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THE LEADING GAME INDUSTRY MAGAZINE

POSTMORTEM:
INSOMNIAC'S
RESISTANCE:
FALL OF MAN

gamedeveloper

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[GAME PLAN]

TV EMPORIUM

HERE'S A QUESTION TO PONDER: WHICH BUSINESS model, though rarely applied to games, has led to some of the most innovative, interesting, and high-quality products in the television business? And here's a hint: This network had a record 14 nominations for this year's Golden Globe Awards, more than any other network, despite being watched by significantly fewer viewers.

The answer is HBO. The station's business model relies on a monthly subscription that lets viewers watch all movies and original programming on its service. I'm sure most people agree that some of HBO's best shows, including *The Sopranos*, *Six Feet Under*, *Curb Your Enthusiasm*, and *Deadwood*, would not be possible on a major TV network because shows with mature, niche, or edgy themes just won't get big enough ratings to make it.

NEW WAY TO PAY?

Though DVD and licensing sales of its major products no doubt help, it seems a subscription model alone might be the thing that keeps HBO strong. Why can't this same system work for games?

We're starting to see some attempts to exploit this in the PC market. For example, some European companies such as Metaboli have tried it. Exent has powered many games on demand efforts. And most notably, of course, there's GameTap.

These services tend to offer unlimited access to commercial PC games for between $10 and $20 per month, and it's actually a pretty interesting idea—one which some companies (particularly Turner with GameTap) are putting significant money into developing. The licensing fees are significant if the company is using content that has previously been released elsewhere, but that in itself provides a core of interesting games which aren't that easy to pick up in retail.

Then again, Xbox Live Arcade and Wii's Virtual Console both do a fine job of providing retro and other smaller-spec games for $5 and up, and you can keep those forever. Why would you ever want a subscription if it doesn't allow you to keep the games? Well, Xbox Live has movie rentals right now, and people are very happy with that, so it really could work the same way.

PACKAGED GOODS

If the service provider aggregates multiple products and makes them all available on a subscription basis, then the consumer can try everything out for size. Demos are close to doing that, but the sheer amount of interesting niche games that can be easily flipped onto a subscription service and aggregated is massive, compared to those that would be moved onto Xbox Live Arcade and could survive a standalone $5 payment. It's the same with TV channels like Turner Classic Movies, which has plenty of great movies that most consumers would never pay to buy or rent individually, but which become more appealing when amassed and sold as a package of opportunities, rather than a single film.

FUTURE INDIE

A lot of the action thus far has been about repackaging existing games. If one of these services really takes off and gets one million subscribers at $10 per month each, it might be able to fund the development of episodic games, independent games, and a plethora of others from scratch. These games would then be available exclusively on the subscription service first, and then could even be rolled out to retail at a later date, or maybe given away as a bonus alongside the subscriptions.

That's what excites me—the idea that there could be a fund through a subscription service for these edgy and cool titles, which would foster innovation and excellence, just as HBO does with its programming. But it requires a big subscriber base, and I'm not sure that launching solely on the PC is really going to do it. There needs to be a console solution, or anything that will play in the living room.

Maybe something like the inevitable Apple iTV or massively upgraded cable set-top boxes will be the answer in the much longer term. Or maybe a console company will see the benefits of allowing this option for a third-party firm, even though it runs against current business models. Either way, can anyone else see the possible benefits here?

It requires gamers to think about how they consume games differently, but with digital swiftly becoming the paradigm, anything is possible.

S!

Simon Carless
Editor-in-Chief

xna™

G D C 2 0 0 7

G D C M o b i l e 3 . 5 – 3 . 6
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RACE 08

A look at the next likely presidential candidates, including their past actions and stance on the electronic entertainment industry

FORMER N.C. SENATOR JOHN EDWARDS (D)

ANNOUNCED? Yes

A former North Carolina senator and John Kerry's running mate in 2004, John Edwards hasn't interceded in the electronic entertainment world much. As a senator, he did co-sponsor a 2000 bill (the Consumer Privacy Protection Act) to protect the privacy of online consumers of books, recorded music, and videos.

About the closest he has come to anything like a video game controversy was when an aide was caught trying to coax a launch-day PlayStation 3 out of a Raleigh Wal-Mart. It was a significant gaffe because the former senator has been a relentless critic of the retailer's labor practices.

SEN. HILLARY CLINTON (D-NY)

ANNOUNCED? Yes

Turning a critical eye to the marketing and selling of violent video games to children, Sen. Hillary Clinton—often hand-in-hand with Sen. Joe Lieberman (D-CT)—has organized much of the major legislative efforts pointed at the game industry. However most recently, she and Lieberman endorsed the ESRB rating system, putting some credibility back in the hands of the experts. In 2005, Clinton led the political charge on the Hot Coffee scandal and co-sponsored the Children and Media Research Advancement Act (CAMRA), which authorizes the Center for Disease Control to conduct a $90 million study on the effects of media on children. She also co-sponsored the Family Entertainment Protection Act (FEPA), which would give game rating restrictions the force of law.

SEN. SAM BROWNBACK (R-KS)

ANNOUNCED? Yes

This arch-conservative chaired the Senate hearings on video games in 2006. He is a co-sponsor of Hillary Clinton's CAMRA bill and more recently proposed the Senate version of the Truth in Game Ratings Act, which would require the ESRB to play every game to completion before assigning a rating. Brownback actually sponsored the 2005 bill that called for the Federal Trade Commission to investigate how GRAND THEFT AUTO: SAN ANDREAS came to be rated, and whether the publisher willfully deceived the ESRB in doing so. Following that in September 2006, Brownback sponsored another bill to "direct the Federal Trade Commission to prescribe rules to prohibit deceptive conduct in the rating of video and computer games and for other purposes." Neither Lieberman nor Clinton co-sponsored his bills.

CHILD'S PLAY RAISES OVER $1M

IN ITS FOURTH YEAR, webcomic Penny Arcade's charity Child's Play has raised more than $1 million in toys and donations for children's hospitals around the globe. And the number keeps climbing.

"A $5,000 check just came in," says Penny

An auction and charity dinner helped Child's Play raise money to put games in the hands of sick children.

Arcade writer and co-founder Jerry Holkins. "We have the final number up [for donations in 2006], and we're happy with it. We're proud of it—but at the same time, it's more than that."

Further bucking the stereotype of video games and game companies as socially irredeemable, the charity is run by avid gamers, who also contribute the largest percentage of donations. These come in the form of video games and toys (which can be purchased through

Amazon.com wish lists), a $125 per plate dinner and auction, and cash donations, which are used to negotiate the purchase of entertainment for the children of some 38 hospitals worldwide. While the bulk of the hospitals are in the U.S., Child's Play also helps sick kids in the U.K., Australia, Canada, and Egypt.

Active since 2003, Child's Play aims to simply relieve children who are cooped up in hospitals by offering something to distract

Other democrats who have announced they will run for the 2008 presidential election: Sen. Joe Biden (D-DE), Gov. Tom Vilsack (D-IA), and Rep. Dennis J. Kucinich (D-OH). Neither Biden nor Vilsack has much of a track record with video game issues. Other republicans who are widely mentioned in the upcoming presidential race include Former Speaker of the House Newt Gingrich (R) and Gov. Mitt Romney (R-MA), who has formed an exploratory committee.

—Jill Duffy and Dennis McCauley

FORMER MAYOR OF NEW YORK RUDOLPH GIULIANI (R)

ANNOUNCED? Formed exploratory committee, but unannounced as of press time.

Rudolph Giuliani has no real official word on video games. He hasn't had to. His efforts in the Big Apple have been rather focused, and since violent games and free speech aren't currently hot-button issues for New Yorkers, they have been left largely untouched by the former Mayor. He's much more likely to be questioned about any number of private family matters than to be asked his opinion of the ESRB.

SEN. JOHN MCCAIN (R-AZ)

ANNOUNCED? Formed exploratory committee, but unannounced as of press time.

In 1999, Sen. John McCain sponsored a bill that called for a Surgeon General's report on media violence and its effect on children. The joint resolution was co-sponsored by none other than Lieberman, as well as one North Dakota senator. The bill specifically called out video games among the potential offenders of children's health and welfare. Also in 1999, McCain sponsored a bill "to provide for the development, use, and enforcement of a system for labeling violent content in audio and visual media products, and for other purposes." In more recent years, McCain has steered fairly clear of the topic.

SEN. BARACK OBAMA (D-IL)

ANNOUNCED? Formed exploratory committee and will announce his decision to run February 10.

The 45-year old senator from Illinois rather pointedly returned a $500 campaign donation from former ESA boss Doug Lowenstein in 2006. Although Obama has no legislative history with video games, the father of two has made remarks indicating that he thinks they are time-wasters. Obama's political activities tend to center around economic issues in his state, though as a former community organizer and civil rights attorney, he has aligned himself well with grass-roots organizations and is relying on them primarily for support in his tentative presidential run. *The Daily Show* host John Stewart has been giddy with excitement since the senator announced his exploratory committee in mid-January.

FOR HOSPITALS

them from their pain, and to create a more welcoming environment in the otherwise unfamiliar world of a sick ward.

One former patient, in a letter of appreciation to the organization, describes being lulled to sleep by familiar video game sounds while having spinal surgery.

The patients get to keep some of the spoils, too. "Kids get presents on their present holiday, whichever that may be, but they also get them on their birthday," Holkins says, "and those are toys for them to keep. Those aren't checked into or out of a library." Larger communal toys and game consoles are kept on carts or in general play areas.

Originally, Child's Play was intended to be a small operation, a donation program for just one hospital, say the organizers. "We thought it would be cool, like a local toy drive, and you could drive the stuff over in your car. But that proved impossible," Holkins says.

The group instead had to rent a truck, seek out donated warehouse space, and eventually borrow a semi and a driver, all in the program's first year. Now, the nonprofit has reached the size where it has to have an actual employee.

What would happen if they were to stop the charity at this point? "Shame," says Holkins. "Shame and disgust on the part of our stalwart supporters, I would assume."

—Brandon Sheffield

TOP XBOX LIVE GAMES 2006*

MOST-PLAYED ONLINE XBOX 360 TITLES

#	Title	#	Title
1	GEARS OF WAR	11	SAINTS ROW
2	HEXIC HD	12	GEOMETRY WARS: RETRO EVOLVED
3	CALL OF DUTY 2	13	DEAD OR ALIVE 4
4	GHOST RECON ADVANCED WARFIGHTER	14	TEXAS HOLD 'EM
5	THE ELDER SCROLLS IV: OBLIVION	15	MADDEN NFL 07
6	PROJECT GOTHAM RACING 3	16	DEAD RISING
7	PERFECT DARK ZERO	17	NEED FOR SPEED MOST WANTED
8	CALL OF DUTY 3	18	TOM CLANCY'S RAINBOW SIX VEGAS
9	UNO	19	BATTLEFIELD 2: MODERN COMBAT
10	FIGHT NIGHT ROUND 3	20	SPLINTER CELL DOUBLE AGENT

HANSOFT'S HANSOFT 4.2

By Ben Board

I'M A PRODUCER. I MAKE SCHEDULES.
I'm part of a team, and they read the
schedules and carry out the tasks while I
lie on a velvet chaise lounge and eat
grapes that glitter with beads of the
purest Alpine spring water.

Actually, I track the team's progress
and constantly adjust the schedule to
deal with all the changes, repositioning,
hiccups, opportunities, delays, and acts
of heroism that make up each exciting
day. For large parts of those days, I am
chained to the schedule, so I might as well
enjoy working with it. And for the last nine
months I have, because I've been using
Hansoft's project management tool.

Sharing a name with the Swedish firm
that developed it, Hansoft is a project
manager's trusty sidekick, encouraging
collaborative scheduling and putting
equal focus on tracking schedules and
creating them. Everything is online, with
all updates occurring in real time so
there's no more tracking by printout.
Hansoft is especially relevant to the game
industry because it was designed by
people who have managed game projects.

Hansoft scales well to multiple projects
that share resources, benefiting larger
companies. It also allows external
agents, such as a publisher, to be granted
read-only access to the live schedule.
And since version 4, Hansoft has added
major features that work within an agile
development environment, which is not
my speciality and not discussed here,
but worth investigating if it's yours.

HANDS ON HANSOFT
There are three core responsibilities project
managers have on a daily basis: creating
tasks, recording completed tasks, and
tracking the overall progress of the team
and the project, in an effort to keep the
darn thing on the rails. In my experience,
Hansoft does all three uncommonly well.

To create schedules, project managers
start with a list of tasks, deliverables,
dates, and people, which is massaged
into a Gantt chart (a project schedule bar-
style chart) that is as elegant and
beguiling as it is ephemeral.

Hansoft's interface is well designed
throughout. Commonly used functions

for creating linked tasks and milestones
are laid out prominently and are easily
accessible via keystrokes. Lesser-used
functions are never far away, but don't
clutter up the principal view.

The Gantt chart, another feature that
needs to be upfront, is clear and easily
panned and zoomed. Milestones are their
own entities rather than special-case
tasks, and as such seem much more
powerful. For instance, if the user links a
set of tasks to the milestone by which
they should be completed, a simple
percentage readout will show just how
much trouble that milestone is in.

DELEGATION AND DESCRIPTION
A key feature of Hansoft, enabled by its
online arrangement, is delegation. With
delegation, the user can create a high-
level schedule, including all the major
dates and feature expectations, and
unlock portions to be fleshed out by the
more knowledgeable team lead. So
empowered, the lead can then sub-
delegate sections to specialists.

Hansoft the company says it's proud of
this feature—and deserves to be. It
works brilliantly by allowing the project
manager to spend more time monitoring
and tracking rather than gophering,
assembling, and formatting.

One problem I've found with schedules
is how easy it is to turn a meaningful task
description into a short and ambiguous
task name, which loses its meaning when
the task is reached months later. Hansoft
has no less than three ways of solving
this problem.

First, to each task you can add a
hyperlink that might give the assignee
more information on its completion, such
as a web reference, a link to a document on
your local Perforce depot image, or a file on
a shared folder. Second, Hansoft actually
features a full document repository,
complete with version history, where
tasks can be directly linked to specified
documents. Because it doesn't link to any
existing versioning software (such as
Perforce), I have hardly used this particular
feature—but it's there. Third, Hansoft has
a heavyweight and deeply cool comments
system, which made a huge difference

on my last project in communication,
allowing whole threads of task-specific
comments to narrate the progress.

VIEWPOINTS AND VANTAGES
Project managers have the ability to add
custom columns to the task list view
containing any info they like, be it
arbitrary text, hyperlinks, or a custom
drop-down box. Users can choose one of
the provided suggestions (priority, risk,
or confidence) or create their own, such
as a column for the project manager to
sign off on an asset or feature. With
thought, a project manager could design
columns that could make a real
difference to productivity.

Once a schedule is completed, and if
politics require it, the studio can give a
license to the publisher that grants
access to the headline levels of the
schedule. The project manager controls
all project staffers privileges in this way,
allowing them to change only their own
tasks—another powerful tool enabled by
the online system.

Each team member has a personal page
listing his or her tasks, with new or
changed items highlighted (and emailed).
The task's pane is used to record
completion progress—either binary or by
percent, whichever suits you—with
explanatory comments. When the task is
marked complete, the project manager is
sent a notification to check the new
addition. No more visiting each team
member with a schedule printout! And
although Microsoft's online Project Server
allows for this online sharing of the
schedule, I have found it slow and clunky
to use. Hansoft, on the other hand, has
been online from the start, and it shows.

ODDS AND ENDS
I really want to convey how simple
tracking is in Hansoft. It gives the project
manager just the info that's needed, all in
one place, with no paperwork. Problems
light up instantly and automatically, and
can quickly be resolved. This is how it
should be.

Although Hansoft's primary benefits
result from it being a purely online tool,
its few downfalls stem from that fact as

well. For example, I currently can't create or manage schedules when I'm out of the office. Moving schedules to and from Microsoft Project is basic (via XML exports). Also, I've seen a few minor bugs, reflecting the fact that the software is relatively young, but most are swiftly fixed with each release.

In my experience, the technical support is excellent. I'm looking forward to seeing how the agile interface will be refined in future releases, too, since as of press time it was quite new.

Hansoft has greatly increased my effectiveness as project manager on HEATSEEKER, and should be considered a serious, and in many ways superior, alternative to Microsoft Project.

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MICROSOFT VISTA: A GAME PROGRAMMER'S VIEW
By Ron Fosner

I LOVE GETTING NEW VERSIONS OF Windows to peruse the latest documentation and find what's new and improved. Unfortunately, a new version also means learning some new behavior as the folks at Microsoft get around to creating new interfaces and pursuing the goal of making the OS more secure.

While I'd like to talk about the new DirectX 10 interfaces or how to use Aero Glass in your program, these aren't the features that are going to immediately affect most game developers. What will have a bigger affect is mastering the tightened user restrictions in the form of User Account Controls, having 64-bit and multi-core capable programs, and getting ready for the Windows Explorer shell extensions and parental controls for games.

USER ACCOUNT CONTROL

When I first used Vista, what I noticed right away (and what annoyed me greatly) was the User Account Control (UAC)—usually in the form of a dialogue box asking me if I really wanted to do something. Granted, I was installing Vista on a new machine and was busy installing all the programs I work with, so I was constantly installing programs that were written with pre-UAC standards in mind.

UAC is Microsoft's latest attempt to get security right, and they have basically made security much more in-your-face. Overall it's a good thing, but it does mean that if you assume the person running your game has administrator privileges, you'll probably be looking at a slew of support calls as the Vista installed base gets larger.

Even if your program does seem to install and run correctly, things are different on Vista. The system attempts to maintain compatibility with pre-UAC

product news

MUDBOX 1.0
SKYMATTER
Skymatter, a new 3D software company founded by artists from Weta Digital and Electronic Arts, recently released to the public its high-resolution, brush-based, and low-cost sculpting software for professional digital artists. Mudbox, which had been in production testing for the past two years, is introducing a few new concepts, such as true 3D Layers, which lets artists organize sculpted forms and details on separate layers, and innovative mirroring technology, which enables artists to sculpt symmetrically on asymmetrical or posed models. Mudbox is available for $299 via the company's web site.
www.mudbox3d.com

FUSION 5 FOR LINUX
EYEON SOFTWARE
Eyeon Software has released a new version of Fusion for Linux users. Fusion, now in version 5.1, is a full-featured, node-based compositing system with backend tools via a

powerful scripting engine with ODBC support. It has a 3D environment with camera and lights support for leading 3D packages, and contains a 3D particle system. However, through the initial release period, the product will be available only to studios and artists who qualify.
www.eyeonline.com

SOFTIMAGE XSI 6
SOFTIMAGE
Version 6 of the 3D art package Softimage XSI, released in late 2006, gives users new toys in the motion capture department. XSI 6 also supports the .NET framework and includes integrated C#, an object-oriented programming language. Support for Python has also been added. The company also says it is working closely with industry partners to offer support for DirectX 10 hardware that will operate on Microsoft Windows Vista once it becomes available. Prices range from $495 to $6,995.
www.softimage.com

PERFORCE 2006.2
PERFORCE SOFTWARE
A new version of the Perforce software configuration management system, a staple to the game industry, recently became available. The release includes an enhanced version of the Perforce Server (with improved branching performance, more administrative control, and file size calculation) and new features to several client tools. End user licenses, including one year of support and maintenance, start at $800 per seat; volume discounts are available. Additional price and license information is available on the Perforce website.
www.perforce.com

KARVONITE
ADVENTURERLAND
A new agile persistence framework for .NET developers called Karvonite focuses on the manipulation and persistence of .NET objects. Created by Adventurerland, the tool is being offered for free to game developers

in hopes it will ease some of the typical problems programmers face when working with ADO.NET, SQL, or XML files. Karvonite aims to assist game developers in creating level or game editor applications faster. More information can be found on the web site.
www.karvonite.com

GENCROWD 3D V2.0
GENEMATION LTD.
Genemation, a developer of 3D face synthesis and character modeling tools, recently launched GenCrowd 3D v2.0. The software is used to create large numbers of synthetic but realistic-looking 3D heads quickly for crowd scenes. Assets are copyright free and can be exported to a wide variety of file formats (including .obj, .mb, and .fbx), mesh resolutions, and texture sizes. The software can be purchased via Genemation's web site for $699.
www.genemation.com

configured programs with file and registry virtualization. That is, when your program attempts to write (under Vista) to protected areas of the file system or registry, Vista will silently redirect them to locations allowed to be written to by the current user's UAC settings. For example, attempting to install some files in the Program Files\ directory will actually land them in Virtual Store\SID\Program Files\, where SID is the current user's account security ID. Likewise, attempting to write to the HKLM/Software registry tree will get virtualized to a user-unique location.

THE INSTALLMENT PLAN
Another interesting compatibility feature you'll find in Vista is called Installer Detection—Vista's attempt to detect installation programs. For example, if your program is a 32-bit executable; doesn't request an execution level; is running as a standard user account with UAC enabled; and has some keywords like "install," "update," or "setup" in the file name, the manifest, or the string table in the executable, then Vista will detect this and allow the program to continue by letting it run with administrator credentials. What does this mean to you? Well, if you're using one of the standard installer packages then your install will probably still work on Vista. But if you have a custom installer, chances are you will need to do some work before the program can install correctly. Take a look at the "Windows Vista Application Development Requirements for User Account Control Compatibility" document from the Microsoft web site for more information.

To be honest, this sounds like a huge pain. I applaud Microsoft for attempting to make things backward-compatible, but having things work silently just means to me—and other programmers—that I might get some nasty bugs down the road because my understanding of how everything

works is wrong because it was grandfathered in.

Developers will be asked to pay careful attention to how their game is installed and how it runs—and treat these as two separate cases. You should note that all this legacy support code in Vista is just that—legacy support. As nice as it is for older applications, the key point is to avoid it if you can. Microsoft has already indicated that this legacy support will be removed in later versions, so it's best to start planning to upgrade your code now. I'll spare you the full checklist for now and just try to highlight some of the main concerns.

WHO IS YOUR USER?
By default, Vista creates only the first account with admin privileges; all the rest are "standard user" accounts. The standard user is now the default user type and the most problematic since the account will be restricted, and UAC is on by default in Vista. You should break out the installation code from the main game code and place as much administrative code in the installer as you can. Don't assume the user installing the game is going to be the player. Save yourself a lot of grief by attempting to get rid of anything that can't be done with a "least privileged" user account. If you need to prod the firewall setting, do so at install time, not when the game is trying to run. Install the game in one of the CSIDL_LOCAL_APPDATA, CSIDL_PERSONAL, CSIDL_COMMON_APPDATA directories supported by the SHGetFolderPath function.

Do the same with registry functions. Read the Microsoft Developer Network document "Gaming with Least-Privileged User Accounts" for more information. I've made a short list of things you should be thinking about for Vista (see "Reminders for Programming in Vista").

64-BITS AND MULTI-CORE
Another goody that's making its way out about the same time as Vista is support for multi-core processors. Vista makes it possible to actually run multiple threads on multi-core CPUs.

The trend of the last few years is heading toward multiple CPUs, not faster ones. Games naturally break into threads, such as graphics, networking, and physics, although that's usually just a starting point. The key to a good multi-

threaded design is one in which there's a minimal need for synchronization and communication between threads.

Typically, about 95 percent of data access is a read, so if you can design your system writes to only happen on one thread, you've got the start of a robust design. Take a look at OpenMP. It makes it easy to create worker threads. If you need better control over threads and don't mind scheduling them yourself, take a look at promoting a thread to a fiber. You'll be able to gain more control with less overhead.

Vista is also the first consumer OS to come in 32- and 64-bit varieties. The biggest advantage to having 64 bits is that you can access more memory on that system. Switching over to 64 bits is usually pretty straightforward. Running on a 4GB (or more) systems will help find some nasty 32-bit overflow errors.

PARENTAL CONTROLS
Vista comes with the ability for parents (that is, system administrators) to select which rated games they want to let their standard users play. Microsoft has created a lot of settings for legacy games, but you'll probably want to create your own Game Definition File, which is an XML file that's embedded as a resource in the executable or DLL. For more information see the Game Definition File editor in the DX SDK.

Microsoft has also decided that games, like documents and music, should be located in their own space, easily accessible from the start menu. Having a Game Definition File plus some modifications to your install script will get you there. See the DirectX SDK for some examples and the MSDN document "Windows Game Explorer Integration" for more information.

There are many new features in Vista that will affect both end users and programmers. With a little work, it's possible to integrate yourself into Vista, but in some cases you might be able to wait until your next release. Still, it's better to be forewarned than to discover you've got a serious problem too late. ⬡

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Unreal® Technology News
by Mark Rein, Epic Games, Inc.

Canadian-born Mark Rein is Vice President of Epic Games based in Raleigh, North Carolina. Epic's Unreal Engine 3 has won Game Developer Magazine's Frontline Award for Best Game Engine for the past three years and Epic was recently awarded Best Studio at the Spike TV Video Game Awards. Since 1992 Mark has worked on Epic's licensing & publishing deals, business development, public relations, academic relations, marketing and business operations. Epic recently shipped Gears of War, which won Gamespot's overall Game of the Year and broke Xbox 360 sales records. Epic is currently working on the next Unreal Tournament title for publisher Midway.

Upcoming Epic Attended Events:

D.I.C.E. Summit
Las Vegas, NV
February 7-9, 2007

PlayStation Developer Conference
Tokyo, Japan
February 7-8, 2007

Game Developers Conference
San Francisco, CAL
March 5-9, 2007

Please email: mrein@epicgames.com for appointments.

POWERED BY
UNREAL
TECHNOLOGY

KYNOGON AND DIGIMASK JOIN THE INTEGRATED PARTNER PROGRAM

Two more companies announced that they've joined Epic's Integrated Partners Program (IPP). IPP members license their fully Unreal Engine 3-integrated technologies directly to licensed UE3 developers.

DigiMask creates facial capture software that puts players right into the game! Digimask is currently used in Tom Clancy's Rainbow Six Vegas on Xbox360. Once online, a player of Rainbow Six Vegas is able to put his or her own face on the character using the Xbox Live Vision Camera. In just two simple steps, a head-on photo and a profile photo taken with the Vision Camera, gamers can create a custom head that looks exactly like the actual player. Once the custom head is completed, players can move on to customize their online character further by choosing weapons, clothing, camouflage and body armor. For more information see *www.digimask.com*

Kynogon is the maker of Kynapse A.I. middleware. In addition to the runtime integration that allows Kynapse to take control of Non Player Characters, Kynogon has developed a transparent integration into the Unreal Editor. Customers can automatically generate Kynapse 3D pathfinding and 3D topological data from within the Unreal Engine 3 interface and have these assets embedded into Unreal packages. They can also configure Kynapse directly in the UnrealEd and call Kynapse behaviors through UnrealScript latent functions. For more information see *www.kynapse.com*

These companies join existing announced IPP members: IDV, Makers of SpeedTreeRT; Quazal, makers of Products and services for multiplayer games; Engenuity, makers of AI.Implant; Fonix, makers of voice recognition software.

FIRST UNREAL ENGINE 3 GAMES SHIP: GEARS OF WAR SELLS OVER 3 MILLION!

Gears of War shipped on November 7th and in its first 10 weeks has already sold through over 3,000,000 units world-wide and won numerous awards including Gamespot's overall Game of the Year for 2006. Roboblitz shipped on PC and Xbox Live Arcade and Rainbow Six Vegas shipped on PC and Xbox 360, with the PlayStation3 version coming to stores soon. These are great milestones for their respective developers but show that Unreal Engine 3 is reaching maturity. Epic's President Mike Capps has this to say; *"with Gears of War out the door, we feel confident that the engine is at the 'version 1.0' stage of development. And while we have won Game Developer's Frontline Award for 'Best Game Engine' for an unprecedented third straight time (and four times total), we are not resting on our laurels. Our next big effort will be shipping our own Unreal Tournament on PC and PS3."*

Gears of War has sold over 3,000,000 units world-wide in its first ten weeks

UE3 SEMINAR AT GDC 2007

UE3 licensees and qualified prospective licensees are invited to sign up for our Unreal Engine 3 licensee seminar at the Moscone Center in San Francisco on Tuesday March 6, 2007. The agenda for the seminar includes separate tracks for technology creators (i.e. programmers) and content creators (artists, animators, level designers, audio, etc.). Although we have more space than last year this event will likely fill up swiftly so please head over to the following web page to register or receive more information: *www.unrealtechnology.com/seminar/*

EPIC GAMES

For UE3 licensing inquiries email:
licensing@epicgames.com

For Epic job information visit:
www.epicgames.com/epic_jobs.html

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GAME DEVELOPERS CONFERENCE
PREVIEW 2007

ACCORDING TO MY HANDY SPONGEBOB SQUAREPANTS-A-DAY CALENDAR, March is almost here, and therefore it's time to make preparations for the annual Game Developers Conference. As in previous years, we, the editors of *Game Developer* (operated by the CMP Game Group, which also owns GDC) want to share with you what we think are the most compelling elements of the convention. This editorially independent look at the show highlights some of the new additions to GDC 07, as well as some old favorites as they return to the Moscone Center in San Francisco.

Turn to our Editors' Picks section (page 16) and you'll find each editor's recommendations for lectures, roundtables, and tutorials—the meat and potatoes of GDC that she or he is most looking forward to. We've also whittled down the week's lengthy list of events into our own top picks, ready to point GDC virgins in the right direction from Monday onward.

While I'm here, maybe I'd better list my own personal tips for getting through GDC in one piece this year.

—Simon Carless

Top Five Tips for GDC Preparedness

1 **REMEMBER TO TRAVEL TO THE CORRECT CITY.** This may seem fairly simple, but in 2004 (when the show was in San Francisco for the first time instead of its longtime San Jose home), one infamous Gamasutra.com contributor took the bus down to Silicon Valley instead of the city by the Bay. And according to the event's operations staff, one poor and unfortunate attendee of a similar CMP conference ended up in San Jose, Costa Rica one year, after the person booking his travel made a rather regrettable mistake.

2 **SEE THE CELEBRITIES, BUT ALSO BE PRACTICAL.** By this, I mean that you may be tempted to spend the entire GDC gravitating toward sexy game industry notables, who will give stimulating talks about shaping games from the top down. But if you're a graphics programmer, don't miss out on a vital lecture about shaders just because the speaker isn't as well known. It might behoove you to turn up to those sessions as well—but you knew that already!

3 **MEETING PEOPLE IS EASY.** This may be obvious. And we're all adults here. The fact is GDC attracts likeminded people to, well, you! I've always found the parties, whether they be an Expo Booth Crawl or Suite Night, which are open to all, or the more rarified limited-entrance parties, to be filled with people who genuinely care about the game business and who will not object if you talk to them to this end. So don't wimp out, get out! But watch out for the Harmonix employees lurking around the GUITAR HERO machines, waiting to thrash all comers, though. They're ringers, one and all.

4 **LEAVE TIME FOR THE EXPO FLOOR.** Sometimes people forget that the expo closes at 3 p.m. on Friday, and especially this year, there will be a wealth of good tools company, international pavilions, and even the Independent Games Festival Pavilion hanging out there. As a rare opportunity to check out tools and middleware with hands-on demonstrations, it's appreciated by game professionals of all kinds.

5 **TAKE SOME TIME TO SEE SAN FRANCISCO** (only don't call it "'Frisco" or "San Fran," please). Sightseeing may seem a little odd, given that the point of being at GDC is to immerse oneself in video game creation, but often, attendees from out of town don't stray outside a five block radius of the convention center, and I personally think that's a shame. Try to make it to the Presidio, or Golden Gate Park, or any number of the city's beautiful neighborhoods. You could even drive down the coastal highways to the San Jose Tech Museum or to Santa Cruz, if you give yourself an extra day and a small car rental allowance.

Incidentally, just as this issue went to press, several new and notable lectures and keynotes were being solidified by the GDC content team, so keep an eye on the show's web site (www.gdconf.com) for late-breaking sessions.

Independent Games

THIS YEAR'S GDC, WHILE FULLY SUPPORTING THE MAINSTREAM, HIGH-BUDGET PC and console game scene, is going further still into the burgeoning indie game arena, both with the latest installment of the Independent Games Festival, now in its ninth year, as well as the first-ever Independent Games Summit (IGS).

The IGS (March 5 and 6), alongside a few traditional events, like the Casual Games Summit and GDC Mobile, is dedicated to the art and science of development practices, distribution strategies, and innovative ideas in the independent gaming community, and includes lectures from major indie figures from Three Rings, Reflexive Entertainment, Telltale Games, The Behemoth, Introversion, Valve, NinjaBee, Gamelab, and many more.

The keynote speaker for the first IGS is 25-year indie veteran and Llamasoft founder Jeff Minter (TEMPEST 2000, ATTACK OF THE MUTANT CAMELS). In this extremely rare North American appearance, Minter will discuss his personal history in the business, design philosophy, and current projects, including SPACE GIRAFFE for Xbox 360 Live Arcade.

Other notable panels and lectures include "Innovation in Indie Games," an exploration of creativity by the developers of the Experimental Gameplay Project at Carnegie Mellon University and a postmortem of Gastronaut Studios' SMALL ARMS—an experiential study of the frenetic Xbox Live Arcade multiplayer shooter—giving insight into indie games on consoles.

The Summit is designed to help support the Independent Games Festival itself, which has its IGF Pavilion in the North Hall and will showcase 32 fully playable games. In addition, the IGF Awards, which dole out over $50,000 to deserving indie gamemakers, will take place on the evening of Wednesday, March 7, and will be presented by Andy Schatz of Pocketwatch Games.

In the IGF Main Competition, nominees were led by Bit Blot's dreamlike, innovatively controlled 2D underwater adventure AQUARIA, which garnered four nominations, including one for the Seumas McNally Grand Prize. Queasy Games' cleverly designed abstract shoot 'em up, EVERYDAY SHOOTER, grabbed three nominations.

The Student Showcase winners also have multiple standouts worth playtesting while you're in IGF territory. Try Stanford University's touchscreen and voice-controlled romp EUCLIDEAN CRISIS, Hogeschool van de Kunsten, Utrecht's KATAMARI-ish THE BLOB, and DigiPen's clever 3D block-manipulating shooter TOBLO. One of the 10 finalists featured in the student showcase will win a first-ever Best Student Game award. Also, in the IGF Modding Competition, four winners in various categories were recently announced; each will now compete at GDC 07 for the IGF Best Mod award.

In the main GDC sessions, there will be two IGF-specific talks, one discussing the Main Competition and the state of indie games, and the other focusing on the Student Showcase and the state of student indie gaming.

—Simon Carless

Sidetracked

GDC IS HOST TO SEVERAL SUB-CONFERENCES WITH TRACKS AND SESSIONS dedicated to specific subsectors of the game industry. All are occurring on March 5 and 6 this year.

GDC MOBILE kicks off with a keynote from Digital Chocolate CEO Trip Hawkins, in which the former Electronic Arts and 3DO president talks about innovation in the mobile space. But is mobile actually worth anything? "Mobile Games: A Strategic Review of the Sector" aims to assess that. Paul Heydon, managing director at Unity Capital, a corporate finance advisory firm, will discuss recent mergers and acquisitions, future trends, growth factors, and other features of the mobile landscape.

MMOs have been pegged as a future trend by a number of people in the mobile sector, and the always-unique Gamevil will share lessons learned from their development of a mobile MMO that has 50,000 monthly subscribers in the game's native South Korea. There's also the "Mobile Game Innovation Hunt," in which independent mobile game developers can pitch their game idea to a panel comprising publishers, carriers, developers, and journalists. The pitches must be done in three minutes, which when combined with the prizes and prestige should make for an entertaining session. Could this be mobile's answer to The Game Design Challenge?

THE SERIOUS GAMES SUMMIT has a very interesting keynote this year, from Square Enix chief strategist Ichiro Otobe. The talk will focus on the company's entry into the serious games arena, which actually marks the first time a massive traditional games company, let alone a Japanese one, has made a (pardon the pun) serious entry into the field.

The serious games space is full of innovative ideas right now, and "Location-based Learning with Mobile Games" is a prime example. In this talk, Nickelodeon's Karen Schrier will describe how an alternate reality game called RELIVING THE REVOLUTION allowed students to use GPS-enabled PDAs to investigate Lexington, Mass. in order to discover who fired the first shot at the Battle of Lexington. In keeping with the historical theme, MIT is providing a postmortem of their game COLONIAL WILLIAMSBURG: REVOLUTION, which used a commercial game engine from BioWare's NEVERWINTER NIGHTS.

Of course the biggest mental stopping block in all of this is the question of whether these games actually do what they set out to do. To that end, there's "Testing Assumptions: Creative Approaches to Gathering Evidence of Serious Game Impacts," an appropriately long title for this panel of academics who will attempt to shed some light on the situation, hopefully with some real-world examples.

The **CASUAL GAMES SUMMIT** has two full-day, single track programs, expanded from last year. Highlights include a roundtable from Sony Online Entertainment, Microsoft, and PlayFirst about viability of downloadable casual games on console, a discussion of the anatomy, demographics, and value of casual games from Steve Meretzky of Blue Fang, and a roundtable on casual game startups.

The **IGDA'S EDUCATION SIG CURRICULUM WORKSHOP** is the last of the two day sub-conferences, and this one's aimed more at academics— though developers can find useful information as well, especially those who are interested in providing internships or speaking at schools. Speakers at the workshop include Doug Church from EA, Tracy Fullerton, professor at University of Southern California, and Doug Whatley of BreakAway among others.

—Brandon Sheffield

EDITOR'S PICKS

➡ Editor Simon Carless' Picks

Nintendo Keynote (60-minute address)
Shigeru Miyamoto (Nintendo)
As of press time, details were hazy on the specific topic of Shigeru Miyamoto's GDC keynote, but really—it's Miyamoto. Isn't that enough? The creator of MARIO, ZELDA, and a zillion other seminal Nintendo franchises will not appear at GDC just to do some Wii orchestra conducting, so I'm expecting great things, hopefully including a look at SUPER MARIO GALAXY and the company's plans for the future. If you're not there, you're oh so square.

SPORE's Magic Crayons (lecture)
Chaim Gingold (Maxis/EA)
Another year, another SPORE talk? Well, yes, but over the course of its obviously careful, experimental, and iterative development, the brain trust at Maxis, led by Will Wright, has constructed a landmark title. Even if SPORE is not actually that fun to play (and who knows, it might yet happen), the mental power that's gone into the procedural and organic creation of virtual life is formidable.

Creating More Original, Unique Music for Games (panel)
Jesper Kyd (Jesper Kyd Productions), Richard Jacques (Richard Jacques Studios), Inon Zur (Composer), et al.
Okay. I'm the first to admit that the title of this audio panel is pretty terrible, but I can't remember seeing a more interesting collection of composers together in one place at GDC, from old school Amiga demo scene veteran Jesper Kyd, through Sega-sonic U.K. composer Jacques. Given the amount of soundtracks licensed from hip hop or punk stalwarts, original scoring is an increasingly important topic, so I'm glad a group of good repute are covering it.

The Video Game Piracy Problem: Fifteen Men on a Dead Man's Chest
Todd Hollenshead (id Software)
Id's CEO Hollenshead has been notably vocal on the problem of game piracy in the past—especially because id makes PC-centric games that often don't have central servers to easily prevent counterfeiting, like MMOs do. This lecture therefore promises to reveal Hollenshead's experiences over the past 10 years fighting for the cause.

Cross Application Asset Creation for LAIR: From Characters to Clouds (lecture)
Mark Teare (Factor 5)
This session's overview explains that the PlayStation 3-exclusive dragon combat game's creators want to share how to "use all the tools an artist has to creatively and efficiently solve these problems and develop new asset specific workflows that can be integrated into the pipeline." In any talk, this would be important, with pipelines ever more complex and vital. But given the specific subject matter, and as LAIR is one of Sony's signature next-gen titles, this looks un-missable.
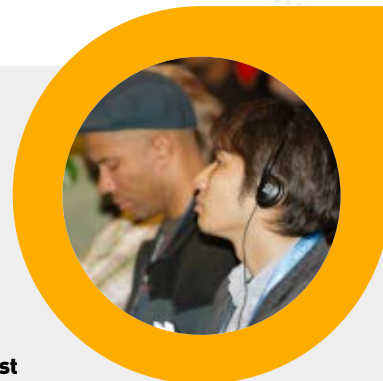
➡ Managing Editor Jill Duffy's Picks

The Game Design Challenge (panel)
Hosted by Eric Zimmerman (Gamelab)
Imagine a video game that's played using a square of fabric, a needle, and some thread. Now imagine three of them. Part game show, part stand-up comedy routine, The Game Design Challenge pits the wits of three contestants in a battle to devise the best game idea, given a few parameters. Reigning champion Harvey Smith will battle David Jaffe and TETRIS creator Alexey Pajitnov. I'll be attending for two reasons: 1) for a rowdy break in my day and 2) to hear what these design pros have to say about avant-garde approaches to control systems.

Interactive Storytelling Boot Camp (day-long tutorial)
David Freeman (The Freeman Group), Hal Barwood (Finite Arts), E. Daniel Arey (Naughty Dog-SCEA), et al.
Listening to either David Freeman or Hal Barwood always brings me back to my first years at college, when the words of orating professors were meant to be scribbled down and ruminated on until sheer genius (or at least a neat idea) sprung forth. Even when the lecture ideas themselves were idealized or impractical, they epitomized they way things ought to be, the way creativity ought to be nurtured, or in this case, the way games ought to affect emotion. This boot camp is likely to attract long-time GDC veterans who come to the conference for the full week (seeing as this full-day session takes place Monday) as well as writers who are seeking a storyteller's retreat.

3D Tricks: Engineering Innovation on the Nintendo DS (lecture)
Chuck Homic (Vicarious Visions), Gregory Oberg (Vicarious Visions)
In this intermediate level talk, two Vicarious Visions programmers explain how they used the Nintendo DS hardware to develop OVER THE HEDGE DS, divulging many of the obstacles (like having only one 3D engine, and VRAM and software limitations) that are unique to the platform. Homic and Oberg promise to share their experiences in sufficient detail that the audience will be able to take home specific ideas to test on their own games.

Burning Mad: Game Publishers Rant (IGDA panel)
Eric Zimmerman (Gamelab), Greg Costikyan (Manifesto Games), Bing Gordon (Electronic Arts), Alex St. John (WildTangent)
I guess it's fair to give publishers a chance to rant. But do these guys really need or deserve an airing of grievances? From a developer's point of view, publishers control the purse strings. They have jurisdiction over marketing and advertising. They pretty much make all the final calls. Or maybe that's not the full story. Maybe publishers put up with more frustration than developers realize. And this may be my one and only chance to hear about it.

Lead Artists/Art Directors Roundtable (roundtable)
Moderated by Seth Spaulding (Firaxis Games)
GDC is, for me, something of a guiding light to get me through the rest of the year. In this roundtable, I'm hoping to learn what topics in visual arts cause the most enthusiasm and the most heartache, which are debated, and which are responded to uniformly. Being an intermediate level discussion, the panelists are likely to share their solutions to common problems, for better or worse, as well as best practices for video game art production.

Features Editor Brandon Sheffield's Picks

Punk's Not Dead (lecture)
Goichi Suda (Grasshopper Manufacture)
When talking about the darker side of originality in Japanese games, Goichi Suda's company Grasshopper Manufacture comes swiftly to mind. Suda's games may be visually striking and sonically unique, but his company's attitude is what makes the games work. In this talk, Suda will discuss how his organization creates games that are true to the spirit of original design, and how like a rock band, if any member of the team leaves, the resulting product is, and should be, changed forever.

Real-World SPU Usage (lecture)
Chris Carty (SCEE), Nicolas Serres (SCEE)
We've all heard how SPUs are going to revolutionize game programming on the PlayStation 3. But how? These little bundles of mystery make the Cell processor what it is, and in this talk, two Sony Computer Entertainment Europe programmers share their expertise on the subject, focusing on concrete cases, rather than abstract "just use them!" ideas. Programmers in attendance are expected to be somewhat familiar with the PlayStation 3 architecture.

Designing GEARS OF WAR: Iteration Wins (lecture)
Cliff Bleszinski (Epic)
GEARS OF WAR is lauded by many as the first fully next-gen game for consoles. In this talk, outspoken lead designer Cliff Bleszinski will take the audience through his team's successes and mistakes when creating the gameplay for the benchmark title and share what he learned about iterative design techniques. He'll also describe the team structure and checks and balances that allowed the game to ship on time. And if we're lucky, maybe he'll explain why he put so many corpses on toilets in the game.

Designing Games for Everyone: Harmonix Design in Practice (lecture)
Tracy Rosenthal-Newsom (Harmonix), Rob Kay (Harmonix)
Harmonix has long been interested in making games appeal to the masses, and with GUITAR HERO, it truly hit its stride. In this talk, Harmonix higher-ups discuss practical steps developers can take to make their games more widely accessible, from removing barriers to entry, to extensive focus testing. This talk, naturally, is designed to be accessible to everyone, so come one, come all.

The Game Attorney's Developer Deal Roundtable (roundtable)
Tom Buscaglia (T. H. Buscaglia and Associates)
Tom Buscaglia will lead a group of lawyerly folks in a discussion of developer deals. Specific topics will include IP retention and reversion, termination pay out provisions, and ancillary revenue streams. The talk is specifically aimed at senior executives from independent studios.

Gamasutra.com Feature Editor Frank Cifaldi's Picks

Dragged Kicking and Screaming: Source Multicore (lecture)
Tom Leonard (Valve)
Valve's team went through a lot of hardship to bring the Source Engine where it is today. When HALF-LIFE 2 was released in 2004, the engine was a single-threaded beast over eight years in the making. Today, it's a multi-platform powerhouse designed to work on a wide variety of cores. In this talk, senior engineer Tom Leonard will reveal the secrets of how this was done, through experimentation, clever use of tools, and I'd imagine lots of caffeine and good old-fashioned grit.

Evolve: Character Pipeline Advances for Next-gen Titles (lecture)
Christopher Evans (Crytek), Hanno Hagedorn (Crytek)
I haven't actually seen any characters from Crytek's upcoming CRYSIS, but if the physics and landscapes from CryEngine 2 are any indication, I'm fully prepared to have my mind blown.

Rethinking Challenges in Games and Stories (lecture)
Ernest Adams
I like Ernest Adams. He has a way of cohesively explaining design theories that should, by all accounts, be vague and abstract. He has controversial things to say, and despite whether I agree with them, he says them with conviction. He writes one of the most popular columns on Gamasutra.com, which keeps me happy. And most importantly, he wears a top hat during his GDC lectures. In this session, Adams explores the possibilities of engaging a player through avenues other than challenge, a subject near and dear to my heart.

Sharing Control (panel)
David Edery (Xbox Live Arcade), Raph Koster (Areae), Ray Muzyka (BioWare), Kim Pallister (Microsoft)
Tides are changing, communities are growing, and players are demanding more and more control over in-game content. But how do game developers embrace this? Raph Koster joins decision-makers from Microsoft and BioWare to discuss the future of user-generated content, from implementation and screening to what GDC's official program guide describes as "user-driven marketing," which sounds a bit nefarious. But hey, I like a little nefariousness once in a while.

Painting an Interactive Musical Landscape (lecture)
Koji Kondo (Nintendo)
Koji Kondo's music is perhaps the most memorable in all of games—it's just that simple. As the composer for SUPER MARIO BROS. and THE LEGEND OF ZELDA, few would deny him that title. In this lecture, Kondo promises to lay bare his technique for the creation of interactive music, drawing on his experience working for Nintendo since 1984. The tough part will be trying to push your way past the fans into the conference room!

Week In Review

IF THERE'S ONE EVENING WE EDITORS DON'T MISS, IT'S THE NIGHT OF THE BIG ball. Wednesday, March 7, marks **The Game Developer Choice Awards** and **Independent Games Festival Awards**. After last year's winners of the IGF grand prize stomped on stage in tuxedos, we all may be obliged to arrive in cocktail attire this time around. We love the Choice Awards for their honesty and integrity, since developers themselves nominate and vote for the games that are recognized, and we love the IGF for its dedication to people who make games free of publisher influence. The party starts at 6:30 p.m.

Somewhere between the awards galas, bar hopping, niche group gatherings, "by wristband-only" parties, complimentary hor d' oeuvres, and drink tickets, there's business to be done. **Game Connection**, a GDC tradition for deal making, will be happening on Monday and Tuesday, March 5 and 6. Game Connection is a prime way for developers to meet with publishers, and vice versa, with no pretense of network schmoozing. Developers looking to make games based on either a publisher's IP or their own original ideas are welcome; prior registration is suggested, but attendees can register at the door, too.

In conjunction with Game Connection, a new **Game Connection Services** event is also being held this year on Thursday and Friday, March 8 and 9, for ancillary deals in the world of video game creation, including contract service providers and outsourcing agencies. Publishers and development studios can hook up with these companies during this two-day series of one-to-one meetings.

Suite Night at GDC always sounds as if it could be gimmicky. It's billed as a networking party hosted by leading game companies held in one of San Francisco's more chic (yet chain) hotels, The W. However, once I get over the worry of whether I can hang with the best namedroppers in the pack, I usually find Suite Night to be much more relaxed and unpretentious than I always fear it will be. Whether you're in it for the "meet market" or the mingling, doors will be open Thursday, March 8 from 8 to 10 p.m.

All day Thursday and Friday, a **Game Career Seminar** will be taking over the second floor of Moscone's West Hall. Because the GDC organizers have already thrown two similar and highly invigorating events in 2006 (one in Valley Forge, Penn., one in London, both of which I had the pleasure to attend) I have faith that this one will be equally appealing to industry newcomers and hopefuls.

Once upon a time, 100 game-geek artists found one another and united their forces for good. They collectively created **i am 8-bit**, a mixed media art exhibit that pays homage to the days of blocky pixels and optical tricks, and sometime in the long Monday to Friday stretch, I'll find an hour to idle my way through the upper lobby of Moscone Center's North Hall, where the group's artwork will be showcased.

On Friday night, when we can finally unwind a bit, we plan to kick back with a 40 oz., put our feet up, and watch a Pink Floyd laser light show. "Dude! Totally..." Oh come now. In all seriousness, Friday night brings us **Video Games Live**, an orchestral and choral rendition of the best music from the last 20-plus years of video game history. Multimedia junkies will find it oh so much more rewarding than said laser light show. Houselights are set to dim promptly at 8 p.m. Friday, March 9. :::

—Jill Duffy

Week In Review Calendar

GDC MOBILE RECEPTION	MON., MARCH 5	6–8 P.M.
SERIOUS GAMES SUMMIT AT GDC RECEPTION	MON., MARCH 5	6–8 P.M.
GAME CONNECTION	MON. & TUES., MARCH 5 & 6	DURING BUSINESS HOURS
I AM 8-BIT (ART GALLERY)	MON.–FRI., MARCH 5–9	DURING CONVENTION CENTER HOURS
EAST MEETS WEST RECEPTION	TUES., MARCH 6	8–10 P.M. (INVITATION ONLY)
GAME DEVELOPERS CHOICE AWARDS AND IGF AWARDS	WED., MARCH 7	6:30–8:30 P.M.
GDC EXPO BOOTH CRAWL	WED., MARCH 7	4:30-6 P.M.
INDEPENDENT GAMES FESTIVAL PAVILION	WED.–FRI., MARCH 7–9	OPEN DURING NORTH HALL HOURS
GAME CONNECTION SERVICES	THURS. & FRI., MARCH 8 & 9	DURING BUSINESS HOURS
SUITE NIGHT @ GDC!	THURS., MARCH 8	8-10 P.M.
GAME CAREER SEMINAR	THURS. & FRI., MARCH 8 & 9	DURING BUSINESS HOURS
VIDEO GAMES LIVE	FRI., MARCH 9	8 P.M.

SCRUM RISING

AGILE DEVELOPMENT COULD SAVE YOUR STUDIO

>> **THREE YEARS AGO, WE AT HIGH MOON STUDIOS WERE IN FULL** crisis. Our first project was slipping. Nothing was working. Customers were wondering where all their money was going. You know, those typical project problems.

As usual, it was the technology effort that was falling behind, and as the new CTO, my job was on the line to manage it. So I started to do some research. This was when I discovered Scrum.

Scrum isn't a big secret. If you read enough project management books, you are bound to run into it sooner than later. Two things struck me about Scrum: 1) it's simple, so you can start using it right away, and 2) it makes common sense. Everything you do in Scrum is done for a clear reason.

In short, Scrum is a methodology that's been used for project management of software development since the early 1990s (its origins are discussed in more detail within this article). With management becoming less of a bottleneck, the talented people we had on staff were able to focus, get on track, and straighten out the project, finishing the game within six months of the original projected date.

Since this experience, I've been talking about Scrum to various developers, and dozens have adopted it. During this time, I've heard a lot of common questions asked, a few myths, and some stories of failures from those coming up to speed on Scrum. This article shares some of these experiences.

FULFILLING THE SCRUM PROPHECY

Change is painful. The bigger the change or the more people it affects, the more pain. Why would anyone want to make a huge change to an entire company?

For High Moon Studios, we needed to make a change because the alternatives were more painful. We were already suffering from overtime death-marches, and we did not see a working game until very late in our projects. Schedules slipped routinely. We spent too much time putting out too many fires, and our customers were becoming impatient and disappointed.

Kirsten Forbes, a producer who introduced Scrum at Radical Entertainment, says the new methodology allowed her to understand the process of game development in a new and improved way. "At the end of every project, we do a huge

CLINTON KEITH
is CTO of High Moon Studios, overseeing research and development of next-generation games, game engines, and agile methods for development. Email him at ckeith@gdmag.com.

postmortem. The lament that comes up most often is that the designers change their minds too many times during development," she says. "Well, they didn't change their minds. They learned something about what was fun and adapted the game to accommodate that learning. That's exactly what [designers] should be doing. The problem is not the designers—it's our process. We lock ourselves into a schedule that we can't easily get out of. To make a change in a rigid schedule means we have to find all the tiny areas that those changes ripple through. That's complex and difficult, so it made us averse to change."

In sharing the Scrum mindset, I have learned a lot from others who have been struggling with the same problems both within and outside the video game industry. I know one thing for sure: As the challenge of making games grows with the complexity of the platforms and the size of the teams, our methods for how teams work together and how games are developed have to keep up. Just as the technology of the Nintendo 64 doesn't work so well on the Cell processor, the team methodology from the 1980s doesn't work for today's teams.

WHAT IS SCRUM?

Scrum is an agile methodology, though defining "agile" is a bit difficult.

A few years ago, a number of prominent agile writers got together and tried to define what agile really meant. They came up with what is now called the "agile manifesto," four values that any methodology calling itself "agile" should hold. (See http://agilemanifesto.org for more information.) I've modified it slightly to reflect its use for game developers, and what they need to value:

1. people and communication over processes and project management tools
2. a working game over comprehensive design documents
3. publisher collaboration over milestone definitions
4. responding to change over following a plan.

Because these values are pretty vague, it's hard to translate them into practices. This is where Scrum comes in. Scrum is a set of time-proven practices that translate these values into day-to-day activities.

The term Scrum comes from rugby, specifically the formation in which opposing teams interlock to engage and move the ball up the field. In game development, Scrum has a small team of developers who take ownership of small increments of product development and discuss the product with the customers. The method uses time-boxed iterations of development, called sprints, that create working versions of a game, which allow the customers to see how it is evolving, better understand where the game is going, and have meaningful conversations with the development team.

Scrum teams are small, typically only eight to 10 people. In game development, one team might be dedicated to working on one core mechanic. The team meets daily for 15 minutes, where each member of the team discusses the work they've completed since the last meeting, what they are working on

FIGURE 1 In the Scrum cycle, the team creates a new version of the game every two to four weeks.

next, and what problems are getting in the way of their progress.

After each iteration review, the team sorts its priorities for the next iteration with the customers, breaks down the tasks, and estimates how long it will take to reach the next iteration. Then they tell the customer what they will deliver.

FACT VS. FICTION

There are quite a few myths about agile practices and Scrum that come up on a regular basis, the most common of which is that agile development is just another management fad.

"Agile" is a relatively new name for incremental and iterative methods and other project practices that have been around for a long time. The agile methodologists combined a number of these ideas rather than inventing new ones. In fact, if you look back 20 years, you'll find that game development teams were typically so small that they practiced incremental and iterative development out of necessity. Game development was far less expensive and time-consuming then, too, so it was a lot more experimental. Publishers could afford 10 failures for every hit, and finding the hit was more critical than nailing the budget.

Another myth is that there is no overtime on agile projects. Agile teams choose how much work they can commit to every two to four weeks. The benefit is that they own their work and aren't trying to meet a schedule they don't believe in. They commit to a level of work that they feel they can accomplish without overtime. However, there are too many uncertainties in even two weeks of work, and a team can often wind up with more work than they can complete without overtime.

Sometimes an overloaded team compensates for the heavy workload by dropping some of its lower priorities. Iterations cannot be delayed, therefore they free developers to complete the higher priority goals within the time frame originally established. Other times, the team has to put in extra hours to meet a commitment. In either case, it's often left up to the team. A few extra hours a day for the last week of the iteration can make a huge difference in what the team produces in that iteration. The goal isn't to stop work after eight hours—it's to produce the best possible value in a sustainable pace.

A third myth about agile development is that long-term plans do not exist. We spend more time planning during an agile project than we ever did in a waterfall project. The main difference is that it's spread out over the entire project, not just done at the start. We plan for the entire scope of the game up front, but we don't try to be deterministic and plan away uncertainty. We focus on *planning* instead of *the plan*

Vertical Slice

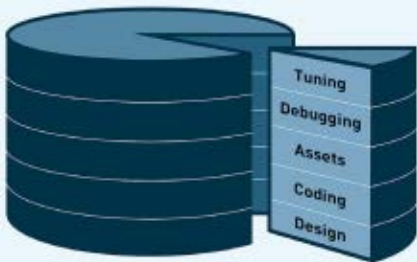Tuning
Debugging
Assets
Coding
Design

FIGURE 2 Each feature added in a sprint has a vertical slice of work done for it.

because we want to be able to embrace change and adjust our forecast for the game based on what we learn.

At High Moon, we set aside a full day every three months to refine and review the full project plan. This allows us to review parts of the game's development, such as asset production, which can't be as fully agile as some of the early work done on core mechanics—for example, we wouldn't want to change our jump heights after we've built half the levels.

Another myth I've heard is that games developed with an agile process will be great. Of course, no methodology can ensure great games. A bad game idea, or worse, a team that lacks talent, will fail regardless of the methodology used. Perhaps the only benefit of agility in these situations is that the game will fail fast. Conversely, agile development can help talented teams avoid many failures that other methodologies allow.

In general, the benefits of working agilely are that it can reduce waste and allow your team and customers to make better choices along the way. The people in your company are your greatest asset; having a healthy company culture is important. Because agile development focuses on communication, ownership, and commitment, a company's culture can really improve as a result of adopting an agile approach.

One final myth is that leads are not necessary on agile game projects. This particular myth was one we fell for when we first started using Scrum. Scrum eliminates many of the tasks required of a lead because teams become self-organizing. Teams break down to estimate and track their tasks at a team level, relieving the leads from doing these sorts of jobs, which they usually dislike in the first place.

The idea of taking one of your most talented programmers and artists and instructing them to estimate and track tasks for half their time is not a good idea—yet, we do it all the time in our industry. However, even an agile team still needs leadership. The agile team lead focuses on mentoring and communicating with the other leads about the needs of a project, ensuring that all the teams are focused on producing a common product together.

OPENING THE SCRUM GATE

Game studios that are interesting in adopting Scrum should start small. Don't try to convert the entire studio overnight; instead, identify a team of approximately eight developers (no

more than 10) who will be the Guinea pigs for this experiment. The team should be willing to try out Scrum and be objective about the results.

Next, identify the champion for Scrum, ideally someone who is a lead or producer from the Guinea pig team. This is going to be the Scrum expert who learns all about Scrum. Once a champion is chosen, have him or her read two essential books on Scrum by Ken Schwaber (see Resources, page 26).

The most important, yet also most controversial piece of advice is that you start Scrum by the book with the first team, following every practice that exists, even if you don't fully understand the value.

The practices of Scrum are derived from very important principles, including ownership, accountability, transparency, and teamwork, which amount to the central benefits of using Scrum to make games. If you change some of the practices without understanding the underlying philosophy, you'll never see many of those benefits. As Schwaber says, "Every time I've seen someone need to get rid of one of Scrum's basic mechanisms or rules, it is because the mechanism or rule is making something visible that nobody wants to see. So, they get rid of the rule and the problem becomes invisible. For example, 'We don't need daily scrums, so let's only have them every week.' The daily Scrum is making visible that the team isn't self-managing and doesn't work as a team, but as a group of individuals doing their own things. No need for information to be interchanged because nobody cares."

REGULARLY SCHEDULED STATUS UPDATE MEETINGS WILL GO AWAY. YOUR PROJECT MANAGERS AND PRODUCERS WILL NOT BE INTERRUPTING YOUR WORK ALL THE TIME TO ASK FOR A GLIMPSE OF YOUR PROGRESS.

This isn't to say that the Scrum practices should never be changed—they are meant to be changed by the teams to improve their velocity. I also suggest that teams who are freshly adopting a Scrum methodology attend a Scrum Master Certification Course. It's a two-day course taught at many locations and times (see Resources).

Another important step new Scrum sign-ons need to take is to identify the customers for the team and define a few goals for that team to accomplish in a prioritized list. The team must then pick someone to be the Certified Scrum Master who will explain the reasons behind every step of development to the customers and the team the first time around.

Finally, the team is ready to begin the sprint cycle, the core development phase of Scrum (see Figure 1). Sprint cycles include: sprint planning, daily Scrum meetings, and sprint reviews. It's outside the scope of this article to describe these practices in detail, but plenty of information is available in the Resources.

In the daily Scrum meeting, each team meets for 15 minutes to go over everyone's tasks and identify problems.

OBSTACLES TO INITIATION

1. Team buy-in. Kirsten Forbes says she faced an initial difficulty in getting the Radical team to accept a Scrum way of life. "When I presented [Scrum] to the entire team, I walked through the same process but added a few spicy advantages to encourage them," she says. "For team members, the benefits are clear. Regularly scheduled status update meetings will go away. Your project managers and producers will not be interrupting your work all the time to ask for a glimpse of your progress. You control how your work gets done because you break the backlog down into tasks. And you do your own time estimates and you learn to get it right."

2. Management buy-in. It's easy to oversell Scrum to management and ruin things for yourself. Working with one team to evaluate Scrum for a few months is an easier sell than asking management to convert the entire studio overnight. Once the higher-ups see the level of performance from the Scrum team, the solution will sell itself.

3. Getting used to iteration. It takes a few months for the team to get used to the pacing of Scrum sprints. The first impulse a team usually shows is to treat sprints like mini waterfalls with small design documents written at the start and working code not coming together at the end. This is still better than traditional waterfall, but coaching the team to keep them communicating with each other and keep the build working (instead of writing documents) will improve performance.

4. Code iteration: how to avoid spaghetti. When the goals of a project can change every sprint, it's hard for the code base to keep pace and not slow the programmers down. Setting aside time for the team to refactor the code on a regular basis is valuable. Programmers might want to investigate some of the practices of Extreme Programming, such as Test-Driven Development—a very useful way of creating code that can keep pace in an agile environment.

5. Publisher buy-in. As with management, publishers asked to accept Scrum should be approached in a very low-key way. The initial hurdle for publishers is often the idea of having a more flexible milestone delivery list. Developers have found that if they include the publisher as one of the customers at every sprint review (either by having them visit or through conference calls while they play the game), it's a very beneficial selling point for Scrum. Once they see how their feedback is considered and possibly included in the next sprint review, they will become more enthusiastic. Publishers are well aware that the traditional milestone-based contracts create a relationship in which change is resisted, so they are likely to see the benefit of Scrum firsthand.

VERTICAL SLICES AND TEAM SIZES

One of the main differences between Scrum and the waterfall method is the idea that the product is kept at a state of near-completion every sprint, and that features added every sprint

RESOURCES

Agile Manifesto
**http://agile
manifesto.org**

Suggested reading,
mailing list, and more
from the author
**www.agilegame
development.com**

Nonaka, Ikujiro and
Takeuchi, Hirotaka.
*The Knowledge-
Creating Company.*
New York: Oxford
University Press, 1995.

Schwaber, Ken. *Agile
Project Management
with Scrum.* Redmond,
Wash.: Microsoft
Press, 2004.

Schwaber, Ken and
Beedle, Mike. *Agile
Software Development
with Scrum.* Upper
Saddle River, N.J.:
Prentice Hall, 2001.

Ken Schwaber's site,
with Scrum Master
Class schedules
www.controlchaos.com

have a level of completeness that improves the value of the final game. The goal is to have the value of the feature proven during every sprint. Design, coding, debugging, tuning, and assets are all taken into consideration.

A common misconception is that it becomes impossible to implement any work that takes longer than one sprint. That's just not true. The purpose of working this way is to show the customers the value of the feature every two to four weeks, and to show how it improves sprint-by-sprint.

In planning the work for each feature, the team considers a vertical slice (see Figure 2). Think of a vertical slice as a slice of five layer cake: The bottom layer is design, followed by coding, assets, debugging, and tuning. With waterfall, the team would create the entire bottom layer first, leaving the frosting until the end of the project, if there's time left at all. With Scrum, the cake is built one complete slice at a time instead of layer by layer.

Defining what a vertical slice is per feature is not easy. For example, if a team is working on AI, does it need characters with final models and animations to prove that AI characters are fun? Does it want to find out how many characters should be used in a scene before figuring out what the character asset budgets are? What about the trade-offs between character quantity and quality? How does anyone know when it's done?

" 'Done' means fully tested and integrated at each sprint," says Forbes, citing Radical's definition. "Early on, we found some items that one team member considered done were contentious. Not everyone agreed it was done. To resolve this, we added a column on our task board for verified," she says. "The customer receiving the piece of work verifies it.This would be the artists if a tool fix is made for them, or the art director if a piece of art is completed, for example. The Scrum master is responsible for making sure everything has been properly verified before it comes off the task board."

There are no hard and fast rules on this. A typical example would be the trade-off between the quality versus quantity of characters you want in a game. If the quantity of characters is more important to the customers, they would want the team to focus on developing the AI for many characters and defer the quality decision a bit longer. Many times this decision is made too early, too late, or based on what the customers might not want. We want to avoid the situation where we have to throw out the work we have done because it doesn't fit the budget, or chop out key features just to ship the game.

Teams building next-generation games can exceed 70 people in size. With Scrum, no group should exceed 10 people. What results is seven teams focusing on different areas of one game, which can create dependency and communication problems.

A common reaction is for management to jump in and solve problems for the team, but the right thing to do is coach the teams to self organize and lead themselves out of their problems. Scrum methodology allows for this, but it's sometimes difficult for management and team members to let go and allow the teams themselves to take ownership.

SCRUMPTIOUS RESULTS

I can't guarantee that Scrum is the solution for all project management problems. All I can claim is that it's working well for us at High Moon. It's not as simple as reading a book and applying the practices. It's easy to start, but it takes a long time to truly understand the ideology behind it. Since the road to adoption is different for every studio, it's best to share experiences with a wide range of other adopters. ✖

a brief history of scrum

THE TERM SCRUM ORIGINATES FROM an article that appeared in the January-February 1986 issue of *Harvard Business Review* written by Japanese business researchers Hirotaka Takeuchi and Ikujiro Nonaka. Titled "The New New Product Development Game," the article explored companies in the U.S. and Japan that were delivering innovative products very rapidly.

The researchers found that these companies, all of whom were developing highly sophisticated products such as automobiles and consumer electronics that required a lot of complexity in terms of design and manufacturing, shared a number of characteristics in their product development processes. Among these were self-organized teams that were cross-functional and the development of products on an iterative basis. The researchers likened the behavior to what happens in the sport of rugby, as mentioned in the article.

Jeff Sutherland and Ken Schwaber began formulating the Scrum software development process in the early 1990s, and announced it in 1995. Their variation on the methodology adopted common good practices that had existed for many years into a framework for teams that self-organized and communicated and cooperated closely to develop software in an iterative and incremental way.

Schwaber and Sutherland formalized their philosophy throughout the 1990s, and in 2001 they gathered with other groups to create the "Agile Manifesto" (see Resources), which defines the values of every agile methodology, including Scrum. Today, Schwaber is considered the leading consultant on certified Scrum Master training.

Over the past five years, use of Scrum and Extreme Programming has grown tremendously, driven in part by studies that have shown as much as six-fold improvement in time and cost to create new products. Technology innovators Google, Yahoo, and Microsoft have adopted it, as have companies in traditionally more conservative industries such as banking and insurance.

High Moon adopted Scrum in 2004 in the last year of development of our debut game DARKWATCH, followed by our implementation of Extreme Programming the subsequent year. Since then we have seen these methodologies spread throughout the game industry, as dozens of developers have chosen to implement both methods.

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POSTMORTEM

RESISTANCE: FALL OF MAN

GAME DATA

RESISTANCE
FALL OF MAN
PLAYSTATION 3
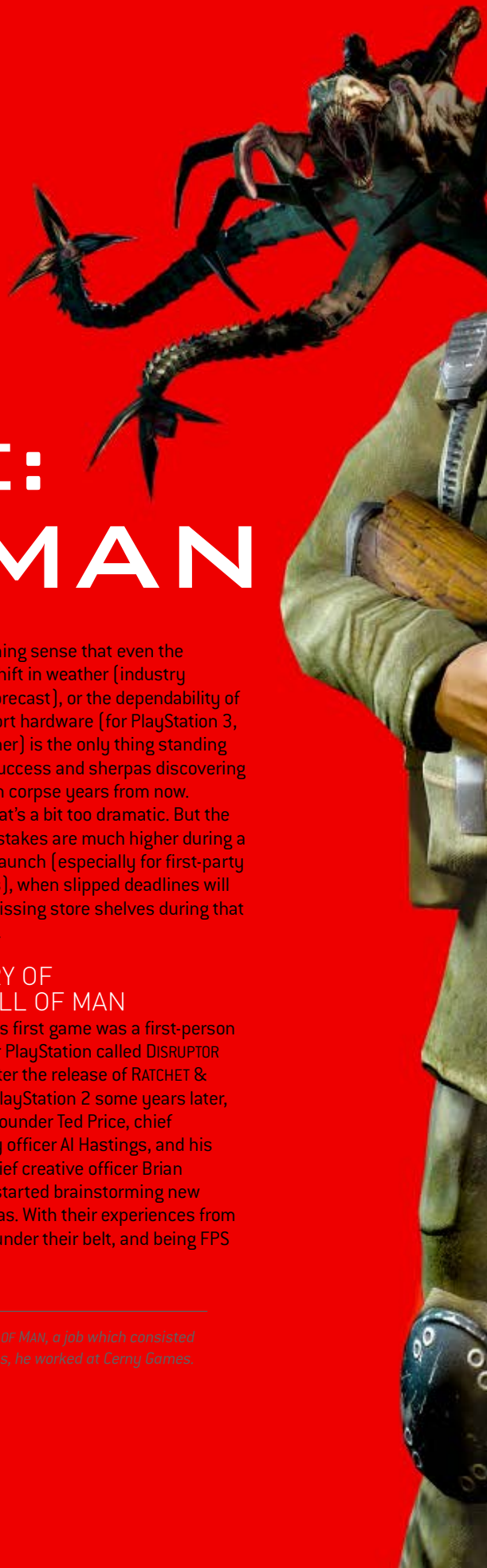
DEVELOPER:
Insomniac Games

PUBLISHER:
Sony Computer
Entertainment

PLATFORM:
PlayStation 3

**NUMBER OF
DEVELOPERS:**
Around 100

**LENGTH OF
DEVELOPMENT:**
Over two years

**DEVELOPMENT
HARDWARE:**
PC/PS3 dev stations

DEVELOPMENT SOFTWARE:
Maya, and proprietary
software

PROJECT SIZE:
17GB

**AMOUNT OF MONEY
SPENT AT LOCAL
PIZZERIA ON TEAM
LUNCHES AND DINNER
OVER THE PAST YEAR:**
$14,770.27

WORKING WITH ORIGINAL INTELLECTUAL property for a launch title is, to many game developers, like climbing Mt. Everest. It's immensely rewarding, but brings the biggest set of challenges. Developers have no control over the development of the hardware for which they are creating software. They are also simultaneously creating all the core technology (like rendering engines, audio and physics simulations, collision models, and so forth) to build this game. The developers, therefore, have only vague notions about how the game will work, such as its final memory limitations, total attainable character count, environment density, texture resolution usage, and all the aspects that keep the dream grounded firmly in reality.

Having now gone through the experience of creating an exclusive launch title—RESISTANCE: FALL OF MAN—for PlayStation 3, the Everest analogy seems all the more fitting. Once the game was complete, we were given plenty of bragging rights, but during the climb, there was an overwhelming sense that even the smallest shift in weather (industry financial forecast), or the dependability of your support hardware (for PlayStation 3, the carabiner) is the only thing standing between success and sherpas discovering your frozen corpse years from now. Perhaps that's a bit too dramatic. But the fact is the stakes are much higher during a hardware launch (especially for first-party developers), when slipped deadlines will result in missing store shelves during that key period.

HISTORY OF THE FALL OF MAN

Insomniac's first game was a first-person shooter for PlayStation called DISRUPTOR (1996). After the release of RATCHET & CLANK on PlayStation 2 some years later, company founder Ted Price, chief technology officer Al Hastings, and his brother, chief creative officer Brian Hastings, started brainstorming new project ideas. With their experiences from DISRUPTOR under their belt, and being FPS

*MARCUS SMITH worked as project manager on RESISTANCE: FALL OF MAN, a job which consisted almost entirely of juggling cats. Before working at Insomniac Games, he worked at Cerny Games. Email him at **msmith@gdmag.com**.*

Concept art for the Widowmaker enemy.

well because we had a reliable and experienced technology group in place, though we did end up migrating to hardware around a month earlier than we had planned. We were able to not only make forward progress by developing our technology in-house, but port many of these systems to the PlayStation 3's SPUs, freeing up more cycles from the CPU. Going forward, we can take further advantage of the PlayStation 3 because of the knowledge we gained from this project.

2 PHOTO REFERENCE. Creating a game that takes place in England while we ourselves are located in Burbank, Calif., proved to be quite a stretch. To help bring more realistic details into focus, we sent one of our environment artists and his digital camera on a whirlwind trip through England. He returned with ideas that proved to be vital assets for both our texture collection and our environment layouts. Despite being yelled at a few times and mistaken as a terrorist who was casing industrial sites, the trip was highly successful and worth every penny. There were only three downsides. First, we should have sent him to England sooner because several levels were well underway by the time he left. Second, every person on the team felt that s/he should have gone. Third, I'm having a very hard time convincing everyone that any sequel should be set in Tahiti and there would be no one better than me to collect reference photos.

3 THE WILL TO KILL. While we often suffered from biting off more than we could chew, we did make some pivotal early cuts after prototyping features that could have become quagmires which would drag our game down with them. One example was squad combat. Early on we prototyped ways to incorporate real-time strategy elements into the FPS genre. The problem was that this feature required additional HUD elements and the introduction of a slower-paced game style that complicated, rather than enhanced, the game experience (though others have done this well, most notably on PC).

We plan to utilize pre-production for more prototyping with the foreknowledge that not everything will work. With a solid pre-production/prototyping period, cutting becomes a success rather than a failure. From a design standpoint, there's a fine line in terms of what to focus on: Too many features means ultimately sacrificing quality in implementation, and too few features means the game will not push the envelope. In general we fall into the "too many" feature ideas camp, but then whittle our way down to what works. (And then we add more. And then whittle. Repeat.)

fans to begin with, it seemed only natural to create a new shooter franchise for PlayStation 3.

During the subsequent years—from initial pitch, to release, to manufacture—a lot changed. The company grew fourfold as it moved from being a single-title developer to supporting dual development. Our technology staff had to begin working on PlayStation 3 systems before there was a PlayStation 3 to work on, and we released two more RATCHET & CLANK titles between the twinkle of an idea and RESISTANCE: FALL OF MAN hitting the shelves. With that said, here is a very condensed list of what went right and what wrong during the development of RESISTANCE.

WHAT WENT RIGHT

1 HOMEGROWN TECHNOLOGY. At a time when middleware is making bigger inroads into production out of necessity, it was our homegrown engines, internal tools, and real-time systems that allowed us to ship on time. Our physics engine in particular performed faster and more reliably for launch than we would have been able to get from an out-of-the-box solution from any middleware company—and this was developed by one guy! While some developers were hampered by a lack of support for early PlayStation 3 middleware, our rendering engine and level editor got the job done.

Our strategy was to develop our core systems on the PC and then migrate to Sony's hardware when we were at a place in the project that made the most sense. This plan worked remarkably

4 MULTIPLAYER. A major aspect of offering a long-lasting play experience to our audience is the online capabilities. With a relatively small headcount and under impossibly tight schedules, our multiplayer team delivered a multiplayer experience of ridiculous depth. This includes everything from supporting 40 players at a time, to multiple game types, to custom game options out the wazoo. Plus, because of the magic of patching, the multiplayer team had the pleasure of continuing to work on the title even while the rest of us were off on post-production vacations. Rest assured that many a cocktail was raised in their honor during these vacations.

Contributing to the success of the multiplayer support, our Q/A teams, both in-house and at Sony Foster City, coordinated beautifully. The two companies ran their Q/A departments smoothly, and despite the crazy schedules, the long hours paid off. Testers (and others on the multiplayer team) now work out their aggressions on unsuspecting online players, dishing out a level of punishment that was honed by hundreds of hours of experience.

5 AGILITY AND ROCKSTARS. The number one thing that went right (by far) was Insomniac's ability to remain agile and roll with the punches on the launch title rollercoaster. This is no Hallmark sentiment, either. As anyone who works on video games can tell you, things change: An awesome weapon idea falls flat when it finally gets implemented. E3 deadlines move. Gameplay systems aren't ready in time. OS changes affect the save system. The results of that latest focus test aren't working in the development team's favor.

Our team consistently remained focused despite changes that could have been completely deflating. For example, the team worked hard for weeks to create a promotional trailer for the 2005 Tokyo Game Show that was ultimately never shown because it was deemed too violent for the all-ages show (you can see portions of it now if you look carefully somewhere on www.rfomps3.com). Although it was a dark moment, we were able to rebound and focus our energies back on the game. Aside from the company as a whole, there were the rockstar developers who stepped up and became the people without whom the title would not be released. These are the people every game company needs to foster and hold onto tightly. If not, they will be rockstars elsewhere, and the void they leave may be too great to fill.

WHAT WENT WRONG

1 THEMATIC SWITCHEROO. About one-third of the way through the project schedule, we made a decision to radically change our theme and storyline. The game went from being a futuristic space battle, to an alternate history WWI theme, before settling down in England circa 1951. Shifting the basic scene and premise of the game had a cascading effect, as it required us to start over each time. New enemies needed to be designed. Environments were scrapped and core mechanics (like weapons) had to be rethought.

Despite the switch and subsequent production setback, our final decision proved to be the correct one. It was a pivotal motivator that galvanized our team behind the premise of the game—much more than if we had had the idea from the get-go. Looking back, there were a few turning points that motivated the team, but none more important than this thematic shift. It's the type of decision that requires a driven creative director and gives project managers heart palpitations. I put it on the "what went wrong" list for two reasons. First, lots of work was lost as a result, and second, it could have just as easily had a disastrous effect instead of a uniting one.

A.I. for the masses ...
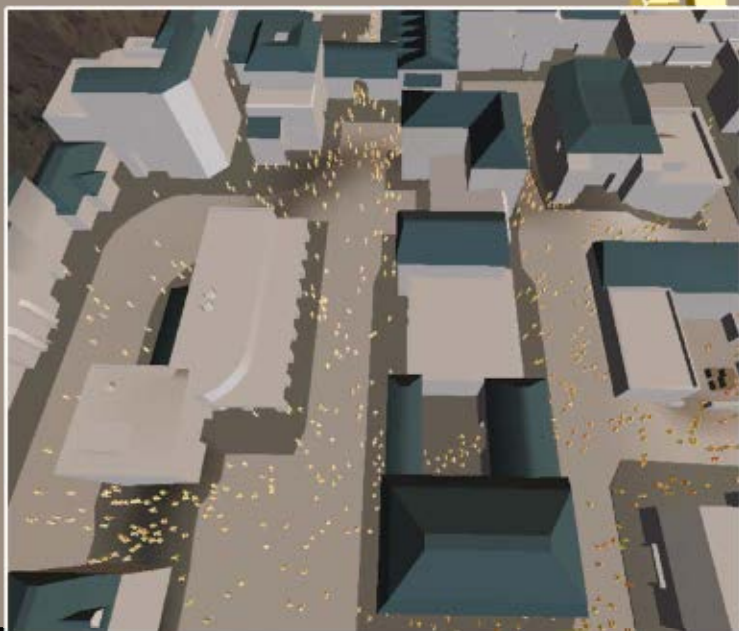
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no mind no game

We offer our condolences to the family and friends of Dan Johnson. His talents, humor, and friendship will be missed.

Daniel Aric Johnson
1974 - 2006

GAMEOGRAPHY:

Environment Artist
1997 Treasures of the Deep – PS1
1998 Spyro the Dragon – PS1
1999 Spyro the Dragon 2: Ripto's Rage – PS1
2000 Spyro the Dragon 3: Year of the Dragon – PS1

Character Modeler and Rigger
2002 Ratchet & Clank – PS2
2003 Ratchet & Clank 2: Going Commando – PS2
2004 Ratchet & Clank 3: Up Your Arsenal – PS2
2005 Ratchet: Deadlocked– PS2

2006 Resistance: Fall of Man – PS3
2007 Ratchet & Clank: Size Matters - PSP

The Dan multi-player skin from R&C: Up Your Arsenal and R&C: Size Matters.

Dan's likeness appears in both Insomniac and High Impact games.

POSTMORTEM

2 **TOO MANY DEMOS (EXTERNALLY DRIVEN MILESTONES).** Building demos requires some tricky balancing. The team often feels its efforts are being consolidated, as they focus tightly on the game to make the demo. However, demos also force the team to focus on only one portion of the game, or worse, no portion of the game at all, which can breed a culture in which adding hacks for a more polished look seems somehow acceptable. And sometimes, these hacks remain in the game because we run out of time to make changes.

For example, we had a demo due in December 2005, just before our holiday break. It was important that we showed a level that looked as polished as possible. But, we were only at the stage of just starting to convert our core systems to the hardware. (In fact, we had to migrate to the hardware about a month earlier than we'd planned to facilitate this.) The cost of making demos like this is lost work or re-work later on. In order to show what the game could look like, we had to hardcode special effects and particle emitters that would ultimately be re-done by artists using tools that were not yet ready.

Consequently, the enormous effort we put into getting these effects up and running for the demo was for naught, since the effects were removed when the tool we needed to implement them properly became available. The sum total in terms of expended effort ended up being between two-and-a-half and three times what it should have been.

Losing time due to hacking demos can only be diminished by defining internal deadlines and coinciding focused demos with these. By focused, I'm talking about demos with clearly communicated (both internally and externally) goals. Everyone working on the project as well as the publisher (or whoever will be seeing the demo) knows what will and will not be included. Word of advice: Don't demo elements of your game that aren't ready. It can only end in tears.

3 **LIGHTING PIPELINE.** As we worked out our technology for the new console, we were also finalizing the toolset that we planned to use to generate our baked and dynamic lighting elements. For most of the development cycle, the lighting pipeline was a like a house of cards, and frequent changes in the way data was handled by the engine resulted in our level lighting needing continual re-work. And there were countless other process inefficiencies, too. For example, an environment artist adjusted a few vertices on a building to fix a visual bug in the model, and the seemingly small change ended up invalidating the UV maps of the building. Suddenly, every instance of that building in the game now had offset lightmaps and generally looked like regurgitated fruit-cake.

The problem (aside from the delicate nature of this scenario) is that the lighting artist had no way of knowing which levels and instances were affected and needing to be rebuilt. This means artists must constantly load the levels and examine them for glitches, which takes time that could be better spent

The RESISTANCE: FALL OF MAN team, complete with official RESISTANCE jackets.

on other production-related tasks, and we had no automated process to rebuild the assets or notify someone when it happened. And it happened all the time. By the end of the project, we had set up a render farm to speed up the rebuilding of the light maps; our tools had become usable enough to ship our game, but during production it was a constant source of consternation. Only by utilizing brute force and workarounds were our artists able to light the levels. We are addressing the lighting pipeline with closer communication between tools and tech to prevent data input changes, a dedicated lighting go-to guy in the Tools department who is making continual improvement to the process and we are looking into automated logging of asset changes that invalidate lighting information.

4 **TRAINING AND WORK DISTRIBUTION.** The flipside to homegrown tools and technology is that our tools changed quickly and our ability to properly train people on all the changes proved impossible. Building assets while simultaneously building the tools needed to create them is akin to trying to build a house on quicksand. Artists would literally open their tools one day and discover new interface buttons and have no idea what they were or how to use them. Many assets needed to be rebuilt, re-lighted and/or re-animated because of changes to our builder tools.

Adding to the confusion, only a small number of programmers had the knowledge required to debug the problems, and these people were overwhelmed with requests for help. If it weren't for their inhuman effort and long hours hunched over their keyboards, we would have never hit the launch date.

We are currently working on simplifying the build process for users and incorporating methods for our tools to catch more build-time errors (with reader-friendly feedback) before assets are put into the game. This will allow users to fix the problems instead of overwhelming tech people with assistance requests, and it has the added benefit of making a more stable game, as fewer broken assets will make their way in.

5 INTERNAL COMMUNICATION. Insomniac grew from a company of 40 people to around 160 in a few short years. In order to keep the business running smoothly, a new layer of management structure was introduced, which worked surprisingly well. But Insomniac quickly became more departmentalized. People began to focus more on the needs of their department than how their department related to the ultimate goal: the game. Add to this a new emphasis on deadlines for the individual and Insomniac was turning into a place where "getting things done" was more important than "getting things right."

In a world where we deal in the qualitative rather than the quantitative, a company structure like this can be more stifling than if we were running a factory that assembled spatulas. With time, we did get better about breaking down interdepartmental walls and returned to less rigid individual deadlines, but it required reprogramming a culture. By the end of the project, it was common to see animators sitting next to gameplay programmers, going over get-hit timings and whatnot. In a collaborative environment where each person brings ideas for improvement and innovation, getting the right people together is the key to creating quality.

As a side note, one surprising tool that has helped communication in such a sprawling office space is our internal instant messenger. There seems to be a social block here against using the telephone to ask someone a question, and walking is definitely out of the question (even with the ubiquity of Razor scooters scattered about) and email is apparently for more thought-out communiqués—so for whatever reason, IM hits the right balance between the instantaneous contact of the telephone without the investment of email.

FALL OF MAN, RISE OF AGILITY

The ascension of our personal Everest now at an end (for the single-player portion anyway), we're left with an overwhelming sense of accomplishment. The climb was a struggle, without question, but we were able to deliver a large, original IP on-time for launch without sacrificing much in the way of our original game design. Much like a true climb, there wasn't much time to appreciate the view from the peak because we're already halfway up another mountain with a new RATCHET & CLANK title in development for PlayStation 3 and scoping the path of a new mountain beyond that. Our climb revealed many, many more things that went right and wrong (too many to mention here), but we are looking at ways to address them. We need to improve the way we create cinematics, for example, but work is underway. Agility is the key.

During the production of RESISTANCE: FALL OF MAN, Insomniac grew not just in terms of employee numbers, but in our approach to development. While we did crunch a lot on this project, it was generally less severe than on previous titles. The way we approach development now includes forward-thinking approaches to our tools and technology challenges. Those that we faced while constructing RESISTANCE are being addressed on our current RATCHET & CLANK title. We're even finding a balance between corporate culture and unbridled creative energy. While we are now a mature company that benefits from a little management, our biggest strength remains our ability to adapt to changes. We are trying our best to be a mid-sized company that still has a start-up edge. And that's why no-pants Fridays have been such a hit. ⋈

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ALL FOR GAMES

AN INTERVIEW WITH

WARREN SPECTOR

WARREN SPECTOR IS PROBABLY MOST ACCLAIMED FOR HIS work on DEUS EX, but his experience has spanned many studios. From Origin, to Looking Glass Studios, to Ion Storm, Spector has made his mark, especially in terms of interactive storytelling and deep character immersion. Now, with his new Houston-based studio Junction Point (the name is borrowed from a cancelled Looking Glass game), Spector plans to take all that a step farther, with brand new intellectual property. On the occasion of Junction Point's new creative deal with Vivendi Games, *Game Developer* spoke with Spector about his new studio, his stance on MMOs (preview: he doesn't like them), writing in games, and dynamic storytelling.

Brandon Sheffield: *I was just reading the mission statement for Junction Point, which says you want to create the narrative with the players and not for them. How do you go about doing that without becoming a choose-your-own adventure or a* SPORE?

Warren Spector: That's a great question. In terms of game narrative, there's a broad spectrum of possibilities and implementation styles. On the one hand, there's Will Wright who's not even interested in telling stories to or with players—he wants to provide them the tools to create their own stories. That's perfectly fine. I love Will and the fact that he exists. I love playing his games.

On the flip side there are the roller coaster rides like HALF-LIFE. I'm loving TWILIGHT PRINCESS right now. The Square Enix games.

Those are games that put you on rails. They're exhilarating, exciting, fun, and challenging … all the things games should be.

There is a middle ground, and I don't think it involves the choose-your-own adventure approach. There's a philosophy that I like to apply: As a developer I want to control the overall narrative arc. Using DEUS EX as an example, (main character) JC Denton has a brother, he works for this agency, and the agency turns out to not be what you thought it was, and you have to switch sides because they turn on you. The terrorists are the good guys, and so on. All that stuff provides context and meaning for all of the minute-to-minute player choices. In that sense, I own all the acts and [purpose for] why you do things. Now, saying that, it's possible to own why you do things and leave how you do them in the players' hands.

The key for me is creating linked sandboxes and letting players explore those little narrative chunks on their own. I'll determine why it's important that you get through a door, but how you get through it, what happens, and whether you kill, talk to, or ignore everyone on the other side belongs to you. That concept of sharing authorship is where the sweet spot of game narrative is. There are some things that I think we can do to take that to the next level, and things that can be done a couple of years from now that can take it to yet another level. The end goal now isn't for me to allow players to play a movie, ride a roller coaster, or provide a sandbox so they can do what they want, but to find the compromise where I can have a dialogue

BRANDON SHEFFIELD *is features editor of Game Developer magazine. He really wants to play Warren Spector's theoretical one-block RPG, but would settle for* GRAND THEFT AUTO *with zombies. Email him at* **bsheffield@gdmag.com**

with each player virtually. That's what's exciting to me.

BS: *There's still an importance on checkpoints there, though, in order to advance the narrative arc in a way that you've set out.*

WS: Certainly, and I think there are ways around that, too, that we'll explore over the next several projects. You have to know the narrative entry point and exit point of each major part of the game for that to work. Absolutely. That's why it's a hybrid of a linear string of pearls game structure and sandbox approach.

BS: *You've been a long-time proponent of single-player role-playing experiences. What do you think of MMOs?*

WS: Honestly, I don't much care for them. If I'm going to have a social experience, I'd rather have it in person. I feel like a blind, deaf, and dumb person watching a movie while I'm playing an MMO because the social experience is really shallow. This is one of the things I'll end up talking about at the Game Developers Conference, but I'm—perhaps to a fault—a story person. I really need narrative.

The level of narrative that people have been able to achieve in MMOs has been so shallow. I'm one of those people who doesn't find anything interesting at all in leveling up, finding a plus-three sword or paper-dolling a character with a purple cloak. That doesn't appeal to me in any way as a human being. Put that all together and the play experience of MMOs is on par with role-playing back in 1987. In all fairness, my wife is a WORLD OF WARCRAFT addict.

BS: *You have a background in writing. What do you feel about writing and stories in games today? Do you think there are any that do it well?*

DEUX EX was lauded for its deep story and gameplay.

WS: Yes and no. There are plenty of games in which the quality of writing is high. I'm going to generalize so much that all my friends are going to hate me in about 30 seconds, but the games that are really well written tend to have too much writing in them. People don't play games to read or listen—they play games to act or do.

We still need to learn some lessons from film and television writers. They can bring a character to life in six words and not 6,000. If you look at the games that have the best writing, they tend to have the most writing as well, and that's a problem. I think most of the games I've worked on have fallen into that trap as well. I will say that Sheldon Pacotti, who was the lead writer on DEUS EX and INVISIBLE WAR, is now back with us at Junction Point. He's a spectacular writer, and he gets that. I think you're going to see some big strides from us in that area: characterizing people much

SYSTEM SHOCK was an early FPS from Looking Glass—a precursor in concept to DEUS EX.

more succinctly and making great writing interesting to players.

BS: *It seems to me that even the method of storytelling has some areas to advance. Sometimes the stories seem immature, and I'm just speaking freely now, but people need to realize what a good story is and make compelling characters and a great universe, and the story will tell itself.*

WS: I think you've hit upon something that has three underlying problems—and again, I'm going to alienate just about everybody in the game business. First of all, I think there's a widespread belief that, even as developers and players get older, at its core, our market is young, and that our games are made for kids, and that people stop playing as they get older.

I mean, seriously. Who in their 20s or 30s gives a darn about being the last space marine on a space station who has to stave off an alien invasion? Who cares? Games are still aimed at kids even though the players may be adults.

There's [another] problem that comes from many developers who have no experience of life other than "I've played a lot of games, I love games, let me make games." You end up with games about other games and not about life. So that's a real issue. We'll start telling better stories when people who have interesting things to say start making games.

Then there's what the audience buys. One of the big reasons I'm such an advocate of game education and university programs about game development and analysis is because I think we need to change the way our players think. Players just accept what we give them, it seems. I want players that demand more of us. Right now they don't seem to be demanding much more. In fact, without naming names, I've had publishers tell me that there's an inverse relationship between reviews scores and sales and that quality doesn't sell. I'm sure there's some hyperbole in there, but that's a scary thought.
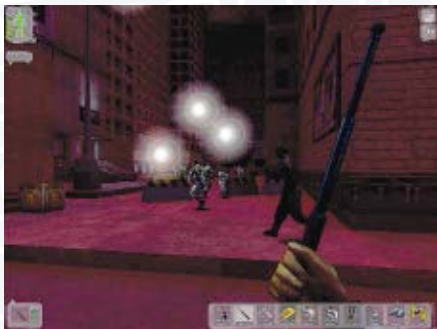
BS: *There are a lot of licensed kids games factored into that.*

WS: That's certainly true, but the audience needs to demand more. We need developers who have a much broader base of experience, knowledge, and education. It would be nice if we had some developer who had read Aristotle's *Poetics*. If only we could somehow internalize the fact that all games don't have to be male adolescent power fantasies. There's more we can do than that.

BS: *If the player demand isn't there, the impetus is going to be on the developers themselves to advance the media. No one's going to tell anyone to make better games. It's going to have to come from the creators.*

WS: You know, I fight that, and I've been fighting that every day for the last 15 years. You don't want to know on how many projects I've been told to "just go make a shooter." I had one publisher tell me "you're not allowed to say 'story' anymore." Luckily, Vivendi seems to get it. It's a constant battle to do something other than what everyone else is already doing.

BS: *A long time ago I heard you talk about wanting to make a one-block RPG which deals with a single city block and all the people and experiences involved in that.*

WS: If you could find a publisher that would front that, I'd still make that game.

BS: *Do you think that's actually something that can be done with the technology we have now?*

WS: I think there are huge design problems that need to be solved there. There are huge audience expectation issues that need to be addressed. I think that a version of that could have been done before and certainly could be done now. It would be a real interesting challenge. It would be extremely risky from a development and commercial standpoint.

Realistically, as cool as Vivendi is to work with, maybe I should pitch that to them just to see how they respond. I think it could be done. I think it's a mistake to look for gigantic, revolutionary steps—or plan for them. There's probably somebody in a garage somewhere that has all that working and will change the world completely. In terms of the games I work on at Junction Point, at the end of my career, when I shuffle off of this development coil, I want to be able to look back and see that every game I did was some logical, evolutionary step toward some clearly defined goal.

Even now, if I look back on all the games I've done, I've been really lucky and blessed to work with people who wanted to go in the same direction I did, and we have made evolutionary
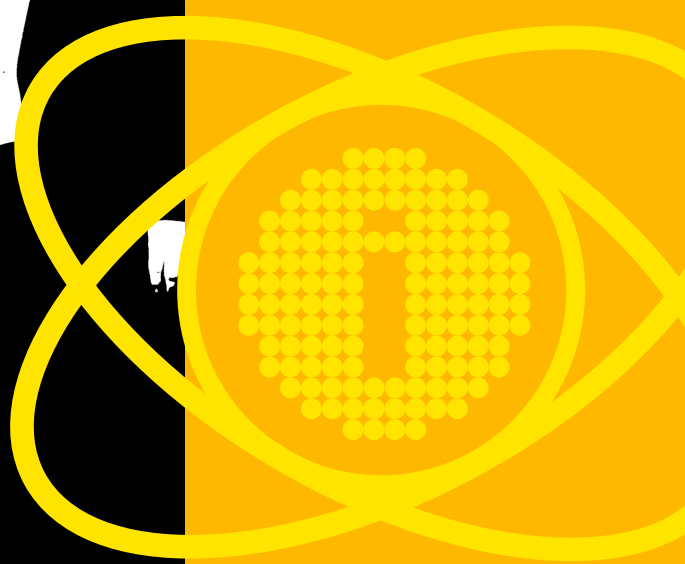
steps. I think looking for the be-all-end-all one-block role-playing game, the simulated city block, is not the point. The point is that every game takes a step closer to that, and we may fail. Failure is fine. I always say this to my teams, and they hate it when I say this, but "I would rather fail gloriously than succeed at something mediocre." Some day we'll get there.

BS: *I'm particularly hopeful that it's possible to advance games in the area of interaction and, not immersion necessarily, but dynamics and depth. It seems like the danger is people being too influenced by a game that's closer to reality. Of course, it's the people who are already disturbed and would be influenced by anything. It puts an extra layer of responsibility on the developer that wasn't there in the past.*

WS: There's an assumption in what you're saying that deeper simulation and more player control must equate with more realism, which isn't the case. You can simulate a fantastic world that has nothing to do with the real world. It's important to remember that. We don't have to strive for greater realism. We can strive for more a iconic, stylized, or fantastical approach as long as it's internally consistent and the player can reason with the simulation and figure out how to interact with it. My guess is that players will feel more on an emotional level about their characters in Spore than they ever have, or maybe ever will, about a human character in any other game ever.

I don't think we have to focus on creating a realistic world. I want to move away from that. It's hard to convince publishers to do this. I would love to do a game that isn't realistic. Bear that in mind.

Another point is that if you're going make a game that allows players to make significant choices that puts them in control of a narrative or of a character in a simulated world, you do have an obligation. You have an obligation to show the consequences of choices. One of the biggest problems with games, especially more linear games, is they say, Kill everything that moves! Good player!" Or, "Win this game!" and then they pat you on the back for solving a puzzle, killing virtual things, or crashing a car in a fantastic way.

It's pathetic that I'm saying this 10 years after we began work on Deus Ex and the Ultima games that have a strong ethical core, but the fact is that we have to show the consequences of choices or those choices are meaningless. We have to show that if you kill somebody, then someone might think that's great but there's going to be a lot of people that are really mad, and that has to have a direct impact on your gameplay experience. It can't just be rewards for solving a puzzle or killing that thing or even saving that thing. In the context of a story that players are sharing in the telling, you have to show the consequences and it's really hard to do.

The reason very few people do what we're doing at Junction Point, and what we did at Ion Storm, Looking Glass, and Origin, is because it's really hard to do, and it's a lot of extra work that's satisfying to developers and players who get it, but it's not necessarily something that immediately increases sales, and it certainly costs money. It's more expensive to make games that have choice and consequence than it is to make a game that has an illusion of choice and one scripted consequence. ⁑

Spector's early work included Ultima Underworld.

MICK WEST

PROCEDURAL SPOOLING

IN A GAME WHERE THE ENVIRONMENT and game objects are spooled from the disc as the player moves through the game world, the limiting factor in the allowable scene complexity is often a function of the data transfer rate of spooling and the virtual speed of the player within the world.

If the world has too much variety, then as the player moves from one region to another, a large amount of new data may need to be spooled from the disc in order to correctly display all the elements in the new region. If the data cannot be spooled fast enough, visible glitches may result as new geometry pops into existence. Anyone playing the GRAND THEFT AUTO series on the PlayStation 2 will have had the occasional experience of rapidly turning a corner and finding a large section of the road invisible for a few seconds.

If the missing elements are logically necessary for the game to work, the player may be forced to wait out these stalls in gameplay, as the missing elements are loaded.

To prevent these problems, developers should be placing limits on the scene complexity and the allowable variation between game regions. Limits should also be placed on the maximum speed at which the player can move through the world, keeping it slow enough so there is sufficient time for the world to be updated as the player moves through it at top speed. (For more on this point, see Bulkley in References, page 46.)

Disc bandwidth is frequently used as a shared resource, with the environment spooling simultaneously with the background music, voice over, and sometimes video. So, in addition to increasing allowable scene complexity,
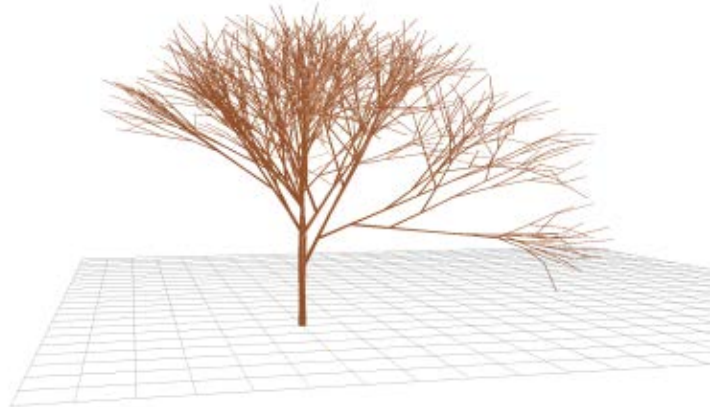
FIGURE 1 A procedurally generated tree of 65,000 polygons is generated from just 48 bytes.

any improvement in the utilization of disc bandwidth will allow a richer game experience with these additional audio and video elements.

DATA COMPRESSION LIMITS

To maximize disc bandwidth utilization, the data on the disc needs to be compressed as much as possible. The greater the ratio between the size of the disc data and the system memory data, the more disc bandwidth we're able to use.

Naive lossless compression generally gives us an approximately 50 percent reduction in the size of the data. While there is frequent talk of more powerful processors (and particularly multi-core processors) that would let us use more powerful compression algorithms, the fact is that we are not talking about orders of magnitude in improvement. On arbitrary data, advanced algorithms (such as PAQ) don't perform much more than 10 to 20 percent better than simple algorithms (such as Lempel-Ziv), despite taking more than twice as much CPU time in the decompression stage and several orders of magnitude more time in the compression stage (which can cause serious production problems by increasing build time).

It's possible to achieve more significant improvements by tailoring specific compression strategies to the data being compressed. This could involve re-ordering the data by de-interleaving data channels to allow the compressor to take better advantage of repetition within a channel (such as the X, Y, and Z channels of a vertex list).

Another data-specific compression technique is recognizing that certain numbers fall within a well-defined range and re-coding them using a reduced number of bits per value, or re-coding floats as fixed point. You could also use lossy compression, although there's an obvious trade-off between improving bandwidth and perceptual degradation of the spooled content.

But compression on the actual scene geometry can only be taken so far. To further increase the spooling scene complexity, we need to look at procedural content.

PROCEDURAL CONTENT

Procedural content is content that's generated from a mathematical description of the underlying form of that content, and a set of parameters that describe the specific instance of that content.

All forms of content can be expressed in procedural form to one extent or another. For example, music can be stored in MIDI format. Speech can be stored as annotated text and converted using a

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

text-to-speech converter. Textures can be generated with algorithmic patterns and combined archetypal layers. Animations can be generated based on archetypes and physical constraints.

The most relevant form of procedural content in the context of spooling is procedural geometry. As the player moves through a spooling world, the majority of new content that needs to be spooled is usually the environment geometry and the geometry of any new entity models.

Environment geometry can be divided into two types: natural and artificial. Natural geometry consists of things found in nature, such as natural terrain and rock formations, trees, flowers, vegetation, rocks, rivers, streams, lakes, smoke, and clouds. Artificial environment geometry is anything man-made (or alien-made, if that's your game), like roads, buildings, telegraph poles, walls, light poles, steps, ladders, and fences.

There are some obvious differences between natural and artificial environment geometry. Artificial geometry tends to have a lot of straight edges, flat surfaces, right angles, and identical components, like bricks. Natural geometry has more curved edges, curved surfaces, and components that are similar but not the same, such as leaves and branches.

The irregular nature of natural environment geometry results in a
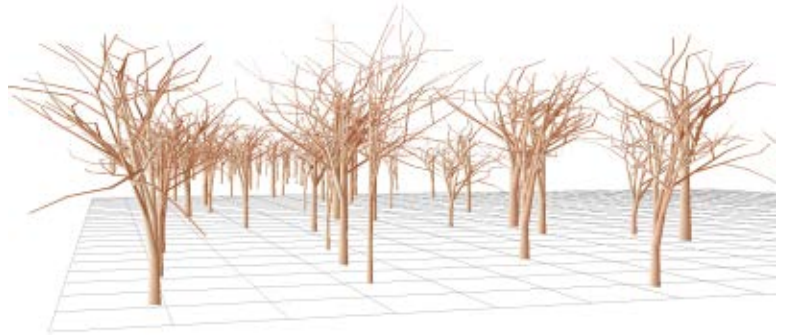
FIGURE 2 A forest of real-time procedural trees with continuous LOD generation.

large number of polygons used to accurately represent the variety found in real life. Figure 1 shows the archetypical form of procedurally generated natural content: a tree. Trees and plants are formed based on fairly simply mathematical procedures, and the shape of a tree consisting of thousands of polygons can be represented in less than a hundred bytes.

Natural geometry is hence the most obvious candidate for compression using procedurally generated geometry.

PROCEDURAL COMPRESSION

Procedural compression is simply storing a piece of geometry as a set of procedural parameters rather than as the final model. While this is not compression in the normal sense of the word, the effects are essentially the same, only with a vastly increased (even arbitrarily large) compression ratio.

The disc spooling bandwidth requirements are thus greatly reduced, allowing us to pack vastly more level geometry into a small percentage of that bandwidth. The trade-off is that artists have reduced flexibility in the models they can represent, since they are constrained to the possible output of the procedural algorithms. We also trade some CPU resources, since the generation of geometry may require more CPU time than the standard spooling and decompressing of the raw data.

Are these trade-offs worth it? What are the ultimate benefits of using procedural models for level geometry?

To get some real-world numbers to answer this question, I wrote a procedural tree generator and measured how long it took to generate level geometry. (The code used to generate the table and figures shown here can be downloaded from www.gdmag.com.) I then compared my results to the theoretical peak spooling speeds of various game platforms. The results are summarized in Table 1.

The bandwidth figures shown in Table 1 are peak bandwidth; in reality, actual average bandwidth can be as little as half. Two factors influence these results. First, it's difficult to actually fully utilize the available bandwidth, as the data set tends to be loaded in chunks. Second, seek-times play a significant role in actual bandwidth utilization. Layout of data on the disc can greatly affect these numbers by causing excessive seeking, especially when data spooling needs to be interweaved with audio spooling.

Hard drive figures are included in the table, too. On a PC, the level data is generally loaded onto the hard drive first, and hard drives generally have a much faster average read rate than optical drives. Unfortunately, we must code for a lowest possible common denominator on the PC. Not so on the PlayStation 3, with a default hard drive which can potentially be used to cache level data.

Note though that the transfer rate of the 2.5-inch drive used isn't astoundingly faster than the peak Blu-ray rate, so many of the same problems still apply even if the hard drive is used for caching. On the Xbox 360, the hard drive is optional, so we have to assume it's not there.

A typical broadband internet rate of

TABLE 1 Approximate Peak Loading Bandwidth

PLATFORM	HARDWARE	BANDWIDTH (MB per second)
PlayStation 2	4X DVD	5.3
Xbox	4X DVD	5.3
Xbox 360	12X DVD	16
PlayStation 3	2X Blu-ray	9
PlayStation 3	2.5" HD	10–35
PC	3.5" HD	30–150
Procedural	1GHz laptop	~100
Procedural	3.2 GHz PC	~300
Procedural	GPU	~1000
Internet	DSL	0.3

0.3MB per second is shown for comparison. Spooling level geometry over such a slow connection would be very limited. However, if the majority of the level content is procedural, it's quite possible to spool an arbitrarily large world of content over the internet. To a small extent, this is the driving idea behind Will Wright's game SPORE.

The tree generator in the code samples is very simple and rather inefficient, using vertex lists rather than indexed vertices. However, it does perform a reasonable amount of computation to generate the model, calculating texture coordinates and vertex normals. No optimization efforts have been made with this code, so the figures given here can be viewed very much as the bottom end for procedural geometry generation, with

a more efficient algorithm easily being twice as fast.

Looking at the figures for the Xbox 360, the DVD spooling figure is a maximum of 16MB per second. Again, this is a peak figure, with a sustainable average of perhaps 8MB per second (although standard compression would again bump this up to an effective >16MB per second). Utilizing one of the three CPU cores of the Xbox 360, we should easily be able to generate level geometry at a rate upwards of 300MB per second.

Procedural level geometry is an ideal use of a multi-core system, like the Xbox 360 or PlayStation 3. If the procedural generation is being used essentially as a spooling system, then the geometry generation can be run on a low priority thread, making very effective use of "spare" CPU cycles.

INSTANT SPOOLING

Using procedural level generation as a way of accelerating spooling is great, but it can swiftly lead to another limited system resource: memory. If we're building the geometry in memory, then we're limited by how much memory we can reserve for geometry. In many cases, the available memory can hold far fewer polygons than the GPU can process.

The solution to this resource issue is not to use memory at all; instead, we generate the geometry in real time and feed it directly to the GPU. Theoretically, this method lets programmers fully utilize the polygon-pushing power of the GPU, while freeing up system memory for other things, such as materials or additional artist-generated geometry.

One way of generating polygons in real

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time is to perform dynamic tessellation, in which surface polygons are subdivided into smaller polygons, interpolating across surface normals to maintain the curve of the surface. A better looking result can be achieved if the model is stored as higher order surfaces, such as NURBs, which can be tessellated in real time. Real-time tessellation can be dynamically varied depending on view distance, and so can be used as a very effective real-time level of detail (LOD) generator. Dynamic tessellation can be used to enhance procedural geometry. In my tree-generating sample code, I can dynamically alter the number of polygons that make up the trunk and branches based on camera distance.

Real-time LOD is another great advantage of real-time procedural model generation. Instead of storing discrete models for several levels of detail, the procedural model generator simply generates a model to a sufficient level of complexity based on camera distance and current viewable scene complexity. You can also code for a fractional LOD transition, where the LOD is given a floating point value, and smoothly transitions from one stage to another.

In the tree sample, the LOD is defined by the branching depth. If this were done at the integer level, the user would notice distinct pops as the LOD moved from one stage to the next. However, by scaling the terminal branches by the fractional part of the LOD, the geometry of the tree can smoothly and simply morph from one stage to the next, providing a continuous increase in LOD that is almost imperceptible. Figure 2 shows a variety of procedural trees being generated in real time, with the trees in the distance having lower LOD. As you move through this scene, the LOD transitions are very smooth, an effect that would be impossible to achieve without real-time procedural geometry generation.

GENERATED CONCLUSIONS

Procedurally generated content has the potential to support huge and unbelievably detailed worlds. It can be used to significantly augment traditionally spooled static level geometry to more fully utilize disc spooling bandwidth. Effective use of procedural content may require a new set of tools and working practices, which may take some developers a while to acquire. The difficulty in creating swathes of content by hand, and the imbalance in spooling speed and polygon pushing power, has made the utilization of procedural content an almost unavoidable necessity. The good news is it's a lot of fun to code! ✴

STEVE THEODORE

GETTING THERE FROM HERE

Directing players using landmarks

SOMETIMES IT'S FUN TO BE A PIONEER in a young medium, blazing trails, meeting new challenges, and inventing new ways of seeing. Other times, it just kinda stinks.

The unique power of our work is that we aren't the sole creators of our games. The players are just as important to the process as we are, crafting their own particular experiences from what we give them. But wouldn't it be nice, just for once, to be a film director, with complete control? Want attention focused on the important clue? Cue the close-up and the significant background music! As the famous voiceover used to say, "We control the horizontal, we control the vertical"—you chumps in the audience just sit back and bask in our genius!

DRAMA QUEEN

The poor game artist, alas, is expected to whip up just as much drama and tension but with fewer of the dictatorial powers of the traditional creator. Usually, it's the players who control the pacing and the point of view, the two most important keys to telling a story on screen. Drumming up cinematic levels of intensity is a tough job when the player is focused on timing a jump, finding cover, or locating some swag rather than soaking up your lovingly crafted atmosphere from a well-chosen angle. What's a poor artist to do?

This conundrum affects us all to some degree, but level designers and landscape builders bear the biggest

FIGURE 1 Too few or too many landmarks can be equally off-putting.

responsibility for coping with player freedom. Guiding and controlling the player—without appearing to take away control—is a delicate art. If that weren't enough, environment builders have to balance the player's expectations of realism against the design team's directives about gameplay. Players love to imagine they're moving through real spaces, but they don't actually want to spend a lot of time in parking lots or coatrooms. The true environment artist is equal parts psychologist, tour guide, set dresser, and engineer.

Although TV and Hollywood don't have to worry about the scourge of the free-range player, other art forms do. From the earliest days of city building to cutting the ribbon at the latest theme park, architects, urban planners, landscape architects, and event organizers have learned to cope with many of the same problems we grapple with. This month we're going to take a look at some lessons we can borrow from these other disciplines.

FOCUS

Not all spaces are created equal. In any open environment, the eye seeks out dominating features to maintain a sense of spatial location. Managing these landmarks is extremely important: Too few landmarks leave the player lost and bored, but a world with too many focal points can become equally difficult to cope with. A faceless gray rank of Stalinist

apartment blocks and the chaos of Times Square (Figure 1) are both difficult to navigate, though for opposite reasons.

In a sense, each visible landmark represents a possible choice of destination. Even if you can't go right to it, you can use it as a point of reference. If more than a handful of landmarks are visible at one time, you risk overwhelming the player with choices. Theme parks, for example, typically offer many different attractions. Their designers expend fantastic ingenuity controlling sight lines to keep the visitors from becoming overwhelmed by options. Keeping only a few critical landmarks in sight also breaks up the visit into a series of chapters with distinct flavors and themes. After all, nobody wants to see a giant fantasy castle looming up behind the herd of robotic stegosauri in their Jurassic jungle fantasy.

TEMPO

Landmarks are more than giant signposts. They also function as a kind of metronome that regulates the visitor's sense of time. Controlling the landmark "clock" is done by shaping the routes between the different key locations. Theme park goers perceive progress by the intervals between important features or vistas. The urban warfare levels in HALF-LIFE 2 are a great examples of the same thing in a game: the repeated glimpses of the looming Citadel tie together all the corridor-shooter action

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FIGURE 2 The looming Citadel dominates HALF-LIFE 2's City 17, orienting players and tying disparate action sequences together.

FIGURE 3 The long walk up the door of Blenheim Palace is deliberately designed to remind the visitor who's in charge.

sequences, reminding the player of the ultimate goal of the battle and tracking progress visually, as in Figure 2.

There are two basic ways in which the landscape can control the tempo of a game: directly and indirectly. Games generally use indirect approaches, in which the goals are visible only periodically as the player navigates a series of smaller areas. Direct approaches, on the other hand, keep the distant goal in sight most or all of the time. The constant sight of the goal keeps the tempo to a statelier, more measured pace.

While indirect approaches are more common in games for technical reasons (breaking up the world into smaller chunks is less resource intensive, and

many engines aren't happy about long sightlines), each kind of journey has its own uses, and each affects the player in different ways.

THE DIRECT APPROACH

Historically, the direct approach is used as a tool to make a visitor feel small, humbled, or awestruck. The long straight park drive of an English stately home (see Figure 3), the miles-long converging sight lines of the Champs-Elysee, or the enormity of St. Peter's Square are all symbols of power and authority. Funneling your players up the long King's Causeway is a much better way to prepare them for His Majesty than having them turn a corner and come face to face with the gatekeeper.

Of course, just sticking a big driveway in front of a palace isn't enough to create a sense of drama. Artists and architects still need to guide the eye along a direct approach to a landmark, and they can do so in two key ways.

The first way is to use converging horizontal lines. Like the perspective lines in a 2D drawing, strong horizontals pull the eye toward a goal. Baron Haussmann's gigantic rebuilding of Paris in the 1860s enforced uniform roof heights, setbacks, and window lines to concentrate the viewers on the Arc de Triomphe, the Opera House, and other landmarks (see Figure 4). If you cheat these lines downward, converging them below the real horizon, you can make the destination seem even larger and more imposing; simply tilting the first part of the approach downward a bit can add a great deal of drama to the final goal.

The other major tool for adding interest while using a direct approach is rhythm, the use of repeating elements to provide a kind of scale reference for the big focal point. An avenue of elms leading up to a mansion or a colonnade of statues leading up to the temple of Thoth-Amon would do the trick. But in either case, the repeating image adds a valuable component to the vista. The details can break the monotony of a long trek in a game and provide players direct feedback on their forward movement. Squeezing the units of a pattern at the far end can also cheat the perspective, making the goal seem that much larger

and more impressive. A very regular pattern can also be another subtle signifier of power and majesty. Authoritarians of all stripes have always favored regularity and symmetry as advertisements of their might.

Like all rules, these are made to be broken. Disfiguring the formal, symmetrical, and converging elements adds an element of narrative to the landscape: a shell-pocked road, fallen statuary, or dead trees all symbolize fallen glory and overthrown authority. The psychological implications of the direct approach are valid even when the destination isn't a temple or a palace. It's certainly unlikely that King Ugluk of the Orcs would have a stately avenue of trees leading up to his tent made of human skin, but if the player approaches up a rough stone ramp marked with the crucified corpses of enemies, the real world language of power is still adding weight to the fantastic elements. Likewise, if a gangland kingpin holds court in the old neighborhood, placing his "social club" at a T intersection, up an avenue of businesses with smaller storefronts at his end, is a good way to signal to the player who really runs the block.

THE INDIRECT APPROACH

Where a direct approach typically involves a regular, clocklike rhythm, an indirect approach allows the designer to create a number of different stages with individual flavors, timing, and challenges. Repeated glimpses of far off objectives give players a way to measure their progress. Equally important, the sight of a landmark can reinforce the larger themes of the game that might otherwise be lost behind tactical action. For example, the growing gloom of Mordor and the distant fires of Mount Doom constantly remind Frodo and Sam that they have bigger problems that crossing a marsh or evading a few Orcs.

Indirect approaches also make it easier to provide moments of drama. Each twist or turn in an indirect approach can be an emotional as well as a navigational revelation, whether it's the player's first sight of the Monkey King's palace or a quick glimpse of the rescue chopper idling at the LZ. Unlike a stately approach

PHOTO BY BEAU WADE

FIGURE 4 **Parisian streets are designed with long horizontal sight lines that pull the eye toward landmarks, like the Arc de Triomphe.**

across a large space, sudden revelations also make it possible to frame the player's point of view in ways that approximate traditional cinematography by using windows, doors, or sudden vistas as framing devices.

Like the formal direct approach, a carefully controlled indirect approach also has a very long pedigree in real-world architecture. In a theme park, visual lines give waiting patrons occasional glimpses of the attractions, rather than a continuous view of the goal. This breaks the monotony of the wait and also maintains the allure of the destination, instead of allowing the visitors to become bored with a long, static inspection. Spaces designed for religious rituals often use a similar technique. For example, the famous Parthenon of Athens was carefully planned so that worshippers were guided through a series of narrowly framed views as they approached the temple. When they reached the summit of the Acropolis, they were suddenly and dramatically presented with the whole facade of the temple from a carefully chosen angle (see Figure 5).

Using indirect approaches is also a traditional way to make a space seem larger than it actually

is, and sometimes in games, this is desirable. The urban areas of RETURN TO CASTLE WOLFENSTEIN and SUPER MARIO SUNSHINE, though utterly different in character, both do a good job of pretending to be much larger than they really are through the careful use of landmarks and reveals. Unfortunately, this confusion of space means indirect routes can also be a lot more confusing to players, particularly if the layout allows a lot of freedom. A medieval village huddled beneath a castle can be crammed into a couple of switchbacks along a single road, and the player won't really have the option of getting lost. If the same village has a network of streets and alleys instead of a single main thoroughfare, it will be much easier for players to become confused when the castle is out of sight.

COPING WITH PLAYERS

The art and science of gently manipulating visitors to your domain is as old as architecture itself. It is often refreshing to incorporate the experience of older disciplines as part of your craft. A good book about the landscaping genius of Frederick Law Olmsted or *The Death and Life of Great American Cities* by Jane Jacobs might be a useful break for the environment artist looking for some inspiration.

If you want to feel better about your own job, read some of the critiquing that goes on at http://imagineerebirth.blogspot.com, a gathering place for present and former Disney imagineers. Even though game artists have to deal with cranky designers and clueless players, at least we 1) never had to work for Michael Eisner and 2) are unlikely to have been bitten by a robotic alligator. Things could certainly be worse! ⁑

FIGURE 5 **The approach to the Parthenon (right rear) was carefully framed as a series of interrupted views and dramatic revelations.**

NOAH FALSTEIN

BELIEVING THE IMPOSSIBLE

"THERE IS NO USE TRYING, SAID ALICE; *one can't believe impossible things. I dare say you haven't had much practice, said the Queen. When I was your age, I always did it for half an hour a day. Why, sometimes I've believed as many as six impossible things before breakfast."*
—Lewis Carroll, *Alice in Wonderland*

In AMERICAN MCGEE'S ALICE, "impossible" things become game design realities.

This month, The 400 Project brings you another rule of game design. Like the Queen in *Alice in Wonderland*, we game designers are used to having to imagine a few impossible things—and lots of improbable ones. It's our stock in trade, one of our greatest strengths.

Occasionally, I'm approached by people who want to be game designers and who have some wonderful idea that they are

certain will make them famous. But the truth is a game designer has to come up with thousands of ideas to be successful. They must be able to produce new ideas in a constant flow. Professional designers learn that implementation is the hard part, where one finds out if an idea can deliver fun gameplay.

Although coming up with lots of ideas is a critical skill in game design, sometimes those ideas actually are impossible. Sometimes we dream about an amazing idea that, upon awakening, is totally self-contradictory. Sometimes we do that while fully conscious! It's easy to fall into a trap of imagining a game or story element that seems wonderful in our heads, but just doesn't work in reality.

THE RULE
Use concrete examples of systems and their interactions in your design documents. Seek to transform vague, implied, and general concepts into clear, explicit, and specific implementations.

THE DOMAIN
The game design process (a meta rule).

TRUMPS
There are several conditions that allow this rule to be trumped. If you are in brainstorming mode very early in a project, it can stifle the flow of concepts to worry about coming up with explicit examples. But it does pay to get specific soon afterward, to make sure the ideas can be expressed as solid implementations.

Another trumping situation is related to the rule, "Implement the hardest part of the game first." Sometimes the playability of even a concrete written description of a game concept may be hard to evaluate. The best way to prove a concept here is to quickly prototype it to make it playable, which can prevent disasters like the one mentioned at the end of this article.

A related rule is Concretize Ideas, which says all your game ideas must find a

concrete expression in playable elements. This rule is one of the original four in The 400 Project. However, it applies more to specific game concepts rather than the practice of design. To clarify, Concretize Ideas would suggest that instead of having an abstract concept like "stealth," it is better to make it concrete, showing with a meter or graphic effect how stealthy the character is in real time.

EXAMPLES AND COUNTEREXAMPLES
The main purpose of this rule is to help the designer winnow out the ideas that seem wonderful in the abstract, but lose something in the translation to reality. It can also serve to show that a game idea that seems uninteresting can come to life when embodied in concrete play mechanisms.

My favorite personal example of this is SID MEIER'S RAILROADS! When I heard he was working on a game in which the player had to build a railroad and buy and sell goods across the country, it sounded terribly boring to anyone who doesn't care for model railroads. But when I saw a description of what the player actually did, the appeal was obvious, and the game delivered on that promise.

One infamous game that shall remain nameless (to protect the guilty) had a high concept: the player, a normal human, fought fearsome beasts using nothing more than some furniture and crates, using ingenuity and real-world physics to prevail.

But through an amazing span of the game production, just how this would be accomplished on the hardware of the day was relegated to hand-waving and was never described concretely. The concept was presented with such confidence and expert showmanship that the company poured millions of dollars into it, which went nowhere—or perhaps Lewis Carroll would say, "down the rabbit hole." ✕

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

JESSE HARLIN

DOES IT SOUND NEXT-GEN?

FEW TERMS CARRY MORE WEIGHT IN THE industry now than "next-gen." From the Wii to GEARS OF WAR's cover mechanics, developers and consumers alike are trying to figure out what that word means. However, before audio professionals can delve into the finer points of surround mixing or user-driven content, there are still unresolved issues from the current generation of home consoles that need to be addressed.

ROBUST VARIATION
Disk space is no longer an issue on home consoles. The only things standing between diverse audio and two-footstep characters are old habits and narrow aesthetics. As games became bigger, current-gen audio strove to cover this wider game arena. The results were often little more than a sketch.

Next-gen audio should now strive to fill in the canvas. The solution is simple. If the player will hear the sound frequently, there should be five to ten randomized versions so as prevent fatigue. Real worlds are rich with variation. Ours should be, too.

OCCLUSION
It's happened to every gamer. Their character enters a new area. There's no map. The character's radar malfunctions. The power has been cut, and surprises lurk in the shadows. Regardless of the visual mood, a lack of occlusion means that they can hear the signature vocalizations and foley sounds for each enemy around every corner and know exactly what to expect next.

At that moment, the lack of occlusion has completely destroyed all drama, tension, and anticipation that the level designers and environmental artists have painstakingly worked to create. To

lack occlusion is to undercut the efforts of the other game designers.

DYNAMIC LOADING
There's nothing immersive about a loading bar. While dynamic loading is a battle that must be planned for and waged across all disciplines, it's the responsibility of the audio lead to initially request dynamic loading of audio assets.

With the launch titles on the new consoles, it's clear that "next-gen gaming" means little more right now than prettier graphics. Eventually this will expand to all disciplines, as greater immersion is inevitable throughout the next console cycle. The ability to load and unload sounds only when needed will be vital for audio. Smarter memory management should be one of the primary goals of all audio tech moving forward.

REAL-TIME DSP
Much like occlusion, robust digital signal processing (DSP) systems speak directly to the heart of immersion. DSP effects like filtering and reverb place our sounds in the spaces the characters inhabit. Unfortunately, with surprising frequency, real-time DSP is a casualty of poor planning, poor technology, or both. Foley in outside spaces should sound different from the same foley files played inside interior spaces. If characters are grunting and groaning inside a cave, their utterances should be processed with a cavernous reverb (I'm looking at you, FINAL FANTASY XII).

ABANDONING CHIPSET MIDI
You only have to look as far as GameSpot's review of THE LEGEND OF ZELDA: TWILIGHT PRINCESS to see that chipset MIDI scores aren't going to pass muster with the gaming press in the next-gen age—and rightfully so. Enough game scores over the last console cycle ditched old technology and embraced digital recordings that gamers' tastes have largely evolved.

Consumers have come to expect their epic games to have epic orchestras. It might be excusable if every game using

chipset MIDI were doing so because it used an extremely interactive music system that digital recordings can't achieve ... They're not, though.

INTERACTIVE MUSIC
Interactive music made strides over the last round of consoles. Unfortunately, thousands of new games come out each year, only a fraction of which have interactive scores. The majority of games still have "trigger and forget" loops tied to in-game locations. This fatiguing approach leads many players to turn music off in their options menus. What's worse, it's led to Microsoft's insistence that music in every Xbox 360 game be replaceable with the user's own music files. This should be seen as a great failing on our parts as game composers. We can make music systems that don't fatigue users. The goal of all game sound should be to become as integral to the gameplay experience as maps, NPC objectives, and weapon upgrades—music included.

VOICE
Story, characterization, and gameplay are rapidly distancing themselves from the text-scrawl days of games' 1980s Neanderthal forefathers. Like chipset MIDI, voiceless games are already getting dinged in their reviews for their lack of dialogue. Again, disk space limitations are crumbling, and localizing dialogue for a global market isn't only doable, it's proven to have tremendous benefits in opening up new markets to titles. Words like "toy" and "diversion" used to describe our games in the mass media. Soon, we will *be* the mass media, and already terms like "art" and "cinematic experience" are replacing the labels of the past. Voice is crucial to this transition.

Obviously, not all these issues are going to be applicable to all titles, all platforms, and all audio teams. MADDEN doesn't need interactive music any more than DRAGON QUEST IX could possibly be fully voiced on the DS. Nonetheless, this list will hopefully serve as a jumping-off point for debate and innovation. :::

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ANDREW E. KATZ

ORIGINAL MONEY

How to maximize the value of intellectual property

THE PRINCIPAL ASSET OF MOST GAME companies is intellectual property. Yet, many continue to borrow money to make games using traditional debt financing transactions, which don't count the full value of their IP assets (the game characters and concepts that they've devised) when the maximum borrowing amount is calculated.

New structured finance transactions can unlock the full value of IP assets, and frequently at lower all-inclusive borrowing rates. These transactions focus specifically on the full value of IP assets based upon the cash flow to be derived from them.

PUTTING A VALUE ON IP

Quite simply, a typical loan transaction is not adequate for most game companies because the lenders are unable to adequately value the company's IP. The lenders tend to focus only on the liquidation value at a foreclosure sale—not the revenue-producing value of its assets.

Traditional lenders are not typically equipped to investigate the lending value of intellectual properties. As a result, nominal values are often placed on them. Plus, most game companies are not rated, and many investors are not permitted to invest in notes unless they are rated "investment grade." This means game companies that issue notes are more limited as to whom they can sell their notes.

STRUCTURED FINANCE

Structured finance transactions, in this context, are lending transactions in which the lender focuses on the "real" value of the game company's IP assets and designs a lending program to maximize the value of those assets and the amount to be advanced in reliance

upon those assets. Because of the way these transactions are structured, the notes that a game company issues may be rated high enough to qualify as investment grade and bear lower interest rates, even though the company itself is not rated investment grade.

The lenders in these transactions take the time to determine how much cash flow needs to be derived from the assets to be included in the transaction; then they lend money based on the anticipated value of those cash flows, with the borrowed sum to be repaid solely by those cash flows. In other words, the focus of the deal is on the IP assets as both the principal collateral and source of repayment.

IP ASSET GUARANTEES

An IP asset guaranteed transaction is a type of structured finance transaction game companies might investigate. Here, the company's borrowing is divided into segments. The first segment is a typical bank loan, collateralized by the non-IP assets of the company. The second is based solely on the value of its IP, the value of which is guaranteed for the lender by an irrevocable letter of credit provided by an entity which specializes in guaranteeing the value of IP. As a result of the guarantee, the game developer can borrow more money than it would be able to otherwise.

IP asset guaranteed transactions allow a game company to gain added value from its IP assets while retaining a borrowing structure that's similar to typical bank financing. For many game companies with only a few years experience developing and marketing games, this form of guaranteed transaction may be a good introduction to the world of structured finance.

ASSET-BACKED SECURITIES

When a game company has a portfolio of titles that are actively marketed and are making a good deal of money, it could very well engage in an asset-backed securities transaction.

Asset-backed securities transactions involve the sale of securities, typically notes, which are repaid solely from the cash flow received from specific assets that have been sold to a company established for this purpose. These transactions have increasingly been completed with intellectual properties as the assets being securitized. The game company puts only those assets being securitized at risk, and the investors look only to those assets for repayment.

As a result, the notes sold are generally rated investment grade by the rating agencies and bear a substantially lower interest rate compared to the rate that the game company would otherwise be obligated to pay.

SLATE FINANCING

A number of film companies have used slate financing transactions in a way that should be of interest to some game companies. In these transactions, the borrower is a special purpose entity created by the studio, which sells notes to investors in an amount sufficient to finance eight to 10 productions. The funds raised are repaid from the revenues generated by the films—or in the case of a game company, the games produced and marketed using the proceeds of the financing. For slate financing to be successful, the borrower needs to have both a history of successfully developing and marketing games and a well-established business plan.

The beauty of these transactions is that the cost and risk of game development essentially shifts to third-party investors, whose upside is frequently a fixed interest return on their investment.

RISK AND REWARD

While these transactions are time-intensive, the rewards to the game companies—higher borrowing base, lower interest cost, and partial displacement of risk—will be well worth the investment. ✖

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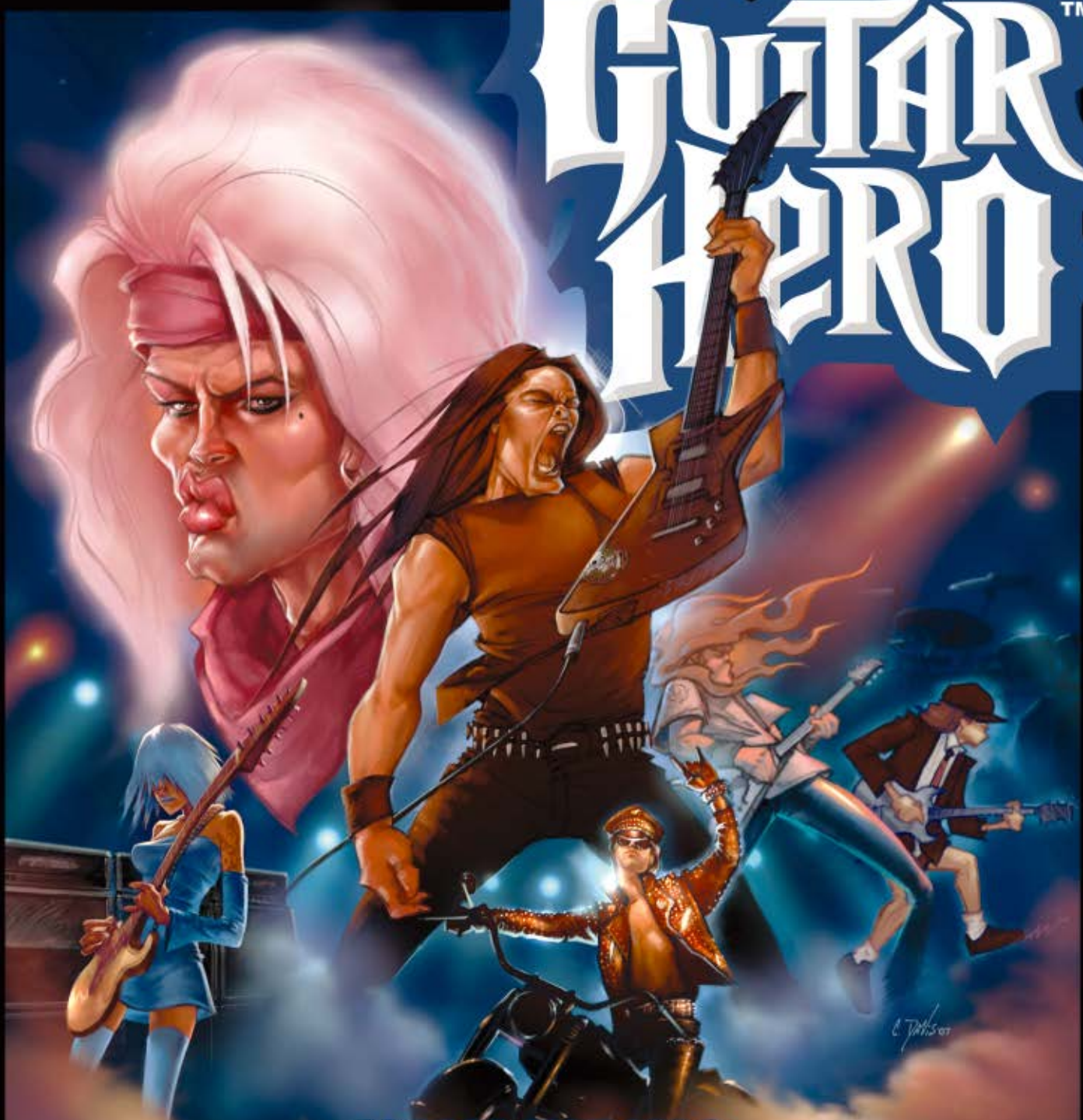
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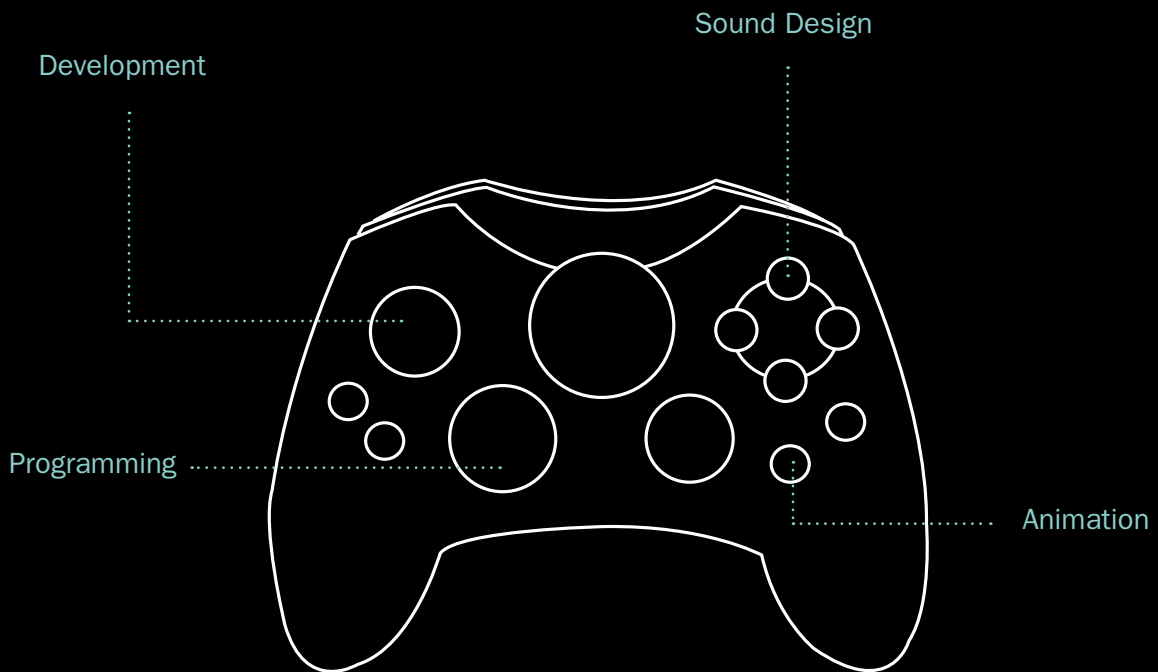
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What is it?

The Florida Interactive Entertainment Academy (FIEA) is a graduate game-development program that teaches you how to succeed in interactive entertainment industries like video games and films. It formed from a unique partnership between the video game industry, the state of Florida and the University of Central Florida.

What will I do?

You'll become part of a team of fellow students who work with you as producers, programmers and artists on real-world projects with milestones and tight deadlines. All overseen by some of the best gaming faculty in the world.

What degree will I earn?

In 16 short months, you'll earn a fully accredited master's degree in interactive entertainment. Specializations include tracks for producers, programmers and artists.

How will FIEA help me get into industry?

Besides putting you through a rigorous, industry-based curriculum, FIEA has a full-time job placement director with contacts in many of the nation's best gaming and film studios. In industry, he placed and recruited hundreds of the top executive producers, designers, development directors, programmers, concept artists and art directors.

Learn more at www.fiea.ucf.edu or 407-823-2121

Artwork by FIEA student James Moore

UCF School of Film and Digital Media

FIEA

ADVERTISER INDEX

A THOUSAND WORDS

QUANTIC DREAM'S HEAVY RAIN

Quantic Dream's next-generation title HEAVY RAIN, from the developer of the critically acclaimed INDIGO PROPHECY, has shown little more than a brief tech demo for Sony at E3 2006 thus far. But creator David Cage clearly intends to take digital actors to a new level, and early screenshots show the kinds of level of detail the game is aiming for.

WHAT
DO
YOU

SEE?

People with extraordinary vision find a home for their big ideas in Orlando. That's why leading game studios, specialized industry training programs and the world's largest concentration of simulation developers make their home here. Look closer, and see why forward-thinking companies and talented workers come to Orlando to turn their visions into realities.

Putting imagination to work®
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