing InnoGames products completely free of charge and without restrictions for as long as they want. We also offer players the possibility of enjoying added benefits in the game by purchasing fee-based premium features. At the same time, InnoGames places a high priority on providing entertaining gameplay even without a premium pricetag.

This principle has great advantages to the user. In contrast to traditional PC games, the product features here are already well-known before the player makes the decision to pay for added benefits—or not. The specific advantages offered by the premium features are also transparent. “What you see is what is what you get” is the underlying principle.

In our games, we focus on high long-term motivation. Our game TRIBAL WARS has been online for more than nine years now and continues to attract millions daily.

Partner with us

We have a good working network with trustworthy partners in all important game markets. In Asia, we have founded a subsidiary company, InnoGames Korea Ltd. This makes it much easier for us to publish our games in this area and to find suitable Asian games, which we publish in western markets. As we are rapidly growing, we are looking for promising new partnerships. Do you have great games, which you would like to publish in Europe, North/South America or Asia? Do you have high media competence and would like to cooperate with us? Or are you highly talented and want to boost our human resources? No matter your skill set—we are eagerly waiting for you. Just contact us!



MMOs ARE OUR PASSION!



InnoGames GmbH
 Harburger Schloßstr. 28
 21079 Hamburg
 Germany
 Phone: +49 40 788 9335 0
 E-Mail: info@innogames.de
www.innogames.com

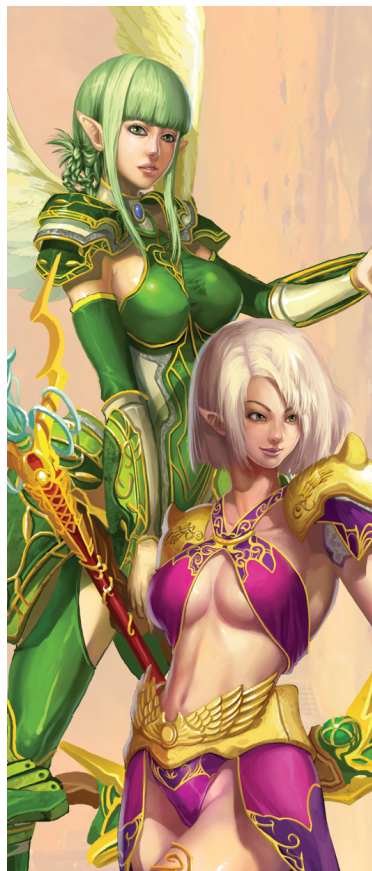
We are looking for

Business partners

- + High quality online games
- + Effective media cooperations
- + Partners for our in-house affiliate program

Talents to boost our human resources

- + Frontend-Developer
- + PHP-Developer Games
- + Producer
- + Game Designer
- + Marketing experts



Jotter Production
Jl. Beruang No. 40
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West Java Indonesia
Phone : +62 856 240 735 31
info@jotterpro.com

www.jotterpro.com

services

- + Concept Design
- + 2D Assets Production
[Still & Animated]
 - Character
 - Environment
 - Props
- + General Visual Arts Development

We're able to develop multiple IP/
projects at the same time.

Supported Platforms

We're platform agnostic by nature but
we're most experienced in:

- + Mobile : iOS
- + Web : Facebook, Flash

////////// Jotter Production is a boutique
style-Art Production service for game development.
Capable for developing general visual arts, our
service ranges from Concept Design all the way to
full Assets Production.

Jotter Production has been in the business since late 2005.
Through all these years, we have been collaborating with
noteworthy international vendors, publishers and developers,
mostly the social and mobile game developers.

We are very suitable to be involved in medium to big projects
because with our considerable size of team, we're fast,
nimble and cost effective.

OUR VALUES

We do realize that with more and more developers jumping on the social/mobile market,
standing out is becoming more difficult. To stand out, developers must build great games that
have engaging experiences from the beginning to the end of the game. We believe that visual art
plays a big part in building that great experiences.

Jotter Production's goal has always been to help creating the most standing out and without
doubt engaging visual for every player and the whole audience. We believe that all artworks
presented on the eyes of the players must be enticing, cool, beautiful and just- works.

We hold our pride for being a part of the world of entertainment. A world where making people
happy is the very core of the business. We are happy to make other people happy. Thus, great
service is one of our important priorities.

OUR FEATURED CLIENTS

Green Patch Inc./Playdom
Digital Chocolate
Funtactix
ngmoco:)
Funverse Inc.
Game Samba

COLLABORATION AND PARTNERSHIP

Working in this industry for all these years have been the best experience we ever had.

Currently, we are growing rapidly and is ready for promising new collaborations and
partnerships.

We don't want to limit on what we can already do, we're looking ahead to new possibilities to
push our potential to the max. Please visit our website for more info and details, find out what
we're capable of. Or if you just want to say hello, please do drop us a line!





gamescom 2012: The entire gaming world in one place

The concept of the world's largest trade fair and event highlight for interactive games and entertainment is unique: it networks the entire value-added chain, from development and publishing to retail and the consumer. As the largest event of its kind in the world and the leading trade fair, it provides discussion platforms on all levels. It covers the entire spectrum of the international gaming scene:

- + PC Games
- + Online Games
- + Browser Games
- + Video Games
- + Mobile Games
- + Gaming Hardware

The concept provides individual platforms for all target groups:

entertainment area For passionate gamers (public visitors)

business area Exclusively for exhibitors, trade visitors and journalists

GDC Europe Largest European developer conference

gamescom 2012 starts with a larger exhibition space of 140.000 squaremeters, new topics for mobile gaming and the new partner country Korea. The trade fair and event highlight for interactive games and entertainment demonstrates with its leitmotif what the games world can expect in Cologne from 15th to 19th August 2012: The international games community – developers, providers, trade visitors, media representatives, retailers and thousands of gamers – meets at gamescom 2012 in order to experience spectacular innovations together and to celebrate the games and entertainment event of the year.

Koelnmesse and its partners, headed by the BIU (the German Trade Association of Interactive Entertainment Software), are already working flat out to further develop gamescom as the world's largest trade fair and event highlight for interactive games and entertainment. Thus, the event is not only accompanied by a new advertisement campaign; the gamescom awards are also further developed due to the great popularity. The BIU also expects exciting novelties and innovations at gamescom when it comes to hardware and software innovations.

We look forward to welcoming you to gamescom 2012!



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info@koelnmesse-nafta.com
www.gamescom-cologne.com

gamescom at a glance

- + business area, halls 4/5
- + entertainment area, halls 6-10
- + Presentations of news and innovations of the entire industry
- + gamescom award
- + Games Developers Conference
- + gamescom festival, City of Cologne

gamescom 2011 was a complete success:

- + 557 exhibitors from 33 countries
- + 276.000 visitors in total
- + 255.000 public visitors
- + 21,400 trade visitors from 71 countries
- + 5.200 journalists from 50 countries
- + More than 100,000 additional visitors at City-Festival

QLOC S.A.
Działkowa 37
02-234 Warsaw, Poland
+4822 355 74 00
contact@q-loc.com
www.q-loc.com

"QLOC has helped us on several projects and always delivered a high quality service. They have been very flexible in helping out with our specific need on niche projects with short notices. The company runs a professional business and that's why we keep using them for our projects."

*Jörgen Björklund,
Line Producer
Paradox Interactive*

"QLOC has been a supplier of external services for Capcom USA for a number of development projects. In all cases, they have performed an outstanding job, being a turn-key solution – we have allowed them to operate without much direct management, and they have delivered final products that passed certification testing on first submission."

*Gary Lake-Schaal,
Director of Technology
Capcom USA*

supported platforms

- + PlayStation 2 / 3 / Portable / Vita
- + Nintendo DS / DSi / 3DS / Wii / WiiU
- + Xbox / Xbox 360
- + iOS / Android
- + PC / OS X



QLOC – The One-Stop Solution for All Your Porting, QA & Localization Needs

QLOC offers game developers a hassle-free solution for Porting, Quality Assurance, and Localization. Our reputation for professionalism and efficiency will assure you of a superior product ready for manufacturing and always on time. When you QLOC Your Game, you can rest assured that:

- + you save money by having three services in one package
- + you conserve the time spent on transferring source code and knowledge between companies
- + your project is taken care of by dedicated specialists
- + all our services are provided on-site in our highly secure HQ, which allows for flawless communication at each stage of the project

Porting

QLOC can adapt software from PC to consoles and MAC, between consoles, and from consoles to PC. Our talented team fixes bugs, prepares tools for game developers, and can create HD versions of the game, as well as provide support for cloud gaming.

Quality Assurance

Our highly skilled staff works continuously to ensure that the quality of your product is of the highest standards. Through rigorous functionality, compatibility, and compliance testing, our highly secure QA lab gets your games through certification tests and onto the shelf in no time. We dedicate teams tailored to your needs, so you can rest assured that your project gets the attention it deserves.

Our commitment to quality stretches well beyond the industry's norm. We offer linguistic testing from proofreading to platform-specific terminology which guarantees that your product will have a kinship with any market around the world you wish to enter.

Localization

Our dedicated worldwide staff of experts is able to translate into 25 major Indo-European, Semitic, and Asian languages including Arabic, Hungarian, Japanese, Korean, Norwegian and Russian, as well as both simplified and traditional Chinese. Not only will the text be culturally adapted for each linguistic region, but celebrity voice recordings will also guarantee a high level of affinity with the target market.

Superior Service

Our extensive experience has taught us the needs of the gaming world. By holding ourselves to a higher standard of excellence, you can be confident that your product will be held to the strictest criteria of performance, appearance, and reliability. From Porting and Quality Assurance to Localization, along with the peace of mind that comes with knowing your source code is in safe hands, QLOC is the one-stop solution for all your needs.

QLOC Your Game Today

SQUARE ENIX®

Join our next-gen game engine team!

As industry technology continues to evolve at a breathtaking pace, Square Enix remains ahead of the curve with our ongoing next-gen game engine development effort. We are actively seeking talented individuals interested in contributing to a multi-platform game engine aimed at delivering cutting-edge content to tomorrow's gaming systems. Put your abilities to the test, push the boundaries of game development technology, and support future titles in our rich lineup of world-renowned franchises such as FINAL FANTASY, KINGDOM HEARTS, and more.

The thrill of living and working in Tokyo

Employment at Square Enix comes with the chance to live and work in one of the largest and most exciting metropolitan areas in the world. Tokyo offers a wealth of museums, parks, festivals, and events year round, not to mention its nonstop nightlife. Mountains and beaches are only a short train ride away, providing a healthy balance to the excitement of city life. Tokyo is also a shopper's and diner's paradise, offering the latest fashions, high-tech gadgetry, and a smorgasbord of international cuisine.

Sounds great, but I don't speak Japanese...

Perhaps the only Japanese you know is sushi, karaoke, and ninja? That's not a problem. If you're skilled and motivated, you'll fit right in. What's important to us are your technical skills and passion for games and engine development. Over 30% of our team consists of overseas developers – hailing from America, Canada, France, Austria, England, Germany, Indonesia, Thailand, and Australia – and is still expanding. The international nature of our team not only inspires a variety of ideas and approaches, but also creates a relaxed and comfortable atmosphere.

Got what it takes? We'd love to hear from you!

In addition to world-class engine developers, we're also looking for top talent for our demo creation teams, as well as researchers interested in using their academic skills to help guide the next generation of entertainment technology.

If you're a passionate developer ready for a unique career adventure, we'd love to hear from you. We're confident that you'll find rewarding challenges and exciting experiences that only Square Enix and Tokyo can offer.

For more information on available opportunities, check out our website at:
<http://www.square-enix.com/na/careers/getech>.

available positions

NEXT-GEN GAME ENGINE

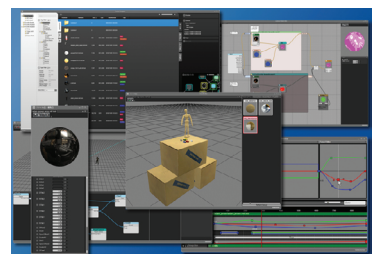
- + 3D Graphics Programmer
- + Runtime System Programmer
- + Online Systems Programmer
- + Server/Database Programmer
- + UI programmer
- + Animation Programmer
- + AI Programmer
- + Physics Programmer
- + Audio Programmer
- + Plug-in Programmer
- + Technical Artist

REALTIME TECHNOLOGY DEMO

- + Modeling and Texture Artist
- + Character Rigging Artist
- + Animator
- + Visual Effects Artist

RESEARCHERS

- + Graphics Researcher
- + Online Technology Researcher
- + Audio Researcher
- + Animation Researcher
- + AI Researcher
- + Physics Researcher
- + Other Research Positions



LUMINOUS
STUDIO



available positions

Current main job openings:

- + Producer
- + Technical Director
- + AI Programmer

Other roles we are looking to fill:

- + Gameplay Programmer
- + FX/Lighting Artist
- + Technical Artist
- + Senior Animator
- + UI Artist/Designer

Don't see your position? We are always looking for talented individuals to join the Tripwire Interactive team. Check on the website (<http://www.tripwireinteractive.com/jobs/>) for the latest openings. If you are near the top of what you do, let us know and apply today!



TRIPWIRE
• I N T E R A C T I V E •

Background

Tripwire Interactive is a truly independent developer and publisher of award-winning games. The company was formed out of the team that won the 2004 edition of the \$1,000,000 Make Something Unreal contest. We set up in Roswell, GA early in 2005, after winning multiple awards and popular acclaim with the original Red Orchestra mod. The retail version, Red Orchestra: Ostfront 41-45, was one of the first 3rd party games released over Steam®, winning more awards, selling over 500,000 units and paving the way for independent game developers world-wide. Released in 2009, our second title was Killing Floor, the hit co-op survival horror game that has gone on to sell over 1.2m units on PC, making it one of the biggest-selling PC titles of all time. Red Orchestra 2: Heroes of Stalingrad was released in September 2011, winning more awards, including PC Gamer's "FPS of the Year [MP]".



With the release of Killing Floor, Tripwire Interactive also became a publisher in our own right. With Killing Floor released across the world, we have since released Zeno Clash in North America, Dwarfs!? across multiple digital routes and The Ball in store globally, as well as digitally. The Ball will also shortly be our first foray onto the mobile platforms.

Games and Customer Support

We believe very strongly in the idea that, when players invest money in our games, they aren't just throwing us money to walk away with. They are entitled to expect more than a faceless developer, who has quickly moved on to whatever game is next. This is where Steam® and Tripwire Interactive have succeeded so strongly together, with other digital distribution channels following suit. After releasing the original Red Orchestra in 2006, we provided free content updates for 3 years. This included new weapons, new vehicles, new maps – as well as hosting the best of the mods for the game on Steam. We have taken that even further with Killing Floor, running seasonal special events multiple times a year, as well as adding all that new content. We also introduced DLC Character Packs for some extra fun. The net result is 1.2 million units of Killing Floor sold on PC, over 2.5m games sold in total.

Tripwire Interactive today

After the success of Killing Floor and Red Orchestra 2, we will continue to provide support for both games for a long time to come. We are moving to new, custom-built offices shortly and we are recruiting once again. The company is still fully independent and fully self-funded, with new projects starting. It could be a great time for a move to Georgia!

////////// Very few studios have several AAA and online titles to their credit within just a few years. But Ubisoft Singapore is no ordinary studio. Established in July 2008 with a handful of Ubisoft veterans, it has quickly built itself into the sole AAA developer in Southeast Asia, and one of the very few studios in the industry mastering both premier Western production values and advanced F2P games.

OUR GOAL

To change the face of online gaming and become the world's leading studio for AAA online content.

OUR CREDITS

Co-developed with Ubisoft Montreal: *Assassin's Creed® II*, *Prince of Persia: The Forgotten Sands®*, *Assassin's Creed® Brotherhood*, *Assassin's Creed® Revelations*, *Assassin's Creed® III*.

Independently developed titles: *Ghost Recon® Online* (PC), *TMNT™: Turtles in Time Reshelled* (XBLA/PSN).

OUR TEAM

We have over 200 talents, representing 32 different nationalities, who previously worked on award-winning franchises such as *Assassin's Creed®*, *Splinter Cell®* and *Ghost Recon®*. Although we're growing, we still maintain a friendly size where everyone knows each other by name, and the energetic vibe of a young studio is felt.

OUR LOCATION

Singapore is a dynamic economic hub whose modern city life juxtaposes idyllic, sunny island beaches surrounding it. The high quality of living and its strategic position in the region draws people from around the world, and is a fantastic place to be pushing cutting-edge innovation.

OUR SECRET WEAPONS

Just like Ezio Auditore, we have a few tricks up our sleeves.

As revealed at E3, Ubisoft Singapore is continuing its award-winning collaboration with Ubisoft Montreal, by developing an entirely new gameplay for the upcoming *Assassin's Creed® III*. Further, with the upcoming *Ghost Recon® Online* open beta, you'll get a taste of Ubisoft Singapore's unique ability to deliver the future face of online F2P titles with epic quality gameplay.

OUR BENEFITS

As part of Ubisoft, we benefit from the resources and support of the #3 publisher worldwide: next-gen technologies, cutting-edge training programs, international long-term career opportunities, and much more. Participation in karaoke parties is entirely optional.

THE BOTTOM LINE

We are looking to expand our team with experienced, senior development talents who believe in the future of innovative AAA online gaming.



UBISOFT®
SINGAPORE

Ubisoft Singapore
1 Fusionopolis Walk #09-01/02,
South Tower, Solaris
Singapore 138628

singapore@ubisoft.com

www.ubisoftgroup.com



current openings include:

- + Technical Director
- + Technical Director, Animation
- + Senior/Lead Animator
- + Art Director
- + Assistant/Technical Director, Art
- + Senior Level Designer / Level Designer
- + Technical Director, Level Design
- + Online Operations Manager
- + Deployment Engineer
- + Lead Programmer
- + Senior Programmer
- + Game Director



Your HR team



Jan (Product)
janf@wooga.com



Carolin (Tech)
carolin@wooga.com



Anne (Students)
anne@wooga.com

and check out our website

wooga.com/jobs



wooga

Based in Berlin, Wooga creates social games for Facebook and mobile, with a focus on emotional character development, usability and superb localization.

What makes us special?



An International Team.

More than 170 people from over 30 countries work at Wooga. Working at Wooga is not only about building cool products, it is also about building close friendships.



Every Individual Matters.

Although we're on a fast growing track, at Wooga every individual matters. Feel empowered from day one, work in small teams and expect to see a big impact from your everyday work.



Coolest Workplace. Ever!

One office. One location. One timezone - located in the heart of Berlin, the Wooga office is fun and colorful. Each team decorates their own working space, so don't be surprised by flying sharks, jungle wall papers or monkeys.



One Incredible City: Berlin.

If you've ever been to Berlin then you will know what we mean! Not only does it have a great standard of living for a relatively low cost, it is also a hub for startups and artists - making it the coolest city.



Work Hard. Play Harder.

Everyday we work very hard to deliver the best social games. However, we know how to celebrate success. Every milestone is celebrated with a surprise Wooga party.

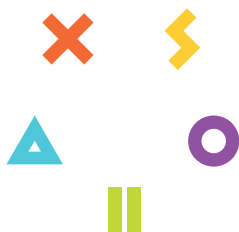


No suits. Casual and Relaxed Vibe.

No one wears suits. Most of us work in an open space and in relaxed peace. Take a break when you need one, grab a nice cup of coffee from the kitchen and pet our office dog.



We combine hearts and brains to make the best games!



Xsolla is the worldwide leader in global, in-game payment optimization. The company's easily integrated products dramatically increase payment conversion by localizing and simplifying transactions for each unique user. Since its inception, the company has been innovating solutions to traditional publisher concerns such as tax law, currency conversion, piracy, and payment fraud. Xsolla collaborates with over 350 payment service providers to offer solutions via credit card, mobile payments, e-wallet, cash and e-cash, payment kiosks and more — all within one interface backed by 24/7 customer support.

Xsolla is partnered with many leading game publishers worldwide, such as Valve (Steam), Aeria Games, S2 Games, Gameforge, Bigpoint, and Wargaming.net.

Playstation

The Playstation is the core of what we do at Xsolla. It is adapted to all different interfaces, including i-frame for in-game use, mobile, tablet and full web usage. Game publishers understand that no two people in the world play a game the same way; we at Xsolla understand that no two people in the world pay for a game the same way.

The real advantage of the Playstation comes with the user experience. From the beginning to the end of the transaction, our singular goal is to make it as frictionless as possible for all users to convert their real world currency into in-game items.

Additional Services and Apps

Game Wallet – Xsolla creates title-specific Payment Interfaces that allow users to pay for services within your game without actually having to be connected to the game itself. Imagine being able to offer your customers the ability to pay from a phone, a tablet, or other device without disrupting the in-game experience. Alternatively, users could use this in anticipation of a block of gaming to preload their account or renew a subscription, all without the traditional friction of leaving the game experience.

24/7 Customer Support – With live chat, email support, and international call centers, Xsolla is always there. If your customers have a problem making a payment, Xsolla operators are standing by to walk them, step by step, through the process. At our company, there are no outsourced call centers; all of our reps are in-house and specialize in helping users make successful game payments. If a payment doesn't post to the user's account, we take care of that, too. Follow-up and ticketing are only a few of the great perks our customer service team offers.

Payment Protection – Fraud and Chargeback protection are just a few examples of Xsolla's value in addition to its award winning Payment Services. Using advanced web technology, our system is engineered to detect fraudulent behavior and prevent it before it can begin. Black lists, white lists, and other data collected from the many transactions we've processed in every game platform allow our system to identify fraud and prevent future attacks.

"Xsolla specializes in online games and offers more payment options than any other payment solution provider. Partnering with Xsolla was an obvious choice for Valve."

– Mark Richardson, Valve Corporation



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Coming to E3?
Visit us at
Booth 555

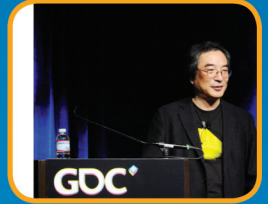
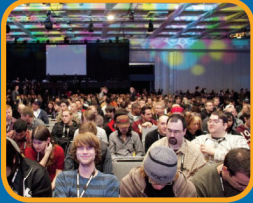
services and capabilities

- + Multi-platform Integration
- + Localized Payment Solutions
- + Tax Management
- + Fraud and Chargeback Protection
- + Online Analytics Dashboard
- + Personal Account Managers

About Xsolla

- + Headquartered in Los Angeles
- + Satellite Offices in Asia and Europe
- + 75+ Employees and Growing

24 HOUR ON DEMAND ACCESS TO A
LIBRARY OF DEVELOPER KNOWLEDGE.



GDC Vault

Streaming video,
audio, and PowerPoint
presentations from
GDC 2012, GDC
Europe, GDC China,
and GDC Online.

For more information visit: www.GDCVault.com



THE KICKSTARTER GOLD RUSH

IS CROWDFUNDING OVERCROWDED—OR JUST GETTING STARTED?

Game developers are used to seeing gold rushes. We see a runaway hit on a new platform/business model/genre, and then we see hundreds of followers lured by the prospect of easy money from huge sales numbers, high conversion rates, or low development costs. But like a real gold rush, the appeal of a new industry sector wanes when competition and costs increase and the money doesn't look quite so easy anymore.

Crowdfunding has been getting exciting lately, thanks to a few Kickstarter projects that made a lot of seemingly easy money. This is not a gold rush limited to any one platform or genre or business model—but it could still be a bubble. Let's consider a few of the positive and negative elements in play.

THE GOOD

» The promise of crowdfunding is exciting for several reasons. Most significant is the disintermediation of the publisher/investor. Not its money, which some devs will still need, but its role as gatekeeper of consumer tastes. Now consumers can decide for themselves whether a particular game has sufficiently strong consumer appeal, and developers can enlist consumers' funding and emotional support—in other words, your consumers become strong supporters (even evangelists) who have a vested interest in the title's success.

From the developer's perspective, the biggest plus is that the money comes without the kind of strings attached and loss of control that comes with a traditional publisher/investor. Instead of promising to deliver a certain ROI, the dev merely has to ship the game and associated rewards. The only thing the developer risks is its reputation should it not live up to expectations (Kickstarter's site does state, rather vaguely, that "there are certain instances where action may be taken by Kickstarter," including "actions that are more closely associated with fraudulent or high-risk activity").

THE BAD

» I see a few issues with how consumers and developers are approaching crowdfunding projects. First, some developers appear to be deliberately naive about their Kickstarter project. A project page for a 3D sequel to GUBBLE claimed, "If we went to a publisher with this they'd laugh at us, tell us to build a vertical slice, a fat design document, a couple of spreadsheets, a detailed



Concept art for WASTELAND 2, by Andree Wallin.

!! We may see supporters acting more like publishers as they question risk of different places to put their money... the short list of top-raising Kickstarter video game projects includes a sequel (WASTELAND 2), a remake (LEISURE SUIT LARRY), and a new title from an industry veteran (DOUBLE FINE ADVENTURE) !!

budget, and then maybe they'd talk to us again. Yuck! That's not how innovative, groundbreaking games are made!"

Sure, sometimes the users may "get it" from the game concept alone, but a developer should still be rigorous with its design and budgeting. In fact, not having them at all (if this is the case) is a formula for trouble, and shows that the developer may not be taking its supporters' money seriously.

Also, many Kickstarter projects often run into problems with fulfilling rewards; developers often underestimate the time and money they spend on rewards, especially those involving physical goods, which eats into the time and money meant for building the game.

The supporters can also be naive. Kickstarter funds are considered donations in support of building a product, and rewards are tokens of thanks. Usually, one reward tier is treated as a quid pro quo product purchase. That's fine, unless supporters think they are buying something and expect the rights that come with that.

For example, the iPad is an interactive high-precision stylus for the iPad that was funded

on Kickstarter. After receiving their iPens, some supporters were unhappy with its performance and asked for a refund—but that's not how Kickstarter works, since they didn't "purchase" anything. Even though the users were at fault here, their ill will ended up directed at the manufacturer. That evangelical support can turn into negative buzz.

THE FUTURE

» The main reason that Kickstarter's pledges are all classed as donations is that there are legal barriers to crowdsourcing equity investment. Making an appeal akin to "donate some money to own a piece of this company or game and you'll get a share of the profit in return" falls under regulations overseen by the Securities and Exchange Commission (or comparable organizations in other countries).

Over the past year, interested groups lobbied to support the CROWDFUND Act ("Capital Raising Online While Deterring Fraud and Unethical Non-Disclosure"). This act provided guidelines allowing for equity investment crowdfunding that limits risk to would-be investors while enabling startups to source money without the overhead that a full SEC filing would entail. President Obama signed the bill in February.

I expect to see Kickstarter competitors that actually promise would-be investors a return on their money (in fact, some already exist). This is a great thing overall and could attract more money and give developers more options, but it could be risky as well. As one Twitter commenter put it, "You think gamers act entitled now? Just wait until they're your investors."

The consumer/supporter/investor relationship will become more sophisticated as crowdfunding matures. We may see supporters acting more like publishers as they question risk of different places to put their money. To a certain extent, we can already see these attitudes in action—the short list of top-raising Kickstarter video game projects includes a sequel (WASTELAND 2), a remake (LEISURE SUIT LARRY), and a new title from an industry veteran (DOUBLE FINE ADVENTURE). I find this a bit disheartening. But as long as innovative pitches like THE BANNER SAGA can pull in reasonable funding, I'll remain hopeful. ☺

KIM PALLISTER works at Intel doing game industry forecasting and requirements planning. When not prepping the world for super-cool hardware, he blogs at www.kimpallister.com. His views in this column are his and do not reflect those of his employer.



SCOUTING THE BATTLEFIELD

WHY YOUR GAME MIGHT BENEFIT FROM A LITTLE PREP TIME

Football has a lot of situational game decisions. Coaches call very different plays when their team is up by 30 points than when their team is down a field goal with two and a half minutes to go. The trailing team needs to score quickly and leverage certain rules, such as running out of bounds, in order to stop the clock. Defenses adjust to anticipate and shut down these common strategies, but often in doing so they leave the field open for a high-risk, high-reward play. These situational game decisions are a large part of football's tactical depth.

But football gets even more interesting from a design perspective when we factor in the time teams spend preparing for each game. The planning phase is a more strategic, rather than tactical, game dynamic. Most football teams practice a very limited number of plays, so they spend time studying film of the

opposing team to bring the best playbook possible for the matchup. If they have a prolific quarterback, the defense may optimize its play to defend against passes rather than running plays. If one team's key player is injured, the other team might choose plays that exploit the second-stringer taking

his place. Even the weather is a factor—rain makes it harder to complete passes, and strong winds make kickers less useful.

STRATEGIC PLANNING

» This kind of pregame planning is rather common in our industry. Games as old as X-COM and as new

as MASS EFFECT employ a pre-game squad-selection mechanic, wherein you equip party members, and decide which of them you will bring to a fight. But most systems like these lack a key element of the decision-making process: reconnaissance.

Very few games give the player an idea of what challenge they

will be fighting beforehand, which means players often don't have enough information to make the best decisions. If players cannot determine the best squad to take with them before they step on the battlefield, they will play the averages and take the teammates that happen to be the most effective at any given time. In many games I've played, the only way to learn you need to bring a sniper for a given level is through trial and error: Load the level, run into a wall, die, then reload until you realize you can't beat this mission with the team you brought with you..

When players have the option to train their teammates or customize their equipment, this problem will compound itself over time. Players will stick to their favorite allies—companions that have the best synergy with their characters, provide the most interesting story, or even the most interesting color commentary—and keep those companions up-to-date. The rest of the stable will fall behind due to disuse, which means that when a lazy player finally gets to the mission where the sniper is king, the sniper is so far behind the power curve that he isn't good enough to be useful.

As a designer, you have to ask yourself: Do you want to fight the player? They may have other valid reasons for having a favorite sidekick, and they may be happy running with the same squad most of the time. Will they appreciate being forced to run without the main character's wisecracking love interest, or will they resent it?

RECON IN DOMINION

» One of the most inspiring games in my career has been the card game *Dominion*. The game is relatively simple, its rules are easy to learn and teach, and the goals are easy to understand. Card combinations offer a lot of depth, but even casual players can get the hang of them. But the most interesting part to me is the setup.

Over the course of the game, players build their own decks by acquiring cards ideally meant to feed a coherent strategy. Including the expansions, *Dominion* features

hundreds of potential cards that could be chosen, but in any given game, a player can only use 10 different kinds of cards to build his deck. Because these cards are chosen randomly, the most important phase of the game is when the player figures out which of the available cards can be combined to create a powerful deck.

The result is a remarkably fertile game-dev environment. Cards that are normally powerful may be made impotent because a counter card was also randomly selected. Cards that are frequently weak have synergy with other cards in often unexpected ways. Players who can identify these rare interactions are often rewarded with ludicrously fun power loops (if not with outright victory).

In *Dominion*, performing reconnaissance and responding to it isn't a secondary option—it's the core game loop. Failing to do so is abdicating the game. The game mechanic succeeds partially because players have the time and opportunity to strategize around the possibilities—but it also succeeds because, at its core, reconnaissance is not optional.

RECON, RAIDING, AND GAMEFAQS

» These days, players are a few button clicks away from a comprehensive guide that tells them how to best play their class or defeat a boss. This can have some unexpected side effects. Many MMOs with raid-based gameplay work to make bosses with puzzle mechanics that force players to play their classes in new and interesting ways: The Leotheras fight in *WORLD OF WARCRAFT* requires the Warlock to use abilities he normally doesn't in order to serve as a tank—a role he usually never needs to perform. Players take pride in being among the first to defeat these bosses, and then they post their strategies for all to see. Because each raid is largely static and predictable, reconnaissance for the frontline soldier means knowing the mechanics and executing his role.

Unfortunately, these boss fights are often quite lopsided in favor of certain classes—most commonly

ranged damage-dealing classes, not melee-range classes. Some raid leaders, when faced with trying to teach a difficult maneuver to one of these problem classes, may instead opt to replace that player with someone playing a class more suited to that encounter. This is pretty much just like being benched in the real world—and feels just about as good—so make sure this doesn't happen to your players.



!! The Leotheras fight in *WORLD OF WARCRAFT* requires the Warlock to use abilities he normally doesn't in order to serve as a tank—a role he usually never needs to perform. Players take pride in being among the first to defeat these bosses, and then they post their strategies for all to see. !!

BETWEEN TACTICS AND STRATEGY

» I'd like to see more game mechanics that randomly change the battlefield during the fight just to spice things up. The prototypical example to me is the Hawkmen's arena in Sky City, from the movie *Flash Gordon*. Nothing makes you adjust your strategy quite like spikes suddenly emerging from the floor.

Some video games do use this kind of mechanic. One interesting example is the "Week of" bonus in *HEROES OF MIGHT AND MAGIC*—if it was the "Week of the Dragon," players could buy twice as many dragons to add to their army (if they controlled territory that spawned dragons). However, the game lacked a way for players to know

what was coming. If they could spend a resource to know that this purchase opportunity was coming, they would now have an incentive to shift strategies, save their cash, and quickly steal control of dragon-producing cities from their enemies.

Magic: The Gathering is another card game that employs a central recon mechanic; players can see their own hand of cards, but not their opponents' hand or deck, and most decks have only the power to respond to these cards once they're played. However, blue cards often give players the ability to get a glimpse at their own deck or their opponents', and in some cases, rearrange the upcoming cards' order. Played poorly, such cards are almost always a waste of deck space. In the hands of a talented blue player, though, these cards can prevent an opponent from ever having an effective turn.

THE PRE-GAME SHOW

» Giving your players the opportunity to make interesting strategic decisions before combat begins gives your game a lot of depth and replayability, especially when you mix in random elements that force players to adapt and think in new ways. These mechanics can even give a game new life by giving players new ways to navigate your game's challenges.

However, random is not enough. If players can't get a hint of the challenges they face, they can't make informed strategic decision, and will instead lean toward building generalist strategies until they lose, start over, and build a team specifically meant to clear that mission. Offering a player even a glimpse of the path that lies ahead can make the player feel clever, and that is one of the best feelings a game can provide. 🐉

DAMION SCHUBERT is the lead systems designer of *STAR WARS: THE OLD REPUBLIC* at BioWare Austin. He has spent nearly a decade working on the design of games, with experience on *MERIDIAN59* and *SHADOWBANE* as well as other virtual worlds. Damion also is responsible for *Zen of Design*, a blog devoted to game design issues. email him at dschubert@gdmag.com.



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VERTEX LIBERATION FRONT

POWER TO THE GEOMETRIC PRIMITIVES!

It's time to offer our respects to the most overworked and yet underappreciated member of the game-development community. This unsung hero toils every day to make our games work. Dozens of times every second (hopefully), the humble, hardworking vertex toils to bring our worlds and characters to life. Do we reward the vertex for its selfless labor? No! When vertices multiply, we ruthlessly wipe them out. Who can deny it? Game artists are trained from their earliest days to hunt down and annihilate the innocent vertex. It's time to bring an end to this senseless slaughter.

The vertex gets no respect. As the craft advances, game artists get a lot of cool new doodads to play with—such as fancy shaders to cool lighting models—but games can't look good without good geometry. Despite this basic fact, many artists will strain endless resources to shave polygons, even as they splash texture memory around like they've just won the Megapixel Millions lottery. On modern hardware, vertices are often the best way to get good results for a reasonable memory cost, but many artists suffer from an irrational vertex-phobia that makes their lives more difficult than they need to be.

This peculiar state of affairs derives more from social factors than from technology. As we all know too well, doing art on computers and video game consoles is an endless game of catch-up. Hardware and software evolve so quickly that artists barely have time to assimilate one round of new technologies before something new changes the rules of the game. In that kind of environment, old skills and outlooks sometimes outlive the conditions that gave them birth. They live on in the form of habits—superstitions, even—that limit our choices and ultimately make it harder to make great images. Nothing illustrates this better than the confusion that still bedevils artists choosing between geometry and normal maps.

CHILDREN OF THE REVOLUTION

» Over the last decade or so, nothing upended the rules for game art as much as the advent of the normal map. When we first

covered normal maps in Pixel Pusher, artists greeted them with a strange mixture of hope and mistrust. The first generation of games with normal maps clearly offered graphic possibilities beyond anything we'd seen back in the days of the PlayStation 2. Character models in particular suddenly sported subtleties of form that their predecessors could never match. Specular highlights seemed

(and remains) incomplete. The key technical advantage of normal maps is that they provide enormous numbers of light samples; a 512x512 normal map contains as much lighting information as a 250,000-poly model. However, the value of those lighting samples depends on the quality of the lighting calculations. In the early days of normal mapping, when the visual implications

The resulting confusion was pretty ugly, both literally and figuratively. Many studios went through low-grade civil wars pitting graphics engineers who wanted flat-colored albedo textures and normal maps against artists who doubted (often with good reason) that the technology could match their carefully nurtured skills in texture painting and trompe-l'oeil shading. Meanwhile,

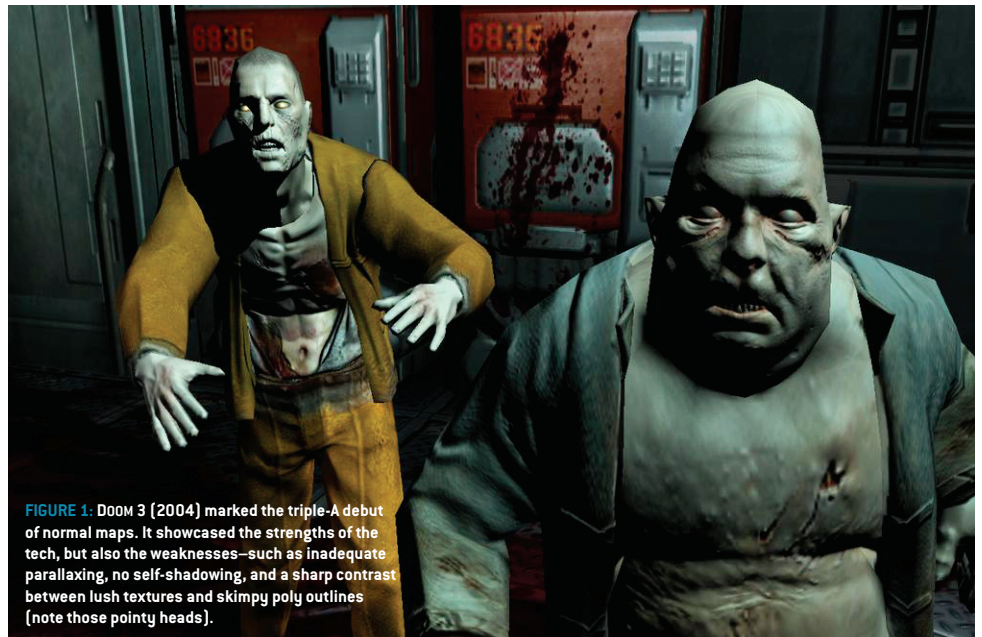


FIGURE 1: DOOM 3 (2004) marked the triple-A debut of normal maps. It showcased the strengths of the tech, but also the weaknesses—such as inadequate parallaxing, no self-shadowing, and a sharp contrast between lush textures and skimpy poly outlines (note those pointy heads).

to travel naturally over contours. The rise of normal mapping turned high-poly modeling tools such as ZBrush and Mudbox into frontline tools for game artists and turned many modelers from CAD-style polygon engineers into full-time digital sculptors.

The normal map revolution was victorious, but the triumph was

of the technology weren't well understood, many games still used crude lighting models that didn't get all of the value out of normal maps (see **Figure 1**). Without good ambient lighting (and a decent way of separating ambient occlusion from old-school fake shadows), a lot of early normal-mapped games failed to live up to the hype.

younger modelers who'd learned ZBrush in school would flash prettier portfolios than those from accomplished veterans who'd always lived by their clean, lean poly-tweaking skills. The old-schoolers grumbled about inefficiency and poor layouts while frantically trying to learn the new tools and techniques. The new



blood often failed to respect—or even to learn—the tricks of the polygon masters, which often led to game art that never lived up to the promise of those softly lit, ambient-occluded ZBrush beauty shots.

Almost a decade later, things have quieted down. By now, most of us have realistically limited expectations for what normals can and can't do. Those Mudbox prodigies have grown up, shipped a few titles, and learned to value some of the hardened wisdom of the budget-conscious ancients. The anti-normal map holdouts have, for the most part, quietly surrendered—the fake shading and false specular highlights are tolerably rare, and most working artists can at least fake their way through the peculiarities of the ZBrush UI. The cultural divide remains (you can tell a lot about an artist's history by finding out if she spends more time in CrazyBump than in ZBrush), but the rancor and confusion has died down to a tolerable level.

THE ANCIENT REGIME

» The real victim of this bit of dubious history has been the poor poly vertex. Vertices used to be luxury items. Artists who learned their trade in the pre-DirectX 8 days had to make high-speed geometry transformation and lighting the norm, and they focused on polygon optimization as the core of all modeling skills. Even though modern hardware crunches triangles with abandon, the habit of optimizing dies hard. For the ZBrush generation, on the other hand, simplicity and turnaround times also encouraged polygon parsimony. The indirection of the cumbersome high-res to low-res workflow pushed artists to treat game resolution models as cheap proxies rather than full-fledged, hand-created assets. The need for clean UVs to hold those normal maps encourages simple shells. In the contentious climate of the normal map revolution, everybody could agree on lower poly counts.

Unfortunately, normal maps cost a lot of memory. Not only are they big textures, they are also notoriously difficult to compress. To make matters worse, many

implementations don't allow normal maps to be mirrored, which makes it harder to save memory. To top it all off, normal maps generated from high-poly geometry typically demand carefully laid-out UVs with good, even density—which can translate into large areas of a texture sheet going to waste.

In a world where normal maps are increasingly assumed to be “normal”—that is, where almost every asset will have one—this memory cost adds up fast. A 512x512 normal map, uncompressed, represents about a quarter-million bits of lighting information. Uncompressed, it costs a full megabyte of memory; with a common compression technique like 3DC it will still cost about 384K, though with a few artifacts. That's not a terrible deal. It works out to about 1.5 bytes of memory for every normal pixel, compared to something between maybe 32 bytes and 48 bytes for a geometry vertex including position, normals, and UVs. (The exact vert cost is, of course, engine-dependent; things like extra UV channels, vert colors, or vert compression can change the real number. But this gives you an idea.)

This means, theoretically, you can have either an extra vertex or some 30-odd pixels for the same amount of memory (exact numbers, again, are engine-dependent). To put it another way, a 512 normal map costs about the same as 8,000 vertices. In one way, these numbers bear out the wisdom of the gaming ancients: While 30 bytes or 40 bytes per vert may not sound like a lot, wasteful modeling remains a bad idea. Normal maps really are a more efficient way of storing lighting information. For some kinds of details—like musculature, folds in cloth, or the treads on a tire—the cost of capturing the spirit of a model in polygons is pretty excessive. Normal maps are often a more efficient way to get your point across.

VERTEX LIBERATION

» But if you're worried about memory (and at this end of the console cycle, with the boxes looking so creaky, who isn't?), think about

the flip side of the pixel-to-poly equation. While a single vertex costs as much as 32 pixels, in most real-world applications, 10 percent to 20 percent of those normal map pixels are wasted—thrown away on UV shell borders and unmapped space. Moreover, those pixels will be distributed based on texel density, so it's hard to concentrate the visual goodness in important areas. Worst of all, the curse of powers-of-two texture sizes makes it hard to fine-tune your memory usage with normal maps. If your 512 map can't give you the details you want, your alternatives are all unpleasant. You can up the size of your map to 1,024 and quadruple (!) your memory cost, or you can laboriously remap and recast your model to use several smaller textures.

Vertices, on the other hand, offer much more control. It's a lot easier to add verts where you need them—to enhance a silhouette or to give the right relief and parallax to a detailed area. Adding new verts to increase the detail in an existing model is easy and usually not destructive. Wholesale removal of verts is dicier, particularly when they lie along UV borders. Even so, the labor involved is still less intimidating than doing a wholesale remapping and recasting should memory get tight.

If you can replace a superstitious fear of vertices with a more rational take on their good and bad points, you can also make more efficient use of your normal maps with smarter modeling. Clean mechanical surfaces—such as auto bodies and spacecraft, but also armor pieces, weapons, and even claws or teeth—can often be heavy on polys but light on a normal map, freeing up normal map pixels for better use elsewhere. This is particularly true for assets that are physically large (again, such as cars or planes) and thus hard to cover with normal maps at high density.

Just to give an example of the tradeoffs that are possible, if you used more aggressive modeling to reduce your normal map resolution from 512 pixels to 256 pixels for a given asset, you could add an extra 6,000 or so verts without much of a change to your total memory cost.

Use only 5,000 and you'll have saved about 32kb of memory. The visuals won't be exactly equivalent, but they'll be good and may even be better. Typically, geometry-heavy models will have slightly less-appealing specular behavior, since traveling highlights will tend to sow the grain of the underlying polys more than normal maps do. On the other hand, a poly-heavy model will have cleaner silhouettes, better parallaxing, and better self-shadowing than a low-res model with detailed normals. The key goal, as always, is to match the technique to the effect rather than clinging to a fixed idea that either normal maps or vertices are the only right way to do things.

It's traditional to end these columns with a caveat, and in this case the caveat is that all engines and platforms have their own quirks, so that savings in one area may not readily be spent somewhere else. While modern hardware tends to be poly-friendly, the Xbox 360 is generally more so than the PS3. More importantly, there are many ways in which your engine can affect the polygon-to-normal map tradeoff. Hard-coded limitations on model sizes, streaming behavior, collision detection—there are a lot of variables.

You simply can't be sure that either normals or verts is the right way to go unless you go over the pros and cons with an engineer who really knows your game, and you can't do a good job optimizing unless you learn the particular brand of crazy that you'll be dealing with. That said, raise the question and make sure you're making a deliberate choice about your modeling style rather than relying on yesterday's prejudices. It's time for every vertex to stand up and be counted! 🗣️

STEVE THEODORE has been pushing pixels for more than a dozen years. His credits include MECH COMMANDER, HALF-LIFE, TEAM FORTRESS, COUNTER-STRIKE, and HALO 3. He's been a modeler, animator, and technical artist, as well as a frequent speaker at industry conferences. He's currently the technical art director at Seattle's *Undead Labs*.



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who went where

UNCHARTED 3: DRAKE'S DECEPTION co-lead designer Richard Lemarchand has left Naughty Dog after eight years with the studio to teach at USC's School of Cinematic Arts Interactive Media Division. As part of a research project, Lemarchand plans to work on a series of experimental games.



Sega West and Midway Games veteran Simon Woodroffe (SONIC GENERATIONS, WHEELMAN) has joined Rare as a new creative director.

Big Fish Games president and CEO Jeremy Lewis has resigned from his roles at the company. Big Fish Games' founder and former president Paul Thelen has returned to lead the studio, while Lewis stays on the casual games developer/publisher's board of directors.

new studios

Former BIOSHOCK designer Steve Gaynor is teaming up with 2K Marin programmer Johnnemann Nordhagen and 2K Games editor/researcher Karla Zimonja to start an independent dev studio called The Fullbright Company, based in Portland. This trio previously worked together on the "Minerva's Den" DLC for BIOSHOCK 2.

Infinity Ward and CALL OF DUTY creative strategist Robert Bowling has founded Robotoki, an independent game-development studio. Robotoki's first game is aimed at next-gen consoles, PC, iOS, and Android, though the mobile versions of the game are designed to be supplementary to the console/PC versions.

Steve Ellis from Free Radical Design (TIMESPLITTERS) has teamed up with Martin Wakeley and Lee Musgrave from Rare (BLAST CORPS, JET FORCE GEMINI) to start Crash Lab, an iOS development studio called. Crash Lab is currently working on three iOS titles.



Developers from GSC Game World (S.T.A.L.K.E.R.) have formed Vostok Games. This new studio has received venture capital to develop SURVARIUM, a S.T.A.L.K.E.R.-like free-to-play MMOFPS. SURVARIUM is scheduled for a late 2013 PC release.

Super Mobile Bros

AARON SAN FILIPPO LEAVES RAVEN TO START FLIPPLY

SOFTWARE ENGINEER AARON SAN FILIPPO LEFT RAVEN SOFTWARE AFTER SEVEN YEARS OF WORKING ON SUCH GAMES AS MARVEL: ULTIMATE ALLIANCE, SINGULARITY, AND MODERN WARFARE 3 TO COFOUND AN INDEPENDENT MOBILE DEVELOPMENT STUDIO WITH HIS BROTHER FOREST. READ ON TO FIND OUT WHICH IS MORE STRESSFUL—STARTING YOUR OWN STUDIO, OR WORKING WITH YOUR BROTHER.

Patrick Miller: *You've spent more than seven years with Raven Software. What made you finally decide to leave?*

Aaron Filippo: It was a combination of lots of factors. Raven and Activision are in a great place right now. We'd just helped finish MODERN WARFARE 3 last year, and I've never seen a group of developers more excited to be doing the next big thing. But ultimately, I was really wanting something smaller, more fresh, more daring and risky, and I wanted to be really challenged personally again. And that's just not where triple-A is at right now.

PM: *Now you're starting an indie development studio along with your brother.*

What kind of games are you planning on making?

AF: We've been looking at the markets a lot. The App Store gold rush is over, but quality games from anyone can still succeed. We're hoping to make use of technologies like Unity, and really hit as many platforms as we can, with iOS being the lead platform. But we both agreed that a good strategy is to crank out several small but highly polished and catchy projects right away, and get in the swing of shipping apps as a team. Our upcoming project is pretty exciting—it's an iOS...thing that'll make use of the camera to do face-tracking, combined with the accelerometer and gyroscopes, to do something kind of crazy.

PM: *Are you worried about how competitive the mobile market is getting now that*

the "gold rush" is over?

AF: I think what we're seeing is that the market is maturing. I think for every postmortem where someone talks about their app failing, one can usually see where it fell short—maybe in accessibility, polish, or marketing, even if the developers haven't come to grips with this yet.

Part of our strategy is to really build a community around our brand. We're starting with a "small bet" strategy, but we also don't plan to put out anything less than great, to start to build some recognition for quality in the Flippfly brand. Analytics and focus testing will be a big part of this.

PM: *Does working with family complicate your development process?*


AF: Working with my brother has been great; we've always gotten along well, and our skills are really complementary, with him having a graphic design background and me being the technical guy. Nonetheless, we didn't ever want Flippfly to become a source of contention between us, and so we set out early to get a legal operating agreement fleshed out just so we could know the business stuff had no open questions and so we

could focus on development. So far it's been awesome.

PM: *Tell me a little bit more about the new skills you've had to cultivate.*

AF: PR is the big one we're having to learn. Just figuring out how to approach the press, the community, and the customers in a way that's professional yet casual. The other thing we're really trying to figure out is how to do effective, continual focus testing. I think we've learned that friends and family aren't enough, but we haven't found a great solution for getting people who are excited to keep testing new builds.

PM: *Is there anything you wish you had known before leaving Raven to start your own studio?*

AF: You know, overall I'm feeling really confident and prepared, and looking back, I really have my experience at Raven to thank for that. I learned so much from the people there about shipping quality products, effective communication and leadership, good QA, and a sense of production values that I think will help drive me in this new effort. If anyone's wanting to start out in the industry and wondering whether to start indie or go to a studio, I'd really consider the studio option for a while. In the right setting, you'll be surrounded by nothing but talent every day, and you'll be totally prepared for whatever you want to do next. Just don't forget to come up for air once in a while and make sure you're still doing what you love! 



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CROSSING THE TWO-WAY STREET

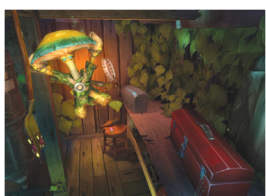


FROM GAME AUDIO TO GAME ENGINE

Some time during the current console life cycle, game audio reached a certain level of competence. We no longer need to argue over why we have to randomize a list of .wav files or nail down the equation for converting a 0.0-1.0 scale to decibels. Instead, we have freely available tools that can do all this and more. However, there lies a magical place somewhere between content creation and tool-side implementation, where the flow of game audio is fed back into the game in a two-way street of communication. And that place lives just outside the reach of most toolsets.

I WAS WALKIN'...

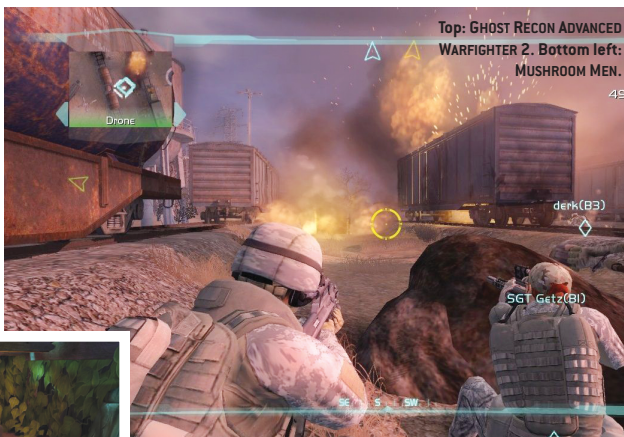
» We often talk about a game engine as if it is a monolithic entity, when in truth it is composed of many different systems all working together. The best engines lock those systems in a lovers' embrace, passing values back and forth in an endless stream of dynamic interplay. Some



of the coolest aspects of games happen when that exchange of data results in new gameplay and interactions, and a feeling of symbiosis within the game. Take the feeling of maneuvering the wind with the Sixaxis controller in thatgamecompany's *FLOWER* and how it reflects the flow of sound and acceleration in every movement. But when it comes to audio, communication from the game is usually limited to a request to play or stop a sound. The audio engine feeds on parameters to trigger and modify prepared sounds, but the audio engine rarely passes any

information back into the game.

Building the bridge between the audio and the game engine is a way to enhance the relationship between sound and everything else that makes up the game. It's not that every game needs this kind of interaction, of course, but if we can make it easier to build these bidirectional relationships, we can give more developers the chance to find good reasons to use them in their games. That's not to say it never



happens. The *SUPER MARIO BROS.* series has a history of

using musical beats and tempo to change animation speed, and the latest version on the Wii has objects that bounce in time to the music. Red Fly Studio's and GL33K's *MUSHROOM MEN* takes things a step further by syncing ambient sound and particle effects to dub-style remixes of jam-band improvisational nuggets. *REZ* and *CHILD OF EDEN* bridge stunning visual effects, motorik animation, and a syncopated sonic slipstream. Future titles such as *DYAD*, *SOUND SHAPES*, and *FRACT* promise to bring even more synergy between sound and visual aesthetic, and *PIXELJUNK*

4AM is set to define interactive music visualizers with more than just a little dynamic digital signal processing (DSP).

JUST A LOOKIN'...

» While these titles all have a pretty direct music-to-visual connection, the interaction doesn't always have to be so direct. Take the particle effects in *GHOST RECON ADVANCED* *WARFIGHTER 2* multiplayer from Red Storm Entertainment,

the use of sound propagation. This makes sense; when the players' goal is to remain undetected, they need to rely on their sense of sound to get information about the environment. Games in the *SPLINTER CELL* and *THIEF* series have been using the amplitude of positional player sounds to alert NPCs for years. Some systems even take into account whether nearby doors are open or closed in order to modify a sound's perceived volume. With this level of communication between the audio engine and the NPC's artificial intelligence, developers can build a style of gameplay that is dependent on information from the audio engine. Needless to say, I'm excited for the day when developers have access to audio information as a matter of course.

Games can create experiences that are impossible in other media. I hope that as our toolsets continue to allow more and more systems to interact with each other, and the repetitive everyday tasks get ironed out into easy workflows, developers (like you) with a creative vision can find new ways to create relationships between game audio and other systems. It may be difficult now, but it will get easier someday. Just take a moment to think about the technology that we can take for granted in today's game development, and how we developers have gotten ever more creative thanks to those developments. I think the near future's looking pretty good! 🎧

"Cross-town traffic, so hard to get through to you!" —Jimi Hendrix

DAMIAN KASTBAUER is a technical sound design spaceman who can be found daydreaming about game audio at LostChocolateLab.com and on Twitter @LostLab.

GDC EUROPE 2012 REVEALS MAJOR ADDITIONS TO MAIN CONFERENCE, SUMMIT ADVISORY BOARDS



With GDC Europe 2012 quickly gaining steam, show organizers have added 14 leading European game developers to the event's main conference and summit advisory boards. They will help program the lectures, panels, and roundtable sessions taking place at August's conference in Cologne, Germany.



The newest members to join the main conference advisory board for GDC Europe 2012 include former BATTLEFIELD HEROES developer Ben Cousins, now general manager of ngmoco Swede, Playdead CEO Dino Patti (LIMBO), DICE creative director Lars Gustavsson, and Christopher Schmitz, head of production at Ubisoft Blue Byte (THE SETTLERS and BATTLE ISLE).



All of these new advisory board members come from notable and varied backgrounds in the European development community. Their range of expertise will bring even more insightful content to GDC Europe 2012, targeted at developers all across the continent.



From top to bottom: Ben Cousins (ngmoco Sweden), Lars Gustavsson (DICE), Christopher Schmitz (Ubisoft Blue Byte), and Dino Patti (Playdead).

Other new additions to GDC Europe's main conference advisory board include Crytek veteran and Yager Interactive design director Bernd Diemer, EA

Phenomic VP Dirk Ringe, Kuju Entertainment COO Adrian Hawkins (BATTALION WARS), Guerrilla Games technical director Michiel van der Leeuw (KILLZONE series), online game consultant Teut Weidemann, Secret Exit cofounder Jetro Lauha (ZEN BOUND series), and Sven Liebich, head of art at Bigpoint GmbH.

These developers will join continuing board members such as Remedy Entertainment's Matias Myllyrinne (ALAN WAKE franchise), Avni Yerli of Crytek, and Harald Riegler of Sproing.

Helping to program the increasingly vibrant GDC Europe submarket summits will be Thomas Grip, one of the key creatives at Amnesia studio Frictional Games, who will join the advisory board for the Independent Games Summit, alongside Knap Nok's Lau Korsgaard (who previously worked on Die Gute Fabrik's B.U.T.T.O.N.).

Elsewhere, Jami Laes, VP, Global Studios of social game giant Playfish, and Henric Suuronen, head of studio at Non-Stop Games (and formerly at wooga), will both join the committee of the Social & Online Games Summit.

In addition, Ansu Lönnberg, chairman of the board at Secret Exit, and Semyon Voinov, cofounder of CUT THE



BATTALION WARS.

ROPE creator ZeptoLab, will join notables such as Fishlabs CEO and cofounder Michael Schade (GALAXY ON FIRE) on the advisory board of the Smartphone & Tablet Games Summit.

Now in its fourth year and happening alongside the European-leading Gamescom trade fair, GDC Europe will take place Monday through Wednesday, August 13-15, 2012 at the Congress-Centrum Ost Koelnmesse in Cologne, Germany.

The event will once again serve the European game industry by gathering the world's leading speakers in areas specific to current European game development trends across platforms and development disciplines.

"With this incredible influx of new energy and ideas across the advisory boards for both the main

conference and all three summits, I believe we can expect this year's GDC Europe to continue to blossom into the most important event on the industry calendar for those who want to push the European development industry into new territory," said Meggan Scavio, general manager of all Game Developers Conference events.

In 2011, GDC Europe hosted more than 2,100 attendees, 170 speakers, 45 exhibitors, and 300 media representatives. With a developer-focused expo floor area and myriad day and evening networking events, GDC Europe 2012 will continue to offer business and networking opportunities to all attendees. For more information on GDC Europe, please visit the event's official web site (www.gdceurope.com). #GDC



WWW.WHATISNOUS.COM

NOUS

IT'S HARD TO PUT A LABEL ON AWESOME SHARK VOLCANO'S IGF STUDENT SHOWCASE FINALIST *NOUS*. AT FIRST GLANCE, IT LOOKS LIKE A SIMPLE ARCADE GAME WITH A RATHER RETRO AESTHETIC—UNTIL YOU ENCOUNTER THE UNHINGED AI NARRATOR. READ ON TO FIND OUT HOW FOUR DIGIPEN STUDENTS MANAGED TO MAKE *NOUS*—AND HOW THEY MIGHT HAVE GOTTEN A LITTLE BIT UNHINGED IN THE PROCESS.

Patrick Miller: Tell me a little bit about the team behind *NOUS*. How'd you meet, and who did what?

Pohung Chen: We're a team of four students at DigiPen Institute of Technology. *NOUS* was our sophomore year game project. I wrote physics code for the custom engine. A lot of the physics code didn't end up being used in the final game beyond basic collision detection and resolution. I also helped the team with scheduling, figuring out where we're going,

That involved scripting the gameplay, the levels, writing the script, running playtesting, and polishing everything player-side.

PM: Where'd the idea for *NOUS* come from? Was the AI "personality" there from the beginning, or did it come after other game mechanics were set down?

BC: We were a team driven to create something great, but we lacked a killer idea. We spent most of our development period

personalities that felt unified? What composes a character—or an identity?

PM: What inspired *NOUS*'s visual style?

JM: As our project evolved, so did its visuals. Throughout the project we struggled with mixing 2D gameplay with 3D visuals, and for a long time the game looked like a random assortment of sprites and effects rather than a cohesive piece. When we figured out the theme of *NOUS*, we figured out an art style to go with it, one that would utilize the effects in more complementary ways. There was some definite inspiration from *GEOMETRY WARS*, being simple and computeristic. The color palette was inspired by *PORTAL*, or any DVD cover, and after consulting with some of the artists at DigiPen, we were able to really make it stand out.

BC: There's a stage in any creative's development where they just want to provoke a reaction. Visual noise, flashing lights, and loud sounds feature heavily in the game, inspired by the opening credits of the movie *Enter the Void*. The chaos is punctuated by silence—by pure, clean letters on a black void.

PM: What did you use to prototype and develop *NOUS*?

PC: We wrote our engine using C++ and Lua. Integrating Lua into our game really sped up our code-iteration speed. We were able to use it to prototype a lot of different ideas fairly quickly.

Because we were only four people building the entire game from scratch and we each had four to five other classes to take care of, some things were left in a barely good-enough state. One good example of this was

our level editor. It was thrown together quickly and wasn't very usable. We didn't end up making it user-friendly enough to be all that useful. A lot of the content was tediously thrown together using a combination of the editor and Lua code.

BC: I still wonder about the prototypes we trashed. Could they have been better than *NOUS*, given time to shine? How do you know when you've developed a prototype far enough to test it, or whether you're abandoning it just before you would have hit a breakthrough that would unlock the fun?

PM: Is your team going to continue to work together on anything else?

JM: Pohung and I have been working on another project for about a year, and it's given me a whole new perspective on game development. We're expecting to release it within the year.

BC: Teams shift every year at DigiPen, and we try to work with a mixture of new people and old friends. Treb, Pohung, and I have been working on another project—and trying to build a game very different from *NOUS*. It involves rhinoceroses. 🦏



and ran playtest sessions. Treb Connell worked on the core engine and wrote our Lua binding.

Jason Meisel: I was the graphics programmer on the project as well as the "co-designer" and eventually the artist—that one surprises me. I came on to the project wanting to learn how to do cool graphics effects, and I think I was pretty successful. I also made many of the prototypes that we experimented with over the course of development as well as a good amount of random gameplay code.

Brett Cutler: I was the last to join the team and was handed the clay of our ideas, tasked with shaping it into a game as the designer.

throwing out prototypes. Before *NOUS*, we had "Dr. Gravity and the Invention of Gravity;" before that, "Spaceburnium." By the end of our regular production, we were known mostly as the game that kept changing. So we made that the focus of the game.

The frustration and indecision we'd fought against for the whole year was poured into a manipulative, confused, and insane narrator. The AI personality grew into this space, personifying our development and exploring the concept of identity; namely, though our game had changed radically, we still felt it was the same project. Could we build a character with radically different

Team Name:
Awesome Shark Volcano (DigiPen)
Release Date
October 2011
Development time:
About a year
Development Budget:
\$0.00
Lines of code in the game:
40,000
A fun fact about the development process:
Composer on the cheap—some of the music in *Nous* was made with Paul Stretch, a program that slows down classical music to a quarter of its normal speed.



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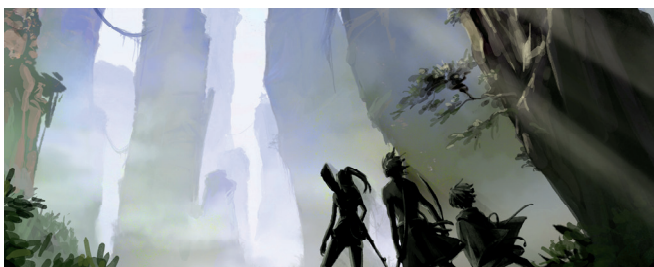
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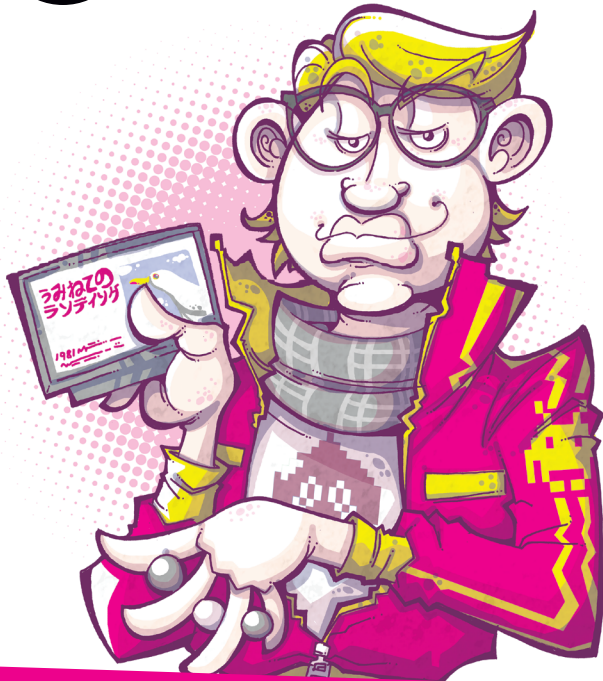
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HOW TO BE HIP

POWER-BOOSTING YOUR GAME INDUSTRY STATUS

Are your coworkers getting promoted around you? Are your colleagues' games hogging all the praise on review sites and dominating the conversation online? Are you feeling like you need to upgrade your status in the game industry?

It's time to change things around, buster! Go on and start acting like the hip, fashionable game developer you are. Don't be shy! As the old adage goes, "Fake it 'til you make it." That's what everybody else is doing, after all! So lose the humble act and become the hottest game developer in the room. People will naturally assume you know what you're talking about, and pretty soon you'll find yourself with thousands of Twitter followers, speaking engagements at conferences around the world, and invites to secret game-industry forums and mailing lists!

Where should you start? It's fairly easy—here are some handy tips for being better than everyone else around you.

PICK AN OBSCURE GAME TO LIONIZE

» The first, most important thing to do is hold unconditional love for a game nobody has ever heard of. It doesn't matter if it's some Apple II adventure game or a bizarre bootleg NES title—it's pretty much the best thing ever, and no modern game can hold a candle to the way it was so dynamic, so complex, so easy to understand yet bursting with interactive possibilities.

"Easy enough," I hear you saying, "but which game should I pick?" That's a good question. Just as with indie rock bands, you don't want pick a game that other people have already picked. That's super uncool!

There's only one way to guarantee the ultimate obscure coolness of your most favorite game, though—just make one up! So many games are out there that nobody, not even the most hardened game writer, would second guess that the cartridge for SEAGULL'S LANDING (feel free to insert your own novelistic name in there), a prototype of a game for the Atari 7800 that was never released and that can only

be found in the programmer's nephew's basement, really exists.

KNOW ABOUT GO

» All serious game designers know about the ancient Asian game Go—how its elegantly simple rules create a veritable universe of possibilities, how people who play the game are said to express themselves through their moves, and how the name "Atari" came from a term in the game.

Consider this your cheat sheet for Go: It's a two-player, turn-based game in which combatants hurl black and white stones at each other in a no-holds-barred fight to the death. The loser is ritually sacrificed to the Snake King inside a ring of flames while a turned monk recites evil incantations.

It's easy to see why so many modern game designers are inspired by Go.

REFER TO FAMOUS PEOPLE BY THEIR FIRST NAMES

» People refer to you by your first name, right? So why wouldn't you do the same to everyone else? Mention that you're interested to see what Peter does after his departure from Microsoft. Talk about how Will's work on THE SIMS helped inspire your own creations. Say, "Hey, did you catch Satoru's keynote?"

It makes it sound like you're about to catch up with them over beers. If anyone tries to call you on it, you can just say, "Well, I'd love to invite you to tag along, too, but..." and hold up your hands in a what-can-I-do pose. They'll understand—you simply don't have the power to lift them up into the rarefied circles that you move in.

HAVE THE EARLIEST GAMING STORY

» You'll want to have had an experience with electronic games earlier than everyone else, so it's important to not tip your scales too early. Let the rest of the group mention what their first computer or console was and the games they played on it. Then pick one before all of those.

Example dialogue: "Oh, yeah, I remember TENNIS FOR TWO. There was this huge line to play it back when it came out in 1958, but I was buddies with the lab director at Brookhaven,

and he let me play whenever I wanted. That game really informed a lot of the design principles I've developed today—wait, you've never played TENNIS FOR TWO? What's wrong with you? Are you crazy? Any game designer who takes themselves seriously needs to play this game! You can't emulate it, either. You have to play the original. Yeah, I know the hardware doesn't exist anymore. Oh, well. Guess you'll never have the transcendent experience that I had."

PRONOUNCE JAPANESE WORDS CORRECTLY

» The Enix in Square Enix is pronounced "ehn-nix," not "EEE-nix." Make sure to use the correct pronunciation when you're talking about the decline of the Japanese game industry.

KNOW ABOUT, LIKE, PHILOSOPHY AND STUFF

» Philosophy sure seems like one of those things that can get us the legitimacy we've been lacking, so it follows that nothing will help you gain your own legitimacy within the game industry more than talking philosophy every now and then. You don't even need to know a whole lot—just suddenly say things like, "Oh, the old games-and-art thing again, eh? You do know what Immanuel Kant said about art that one time, don't you?" and arch an eyebrow.

SURROUND YOURSELF WITH OTHER HIP PEOPLE

» Finally, remember that hipness isn't about one person. It's about being a movement! Once you start on the road to the Cool Club, you'll notice yourself gravitating toward others of the "in" crowd. It's one of those self-reinforcing things, so this last step shouldn't be too hard. Just remember who got you there—namely, me! When you're rich and famous, don't forget that my advice in this column is what helped you out.

Invite me to parties, okay? Okay?

Please? ☹

MATTHEW WASTELAND writes about games and game development on his blog, *Magical Wasteland* (www.magicalwasteland.com). email him at mwasteland@gdmag.com.



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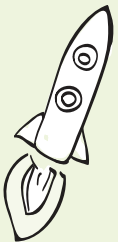
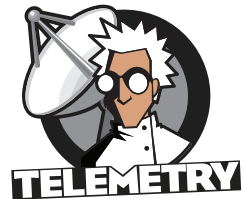


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