

making games

DESIGN | BUSINESS | ART | TECHNOLOGY

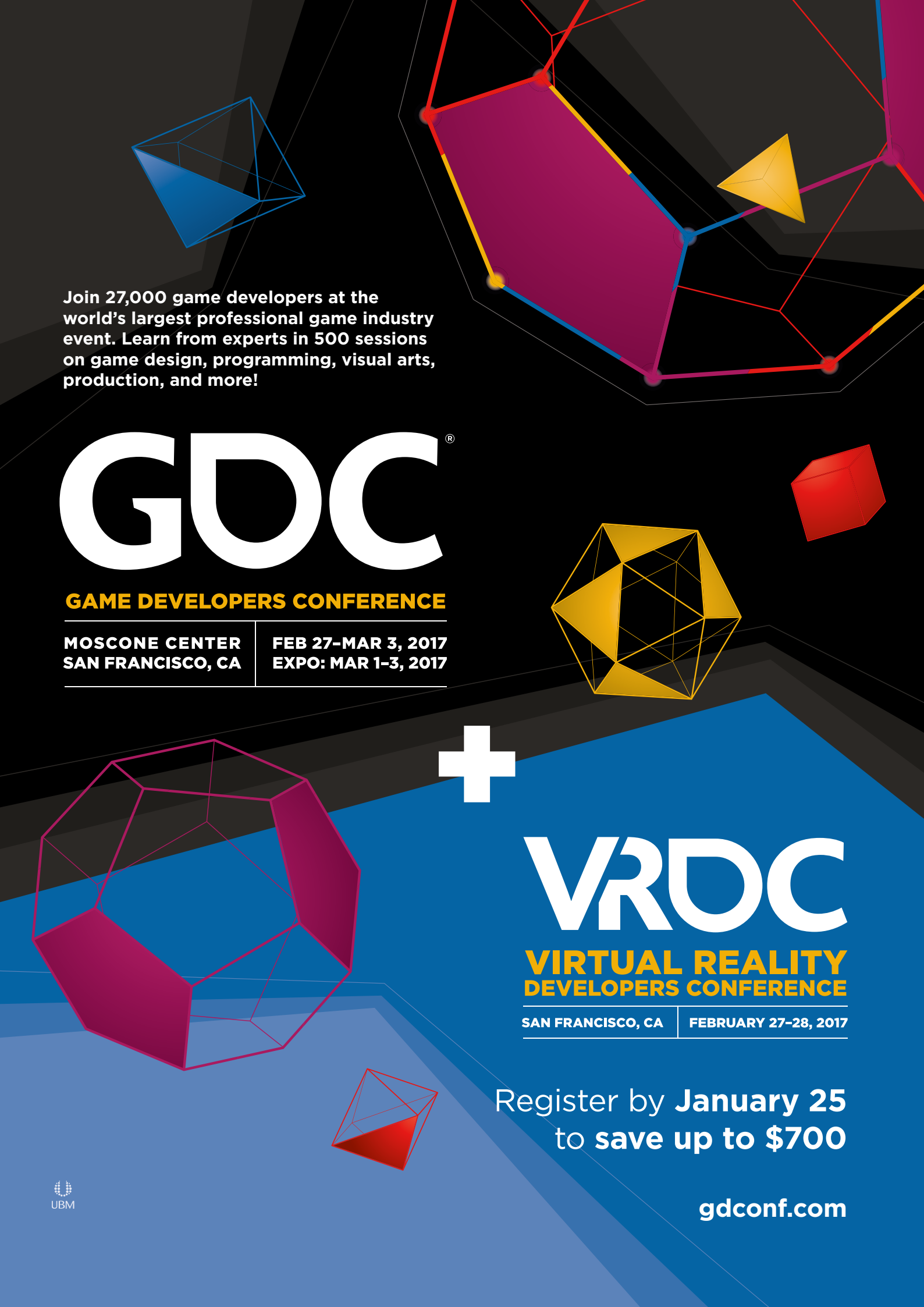
MAKING OF DEUS EX MANKIND DIVIDED

HOW EIDOS-MONTRÉAL REVIVED THE
LEGENDARY ROLE-PLAYING GAME

PROGRAMMING CASE STUDY
HOW YOU CAN EASILY AND QUICK
PORT FLASH-GAMES INTO HTML5

MEDIA ANALYSIS
HOW DEVS CAN GET COVERAGE
FROM EUROPEAN JOURNALISTS

INDIE DEVELOPMENT CASE STUDY
HOW FABRAZ IS VERY SUCCESSFUL
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AN AILING INDUSTRY!?

The past two months have been downright turbulent, at least for the German gaming industry where success and euphoria were promptly followed by disappointment and setbacks. Just as emerging newcomers and long-established companies were flexing their muscles and praising themselves for a broad range of high-quality releases as the industry met for the German Developer Awards, the entire industry suffered a major politically motivated setback. Upon the recommendation of the committee on budgets, the German parliament decided to freeze the prize money for the German Computer Game Awards 2017. To make matters worse, a financial participation by the German federal associations BIU and GAME in the amount of 50 percent was agreed upon. A proper funding strategy looks different, especially since there are still various outstanding payments of prize money from the year 2016. All affected parties are legitimately disappointed, which raises the question: What does it take for the gaming industry in Germany to find its voice and thus provide companies with the funding they deserve? What can be done in order to convince even the most hardened sceptic of the potential that the gaming industry has besides its pure entertainment value? The quality of German games can hardly be a factor – just look at studios like Mimimi Productions who are currently scoring top ratings with Shadow Tactics both nationally and internationally.

Curtain call for the new guy

As you all probably know, Making Games is undergoing times of change, too, albeit behind

the scenes. If you have already been wondering whose face now also graces the column to the right of these lines, I don't want to leave you in the dark any longer and take the opportunity to introduce myself. My name is Nico Balletta, and up until now I was an editor for PC Games MMORE and buffed.de, having worked for Computec Media GmbH for about nine years and having been a passionate gamer for about three decades since my early childhood. As part of the restructuring process within Making Games I have the honor of following into my soon-to-be predecessor Sebastian Weber's footsteps and report from the »other side« of the industry as Managing Editor as of April 1, 2017 – and no, this is no April Fool prank! It will be an incredibly big challenge which I'm looking forward to with excitement and anticipation, but admittedly also with a considerable level of nervousness. My sincere thanks go out to all responsible parties who have provided their advice and support from day one and always lent me an open ear for my numerous questions to make that transfer as easy as possible for me. In a solely symbolic manner, our current cover story fits like a glove: Eidos Montreal also know a thing or two about the responsible takeover of big brands and contribute to this year's last issue with a terrific and comprehensive making-of about the sci-fi hit Deus Ex: Mankind Divided – besides many other informative topics surrounding games, of course. On that note, we say good-bye to 2016 and wish you happy holidays, a happy new year and, last but not least:

Enjoy the latest issue!

Your Making Games Team

Dirk Gooding
Editor-in-Chief
of Making Games Magazine



Nico Balletta
Managing Editor
of Making Games Magazine



»The past two months were downright turbulent for the German gaming industry.«



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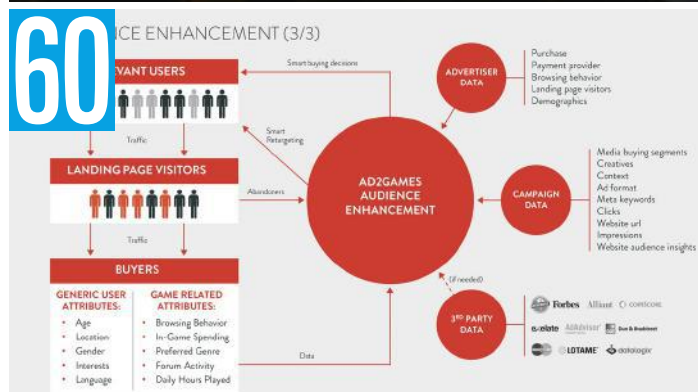
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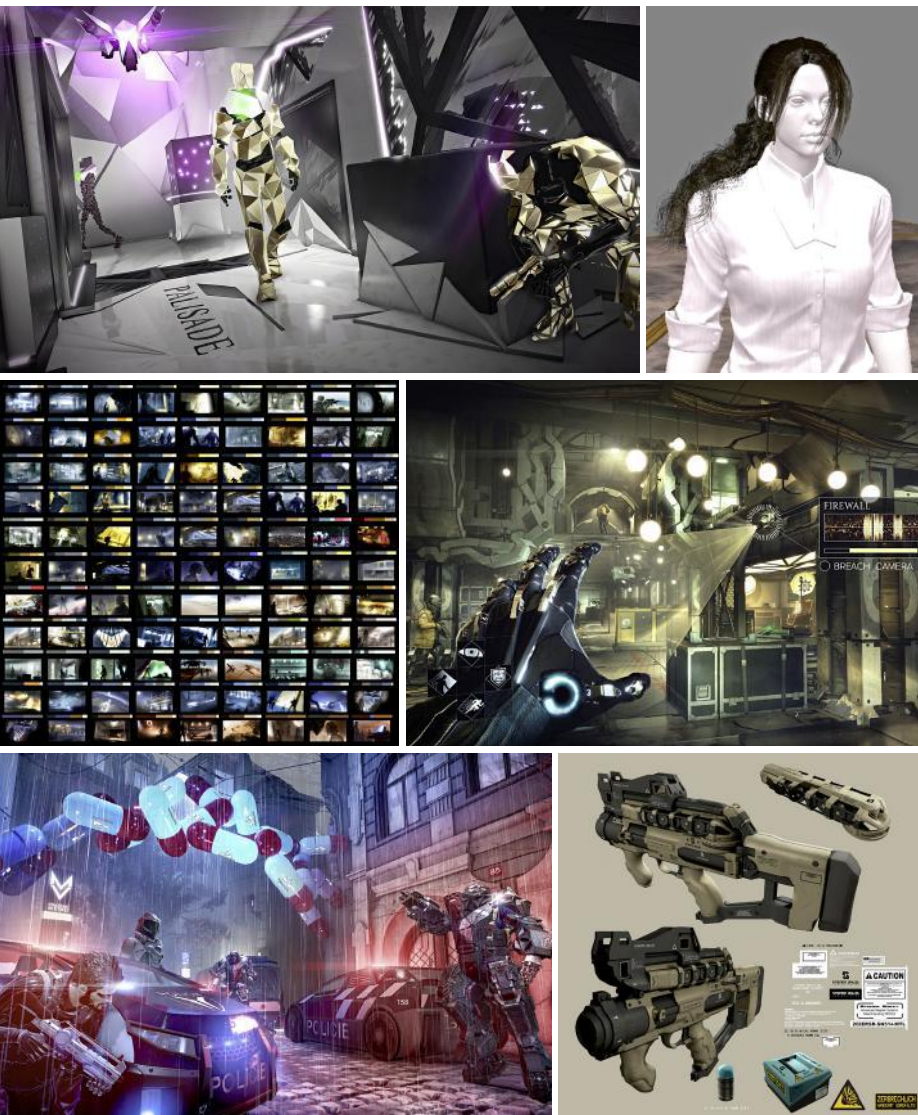
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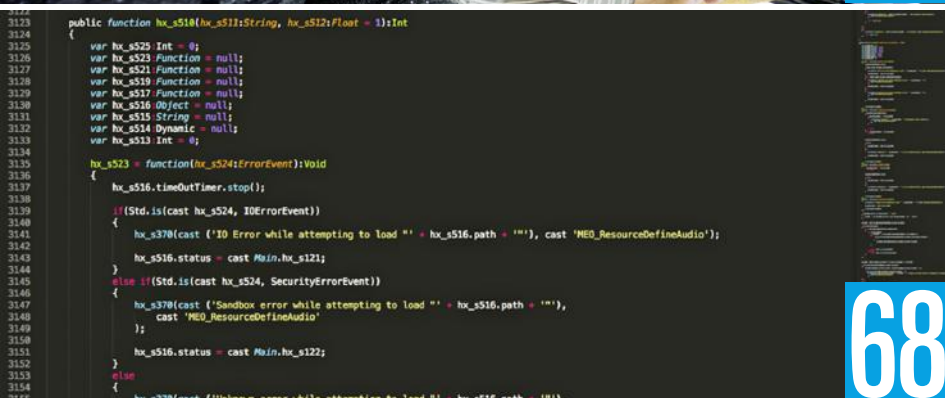
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The industry at a glance



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The strategy game Shadow Tactics won three awards.



Skyhill was awarded as Best Mobile Game.



Portal Knights by keen games is the Beste Online Game.



The adventure Silence could convince the jury with its graphics.



The Climb by Crytek could wow the jury with its VR technology.



The tour of Poki and Band was the Best Marketing Campaign in 2016.

GERMAN DEVELOPER AWARDS 2016

It was that time of the year again on December 7: Traditionally just before Christmas, the German Developer Awards ceremony was held at the Palladium in Cologne for the 13th time. The winners of the night were Daedalic Entertainment above all. The Hamburg-based crew was to take home five awards themselves, and an additional four followed for Mimimi Productions and their strategy game Shadow Tactics which is distributed by Daedalic.

The adventure Silence, an inhouse production by Daedalic, which was published in mid-November, won the award for Best Sound, Best Graphics and Best Story. On top of that, the jury of experts also gave the award for Best Marketing Campaign and the WTF of the Year to the team surrounding Carsten Fichtelmann. The Deponia Doomsday Tour where Jan Müller-Michaelis, a.k.a. Poki, and his band performed songs from the game soundtrack live in Hamburg, Berlin, Cologne and Dusseldorf, was just as creative as the covermount coup with ComputerBild Spiele magazine in the middle of the year when Daedalic included the full version of their new game Deponia Doomsday as initial release in the magazine – just like that. A bold move which apparently paid off.

The young Munich-based team Mimimi Productions who have already won a number of awards for Last Tinker surely opened a bottle or two as well. Not only was the Commandos revival Shadow Tactics awarded Best German Game; it also won the awards for Best Game Design and Best PC/Console Game. On top of that, Mimimi Productions were declared Best German Studio, beating InnoGames, keen games, Sproing and GIANTS Software.

Besides the usual developer achievements, the accomplishments of two individuals were recognized as well. Ingo Horn, PR Manager at Wargaming Germany, received the Hall-of-Fame award for the foundation of Gaming Aid. The non-profit organization which he founded together with Tahsin Avci of Pop Rocket Studios in 2012, aims to support people in need. And secondly, Stefan Marcinek received the Special Award for Social Commitment. Since his departure from publisher Kalypso Media, Marcinek originated, among other things, the free German-speaking developer conference GermanDevDays, got actively involved in the federal GAME association (of which he is now the chairman), and even offered parts of his new offices for free to a young developer team.

Sebastian Weber

The Winners

- **Best German Game**
Shadow Tactics: Blades of the Shogun (Mimimi Productions)
- **Best PC/Console Game**
Shadow Tactics: Blades of the Shogun (Mimimi Productions)
- **Best Mobile Game**
SKYHILL (Mandragora)
- **Best Online Game**
Portal Knights (keen games)
- **Best Indie Game**
The Lion's Song (Mi'pu'mi Games)
- **Best Game Design**
Shadow Tactics: Blades of the Shogun (Mimimi Productions)
- **Best Story**
Silence (Daedalic Entertainment)
- **Best Graphics**
Silence (Daedalic Entertainment)
- **Best Sound**
Silence (Daedalic Entertainment)
- **Best Technical Performance**
The Climb (Crytek)
- **Best VR/AR Experience**
The Climb (Crytek)
- **Innovation Award**
AirConsole (N-Dream)
- **WTF of the Year**
Covermount of a new full-priced game (Daedalic Entertainment)
- **Ubisoft Blue Byte Newcomer Award**
Cubiverse (Ludamus)
- **Hall of Fame – Life Achievement**
Ingo Horn
- **Special Award for Social Commitment**
Stefan Marcinek
- **Best Publisher**
Tivola Publishing
- **Best Studio – presented by BIU.Dev**
Mimimi Productions
- **Best Individual PR Stunt**
Safety First! – personalized special versions (Headup Games)
- **Best Marketing Campaign**
Deponia Doomsday Tour (Daedalic Entertainment)

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■ recent news and rumors

TOOLS

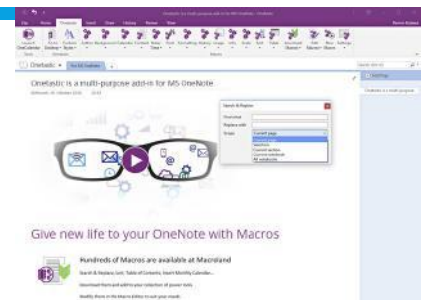
You need great tools in order to build great games. Experts from the industry share their view on recent updates as well as new software solutions and reveal their favorite little helpers.

ONETASTIC  WWW.GETONETASTIC.COM



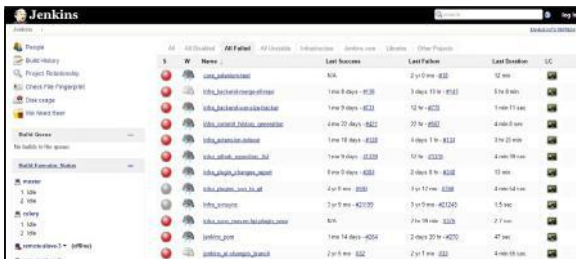
Dennis Bulawa
Live Game Manager
at Blue Byte, a Ubisoft studio

This add-in for OneNote 2010/2013/2016, the free version as well as the Office 365 version, allows you to add a huge amount of useful comfort features to OneNote. Be it formatting your texts with editable custom styles, as you know it from MS Word. Optimizing tables, by allowing column sorting, cell formatting, or using Excel like functions. Or easing up on routine actions, such as search-and-replace text, generating a table of contents, cropping images, extracting text from images, or creating a desktop shortcut to a specific page. Just to name a few. All the activated features will be properly displayed in the menu ribbon. With the possibility to create your very own macros – for which the page provides extensive documentation and tutorials – and an active community, there is very likely a solution for most of your issues with OneNote. Although it is not officially distributed by Microsoft, it has been created and is maintained by Omer Atay, a software developer at the Microsoft OneNote team. A downside might be that it only runs on Windows systems. And if you want to download and run a lot of macros, you might need to opt for the Pro version (\$15/year), as the trial version only allows a specific amount of macro executions. Beside that all other features are included in the free version.



Onetastic as an add-in for OneNote that adds a huge amount of useful comfort features.

JENKINS  WWW.JENKINS.IO



Jenkins is an open source automation server, which enables the user to reliably build, test, and deploy games as well as websites.

also very versatile, and can do more than just building, and in our case, we also use it to successfully deploy our applications. The wide adoption of Jenkins made it one of the de facto standards in our industry.

Jenkins is an open source automation server, which enables us to reliably build, test, and deploy our games as well as websites. Thanks to it, at GameDuell, we can successfully implement Continuous Integration for our products, making it easy for all developers to add new features in a safe manner. With over a thousand plugins, one of the main advantages of Jenkins is its extensibility. Ours is configured to build projects based on Maven (Java), npm (JavaScript) and DuellTool (our very own build tool for our Haxe cross-platform development framework). Jenkins is



Josep Prat
Associate Technical Director
at GameDuell

CANVA  WWW.CANVA.COM



Gunnar Lott
Managing Director
at Visibility Communications

Canva is a tool that amateurs can use to quickly create graphics. It's online, free of charge and features a comfortable and very simple interface. But the best thing is the fact that it includes a plethora of templates, from finished layouts to typographic elements and icons to stock photographs. Some of them cost a dollar, but a considerable part of it is free. It may not be intended for professional graphical work, but pictures for Facebook posts, presentation slides, information graphics for blogs, headers for newsletters, mock-ups and such can be created easily and within minutes. There's also a team version that allows co-workers to work together. I use it pretty much every day.



Canva is an online tool that even amateurs can use to quickly create (quite) professional graphics.

FOCUS GAME

ALL QUIET ON THE WESTERN FRONT?

Timm Walter explains why Electronic Arts may be an example of how an unusual strategy can produce successful games.



Timm Walter is Senior Manager and Head of Office at GAME Bundesverband der deutschen Games-Branche e.V.

Timm Walter is political scientist and takes care of all operations of GAME as Head of Office. Before working for the union, he gained experience in politics, media as well as clubs and societies.

As sure as day follows night, gamers around the globe can be certain that the holiday shopping season will supply them with the usual shooters from the two major market leaders Electronic Arts and Activision.

In the same way, both companies can be sure to make considerable profits with the latest titles of their »Battlefield« and »Call of Duty« series, even if the interest declined noticeably in the last few years due to bugs or the miserly treatment of a certain gamer class.

The players just know what they get: Solid, entertaining FPS action in a »modern war« setting. But then it was there: the first trailer for Battlefield 1. Supported by a clever marketing campaign, EA daringly decided to stray from the beaten path and promised to put the players right in the heart of unprecedented battles during World War I. The reactions to the trailer (60 million YouTube views) prove that the tactics paid off. Just like the reactions to the Call of Duty: Infinite Warfare trailer which was published around the same time and achieved a negative record of almost 3 million down votes within a very short period of time. This shows that the players had obviously expected something different after the announcement of Battlefield 1.

Break the accustomed rules

This trend continued further after the release. While Call of Duty is a solid shooter offering more of the familiar features, Battlefield surprised especially with its setting and the exceptional campaign, and yet remained true to itself. In the game, short war stories feature captivating and (especially for the FPS genre) surprisingly emotionally narrated personal stories which present the player not so much as a super soldier, but rather as one of many who experience acts of war. Sure, above all Battlefield is supposed to be entertainment, and yet it still manages to adequately depict the horrors of war. The prologue mission alone is unparalleled in the genre and should be experienced once by every gamer.

While Battlefield remains primarily a multiplayer experience, it obviously tries to stand out from what we are used to in this respect, too. Be it through the Behemoth units or the terrific Operations mode – they both add fresh ideas to the familiar concept. And for all those who think the innovations weren't groundbreaking enough, another innovative game gem was published, sandwiched between Call of Duty and Battlefield, by EA: Titanfall 2 which pleases not only through a captivating story, but especially through an extremely fun and innovative multiplayer concept that stands out from the familiar market dominated by the two competitors.

But why am I telling you this? Why is this column turning into a product review and a hymn of praise for Battlefield 1? The answer is as simple as it is obvious: If a big player like Electronic Arts manages to interrupt the established rhythm to try something new – twice within one month – the industry should see this as a wake-up call. Of course, EA is working with different budgets; but to enter new grounds with one of the biggest IPs just needs to be respected. So, there's only one thing left to say now: Be adventurous! Think outside the box, shift your focus away from the ever same simulators, pixel games, sidescrollers and indie adventures, and just do something unusual. If Electronic Arts can do it, you can definitely do it, too! Your customers will appreciate it.

Timm Walter



With Battlefield 1 and Titanfall 2, Electronic Arts has shown that blockbusters are also possible beyond the beaten genre paths and, above all, delight the players.



MODERN TIMES GROUP INVESTS IN INNOGAMES

In mid-October it was announced that Swedish media group Modern Times Group would invest approx. 91 million euros in the Hamburg-based browser and mobile games studio InnoGames, which amounts to about 35 percent of company shares. In addition, the group reserved the option to invest another 16 percent. InnoGames would now like to use the financial boost to focus completely on the mobile games market where they have several titles in the pipeline already. Hence, no new browser games are planned for the future; existing ones are to be kept though. Besides, there's hope that the new partner may help to appeal to a broader and especially more international audience. The Modern Times Group operates a number of free and pay TV channels, as well as the online video service Zoomin.TV which generates around two billion views per month – so, InnoGames can profit from an enormous reach. On the other hand, the Hamburg crew isn't keen on entering the eSports business any time soon, although the Modern Times Group hosts one of the world's biggest LAN parties – the Dreamhack – and is the majority shareholder of the ESL.

Three Questions to ...

Hendrik Klindworth
is CEO of InnoGames.



Making Games What are the consequences of MTG's investment for InnoGames?

Hendrik Klindworth Our new investor MTG acquired 35 percent of the company, consisting of shares of our former investor Eight Roads Ventures and founders' shares. When Eight Roads wanted to sell their shares after six years, we, the management, started to look for a suitable new partner. It was always important for us to keep our operative freedom and to find an investor who shares our passion for games. MTG want to intensify their operations in the games department and were particularly interested in us due to the success we had with Forge of Empires and the planned mobile-only titles. MTG are a great match for us since they share our values and support our entrepreneurial spirit. The partnership offers exciting opportunities for both parties. Together with MTG, we will continue to pursue our proven strategy and keep growing sustainably.

Making Games What made you decide to focus on mobile in the future?

Hendrik Klindworth Our community started asking for mobile versions of the existing browser games at a rather early stage since they want to be able to access their account from anywhere at any time.

Especially in highly competitive games like Grepolis and Tribal Wars, ambitious players can always remain up-to-date by receiving push notifications when there's an attack. In 2013, we were already able to achieve a breakthrough in this area with the mobile versions of Forge of Empires. Even if we focus on the development of the new mobile-only titles, the browser still plays an important role for us. The sales and the number of active players on this platform show that there's still high demand – our growth is still based on both platforms. On average, mobile claims about half of the new registrations, but the distribution varies from market to market and is depending on the respective game.

Making Games Why is growth and a bigger audience easier to achieve through the involvement of MTG than it was before?

Hendrik Klindworth Even before MTG got involved, we were well-positioned internationally. Our core markets are still Europe and the US. Since our founding in 2007, we were profitable every year and our goal is to continue growing healthily and sustainably. MTG's media network can support us in making our games accessible to an even bigger audience.

Events

www.makinggames.biz

Searchable list of events online with all relevant infos about each event.

JANUAR 2017

International CES

Location Las Vegas
Date January 5-8, 2017
Topic Trade show
Price 660 to 1,415 euros
Homepage www.ces.tech

Mobile Games Forum London

Location London, Queen Elizabeth II Centre
Date January 17-18, 2017
Topic Conference
Price 2,337 euros
Homepage www.globalmgf.com/london

Global Game Jam

Location No fixed event location
Date January 20-22, 2017
Topic Game Jam
Price Free of charge
Homepage www.globalgamejam.org

PAX South

Location San Antonio, Gonzalez Convention Center
Date January 27-29, 2017
Topic Trade show
Price 33 euros (day ticket), exhibitor fees on request
Homepage south.paxsite.com

FEBRUAR 2017

GIST | Developers Conference

Location Istanbul, Congress Center
Date February 1, 2017
Topic Conference
Price 25 to 300 euros
Homepage www.gamingistanbul.com/en/developers-conference-dc

GIST Gaming Istanbul 2017

Location Istanbul, Congress Center
Date February 2-5, 2017
Topic Trade show
Price 3 to 11 euros
Homepage www.gamingistanbul.com

Casual Connect Europe

Location Berlin, Station Berlin
Date February 7-9, 2017
Topic Conference
Price 466 to 706 euros
Homepage europe.casualconnect.org

D.I.C.E. Summit

Location Las Vegas, Mandalay Bay Convention Center
Date February 21-23, 2017
Topic Conference
Price 2,070 to 3,482 euros
Homepage www.dicesummit.org

Mobile World Congress

Location Barcelona, Fira Gran Via und Fira Montjuic
Date February 27-March 2, 2017
Topic Conference
Price 799 to 4,999 euros
Homepage www.mobileworldcongress.com

GDC San Francisco

Location San Francisco, Moscone Center
Date February 27-March 03, 2017
Topic Conference
Price 187 to 2,258 euros
Homepage www.gdconf.com

It happened on makinggames.biz

EA requests labeling of sponsored videos

As the first big publisher, Electronic Arts announced in mid-November that it will require so-called influencers to label videos. Two options were disclosed for videos where EA was involved in YouTube or Twitch videos, Twitter, Facebook, Snapchat etc.: hashtags or watermark displays of »supported by EA« and »advertisement«. The former is to be indicated when YouTubers and co. are invited to an event, receive money for a tutorial video or any such thing, with EA having no influence on the content and the form of reporting. The watermark, on the other hand, is to indicate that the posting was not created independently, but that it is mere advertising which the influencer lends their face for and receives a corresponding payment. That way, Electronic Arts wants to make sure that the viewer, listener or reader enjoys maximum transparency. The procedure is surely also a reaction

to the incident in the summer when it was announced that Warner Bros. had allegedly transferred large amounts of money to PewDiePie, so that he would create Let's Plays to their games with the promise of a generally positive message.



Chris Taylor is leaving Wargaming to found own studio

Things started to get a bit quiet around Chris Taylor since 2013 when he sold his studio Gas Powered Games to »World of Tanks« developer Wargaming. The end of November brought a surprising announcement though: Chris Taylor is leaving the company to first spend a few months of vacation with his family and then found his own studio. During his time at Wargaming, Taylor was working on a project which hasn't been announced yet. Rumor has it that it could be a new part of the »Total Annihilation« series. In an interview with the website GamesBeat shortly after his departure from Wargaming, Taylor didn't want to comment why he left the company nor what he was working on. He also left everyone in the dark about what he's planning to do with his studio. During his career which began in the 1980s, Chris Taylor made a name for himself particularly with games like Total Annihilation, Dungeon Siege and Supreme Commander.

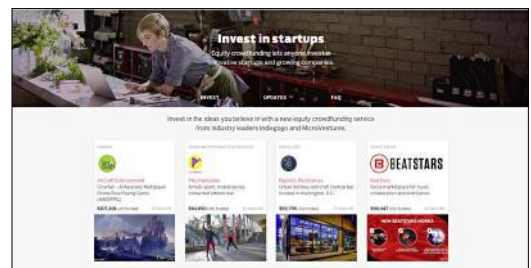


Indiegogo allows crowdfunding through investments

Since mid-November the crowdfunding platform Indiegogo allows users to not only donate money and in return receive the finished product, but also for them to invest money in companies, starting at 100 dollars. Similar to the crowdfunding site Fig.co, backers contribute to a project and later get reimbursed a corresponding amount, depending on the success of the project. On Indiegogo, these campaigns are associated with comparably high costs: While Indiegogo charges a share of 5 percent from a regular crowdfunding campaign, around 7,000 dollars of fees become due at the start of an investment round – according to the New York Times. In addition, Indiegogo requests a



share of 7 percent of the ultimate turnover and secures a share of 2 percent of the financed project. The investors, too, are asked to pay a fee of 7 dollars or 2 percent of the investment sum. The first games campaign to use this option is the online role-playing game Crowfall.



Microsoft enters the VR business

In spring 2017, Microsoft and its partners HP, Dell, Lenovo, Asus and Acer will bring new VR headsets to the market. They are to be available for just 299 dollars – at least initially. Together with the »Windows 10 Creators Update«, also scheduled for spring 2017, the devices are to allow so-called Mixed Reality, i.e. to depict a mixture of reality and computer-generated graphics. In addition, Microsoft also promised that the VR headsets won't require a complicated setup or a lot of space or even a separate room, but that their design would be very beginner-friendly. Also, the hardware requirements for laptops and computers are said

to be »affordable« – a woolly formulation, of course, but still a strong statement: Since this was obviously meant in reference to competitors Oculus Rift and HTC Vive, who are currently more geared towards hardcore users as they are not only much more pricey, but also require a high-end computer and a familiarization period.





Wargaming founds free2play label and cooperates with Sega

In mid-November, »World of Tanks« developer Wargaming announced the founding of a free-2play label called Wargaming Alliance. This publishing department is to help other publishers, but also developers to place and publish their products in the highly competitive free2play market. After all, Wargaming has access to a player pool of about 100 million registered users. The first partnership under the banner of Wargaming Alliance is with Sega and developer Creative Assembly. Together, those three companies plan to publish Total War: Arena which transports the basic elements of the popular strategy series into the world of free2play games, offering strategic 10-vs-10-player battles. Wargaming hasn't announced a release date yet, however, the company plans to launch Total War: Arena worldwide with the exception of China.



Ubisoft opens studio in Belgrade



In mid-November, Ubisoft announced that it opened a new studio in the Serbian capital of Belgrade. The office is run by Sebastien Delen who also runs the Kiev office and currently consists of 15 employees – mainly programmers. Together with other studios, Ubisoft Belgrade is to work on the PC version of Tom Clancy's Ghost Recon Wildlands for the time being and to increase to 40 employees over time. The plan for the future is, above all, the cooperation with Paris and Kiev. According to Delen, Serbia is interesting for Ubisoft especially since there are a lot of IT experts on the job market with a number of key qualifications which make a new location worthwhile. Also, they work closely with universities.

Nintendo unveils new console called Switch

For several months there had been rumors regarding Nintendo's new console, and at the end of October, the time had finally come: The device called Switch was unveiled. A mix between a handheld and a stationary console, it allows gamers to play with the big TV set on their couch at home or to take the tablet-like inner part with them to be able to delve into the virtual world on the go. Nintendo didn't give away too many details though, so the only thing known is that Switch is to hit the shelves in March 2017. A price hasn't been announced though, and the technical requirements weren't revealed either. But the announcement video featured some games like NBA 2K17, a Mario Kart and Skyrim, and also all major publishers and a number of developers seem to be working on games for the new console already.



How 2K has ruined Irrational Games.
www.bit.ly/MG_IrrationalGames

Shigeru Miyamoto's and Yuji Horii's approach to Game Design in 1989.
www.bit.ly/MG_Miyamoto

Parody of NPCs in video games and their strange behavior.
www.bit.ly/MG_NPCMAN

The history of Virtual Reality, from 1958 to present.
www.bit.ly/MG_VRHistory



INDUSTRY-TWITTER @MAKINGGAMES_DE/INTERESTING-PEOPLE



@TIMOFLEGEND

Amazing idea for airports: stools. To put around phone-charging kiosks. There are 6 sad travelers sitting on the floor around me who agree.

Tim Schafer, Founder of Double Fine Productions



@LOCUST9

There are few fallacies that are more damaging than the idea that talent is going to get you further than hard work. Hard work IS talent.

David Goldfarb, Game Director of PayDay 2



@DANIELVAVRA

Cool bug. When you stun a person and are arrested while you carry him, you are both sent to prison and when he wakes up, you have a buddy :)

Daniel Vávra, Creative Director of Kingdom Come: Deliverance



@GRUMPYGAMER

I don't care who buys twitter, all I ask is that they completely destroy it so I can stop wasting so much time and get my life back.

Ron Gilbert, Creator of Monkey Island



@MEGGANPEZ

The GDC content team has spent the last 5 minutes trying to explain the difference between a wrap & a burrito. It must be lunchtime.

Meggan Scavio, General Manager of the GDC



@IBOGOST

»What did people do before they made card games on Kickstarter, daddy?« »They blogged.« »What's blogging?« »Kickstarter without videos.«

Ian Bogost, Author and Game Designer



@GEORGE3DR

»Western games won't sell«, »Zombie games won't sell«. This was common game publisher response a decade ago. So clueless in general. Awful.

George Broussard, Creator of Duke Nukem



@BENJAMINCUSINS

That Nintendo Switch commercial did a great job of showing nearly all of the ways that I don't play games.

Ben Cousins, Co-Founder and CEO of The Outsiders



@ALLOWE

Getting married is like going out to dinner: you make a choice and then, when you see what your friend got, wish you'd gotten that instead.

Al Lowe, Creator of Leisure Suit Larry

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Making Games 01-02/17

HOW EIDOS-MONTRÉAL BROUGHT THE DEUS EX DNA TO 2016

The game director of *Deus Ex: Human Revolution* and *Deus Ex: Mankind Divided* reveals how the team's journey began ten years ago, detailing how they brought *Deus Ex* back to life, and how the game has evolved since then.



Jean-François Dugas is Executive Games Director at Eidos-Montréal.

Jean-François Dugas joined Eidos-Montréal in 2007 after working for Ubisoft for about 10 years. He was Lead Game Designer on several projects for the N64, PS1, and Xbox, focusing on establishing the vision, creating design documents, and tweaking gameplay. During his time as Creative Director on projects for the Xbox and Xbox 360, he focused on establishing the vision, then on working with designers, artists, and programmers to ensure that the vision for each game was fully realized.

@Jeffachoo



Seeing a cult classic like *Deus Ex* turn into the franchise it now is, with *Human Revolution* and its sequel *Mankind Divided* standing beside it, is incredible. Back in 2007, legend had it that making a new *Deus Ex* game wasn't

possible, especially since a few sequel attempts had either disappointed or never seen the light of day. Yet, it was in exactly this context that a handful of seasoned but virtually unknown developers like me agreed to take on the challenge when the offer came on the table.

In Spring 2007 there was only a producer, David Anfossi; an art director, Jonathan Jacques-Belletête; a game designer, François Lapikas; and myself as the game director. I remember those days vividly because we had «carte blanche» for the project, something we don't get very often, especially in big AAA studios. We had to start somewhere so to launch the project, I wrote on the plastic window glass surrounding our creative room a question that we would spend the next 4 years answering: «How do we turn a developer's game into a gamer's game?»

The blunt truth is that, at that time *Deus Ex* (DX) was mainly recognized by critics and game developers as a genre-defining experience, and by a small but very devoted fan base. We needed to make it something more and it was clear to us that something had to change. We didn't want to change things just for the sake of changing them, though. We wanted to modernize the experience, make it a bit flashier and more accessible, without sacrificing the game's roots.

The Journey Begins

Our first step was to go back to the source material, *Deus Ex* and *Invisible War*, to really understand where the franchise was shining and where it was struggling. I'm a strong believer in the importance of understanding the material you want to play with before thinking about transforming it. It's just fundamental logic, but often needs to be reinforced because it's very easy to be tempted by shortcuts. Especially if you're a fan of something and think you understand or know it well.

Reviving *Deus Ex* turned out to be a very challenging exercise because we were all big fans of the series to begin with. We all had fond memories of playing the original game when it came out in 2000, and we all had different aspects in mind that we loved. To get beyond that, we had to learn to divorce ourselves from our memories and examine the source material with a very critical eye.

We began by identifying strengths and weaknesses of the franchise which could commonly be agreed upon and were not just based on personal tastes. We then moved into defining core values of the experience: what makes *Deus Ex* a *Deus Ex* game? We ended up with a list of key words and sentences that defined what it was to us.

I think this step turned out to be very crucial, allowing us to succeed in the journey ahead. Indeed, by really distilling down the experience to primal values like «choices and consequences», «a mix of several gameplays (i.e., combat/stealth/hacking/social)», «worldwide conspiracies» etc., we were able to move ahead with a clear view of what the game needed to have.

It made us understand both the flavor and the global recipe. It also made us walk with confidence when it came time to play with systems. As long as we kept those high-level goals alive, we knew we'd be heading in the right direction. Understanding the flavor and recipe was key to making the old fan base feel like they were at home even as we explored various ideas to make the game more accessible. Or at least, more dynamic for a new audience unfamiliar with such deep game experiences.

It was during those early days that I decided to stray away from the classic RPG-esque management of the Player Character. In the original game, you had to heal each of your wounded body parts individually to become fully functional. Even though I liked doing this back in 2000, I felt it was detrimental to the experience we now had in mind. I wanted players to focus on their tools, their augmentations, the environment, and the challenge at hand. I felt these were more than enough things to think about, so if I could liberate their minds from the health management aspect to focus on the core experience, I'd do it. Surprisingly, even with all the core value exercises we'd done internally, I met resistance from some of my teammates – and later on, from the original fans when I went public with this design. Nevertheless, we decided to stick with the controversial direction and it turned out to be a good decision that kept the experience focus where we wanted it to be.

We also decided to go with a 3rd person cover-based system and animated augmentation sequences that unfolded in 3rd person so you could see the powers of your character in action more clearly. Our main theme was »Transhumanism« and we wanted to be sure you'd see your character as often as possible without sacrificing immersion. Adam Jensen is the embodiment of Man 2.0 and we wanted the player to experience this more directly. Switching to a 3rd person camera at key moments was our way to bring more spectacle on screen and make the game experience more dynamic, but it was never done so gratuitously. Seeing Jensen in 3rd person was always done for a reason.

These are just simple examples of how we streamlined or gave a different spin to some aspects of DX while respecting the type of game it is in the first place. There are more, but the key point I want to make is that, without our process, it would have been harder to understand the ramifications and impacts of our vision on what is expected from a DX game. It would have been harder to attract a new audience while still keeping the old fans on board.

The Human Factor

For me, developing Deus Ex: Human Revolution over the course of 4 years was a great learning experience – both as a developer and as a human being. I like to think that it came at the right time in all of the core team's careers. We were a bunch of people with a solid

decade of experience in the industry, but we'd never had the chance to tackle something as ambitious as DX before.

Every step of the way, we had to learn how the game's several pillars would work together, how to make the narrative and the gameplay blend seamlessly, and, finally, how to build the



The original Deus Ex games strongly influenced the creation of Deus Ex: Human Revolution. In the end, the game was very hard to master for newer players to the franchise, as stealth, and the proper use of Adam Jensen's abilities, ended up being more effective than relying on traditional shooter gameplay.

levels that would support it all. There was a lot of trial and error. We struggled for about 2 years before finally getting the global game recipe right and seeing a light at the end of the tunnel.

One of the things we needed to learn first was how to work together as a team. Most of the group knew each other from past projects in other companies, but most had never actually worked together – or at least, we hadn't done so in a long time. We needed to develop our own culture, our own way of working as a group, and, as the team and the studio grew, our own way of getting new people on board with our vision.

It turned out we were a passionate group that worked extremely well together. We all had very strong work ethics and rarely, if ever, wanted to settle for »good enough«. We shared similar values and constantly challenged ourselves and each other, encouraging everyone to push higher and higher. We had to adapt to each other's quirks, of course – but when you work so closely together every day, the bonds and trust are created much faster.

Dealing with the rest of the team, however, presented some interesting challenges. We in the »creative bubble« were considered to be a very demanding bunch of people, and this created friction during development. We were very hard bosses to please. I believe most people on the production floor wanted to do a great job but if we believed the work they'd done wasn't good enough, we wouldn't shy away from saying so. In return, the production team was also very vocal when they didn't agree with our direction. At times, it was hard to handle. Ultimately, trust did get earned over the course of the project, for the most part on all sides. And once the results started to show, most people understood that success could only be achieved by everyone insisting on excellence – both individually and collectively as a team.

Let's be honest, no one likes to be challenged. It's hard on the ego. But if we were to reach the standards we'd set out to achieve, we all needed to learn to accept criticism. To do this, we needed to grow as individuals, learn how to separate the criticism from ourselves, and understand that none of it was personal. I truly believe this was key to the success of the group and the project.

The Game Factor

From a game standpoint, we also had a great deal to learn. Specifically, about that game's underlying pillar – choices and consequences – and how it tied to gameplay, narrative, level design, and a million other unforeseen factors.

A lot of the choices you see in the game were crafted on paper, but it's only when you play a game that you realize what works, what doesn't, and what falls short of its ambitions. Since we'd never made a game like this before, we didn't fully realize that supporting player choices can

lead to a number of unsuspected conditions. We didn't understand how the ramifications of those choices would create ripple effects that had to be tied up in coherent ways. Even the smallest choice can end up becoming a big headache to figure out. Nothing is ever easy when it comes to Deus Ex. Every little thing connects to other little or bigger things, yet you have to maintain consistency across the board in order to get the immersion right. We had to dive in and learn this the hard way.

For example, we wanted to support the player's ability to create chaos everywhere. It's part of the choice and consequence logic: if we give the player the ability to pull out a gun, he or she should be able to shoot it. And once they start shooting, the world needs to react in a credible way. Sounds simple on the surface but building all the systems – the AI, the animation, the writing, the level design needed to support this freedom of choice – is one of the biggest challenges to achieve. For us, it became a trap that was hard to escape from.

Eventually we realized that we wouldn't be able to support chaos everywhere, as we had initially intended (specifically, in LIMB clinics and Sarif HQ). We spent days and days questioning how to make it logical that a player suddenly wouldn't be able to use weapons in these environments. We even got to the point where we added turrets in both locations so players would get killed if they did anything crazy. But this didn't feel right, either. The logic was not that strong; it felt forced and very »game-y«, in addition to being hard to pull off.

After weeks of arguments, we finally realized the logic was simple and had been in our faces all along. Jensen works for Sarif Industries and LIMB clinics are his employer's business partners. Therefore, he would not condone any violence in either location. It's just not in his character. This could have been perceived as inconsistent from a design standpoint, but the narrative logic was solid enough to justify it. And when the game finally got released, players never even questioned it.

As I write this example, it feels so simple and easy to solve now. But when you're in the midst of creating the game, with all the challenges you deal with every day, suddenly nothing is ever that simple or easy. The great learning here was that we needed the rigor we had for such a title but we also needed to understand that overthinking sometimes puts us in corners that are hard to get out of. It makes our lives miserable in areas where the added value is virtually nonexistent. It's all about finding the right solution for the right challenge while maintaining overall consistency.

The Scope Factor

Here's a nice rule of thumb that every game developer should hold near and dear to their hearts: in order to cut efficiently, you needed a solid plan to begin with. We learned that lesson



10 years back, when the team at Eidos-Montréal initially undertook their journey of reviving the Deus Ex franchise, they determined the vital elements that a Deus Ex game must include, along with which aspects could potentially be changed, by analyzing the original games.



To better illustrate Jensen's augmentations, and to have some spectacular scenes during gameplay, the team decided to retain a 3rd person view whenever the player used special abilities.

a few times during the course of Human Revolution. It's where our blueprint process came in.

The blueprint is to the developer what an architect's drawing is to a construction team: a plan that tells you what you're building and how you have to achieve it. For us, it was a document that described every part of the story from a gameplay perspective and vice versa. We spent roughly 2 to 3 months building all the game's narrative beats, gameplay sequences, and possible player actions on paper. Where is the player? What is he or she doing? What are the twists? What are the narrative goals? What are the choices? What are the consequences? And so on. We set everything out on paper from start to finish even beginning production. Once that was done, we could see where the game was weaker and where it needed fine-tuning. The production team was also able to start planning and building schedules based on what was in the document.

Because of that plan, production leads were able to tell us that three distinct city hubs (Detroit, Hengsha, and Bangalore) were too much to create. We had to cut one even before production began. So, we looked at the blueprint and ultimately decided to fold the story of Bangalore into a second visit to Hengsha.

Once production got underway, we started building the game we had planned out on paper, only to hit some additional bumps on the road. New schedules revealed that the

Bangalore cut wasn't enough; we still had too much on our plate. I was asked to cut another 25 percent of the game. Hengsha had been planned to have two playable levels: an upper and a lower city. The upper level was falling behind and was the weakest point of the narrative experience we had built so far. So, even though the map was fully playable from start to finish and was one of the most stunning maps we had, we ended up cutting it. Since we had our blueprint on hand and constantly kept it up-to-date, we were able to analyze all the affected narrative sequences and determine how to retrofit them into lower Hengsha.

For example, during our first cut, locations that we were supposed to visit in Bangalore – like Belltower Headquarters – had been moved to Upper Hengsha. When we had to cut again and Upper Hengsha was placed on the chopping block, we couldn't fit the compound into the lower part of the city hub. So, we ended up cutting the Belltower map entirely. Pieces of storytelling developed for the map were then moved to another level, Omega Ranch.

Deciding how and what to cut was a process that took Mary DeMarle, the narrative director, and me about three weeks to complete. We were able to do it without too much pain because the blueprint showed us which pieces of storytelling weren't critical to the narrative experience, and which could be moved to other maps without damaging everything that had



been built so far. Because we had a solid plan, we were able to play with the pieces individually and always keep a good understanding of how everything worked together.

Spoiler alert: We thought we were done with cuts at this point, but a few months later we were asked to do it again. We had planned for a small compound in Utah that was supposed to help people recover from having their augmentations removed. By visiting it late in the second act, players would discover a key plot twist: Purity First, an anti-augmentation group, were hiding a terrorist training camp deep inside the facility. We looked at our story at that point in the blueprint and realized we could only cut the map, not its narrative beat, because the reveal was directly linked to Jensen's investigation. So, we found an area in Detroit's sewers where players could encounter the Purity First leader and discover the crucial plot twist during their second visit to the city.

The experience of returning to the blueprint time and time again in order to see what to cut showed us how instrumental blueprinting a game is. Especially for titles as big as

Deus Ex. The return on investment is much higher than the effort you need to put in at the beginning of development in order to get there. At least, it's the way of working that we embraced as a team.

Groundhog Day

On Human Revolution, we were often saying it takes a lot of naiveté to create such an ambitious game. By the end of the project, our philosophy had changed: naiveté was no longer possible. We told ourselves that if we got the chance to make another Deus Ex, this time we'd need to have courage.

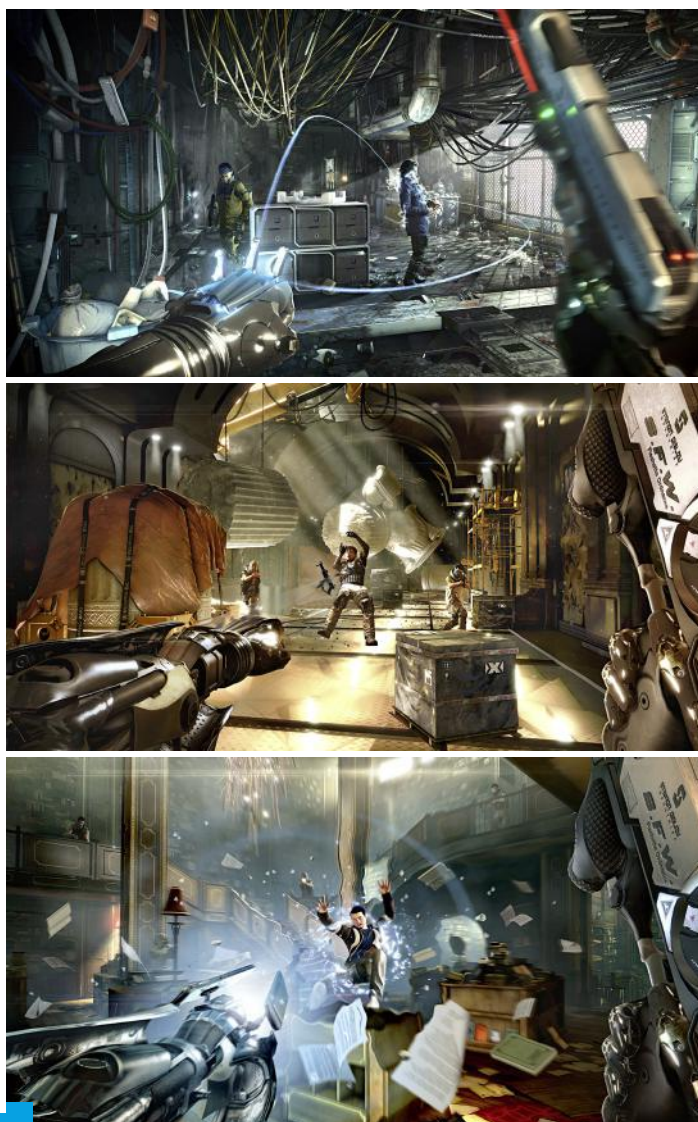
Mankind Divided was to be the 4th title in the DX franchise, and while we still wanted to retain the core values we had identified with Human Revolution, this time our goal was to bring the experience to the next level – specifically in terms of production values and accessibility. We knew that Human Revolution's game mechanics were a bit stiff, that the game balancing was punishing, and that combat wasn't perceived as a truly viable option. We also knew that, visually-speaking, the game was artistically beautiful but disappointing from a technical point-of-view. If we wanted to appeal to a broader audience, we needed to work on these aspects without compromising what had made the last game stand out in the first place.

Key to achieving our new goals for Mankind Divided would be to ensure that the team stayed somewhat the same as with Human Revolution. We managed to pull this off to some degree, but we also brought new blood in to several key positions.

In some ways, doing so made it easier to work on Mankind Divided because when team members started talking about core principles, the »old-timers« immediately understood what was meant. They recognized how things should feel, play, or look. But it also made it harder because the »new blood« often wanted to challenge the status quo. Sometimes they were right to do so, sometimes they weren't. This created some interesting dilemmas to manage but in the end, having a mix of new- and old-timers working together prevented us from becoming complacent and enabled us to bring in different ideas.

To make the game feel immediately more gratifying and in line with its fantasy, we decided to make Adam Jensen proficient right from the get-go, instead of relying on the classic route in which you have to build your character from the start. The new story showcased an Adam Jensen taking charge, fully embracing his augmented body, and assuming the role of Man 2.0. The game progression, controls, and mechanics needed to reflect this, too. If they didn't, they'd end up subverting the narrative.

The problem we faced here was two-fold: how do we present an empowered Jensen who has some new and exciting abilities,



For Deus Ex: Mankind Divided, the team thought about the balancing of stealth and combat from the get go, ensuring that both ways of playing would be equally fun.



The team knew that *Human Revolution* was, visually speaking, artistically beautiful. However, they were also aware that it was disappointing from a technical point-of-view, and that's something that Eidos-Montréal worked hard to improve on in *Mankind Divided*.

while also letting players customize the character any way they want? We solved it by building an intriguing narrative around an unexpected terror attack and subsequent accidental discovery that removed some of Jensen's augmentations early in the game, while simultaneously exposing a new array of mysterious abilities and gun-arms.

The gun-arm augmentations were introduced as experimental tactical weapons with lethal and non-lethal capabilities. They offered a «one-two punch» kind of firepower that could be used on-the-go in combination with basic weapons. We also allowed players to either go for the kill or knock-out their enemies non-lethally no matter which mode they were playing in: combat or stealth. *Human Revolution* had been way more rigid than this, by associating kills to combat and knock-outs to stealth. With *Mankind Divided*, though, we really wanted to give players a sense of control, immediacy, and flexibility.

Brainstorming such elements was only a part of the equation because we also needed control schemes that supported our new philosophy. We had to work hard to standardize the default control scheme because *Mankind Divided* is not your typical shooter experience. It might have seemed unconventional at times, but we wanted players to always feel in control of their character, like they really were playing as Man 2.0. Therefore, we needed to reduce the learning curve as much as possible.

We also needed to balance the new game differently. On *Human Revolution*, we had been so scared that people would not use their augmentations, the environments, etc., that we balanced things in a way that «encouraged» you (i.e., forced you) to use the power at hand. For the most part, this wasn't a problem with core fans. But a lot of franchise newcomers had their asses kicked so hard, they felt left out. When we made the DXHR's Director's Cut version, we corrected this by giving more default energy and loot, rebalancing health points etc. Doing so made the game more accessible, and the feedback we received afterwards proved we could craft a more forgiving adventure without sacrificing the *Deus Ex* experience. So, when

it came time to tackle balancing in *Mankind Divided*, we moved forward with confidence.

All of the changes discussed so far also helped to make *Mankind Divided*'s combat and overall experience more visceral, more immediate, and impactful. Combat had been very static and punishing in *Human Revolution* and we really wanted to do more to improve it. So, we worked on several other systems as well, including the enemy bark system, environmental reactions to bullets, and enemy varieties and their ability to use augmentations.

In the end, bringing *Deus Ex* to 2016 wasn't about changing everything. Rather, it was about understanding what we had achieved with *Human Revolution* – the good and the bad – and knowing where we could shake things up a bit without compromising the core experience. *Mankind Divided* was built on the same core values as *Human Revolution*. The difference was that we now had experience in building this type of game, so our experiments could be undertaken with more confidence.

I remember how, after the release of some action-oriented trailers and interviews in which we said combat would be more exciting this time around, several fans worried that we might sacrifice stealth and make an action game. But the game is released now and fans are still finding the recipe they loved in *Human Revolution*, except with one added note: This time around, combat is a valid option.

Closing Words

Looking back at the last decade spent working on *Deus Ex*, I can honestly say that the team is proud of what it's achieved. Are *Human Revolution* and *Mankind Divided* perfect games? Hell no. But they were made by a group of passionate people who took the endeavor very seriously. We were extremely honored to be given a chance to give new life to one of the most influential games ever made – a game created by a different bunch of passionate people who came before us. The least we could do was tackle the challenge with the same energy and commitment they did when it all started. I can proudly say that the *Deus Ex* legacy lives on.

Jean-François Dugas





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BEHIND EIDOS-MONTREAL'S TECHNOLOGY THE STORY OF THE DAWN ENGINE

The first Deus Ex game from Eidos-Montréal used Crystal Dynamics' CDC engine, which did not meet the needs for Mankind Divided. The team soon decided to go for IO Interactive's Glacier 2 engine, but ended up heavily modifying it, resulting in the creation of its very own engine: Dawn Engine

When Deus Ex: Human Revolution was released in August 2011, we were all relieved to have been able to see this through. Since we started working on the project, we had heard all

the stories about the franchise. Eidos-Montréal was created in early 2007, and a core team would be assembled in May of that year to work on the mythical Deus Ex franchise. When I think about it, it was quite a daunting task. Not only did we have to create a new studio and draft as much talent as we could, but we also had to begin work on the third installment of a beloved franchise from the early 2000's.

Indeed, we had heard many stories about the franchise. While our studio was new, we worked closely with multiple people at Eidos Interactive's head office in Wimbledon, Crystal Dynamics in California, and IO Interactive in Copenhagen, who had been witness to multiple attempts to create a sequel to Invisible War without success. The pressure was definitely on.

From CDC for Deus Ex: Human Revolution ...

When it comes to tech, we set our sights on the Crystal Dynamics' engine (CDC). We were quite impressed by the history of the engine and its overall performance. We had quite a lot to accomplish, and a lot of content to fit in just one game. It was clearly the best decision at the time. We knew little about our game at the beginning, but discovered new things along the way. Games had evolved quite a lot since 2000, and we knew we needed to refresh the franchise while still keeping its core intact. So, we ended up with a long list of things we needed to do to adapt CDC for the purpose of creating a new Deus Ex, and new items would be added to the list as we refined the idea of what Human Revolution would eventually become.

We collaborated with Crystal on the development of these mutually beneficial changes to CDC for a good chunk of time. We eventually moved on to an isolated branch, where we pursued more drastic changes that would make DXHR possible, but were not desired for the Tomb Raider franchise. We clearly struggled on the dual mandate of creating a game that we had not fully defined yet, and also adapting the engine to this ever evolving idea of what Human Revolution would eventually be. One of our major tech undertakings was related to the Detroit level. It is what we call a city hub: a huge, open ended level that the player would revisit several times in the course of one walkthrough of the game. Not only would it contain elements driven by the core story, but the player would be able to roam the city and discover new things to do, including new side-quests. It required adapting the streaming system, creating a host of new tools to cope with multiple layers of gameplay, adapting the shape of the city depending on the point in time the story takes place, etc. The amount of content we crammed in that level was pushing the CDC tools to their absolute limit.

People who had to work in the Detroit level suffered quite a lot. It would take an increasing amount of time to build assets to see your work in the game, the editor performance would degrade over time, etc. Obviously, a lot of the programming effort was spent to alleviate the pain related to the pipeline, but it was still a long and arduous process.

Even as the main team was busy closing the game, we started looking at ways to improve our lives for the sequel.

... To Glacier 2 for the Sequel of Deus Ex: Human Revolution ...

A few months before the release of DXHR, a small team of programmers were indeed looking into some major changes we could make, with the goal being to help fit our vision of CDC. We wanted to make sure that, this time around, the engine would be able to cope with the amount of content required by a Deus Ex game. Those changes included paradigm shifts on how to build raw assets for the target platforms (Xbox 360 and PS3 at the time), ensuring the editor was able to better show what final assets would look like when built, etc. Those changes were too ambitious and risky to push during an ongoing production, but we wanted to have a head start for the sequel.

When DXHR was released, we mandated part of the core programming team of DXHR to undergo a large scale engine evaluation, with the goal being to investigate both commercial game engines and internal ones. The idea was to leave no stone unturned. That may sound a bit drastic, as continuing with CDC was the safe choice, especially considering we had proved it was quite capable of supporting the production of a Deus Ex game. On the other hand, it had

been 5 years since we started to work on the game, and it was clearly a good time to re-evaluate the tech for our next move. Given the Thief team was using Unreal 3, it was obviously on the top of our list of commercial engines to consider. We also evaluated Unreal 4, which was in its infancy at the time. As for internal technology, we looked at the improved version of CDC that Crystal had been working on for Tomb Raider (2013) and IO Interactive's Glacier 2, which was a complete rewrite they were developing primarily for Hitman: Absolution.

That small team of 3 programmers found out Glacier 2 was addressing a lot of the issues we were having on our local version of CDC. On the other hand, Crystal had also been making extensive changes to CDC for the next Tomb Raider, and we had also made our own set of improvements. Both engines were very strong contenders for our next ambitious take on Deus Ex. The fact that the renderer in the Glacier 2



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Julien started his career as Programmer at Ubisoft in 1998, working on projects like Splinter Cell: Double Agent, Splinter Cell: Chaos Theory, and Rainbow Six: Raven Shield, as well as two other unannounced games. In 2007, he joined Eidos-Montréal as Lead Programmer, becoming Director of Technology in 2008, and Chief Technology Officer in 2015.



Deus Ex: Mankind Divided uses Eidos-Montréal's Dawn Engine, which is a heavily modified version of IO Interactive's Glacier 2 engine. One notable addition to the engine was a performant hair simulation.



engine was closer to what we needed, and the toolsets were addressing many of the issues we had just gone through for DXHR, were enough to make us strongly lean towards selecting it for the next big installment in the franchise.

A lot of the new concepts we had to introduce in CDC for Human Revolution were already there in Glacier 2. So that was already something we could safely assume would work right out of the box for DX4 (which was the code-name of the sequel to Human Revolution at that time). Our next game would, however, ship on the next wave of consoles. That meant we needed, at the very least, to convert the engine to 64 bits, and the renderer to DirectX 11.

Early 2012, we made the choice to officially select Glacier 2 for the next Deus Ex. That said, making that decision was not easy. One has to keep in mind that we were not only looking at selecting an engine for the next Deus Ex, but also for any games that would follow. That was actually a big part of the conclusion of the technology evaluation, since it did relate to how we were seeing game development and workflows for the future of the studio.

The next big challenge was to port the »game layer« of Human Revolution from CDC to Glacier 2.

... To Building The Dawn Engine

Moving some high level systems from one engine to the other (e.g. much of the AI subsystems) was a viable option, as it only had limited dependencies on the core subsystems of either engine. For other systems though, no direct conversion was possible. Several gameplay systems were relying on the CDC scripting engine. However, Glacier 2 does not have a text-based scripting engine, instead opting for a very powerful »Entity System«. One can visually assemble behavior blocks to create more complex behavior. The whole engine is built in a way so that many, if not all, of the core subsystems can be interacted with through the Entity System. There is not much you can't do with it. The obvious drawback is that all of our scripted systems needed to be rethought and completely re-implemented when moving from CDC to Glacier 2.

We collaborated with IO on multiple topics in the first year of our adventure with Glacier 2. They provided a lot of support, which ensured that our content creators and programmers were familiar with the philosophy behind Glacier 2. Both studios also actively collaborated on several improvements to Glacier 2. For instance, we worked together as a single team to replace the animation layer, which had been in place since the engine had been originally conceived.

Obviously, we added a lot of requirements of our own. We did a lot of additional work on the rendering side, and a lot of care was put in setting up a Physically Based Renderer. We invested in Global Illumination techniques,



and offline processes for pre-computing light probes used for the second bounce, etc. We also reworked the streaming system extensively, serving the purpose of supporting the open-endedness of our new city hub (Prague), as well as that of the other levels with multi-path, back and forth, etc. These were new constraints that did not exist for Hitman: Absolution, but were very clear for the Deus Ex franchise.

One of the other big additions we had to make to the engine was to support shape shifting levels, much like we did for Human Revolution. Prague, which the player will visit multiple times during their play through, was intended to have both a day and a night version, changing weather conditions, and would even behave differently depending on when the player went there. City blocks would be barred or opened depending on when you visited, and population, along with overall AI behavior, would change based on the same criteria. Even if you visit the same location twice, it would be much different.

On the tools side, we had to add support for Deus Ex specific pipelines, including our conversation and character systems. When we added these tools, we developed them with WPF, which signified a move away from WinForms, the previously used framework in the original Glacier 2 engine. Moving to WPF allowed for increased performance for UI intensive workflows, as well as cleaner architecture, to clearly separate the UI work from the algorithms they leveraged.

Exactly five years after the initial release of Deus Ex: Human Revolution, we released its sequel Deus Ex: Mankind Divided. While we are pretty happy with how the game turned out overall, there are obviously some key areas where we're looking to improve the Dawn Engine.

Continuously Improving Our Engine

Since the studio started back in 2007, we have made forward looking strategic investments, focused on the future of technology. We now have a dedicated team for Dawn Engine, which is taking care of longer term improvements to



When the team started working on their first Deus Ex game, they used the engine that Crystal Dynamics had been using since working on Tomb Raider: Underworld. However, after the game was released, Eidos-Montréal realized that the CDC engine did not meet their needs.



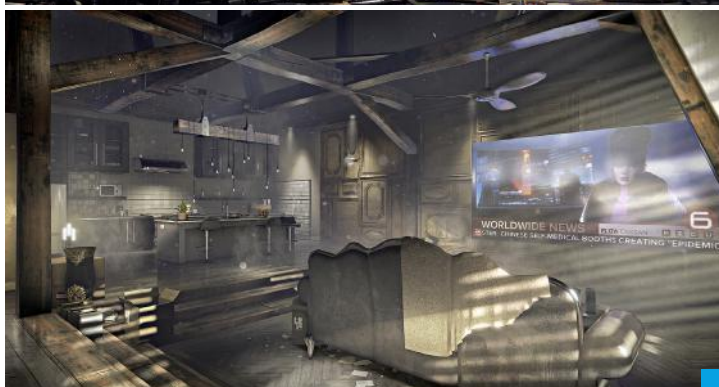
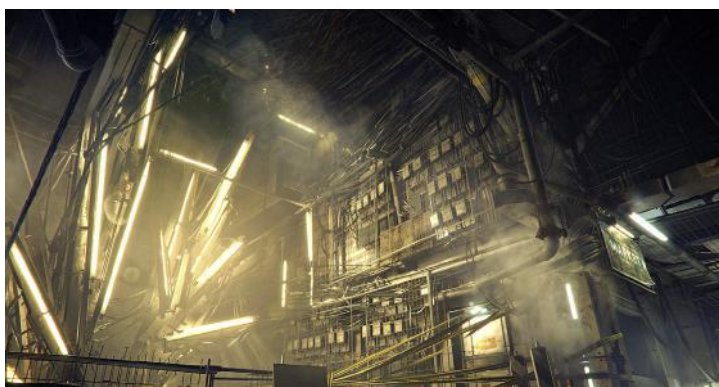
its tools and pipeline, as well as the runtime of the engine. The idea is to ensure they are not caught in the immediacy of game production, and can make technology related changes geared towards the requirements for the next 6 to 12 months, while still accounting for the needs of the games currently in development. They will therefore tackle more complex, or more risky, tasks. We also created an R&D department, called LABS, almost 3 years ago. While being labeled as an R&D team, LABS is still very closely involved with production. We are not simply talking about research topics that will only see the light of day in 5 years. In fact, LABS has already contributed to 3 games since we assembled the team (Rise of the Tomb Raider, Hitman and Deus Ex: Mankind Divided), and worked on various technologies, such as hair rendering and simulation, snow rendering, ocean rendering, volumetric lights, Screen Space Ambient Occlusion, new lighting or occlusion techniques, and loads of kick-ass VFX.

Both these teams started working on the future of Dawn Engine long before Mankind Divided actually shipped. Even though the DXMD team was busy getting the game ready for release, we already had a long list of things we wanted to investigate for the next wave of games.

Dawn Engine (and the original Glacier 2 for that matter) being what it is, doing simple things can be quite complex, and the learning curve is often quite steep. For instance, the version Mankind Divided shipped with had very basic tools for particles. As stated previously, when you want to make a new particle system, you need to do it by assembling a few entities to get you going. Doing anything somewhat fancy can very rapidly become quite technical and tricky. Recently, we added a proper particle pipeline that greatly simplified things. Creating and configuring even complex particle systems is now not only simple, but consequently reduces iteration times by a considerable amount. Ultimately, assets created in this manner are of a much higher quality, as more time is spent working on the art, and much less on fighting with the tools. At this point, this is the strategy we are going for in pretty much

all areas of content creation. On top of this, we have added support for GPU particles, while also reworking the general architecture of the particle system. All in all, particle simulation runtime performance has already improved by 30 percent. Recently, we also made huge modifications to the physics engine, which also yielded a 30 percent to 50 percent improve-

IO Interactive developed their Glacier 2 engine for the iconic Hitman series, but it contained many features that could benefit Eidos-Montréal when developing a Deus Ex game. This was not only the case in terms of graphical fidelity, but also through the tools that allowed for very complex character behavior.



After the team had decided to use Glacier 2, a lot of modifications were made, which lead to the creation of the Dawn Engine. The team added and enhanced hair rendering and simulation, volumetric lights, Screen Space Ambient Occlusion, new lighting and occlusion techniques, and loads of VFX.



ment over the code that shipped this year. We are hopeful this will give our designers much more flexibility when it comes to adding life to the levels, or coming up with neat gameplay ideas that leverage physics.

Another big topic we are keen on investing is animation. While we have been developing a new animation system in Dawn Engine since we started the working on Mankind Divided, there is still plenty left to do. Our current implementation is basically an animation graph that animators can fully control. It does what it has to do fairly well, but still requires a cumbersome setup to get things in motion. Again, these powerful tools give you plenty of freedom to shoot yourself in the foot, so we are looking at new ways to not only simplify the tools, but simplify the animation system as a whole. We have a few ongoing R&D topics focused on producing significantly higher quality body animations with less effort. I can't really get into the specifics at this stage as this is very

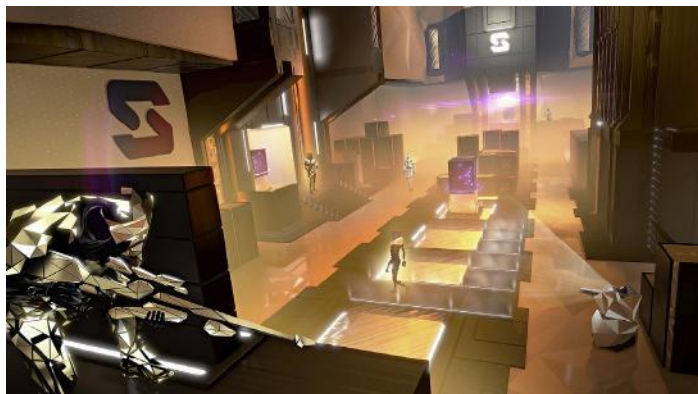
early work, but hopefully we will be able to talk more about this in the not so distant future.

We are also specifically looking into facial animations. We know we have a huge margin for improvement, and also have some really interesting ideas on how to make them much more realistic. We are basically overhauling the whole pipeline from motion capture up to the runtime.

There is still a lot to do and, as a matter of fact, we are still learning a lot from Mankind Divided. Since the release of the game, we've been continuing to deliver patches for it. Of course, we are fixing bugs that unfortunately made it to the gold master, but we are also extending the Breach online mode, provided alongside the story mode. We are releasing content every month, and monitoring how our players are interacting with the game, not only through community forums, but also through metrics collected by our servers. We are literally going through gigabytes of data to understand how the game performs, along with what does and doesn't work. The wealth of data we have gathered in the weeks following the release has proven invaluable, not only on the creative side, but also in helping to make technology related decisions for our next projects. An example of this is how we will adapt our multiplayer approach in the future: We are already doing the groundwork to support a newer vision for multiplayer and, this way, ensure that the technology will not be a limiting factor, particularly when trying to bring new and innovative ideas to life. Of course, this applies to several other areas of the engine as well.

Overall, I am quite happy with how the game turned out, and the solid game engine we now have. There is always going to be something that needs improvement, but that's who we are. That's really what's keeping us motivated every day.

Julien Bouvrais



Deus Ex: Mankind Divided includes a live game mode called Deus Ex: Mankind Divided - Breach. Since releasing the game, the team has learned a lot on how to improve the engine, ensuring that the technology will not be a limiting factor, particularly when trying to bring new and innovative ideas to life, such as those for multiplayer modes.



PLAYER'S CHOICE IN A DEUS EX GAME

Deus Ex: Mankind Divided allows players to approach the game in any way they want, be it by creating chaos, by being stealthy, or anything in between. Senior Level Designer Julien Hantz explains how Eidos-Montréal created quests and levels that supported this kind of gameplay.

Designing the quests for a Deus Ex game is a great and unique exercise. This is because it is done by giving players the opportunity to play the way they want. This seems like a bullet point that we see on the back of the box of a lot of games, but only a few really deliver on that promise, even open worlds, who generally offer a systemic experience between very linear missions. In Deus Ex: Mankind Divided, we put player's choice at the core of every step of our design process.

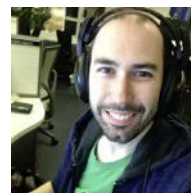
What does »player's choice« really mean in a Deus Ex game? It means that, for any given mission, players will be able to reach their objectives by using multiple paths, completing them by different means while having the freedom to choose how they will proceed past each obstacle: »Do I play stealth, avoiding any conflict and never being spotted? Do I go in guns blazing? Do I neutralize my enemies by being lethal or non-lethal? Do I use augmentations, or not at all? Do I stick to one strategy all along, or do I adapt to the situation and do a mix of everything during one single mission?«

As quest and mission designers, our role and commitment is to make sure that, every time until the end of the game, all these options remain available and possible. When we say that it is possible to remain stealthy during

the whole game, even more so by never being spotted and/or by not neutralizing anyone, it needs to be part of our production checklist. If we say that you can also complete the game without ever upgrading your character, it is also something we need to take into consideration when building the game world, which includes the different paths leading to each objective. Failing to do so is not an option, and we wouldn't have shipped the game if even the smallest section of the game didn't meet this core requirement.

Having all the choices in the world isn't worth a lot if the game doesn't react to the player's actions. For all quests and missions, we needed to think about how to give player's constant feedback regarding their playstyle. This can be done through some subtle changes in future conversations or briefers, adding completely new objectives or environment setups, or even a direct tie in with the main story.

It seems to be a given in games in 2016, but think about it for a moment: how many games provide you with this amount of freedom? Not a lot. Why? Because it is challenging to create a simulation that responds to the player's actions, and it is very costly in terms of production. This is because a lot of variations, along with a lot of specific content, needs to be created, but a good amount of it will never be seen or experienced by players who only play



Julien Hantz
is Senior Level Designer
at Eidos-Montréal.

Julien started his career as QA tester at Ubisoft in Paris in 2001, quickly switching to Level and Multiplayer Designer. In 2003, he moved to Ubisoft Montreal where he worked 5 years on a few AAA games as Level designer, Game designer, and Senior Technical Designer. With his expertise in stealth and non-linear gameplay he joined Eidos-Montréal to work exclusively on the Deus Ex franchise as Senior Level Designer. After a short stop at Warner Bros. Montreal, which he joined in 2013, he returned to Eidos-Montréal in 2015 to help finish Deus Ex: Mankind Divided.

the game once. While this seems like a lot of constraints, it is also what makes creating a Deus Ex game such a fulfilling experience.

Macro Design: Missions and Objectives based on Player's Choices

In the world of Deus Ex, missions and objectives are never set in stone. They can be updated, cancelled, or failed without leading to a »game-over« or forcing the player to reload his game. We always need to make sure the player will be able to explore, roleplay, fail missions, or even break the rules of the game while the story continues to unravel its secrets. We need to give the player the feeling that the game world reacts to his actions, but also lives and breathes without them.

In order to keep things fresh, we didn't have one set way to design missions, and every mission or quest had its own structure, depending on its place in the story. Of course, we have objectives that, whatever the player does, will need to be completed in order to tell our story. However, let's focus especially on how player's choice can affect the way we create our mission objectives.

Optional Missions or Objectives

Optional missions or side quests are important because they are independent stories, designed to reinforce the themes of the game while adding depth to the game world. However, they are also important because the player is free to ignore them. There are situations within the game that exist despite the main mission and actions of the player. Completing them will make the world richer, will give the player more means to express themselves, but not completing them, or ignoring them, shouldn't lessen the core experience for the player. Even if they are ignored though, the presence of these characters and optional areas of the world gives a greater sense of depth to the game, encouraging replayability.

Optional objectives within main missions are different, mainly because they will eventually challenge the player on his playstyle, provide opportunities to get additional XP, or help them to have a better understanding of the mission. We talked earlier about player's choice, and the possibility for one player to stick to one strategy throughout the entire game. Having the freedom to play the same way from start to finish is good, but being morally challenged while doing so is even better.

To give you one example, at the end of the game, there is one mission where terrorists have infiltrated a security detail during a public event, and you need to uncover what their true plans are. One optional objective is to neutralize all of the fake security guards, providing protection to a large crowd of innocent civilians before the terrorists can act upon any of their plans. It is totally possible to ignore this objective, but doing so will lead to the deaths of many people. In that case, this optional objective will challenge stealth players, who usually tend to avoid confrontation. Doing nothing has consequences, and therefore creates a dilemma for players who already have a well-established playstyle.

Preemptive Objectives

Another great example of objectives based on player choice are preemptive objectives. They are particularly interesting because, again, not a lot of games give you the opportunity to complete an objective that hasn't been given yet. Most games are based on a linear structure, where locations and setups are made available the moment the game tells you to go there and complete a specific action.

One example in Deus Ex: Mankind Divided is that, at the very beginning of the game, if you decide to ignore your first primary objectives and explore the city, you may end up at Otar's casino, where it is possible to steal the calibrator (an item critical for one of the game's side quests) right away. Then, when you talk to Koller (the one who assigns you this quest), Adam answers that he already got it. It seems trivial, but in most games, the calibrator wouldn't even be present in the location yet, or accessing the casino would have been impossible. This is a little thing, but it is very typical of a Deus Ex game.

Conditional Objectives, Objective Updates, and Hidden Objectives

From the get go, the missions, and their objectives, are designed in order to make sure that no matter what happens, the only thing that will end the mission is the player's death. To do so, we create diagrams where everything is planned, and every objective update is written in advance.

Of course, we have a few tricks to make sure the player will end up in some bottlenecks, allowing us to be able to tell a story in the end. However, everything that happens in between has to be possible.

That's why we always think about the worst thing that could happen, and create our ob-



Outside of the main quest, players can pursue any side quests they like. If completed, some of these missions might make their lives easier along the way. However, if they choose to ignore them, the game won't punish the player.

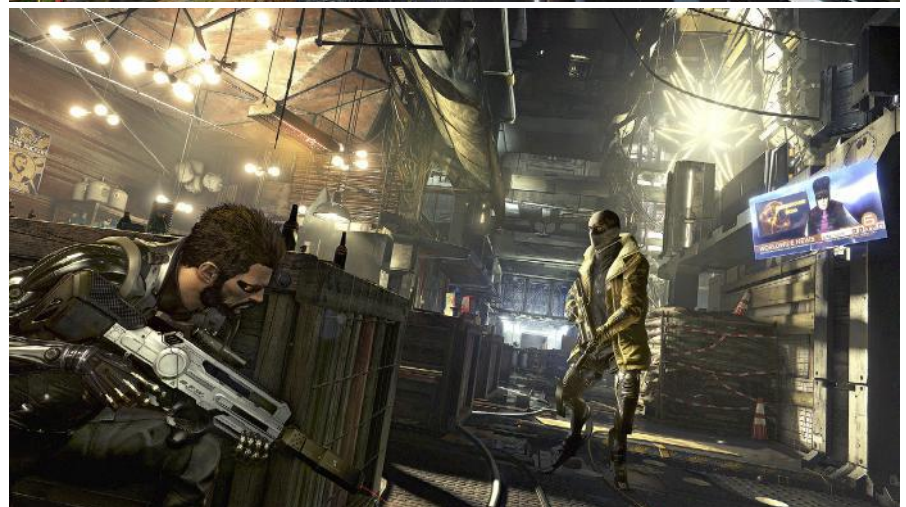
jectives accordingly. Most of the time, a player will only see a relatively simple succession of events, leading to just a few objective updates. But under the hood, we planned every action he could have done, and how far he could have gone within the limits of our simulation.

One of the most beloved side missions of the game, »The Harvester«, has an amazing number of ramifications. In it, depending on what the player discovers, what augmentations he has, and what choices he makes, the objectives given and their descriptions will change to highlight what he has done. The mission itself can be really short, even ignored, but can also last until the final act, and can even end up in a boss fight (or not!). What makes this game stand out is that every player will be able to talk about their experience, and each experience will undoubtedly be different.

In the end, what matters for us designers is to really make sure that every mission feels unique for the player, that the objectives are tied to the player's choices, and that all the game gives the player enough feedback on how he is playing.

While creating missions that can be ignored, failed, or made really short depending on how you play is not really a problem for side missions, it is a completely different story when creating objectives that are tied to the main quest. To give you another good idea on how we think about player choice and how it affects the way we create main objectives, there are a few examples of how we tried to push the limits and support players who don't like to play by the rules.

In the final mission, one of the first objectives is to go talk to a receptionist. It would have been easy to force the player to talk to this guy through a scripted event or a small cinematic, but instead we kept the receptionist in the game world, with the risk that the player would ignore them, or even kill them. When you choose to let the player do what he wants, it multiplies the number of possibilities. Therefore, you need to make sure that everything is thought of, and that every line of dialog is planned and makes sense. For example, there needs to be an objective update for each possibility: if you create chaos before talking to the



In any given situation during the game, the player can choose to start fighting, or to stealth past enemies - this was a big challenge, as both the characters, and the game world as a whole, had to react accordingly.

receptionist, if you create chaos after talking to the receptionist, if you bypass him, or if you talked to him. However, this is only the beginning, since the entire map and its succession of objectives is based on giving the player the right to ignore or disobey most of them.

Another example concerns the final boss fight. In most games, when you get to the boss room, you are stuck in the room until the combat is done. In our case, it is absolutely



As the player is free to choose which augmentations they want to use, the designers had to be careful when balancing those powers, ensuring that none of them became absolutely vital or overpowered.



Players have complete control over how they choose to play the game, with them also having the freedom to select the powers or equipment that match their play style. Therefore, the AI in the game has to be able to react to anything the player does.

possible to escape the room, complete your other objective, then go back and finish what you started. Again, it is really demanding on the design team, because all objectives must be thought out in every possible way, and dialogs must still make sense.

One of the most challenging, but also rewarding, parts of creating quests and missions for a Deus Ex game is to let players do what they wouldn't be allowed to do in most other action-adventure games. Mankind Divided is not an open world, and players still need to follow a somewhat linear story, but the way they complete objectives, and the way the objectives always adapt to the players' choices, makes it a very unique game.

Choice and Consequences

Having the objectives adapt to the players choices is one thing, but it's another to have the environment, and the people who are populating the world, react to every major action undertaken by the player.

To give a few examples, the content of newspapers/emails will change depending on how some objectives are completed, conversations between NPCs or with major characters will change depending on the players' actions, and some gameplay situations will also be different.

If the game reacts so well in terms of objectives and conversations, it is because a lot of work is done by the Level Designers and Narrative Designers to think through, and plan for, every possibility. It is hard work in terms of planning, iterations, and testing to make sure that every piece of the puzzle is well put together.

Another part of the work of designing a quest or mission is to create an environment where players will get to express themselves throughout minute to minute gameplay, choosing, in a very systemic manner, how to behave and go through a mission by using stealth and/or combat.

Minute to Minute Gameplay: be a Ghost, a brutal Soldier, or anything else in between

One of the main features of Deus Ex is to give players the freedom to choose between stealth and combat, and to provide them with the ability to change their strategy on the fly. All of this is possible because of the way the layouts are designed, and the way the AI works.

Layout Creation and Cover Placement

The cover system supports both playstyles, allowing stealth players to stay hidden and easily break line of sight, while providing combat players with strategic cover, giving them an opportunity to avoid incoming fire and flank their enemies.

The layouts are all designed with player choice in mind. Even if the layouts contain more than one path to get to one objective, there is not one path for action, one for stealth, one for hacking, etc. While some paths will be made to accommodate one playstyle over the other, whatever the path you choose, you should always be able to play the way you want. The main reasoning behind that statement is that, when players do choose a path, they won't be able to immediately recognize if they are taking the path which will suit their playstyle or not. In a game where improvisation is king, we need to make sure that every player has the means to express themselves, without relying on the principle of trial and error.



If the player creates chaos somewhere in the game world, they will quickly realize that NPCs, or even newspapers/emails, will reflect their actions. Eidos-Montréal was keen to create a living, breathing game world.

Every single encounter must take place in a layout that allows players to:

- Observe the main threat from a safe zone without ever being spotted (if staying in cover), allowing them to plan their infiltration or attack.
- Move from cover to cover in a very easy and natural way, either bypassing their enemies, or taking them down in the most efficient way possible.
- Be able to retreat (if seen or overwhelmed), change their tactics, and get back into the action.

These simple principles and gameplay loops are valid for both stealth and combat players. Having open environments where it is easy to read the action, easy to look for vantage points, and easy to find places to hide while in difficult situations, serves all possible tactics, providing the opportunity for players to improvise and change their playstyle on the fly.

AI Behavior

In order to support the different playstyles, NPCs have different states which will adapt to every situation. Their behavior is very complex, but for the sake of simplification, let's say that NPCs have 4 different states: relaxed, cautious, hostile, and alarmed.

- Relaxed is when an AI character hasn't seen the player, and is playing his default occupation.
- Hostile is when an AI character has seen the player, knows where he is, and engages them in combat.
- Alarmed is when the AI is actively looking for the player after he has disappeared, or an alarm has been triggered.
- Cautious is when, after having seen the player or after an alarm has been triggered, the AI goes back to their regular occupation. This last behavior is very important, because it creates a gameplay loop where players can start playing stealth, get spotted, and enter a combat situation. It provides them with an opportunity to escape and wait for some kind of reset, then try to stealth their way back again during the same mission. Of course, the AI will be more careful, and the patrols will be a bit harder, but it will still be possible for players to get back on their feet and try another approach.

Being a hybrid game, Deus Ex has to find the right balance between an AI that is challenging enough to engage you in great firefights, and providing players with enough latitude to be able to escape, or avoid being detected too easily.

While combat is handled in a systemic manner, stealth is hand crafted by level designers. All relaxed and cautious patrols are custom made, and it is really important for us that players will be able to look at the patrols, understand them, and act accordingly. Patrol creation is based on a lot of guidelines, designed



The AI has four different behavior patterns, each connected to how alarmed they are. However, even if players fail when taking a stealth approach, they can retreat at any time and come back later, allowing them to try again once the AI has ceased their search efforts.

to challenge the player without creating too much frustration.

The Use of Augmentations

Finally, in a game where augmentations are a major part of the story and players' progression, we need to design the missions so that, when a player has the opportunity to use them, he will gain a strategic advantage over his enemies or his environment.

Even if all missions can be completed without being augmented, every path and every corner is full of opportunities for players who decided to augment themselves. The main goal here is to create the need for the player to get augmentations, but also to give players opportunities to use the ones they already have.

Because there is no way to know what augmentations players will have at any point in the game, we try to balance the missions by locking off different sections, requiring varying types of augmentations to access them, and making the »aug free« path a lot harder. Sometimes, some missions will rely heavily on one particular augmentation, but we keep tabs on the opportunities created by each aug, and make sure that one augmentation does not become more useful than another.

Conclusion

Player choice is at the center of every design decision regarding the quests, from high level objectives to minute to minute gameplay. For all that to happen, it requires an amazing amount of thinking and consistency, not only in terms of level design and narrative design, but also in terms of art. Deus Ex being set in reality, made the comprehension of the world a lot easier, helping to reinforce player choice. This is important because choices only truly exist in a game when you are able to understand, or be fully aware, of all the options available to you.

Julien Hantz



As long as enemy characters are simply patrolling, players can easily go from cover to cover, relatively risk free. However, once the AI has been alarmed, are cautious, or are moving into a state of engagement, they will react more quickly and aggressively upon sighting the player.



Making Games 01-02/17

THE DESIGN PRINCIPLES BEHIND DEUS EX

Gameplay Director Patrick Fortier discusses the game design behind Deus Ex: Mankind Divided, including how the team created the characters, weapons, and AI that filled a plausible, but not necessarily realistic world.



Patrick Fortier
is Gameplay Director
at Eidos-Montréal.

As a child, Patrick already wanted to do Game Design before even knowing it could be an actual career! Over the past 19 years, he's had a chance to work with fantastic people on a variety of projects such as Speed Devils, Myst, Splinter Cell, 1666 and currently with the Deus Ex: Mankind Divided team where he acts as Gameplay Director.

One of the most interesting aspects of working on a game like Deus Ex is the opportunity to use the setting as a »window to the future«. This is the result of the game being set roughly fifteen years in the future, and being built around the core theme of trans-humanism. As developers, we get to spend years exploring and discussing technological concepts which are slowly (or quickly in many cases) becoming a reality effectively reshaping the world around us.

Contemporary Reality, a double-edged Sword

One of the main reasons for choosing to frame the game this way came down to the emotional experience we were aiming to create for our audience. Pushing further ahead in time might provide greater creative freedom, but pushing our universe into true »sci-fi« territory would also mean giving something up. By providing players the ability to go about things the way they want, with real consequential

freedom in a world that is very akin to their own, our goal is to create something which will resonate with them, which will impact them emotionally, and which may even help them to discover a little something about themselves.

Having players operate in a world that is a stone's throw away from ours means, they are particularly sensitive to it. They can draw parallels more easily with their own reality. While this can make it easier for them to project themselves into our world, it can also lead to some headaches for us as developers, since it makes our audience much more demanding in terms of the overall »realism« of all the different aspects of the game.

People understand how the media manipulates information, they know how a city would react the day after a terrorist attack, they understand the complexity and corruptibility of important governing systems, they have an idea about what is humanly possible, and they understand what remains constant in a society, even as technological progress invariably pushes us forward. People still eat, they still drink coffee, they still gossip

about the latest happenings, they still need downtime, etc.

Regardless of its setting, any narrative-driven game needs to spend time establishing these things, framing its own particular »reality«. No matter the time period, the exercise remains roughly the same. You need to understand the realities of the world you are creating (its inhabitants, technology, major historical events, etc.) and deliberately expose it to your players.

The World

The first element players will discover is the world itself. How things look, how people are dressed, how they behave, how they interact with the environment, and with one another. While maintaining the illusion of »realism« can be challenging, being able to draw from »reality« can be advantageous as well. You only need to look outside to find inspiration for common occupations. Drinking coffee, using vending machines, talking on the phone, or taking pictures are activities that are easy to imagine will still be part of our lives in the near future.

However, before long, you have to make some important gameplay decisions that are ultimately not »realistic«, but which are essential to the overall flow and enjoyment of the game. For example, we chose to have a game where NPCs react to you having your weapon drawn out (they refuse to talk to you and comment on their discomfort), but we decided against having them panic and run away at the mere sight of it. Obviously, in real life, you would immediately dial 911 if you saw someone like Jensen walking around your neighborhood with exposed firearms. Actually firing a weapon, whether it hit a target or not, would simply cause complete pandemonium. Everyday life would stop immediately, police would shut down the area and begin an investigation. People would be talking about it days, or even weeks, later with their neighbors, and some would stop going to work for a few days.

Obviously, that level of realism would be majorly detrimental to the gameplay experience. Players would never be able to experiment – never-mind fail – at exploiting the different gameplay abilities. However, players do have expectations that there will be some level of consequence for such behavior. That is why we do trigger a reaction: people yell and hide, and try to alert the local authorities. You do feel that your presence and your actions are generating panic, and the police force reacts immediately by coming after you. After a while though, there is a cool-down period and life returns to normal. This approach allows players to remain immersed in the game world, since NPCs do react dramatically to their actions, but also carry on and recuperate. Players don't need to reload a save to have NPCs go back to a normal state. In fact, it's often something

users will play around with intentionally to see how the game deals with the situation and its consequences. Since they are so punitive, players will generally choose to avoid gratuitous altercations like that afterwards.

Another element which is really important for the credibility of our world is to witness how the population is affected by the events and the overall themes of the game. Transhumanism does not simply translate into cool powerful characters like Jensen. It affects everyday lives in many ways, from the pressure to compete, to the desire to reshape yourself or heal a loved one. It's important for players to see the far-reaching impact of the theme as they travel around the game world, along with hearing people talk about current events (which players may or may not have an influence on). To that end, numerous overheard conversations are placed all around the game world, newspaper articles are created to be adaptable to the players choices, and radio and TV shows are made to provide more background information, framing things from a perspective that goes beyond what players



The topic of augmentations plays an important role in Deus Ex: Mankind Divided, not only for the game world and atmosphere, but also for Adam Jensen as the protagonist. He has had time to get used to the many augmentations inside his body, and he is no longer hesitant to take advantage of them for his own personal benefit.

readily have access to. We also take the time to create content on computers and mobile devices, showcasing exchanges NPCs are having with one another about things affecting their lives and their futures. All of these elements come together to create a rich tapestry on which players can project their own thoughts and assumptions. It bridges the gap between the »game design« objectives of the game, and the »virtual world« portrayal of the setting.

Jensen, the Augmented Man 2.0

In *Mankind Divided*, it was of paramount importance to show the evolution of Adam Jensen as a character. Some of the naiveté he showed in *Human Revolution* had to give way to a strong personal motivation to get involved, a hunger to uncover the truth, and greater self-acceptance. Transhumanism being the core theme of our game, we wanted it to come across differently this time around. Adam is no longer just coming to grips with the idea of being augmented. He has had time to get used to the many augmentations inside his body, and he is no longer hesitant to take advantage of them for his own personal benefit. Gameplay-wise, we chose to trans-

late this feeling of comfort first through the control scheme. With more augmentations to choose from and our main character being more comfortable using them, we wanted to create a more direct access to augmentations for players. We started by designing the quick selection wheels and mapping them to the control sticks. This allowed for instant, symmetrical access to both the inventory and the aug-menu. We also echoed this in the UI, with augmentations on the left-hand side of the screen, and weapons on the right-hand side.

Having to hold either the right or left thumbstick to make a selection meant our control scheme would be a bit more demanding than a typical FPS, but it also meant augmentations and equipment were always only one click away at any time during the game. Seeing as the game is less »action-frantic« than most, we felt comfortable enough to experiment with this system. Sure enough, it immediately became clear that it was putting augmentations front and center, while also feeding nicely into the overall fluidity and rhythm we associated with Jensen's new »self-comfort«. We also decided to dedicate one of the shoulder buttons to the augmentations. Not only would doing this make a strong statement to players about the importance of augmentations, but it also allowed them to use their favorite augmentation smoothly and seamlessly – even while being in movement. Again, this made a tremendous difference once we started experimenting with it, and it became clear we had to embrace this direction.

In regards to the augmentations themselves, it's also important to explain where they come from: these are not »magical powers«. The experience point system, while a useful game design tool, also has to be justified in relation to the themes of the game. Although we needed to »re-spec« Jensen in order to provide players with the freedom to design him in a way that matched their playstyle, we still felt the need to explain all this through the »logistical« issues related to having augmentations. Jensen is unique in that he does not require the neuropozyne drug that prevents aug-rejection from the body, but he is still subject to brain adaptation in order to fully control his mechanical augmentations. This is how we justify the experience points system. They are a visual feedback built into Jensen's HUD to provide information about how well his brainwaves and his body are adapting to the presence of augmentations. We also made a deliberate choice to show, through his interactions with Koller, how complicated it can be to have maintenance over these augmentations. It's not a matter of simply adding or removing augmentations, and there is clearly an element of danger tied to it all.

When actually designing the augmentations, we first looked at function over form. Like much of what we do, it started with a



It was important to be able to witness how the population was affected by the events, and the overall themes, of the game. It added a sense of credibility to the world of *Deus Ex: Mankind Divided*.



The main weapons found in the game are contemporary, which means they are somewhat futuristic, but at the same time based on weapons that either exist, or might exist in the near future. Therefore, they need to reflect players' expectations about relative strengths and weaknesses.

brainstorming session and many post-it notes. We were just throwing out ideas for abilities that would be cool to have. We then took that initial set and pruned its content down based on usefulness. For instance, seeing through walls is not just something cool to do, it can prove invaluable when attempting to play stealthily. Similarly, in a world with a lot of verticality, the ability to fall from any height without taking damage is also very useful. The question we were asking ourselves at that point was: »What would players want to do and why?« We were looking at how much value we could bring in terms of interesting decisions to make, while also ensuring that all four gameplay pillars (combat, stealth, hacking, social) were represented in some way.

Once the functions had been determined, we spent a lot of effort justifying how each augmentation could be explained from a technological standpoint. We could have left it vague, but we felt that grounding our augmentations in real existing concepts would

help tremendously in fleshing out the world along with making it feel more credible. After all, since the beginning of the project, we've always said that the augmentations were the »stars of the show«. It was only natural that we took the time to really build them up and put some care into detailing them properly.

We helped maintain plausibility by doing lots of research on where technology might be heading in the next 20 years. We also employed an external consultant to ensure that any science stuff would be as close to the mark as we could make it.

Weapons

The main weapons found in the game are also contemporary, and need to reflect players' expectations about relative strengths and weaknesses. At the same time, it was very important for us to give each weapon a »job«, which is not always the case if you base yourself purely on real-life weapon values. We wanted players to switch between weapons



based on what they needed to do, each weapon on being best suited for specific situations. Ultimately, we did this by taking each weapon's attributes and elevating one or two of them, making them better than any other weapon's. For example, there's a weapon with better damage, one with a big clip-size, one with a high rate-of-fire, etc.

Once each weapon had been made unique in its own way, we balanced all other attributes accordingly. The goal was to counter-balance a weapon's strengths with some weaknesses. For example, the weapon with the best damage is given a small clip-size, or a lower rate-of-fire. Looking at DPS (damage per second) is a way for us to compare weapons, done by aggregating several attributes into a single numerical value. This comparison is not perfect, since some attributes cannot be factored in, but when coupled with other values (such as accuracy), we get a good idea of where changes are warranted to achieve the desired balance.

We validated our changes by having people play the game averaging out how much usage each weapon gets over the course of the game. If we see that one weapon is favored or

ignored disproportionately, then we go in to make changes and test again.

NPCs and AI behaviors

Having a »realistic« setting means we primarily use »human beings« as our main NPCs. We need to make them feel like they have a real purpose in the universe, other than patrolling patiently in wait of the player's arrival. They have to feel »alive« in their environment if we want to convey the narrative properly. Yet, they need to be predictable enough for players to readily identify patterns allowing them to exploit them to their advantage. This is always a bit of a quandary in game design, and one that's especially true for this game, since we essentially have two AI systems for players to interact with: one for combat and one for stealth. The challenges of designing for each are very different.

Stealth is all about detection. That was our main focus during the design process. AI can see, hear, and touch; that's how it can detect the player's presence. But from how far away? At which angle? Are attenuating factors, such as lighting, taken into account? Those are questions that can have far-reaching impacts on how players experience the game. When you think about it, the answers to these questions are invisible to players. It's not like they see an NPC's cone-of-vision and understand why they've been detected. On the contrary, vital information, such as the width and length of an NPC's vision cone, is often obfuscated, which means players can only interpret what's going on, but they never really know. Herein lies the challenge of designing for stealth. You can't just go about setting your rules based solely on difficulty or realism. You also have to keep in mind how players will interpret what they'll see, and whether they'll think it's fair or not. In fact, the more you succeed at effective and believable world building, the less players will actually see the NPCs as »detection machines«. They will start expecting regular »human« behavior, and will be disappointed if the NPCs are too mechanical.

Early on, we told ourselves that we wanted stealth to feel like a game of cat and mouse, where the player is the cat and NPCs are the mice. But for that to happen, players needed to feel in control – to understand the rules of stealth so they could act accordingly. However, since stealth can sometimes feel »opaque« in how it works, we knew we had to be careful in how we built our detection systems. A good example would be each NPC's cone-of-vision. At first, we did what reality dictated: we paired it with the NPC's head, so that the cone would move along with the head and »see« in the same direction as well. When the feature was tested with external players, the results were abysmal. Players kept getting detected without knowing why, which made



Having a »realistic« setting meant that the team mainly uses »human beings« as the main NPCs. The main goal was to make them feel like they had a real purpose in the universe, other than patrolling patiently in wait of the player's arrival.



Early on, the team decided that they wanted stealth to feel like a game of cat and mouse, where the player is the cat and NPCs are the mice. Therefore, it was important that levels featured a safe vantage point for the player to start from which, if needed, would allow a retreat at any given time.

stealth a very frustrating experience for them. After some analysis, we realized that players often misread where NPCs were actually looking, because the head was too small to see accurately at a distance. Following this, we attached the cone of vision to the torso instead. This made it easier to see from afar in which direction an NPC was pointed, and greatly improved how players fared.

The AI design for combat centered on cover. How do we get NPCs to use cover, and make them feel credible while doing it, all the while making sure they aren't too lethal? Ultimately, it came down to a series of parameters, such as distance to player, accuracy, and cover availability. We wanted NPCs to move around, but not too much. By tweaking these parameters so they were in balance, we were able to have NPCs that moved from cover to cover, either to adjust their distance from with the goal of reaching the optimal range from the player for the gun they were currently using, or staying put if the conditions were right for them. The rest came down to hit points, damage, and how many NPCs could fire at the same time.

»True« Reality is Perception, not Facts

Ultimately, the real goal is to create a »plausible« world more than a »realistic« one. By being true to our own themes and the rules of our setting, by being consistent with our characters and their relationships with the world, and by being mindful not to add elements gratuitously, we manage to create a universe which feels tangible, but which is also interesting enough for players to want to lose themselves in. We continually strive for credibility, but rarely for realism.

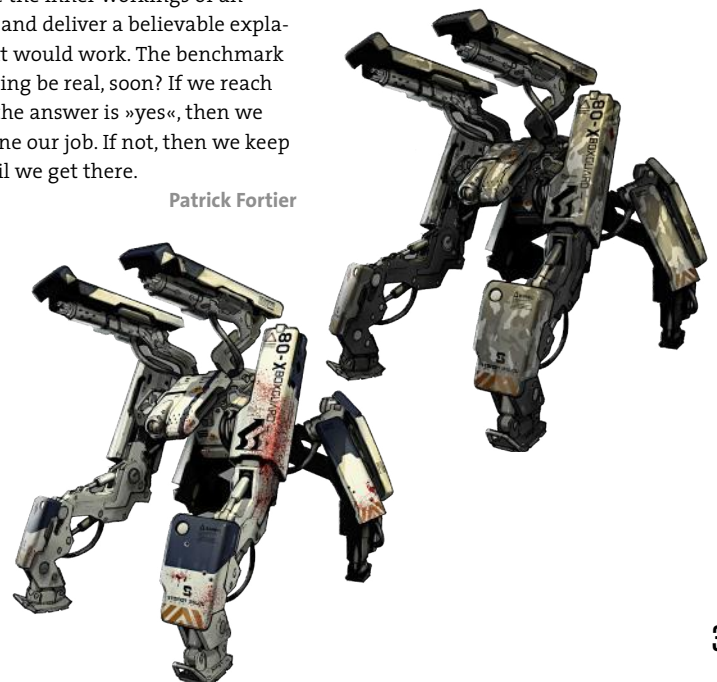
We give that leeway to ourselves when justifying our features in terms of how they would work in real-life. We accept that we can't be faithful to reality one hundred percent. The game does take place in the future, and no one truly knows what technology will



When actually designing the augmentations on Jensens arm, the team first looked at function over form, and tossed around ideas for those abilities. Once they determined which ones would be in the game, they then took the time to explain them logically.

look like twenty years from now. However, by looking at what is possible now, and where prominent experts think we are headed, we can extrapolate the inner workings of an augmentation, and deliver a believable explanation of how it would work. The benchmark is: could this thing be real, soon? If we reach a point where the answer is »yes«, then we know we've done our job. If not, then we keep on digging until we get there.

Patrick Fortier

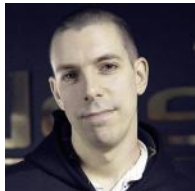




Making Games 01-02/17

HOW TO CREATE A BELIEVABLE CYBERPUNK WORLD

The Art Director of Deus Ex: Mankind Divided explains how he and his team created a futuristic, but believable cyberpunk world. He also explains how Medieval times, as well as color schemes, are critical elements to making this type of world come to life.



Martin Dubeau
is Art Director
at Eidos-Montréal.

Martin started his career almost 20 years ago as Lead 2D Artist for Behaviour Interactive, working on PlayStation, PC, and Dreamcast games for Konami, Disney, and Infogrames. Some years later, after briefly working for Digital-Fiction, he joined Ubisoft, working as the Art Director on the Splinter Cell franchise. In 2007, he joined the Deus Ex: Human Revolution team as the Technical Art Director, switching to Production Manager in 2008. In 2011, he finally went back to art, taking on his current position as Art Director.

[@TheNameless](#)

To give you a bit of background about myself: I worked as Production Manager on Human Revolution, but my previous experience in video games was in art direction. The perspective of going back to my earlier interests was enticing, and the opportunity presented itself. Thus, I took the role, fully conscious of the huge challenge that lay ahead of me.

Following the release of Deus Ex: Human Revolution and a well-deserved rest, we started creating what we know today as Deus Ex: Mankind Divided. Morale was at an all-time high: Human Revolution's critical acclaim literally gave us wings.

Everything came together quickly. Some members of the team got new responsibilities, while new directors joined. New technologies were being developed. A lot of «new» that we needed to get used to. Sometimes, I had the feeling we were making the same mistakes we made a few years back, during Human Revolution. As the Spanish philosopher George Santayana once said: «Those who do not remember the past are condemned to repeat it.»

The first two years were rather difficult, and we had to course correct a few times during

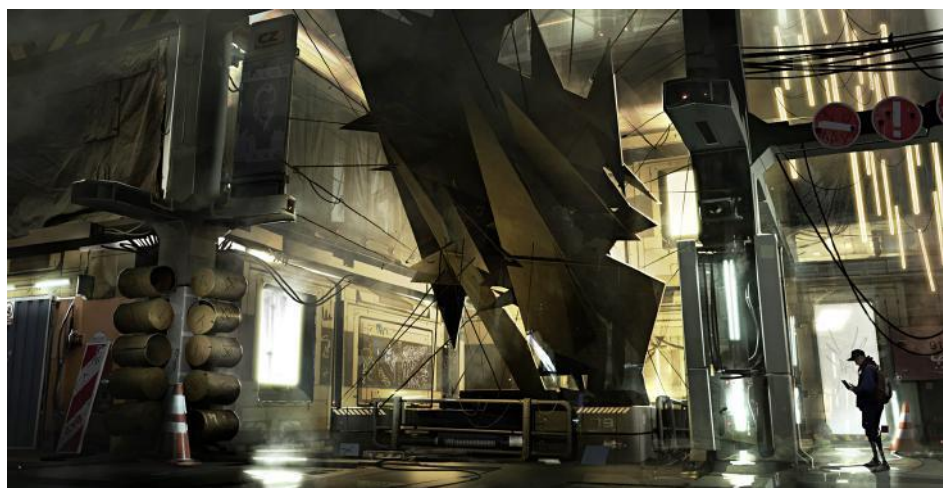
the project – sometimes to a drastic extent. Having to throw away some of your work can be very unnerving, especially when you've poured your heart into it. In the end, these changes allowed us to improve the final game, and we all learned a lot. Despite those challenges, the team soldiered on and eventually developed great chemistry.

In retrospect, the artistic production went along quite well. Of course, we had to face





Early concept art for Deus Ex: Mankind Divided.



Deus Ex takes place in a futuristic, but believable cyberpunk world.

some occasional challenges. Don't be mistaken: a production of this scope isn't always rainbows and butterflies. Thankfully, despite these challenges, the talent, and professionalism of our art team always managed to take us where we needed to be, with a tremendous degree of quality.

Art Direction

In terms of art direction, my goal was to bring a new visual workmanship to this dystopia, while staying faithful to the previously established basis. With the segregation of augmented citizens as a central theme, we were dealing with a much darker setting than the previous title. I had to find a way to visually support and amplify this message.

Very early on, we explored visual language cues derived from the Middle Ages (see Corporate Feudalism below). It represented a nice regression from the Cyber-Renaissance setting seen in our previous title. With a societal collapse as the running narrative, our visual universe had all the reasons to offer more contrasts and to make different elements clash together.

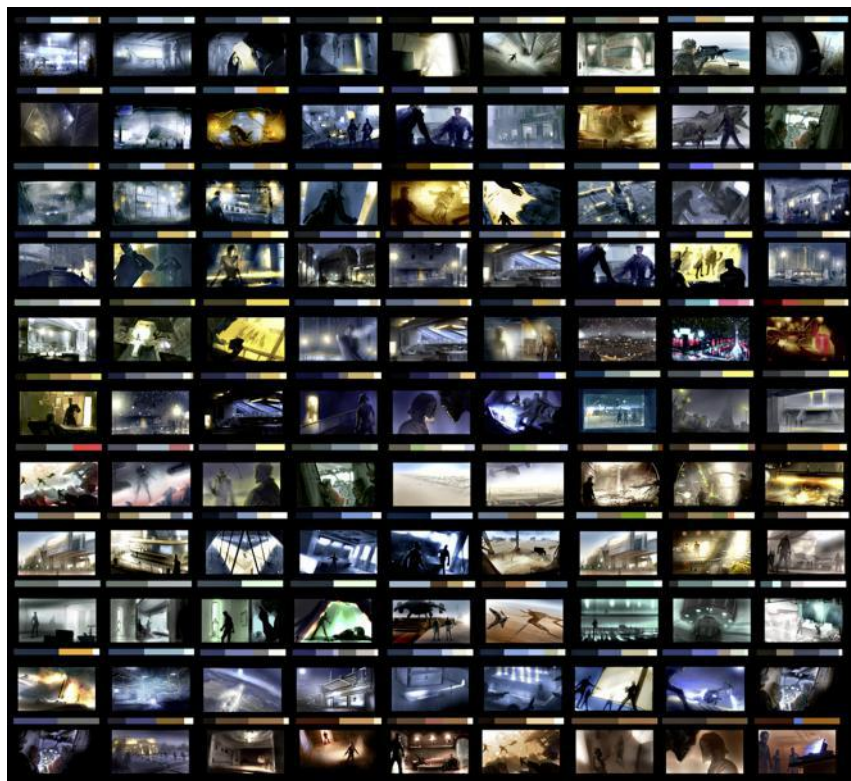
Here are a few examples illustrating this contrast:

- An alluring touristic district during the day, becomes a red light district during the night.
- The immensity of the Utulek Complex (aka Golem City) conflicting with the narrow streets of Prague.
- The juxtaposition of anti-Aug and pro-Aug characters.
- The Cyber-Renaissance and the Corporate-Feudalism stylistics.
- Prague's old architecture versus its modern architecture.
- An environment where you only find corpses under a paradisiac sun.

My associate Dominique Demers and I thought long and hard about the role colour would play in the cinematography of the game. We knew that Human Revolution's use of the colour gold was an integral part of its visual signature, and therefore part of its brand. We were both convinced we could use the colorimetric spectrum to translate the emotions we wanted to evoke. Regardless of the established look of the Deus Ex universe,



This image represents concept art for a street in Prague, one that featured shops during the day, but transformed into the red light district during the night.



Here you see the color script from Mankind Divided. The team wanted to create its own visual language to evoke certain emotions.

with fresh themes and a new narrative in hand, we set out to develop our own visual language. We accomplished this by creating a full portrait of the game as colored vignettes (something we call a color script). The beauty of this process is that, during our exploration, we found an emotional justification to include the signature gold from Human Revolution. This allowed us to support the memory of its era throughout Mankind Divided.

The Tour de Force of Designing a Credible Future

Since our intention was to create a credible but dark near-future setting, we needed to

constantly inform ourselves and identify key aspects from different creative fields: architecture, sociology, mechanics, urban design, fashion design, interior design, product design, and so on. It wasn't an easy task, considering all these fields require the absorption of very wide breadths of knowledge; something that would prove difficult under a tight production schedule. From all these fields comes a multitude of precise rules. People subconsciously assimilate many of these visual rules from their environment. It is impressive how a spectator, without being able to give concrete explanations, will notice when these rules are broken, feeling that something isn't right or seems like fantasy.

In order for us to »keep up«, one solution was to specialize each concept artist in a specific field, to ensure a homogeneity and a visual consistency, which helped support and maintain the credibility of each and every one of the artistic assets.

It was critical at this stage for us to develop our own interpretation of the future, which was achieved by drawing from current facts and trends. This was a much more daunting task than pulling already existing interpretations from another creative field (cinema, comics, etc.).

Corporate Feudalism, a post Cyber-Renaissance Era

The Cyber-Renaissance, a visual metaphor representing the golden era of augmentations, was now part of the past. However, the idea came up to create a signature contrast with this movement. In the era where social fracture, mysticism, and extremism became a reality, everything was in place to portray this regression towards Corporate Feudalism.

The concepts of emotion, creativity, substance, and elegance are replaced by those of reason, fear, dogmas, and function. That's why, early on in the process, we were drawn to cold, raw, and opaque materials to symbolize this regression.

Two more pieces of artwork, the left detailing a section of the Swiss Alps from the game, and the right showing off Deus Ex: Mankind Divided's futuristic interpretation of Prague.



Prague was an excellent city to develop this direction. Its secular, modern – almost brutalist – architecture offered a perfect foundation for the juxtaposition of monuments. It would have been a big mistake to completely modernize the city, considering the richness that has been organically created from contrasts from in its history, of which we were able to take advantage.

One other important aspect of the Corporate Feudalism was the design of characters; more specifically the police force.

In our previous game, we often represented combatants' specific abilities with intracorporal modifications. Our visual approach of representing a technological regression didn't fit with this idea anymore.

As a reference, we used knights from the medieval era. They were an excellent source of inspiration for the regression happening in the world of Deus Ex, and were in direct alignment with our Corporate Feudalism codes. We then replaced augmentations with exo-skeletal elements, signaling an even further step back.

Advice

Here is a list of practical tips I learned over time. I hope they can be of some use to you:

- Take a minute to listen to the less vocal members of the team. Just because they are quiet, doesn't mean they don't have some profoundly useful insights/feedback.
- Surround yourself with people better than yourself and treat them as such.
- Trust yourself and always stay true to the established visual foundations. Over the long course of a production, it's actually quite easy to find yourself wandering off course. If you're not careful, you could find yourself making a completely dull game, devoid of all the amazing direction you planned.
- During the design phase, defining what you DON'T want is just as important as defining the things you DO want. This will help clari-



During the early stages of defining the art direction for the game, the team became drawn to cold, raw, and opaque materials.

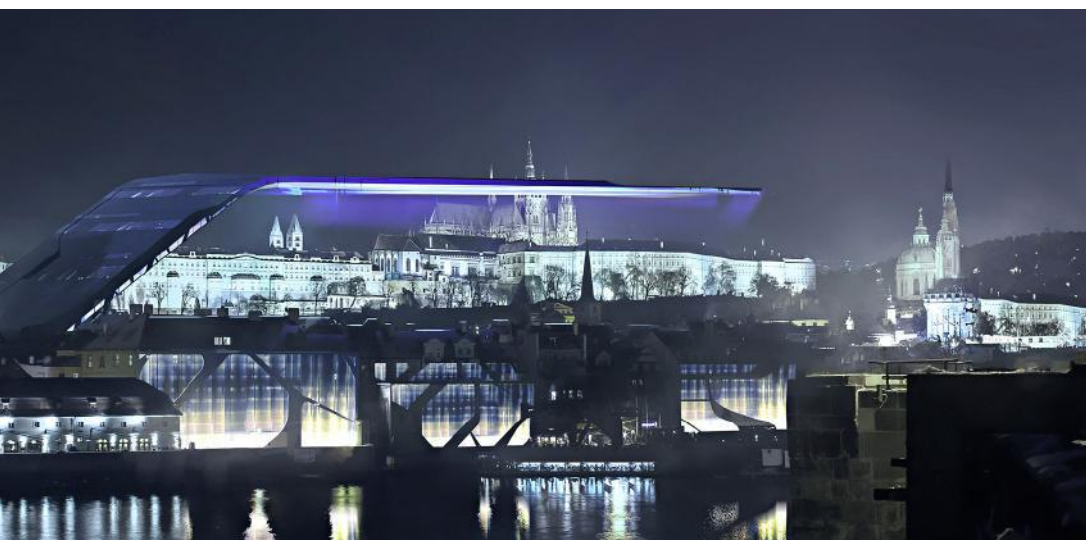
fy the creative limits more precisely (this will be your sandbox).

- Self-censorship, based on your production knowledge, can deceive you. Don't be afraid to push into uncharted and/or uncomfortable territory.
- Make sure your art direction, and the graphics technology backing it, will still be relevant upon release, particularly when comparing it to the competition. Plan for the future ...

Finally

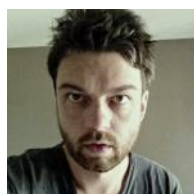
I wish to thank, for their invaluable help, my associates, my art directors, concept artists, level artists, lighting artists, character artists, VFX artists, as well as the marketing team and all the managers who made sure this was a well-oiled machine.

Martin Dubeau



GPU FRAME EXPLORATION IN DEUS EX: MANKIND DIVIDED

Eidos-Montréal's Lead Rendering Programmer goes into detail on how their engine renders a single frame in Deus Ex: Mankind Divided, along with how many steps are necessary to create the final image.



Jean-François Dufort
is Lead Rendering Programmer
at Eidos-Montréal.

Jean-François is passionate about 3D rendering and simulation, and has a strong background in computer graphics, which includes rendering, modeling, or image processing/post-processing effects for movies and video games. Before joining Eidos-Montréal, he had been active in industrial and academic R&D to develop techniques for offline rendering. In 2011, he joined the team at Eidos-Montréal as a Senior Graphics Programmer, but has since become the Lead Rendering Programmer, a position he has held since 2012.

One of the greatest feelings in video game development is to witness the different visual elements coming to life, one layer at a time, to create a rich entertaining scene within a couple of milliseconds. The underlying equations and mathematical models working together to simulate what we see with our own eyes, but reproduced inside a little metallic box for pure enjoyment, greatly nourish one's curiosity and sense of wonder. On top of that, when used accordingly, the same rendering steps put in the hands of artists can convey a message and touch millions of people that thrive for the final images.

Those are the different challenges, and excitement, I was looking for when I started my career and studies in rendering. Being on the mathematical side of the spectrum, I had to fully understand the different ingredients that went into the creation of those pretty images we see in the digital world.

In this article, we embark on a very short journey ... 33 milliseconds long to be precise. We would essentially like to provide you with an overview of a typical Deus Ex: Mankind Divided (DXMD) rendered frame. We will describe the different render passes, in chronological order from beginning to end, that went into creating the final image seen on screen, providing a description of each pass and its purpose. We will also add some inside information regarding the history of DXMD's production,

along with how it influenced what you ended up seeing on screen. Ready? Go!

At First, There Was Geometry

As we all know, the backbone of any image rendered in real-time is a lot of triangles. The efficient processing of those triangles is essential to reach our performance goals, without sacrificing the visual quality of our 3D models. The first part of our frame is used to compute different kinds of geometric information. While most of the game assets are static elements, some of them use different animation technologies (clothing, hair, empir-



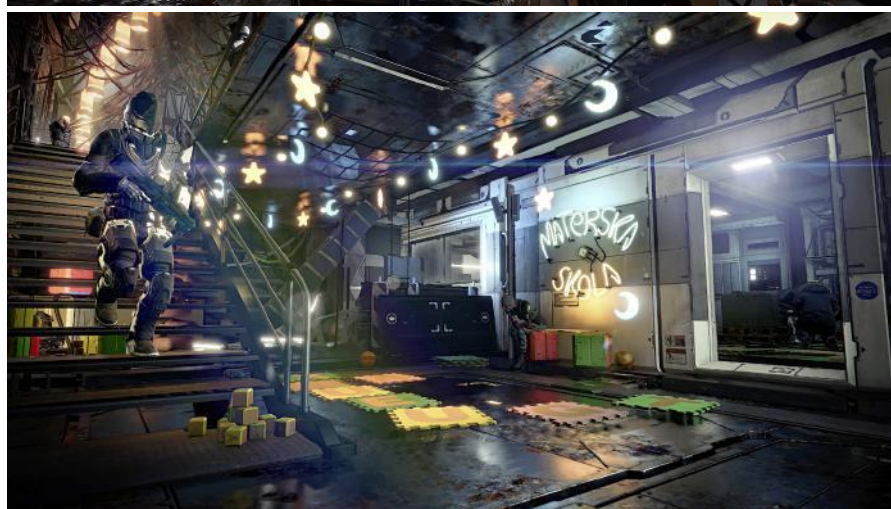
ical animation, skinning). Also, there's a great deal of information that we need to acquire from the geometry itself to feed the lighting passes later down the pipeline.

First, we launch a couple of compute shader jobs to process noisy animations and hair. The noisy animation system is a very lightweight animation tool, designed to simulate natural, noisy movements that we witness in nature. The basic idea behind it is to have a sum of sinusoidal waves with different frequencies, phases, and amplitudes to move vertices around, giving the appearance of natural oscillation. Of course, these parameters can be modulated with geometric data, like per-vertex weight, to mimic hooks and attach constraints. While very simplistic, our artists used this tool to imitate wind and other disturbances on fabric-like models.

Hair simulation is an in-house technology, based on AMD's TressFX, which decouples the hair simulation from the actual rendered hair strands. While noise simulation for hair has been used before in video games, a real hair simulation algorithm provides much better results for our characters.

Our engine uses a fat g-buffer, without a depth pre-pass, to find the visible surfaces that need to be shaded. We chose to decouple the processing of the aforementioned vertices jobs from our main geometry pass, mainly because we wanted more granularity in jobs, in effect making better use of the asynchronous nature of modern GPU's. However, our traditional skinning of geometry happens during the vertex shader stage of the g-buffer pass, but we're exploring ways to reduce the vertex shader stage in favor of more compute shaders.

Our g-buffer contains all the information required by our lighting model to shade the pixels: depth, normal, albedo, reflectance, roughness, etc. Our main objective when going from IO Interactive's Glacier 2 to Eidos-Montréal's Dawn Engine was to improve physically based shading. While we changed the lighting



The team implemented a collection of specialized lighting shaders (shading models) that split incoming light between direct lighting and indirect lighting.

algorithm (more details on that later), we kept the g-buffer approach. Each object is being rendered in multiple render targets, encoding the required data on the fly.

While most of the data can be precisely and directly stored in our render targets, midway in



Artistic decisions and performance constraints may limit what the team was able to achieve, but Deus Ex: Mankind Divided was still designed to deliver the best possible experience to the players.



production, we noticed a lot of artifacts in our lighting using a naïve normal encoding strategy, mainly because of numerical imprecision and the usage of the wrong numerical range. To fix that, we switched to octahedral normal encoding. It's a clever trick to maximize the bit usage in a three component vector. Essentially, we transform the vector in a different base, mapping each normal vector to the faces of an octahedron instead of a sphere.

In opaque geometry rendering, we need to render front to back to populate the depth buffer and to reject occluded pixels at an early stage. Furthermore, an important portion of the screen is covered by opaque first person geometry, like the gun, so we render that part first, using the stencil test to reject geometry that is otherwise hidden behind it. Our semi-transparent HUD prevents us from using the same strategy with user interface elements, but it's something to consider for future production, depending on specific needs.

Finally, our g-buffer pass is used to blend and modulate the content of existing geometry, increasing visual complexity without raising the cost of geometric processing. Some good examples of this are decals that are added on top of geometry, where either the diffuse albedo or the normal to simulation variation of the underlying surface is changed, all without paying the price of fully rendering it again (or tessellate it to the extent of the decal details). The last type of blending we implemented is something we call soft intersection. It is used when we want to blend very fine details, like granular materials (e.g. sand or snow), on top of opaque geometry, without using alpha blending. In real alpha blending, we would light both the ground material and the top layer, then blend the result. Instead, to achieve a similar effect, we blend the overlaying matter with the destination g-buffer content based on distance, and only light the resulting pixel in the lighting pass. The result

is that, when the granular material is »far« from the main environment geometry, we use its full information for shading. However, as it gets closer to it, we will gradually blend its shading info with the g-buffer material properties for final shading.

Before we move on to the actual lighting system, we must add three other layers of information that are closer to our production needs. First of all, we render in another buffer: the velocity of objects during the current frame. The velocity is used for motion blur on our PC version, but is also used during our anti-aliasing pass to project the pixels of the current frame into the previous frame buffers. Characters are pushing the last two pieces of information. To get an approximation of skin thickness, we render the skin portion a second time, which is used in subsurface scattering. Finally, all pixels covered by characters are specially flagged to be artificially lit by a dim aura, adding a subtle contrast between characters in dark sections of the game and the characters themselves, mainly for gameplay reasons.

All these geometry passes could eat a huge portion of our 33 millisecond budget, but thanks to efficient visibility culling, we only spend precious clock cycles on visible geometry. In DXMD, visibility culling is performed by Umbra's Occlusion Culling SDK. Taking the static environment as an input, the software computes a data structure, which can be queried in runtime, to know which models are visible. Therefore, only the visible objects are sent to the GPU pipeline. Our runtime queries use the static scene, along with a combination of bounding volumes, for dynamic geometries. The dynamic models are sorted in a coarse spatial structure. These high-level cells can be checked for visibility against the low-resolution occlusion buffer provided by Umbra.

Let There Be Light

Now that we know all about the visible geometry in the scene, it's time to add some lighting effects and shade the pixels. As previously mentioned, physically based rendering was very important to us when nailing the material tangibility required by our game. To achieve this, we implemented a collection of specialized lighting shaders (shading models), splitting incoming light between direct lighting and indirect lighting.

In rendering, we often approximate lighting interaction with a linear combination of different phenomena. Energy emits from light sources, then it interacts with surfaces by being reflected, absorbed, or transmitted until we measure it using a sensor. In our engine, we categorized all light interactions as either direct or indirect lighting. The lighting pass accumulates all light that reaches the eye in an additive buffer, with the stored value being loosely based on radiance, then it is split in RGB channels.



Graphics quality in Deus Ex: Mankind Divided not only improved in terms of visuals when compared to Deus Ex: Human Revolution, but also in terms of details and the interactivity of objects.

Direct lighting is the light that has exactly one interaction between emission and measurement (or zero interaction when the camera is looking straight at an emissive object). In DXMD, direct lighting for opaque objects is implemented with a tiled lighting approach, with specialized shaders being used for particles, skin, hair, and alpha blended objects.

The tiled lighting algorithm consists of creating 3D frustums of space, bounded by 8 by 8 pixel wide tiles on screen, and the min/max depths of the tile in the view space. Each frustum is a little bounding box of geometric content in the world, and we can perform intersection tests against the light sources in the game with them. Each tile collects all light sources that affect it in a gathering phase. Then, in the shading phase, we use all of the lighting information to shade visible pixels within the tile. Since this pass is only used for opaque geometry, we use a simple shading model based on Cook-Torrance BRDF, using material roughness and reflectance to compute radiance reaching the eye. Since it uses a more complex BRDF, skin is the only opaque exception to this rule, which will be described later.

The data structure we build for opaque tiled lighting is used again to create two extra sets of light collections. The first one creates frustum in the same fashion, but is split in the z direction with multiple planes. We end up with more frustum covering the full eye frustum in 3D, and can use it to light alpha blended objects. Each alpha blended material has an extra alpha component to simulate light transmission. Before we reflect visible light on an alpha blended object, we remove the proportion of light (1-alpha percent) that passes through. The balance is used as incoming radiance for the same BRDF as opaque objects. Of course, light transmission is computed both ways, and light entering from behind and hitting the camera is approximated by the traditional alpha blended equation, with a back to front sort. The second data structure for light query we create is a very low resolution grid, comprised of spherical harmonic probes, to create lighting for particles and rain. The net effect is that, in a 3D grid covering the whole world, very dense particles can use a fast lookup to get an approximation of the incident light.

Skin and hair are given special treatment in the engine. During the opaque pass, skin shading simulated subsurface scattering, achieved by changing the Lambertian term of the BRDF with a precomputed equation, integrates shades of red on the surfaces that are not pointing directly in the normal direction of the light. Also, to further create attraction points for the player eyes, characters are artificially lit with specular highlights of non-existing lights. While this completely breaks energy conservation, it makes characters more interesting from a gameplay mechanic point of view. Comparatively, careful integration of hair had to be done



The team even worked on completely new technologies, such as a sophisticated hair simulation for Adam Jensen.

in the scene because of its very fine nature. Hair polygons are rendered, but in order to be lit, only the first two hair strands per pixel are kept in a data structure. The assumption here is that the most important part of hair lighting happens between those two layers, and the rest can be approximated with a constant. Finally, the two shaded pieces of hair can be blended within a pixel to reduce aliasing. Just like the skin, hair shading uses its own BRDF augmented with an explicit anisotropic term.

When sampling the light source to compute lighting, we have to use a visibility term to prevent adding light that doesn't reach the surface from being shaded (shadowing). In DXMD, we decoupled light sources from shadow casters, allowing artists to bind many light sources to one shadow casting transformation. While it distorts the shadow, it's a very efficient optimization, and simulates many shadow casting lights with only one shadow map. To optimize further, we kept static shadow maps in a special cache and reused them to update the dynamic occluders, frame



after frame, without computation. This allows us to easily integrate the shadow map update to our LOD system, preventing the dynamic update of shadows that are far away from the player. For indirect lighting, the occlusion term is usually approximated with some form of ambient occlusion, losing directional information (i.e. it's integrated over hemisphere above the surface). Our screen-space ambient occlusion (SSAO) algorithm, removes some of the indirect lighting in the scene while still keeping the direct light contribution intact. A common complaint from artists was the lack of contact of some objects on their support, especially when lit by a non-shadow casting light (for performance reasons). To reduce these artifacts, we created a directional occlusion that could be applied on direct lights, and used the SSAO on indirect light. In the end, we decided to combine the two occlusion passes and apply it on all light sources, which helped to reduce GPU costs. Objects feel more grounded with this cheat, even though it removes energy where it shouldn't.

We categorized energy in indirect lighting when it went under more than one interaction before reaching the sensor (eye, camera). To

simplify the lighting equations, we again split the indirect lighting into diffuse (or ambient) and specular lighting, done in order to mirror the two parts of our main BRDF.

Diffuse indirect lighting is baked into a collection of high density spherical harmonic probes. Offline, we automatically populate the scene with thousands of cube maps, convolved with a perfectly diffused BRDF, and project them into spherical harmonic space. At runtime, each visible pixel queries the spatial data structure of probes, identifying which are the closest, and then interpolates its diffuse indirect lighting term using its normal as a parameter.

The specular highlights are collected from four different subsystems that, from a spatial point of view, are increasingly coherent. With a custom cube map applied on the material, very important objects can completely override the indirect specular reflections. Unfortunately, this breaks the dependency between the materials final look and the lighting conditions, but in highly controlled scenes where the reflections are very important, it may be desirable. If the material doesn't override specular reflection, we rely on other algorithms to compute indirect specular reflections. Screen-space reflection (SSR) uses a clever ray-tracing algorithm in screen-space to try and fetch the correct indirect reflected color. In our implementation of SSR, we shoot many rays in a cone, with width dependent on the roughness of the material, and average their hit color using the BRDF of the material. While this approach can lead to some noise (reduced by the temporal antialiasing), it has the advantages of reducing false intersections. In the event that SSR fails to provide a hit, we must rely on a cube map at the pixel location, fetched in the mirror direction of the view vector. Cube maps are placed in the scene by the artists, and different mip-map levels encode pre-filtered versions of the environments, resulting in different roughness parameters. The final indirect specular light sources that are placed in the scene are impostor reflectors, forcing some reflections to appear independently of the scene content.

The algorithms we implemented were a series of compromises between energy conservation and artistic visual goals. Until now, we always assumed that radiance was constant in space, and no energy was lost or scattered from emitter to surfaces. An important aspect of DXMD's art direction was light scattering within the environment. During production, we implemented many different algorithms to support single scattering of light (i.e. emitted light scattering only once toward sensor in a participating medium). The early prototypes relied on analytical solutions, but were too constraining. Instead of the scattering itself, we also tried using a shadow volume approach to extrude light occlusions, simu-



For the release of Sony's PlayStation 4 Pro, the team released an update providing support for both HDR and 4K resolution.

lating the »absence of scattering«. Results were interesting, but suffered from artifacts due to tessellation of the extruded volumes. The final two approaches we tried were a raymarching approach in a pixel shader, in which scattered light would have a numeric integration, and a light diffusion inside a 3D grid that was aligned on camera, similar to light propagation volumes for real-time global illumination. The raymarching would step N times in the participating medium, adding contribution of in-scattered light, and removing absorbed light all along the ray. Despite the results being extremely precise following real single-scattering equations, the trade-off was to drop both this technique, and some precision, in favor of having more scattering light. In turn, we ended up using the light diffusion algorithm, as the GPU costs were lower for a greater number of lights.

Let's manipulate those Pixels

If we would stop the rendering of our frame here, we would show the player a radiance buffer in energy space without any alteration. The Dawn Engine offers multiple tools to manipulate the final displayed color on screen, based on the energy computed during lighting. Some of these tools add fake effects on screen, others manipulate the frequencies of the final image, and the last category adds extra information to the player.

Before it can be displayed, the image has to go through a tone mapping operator, which serves the purpose of remapping the wide range of energy in the scene into a displayable range on regular monitors, or even HDR TVs on more recent hardware. This step converts the energy values into colors that can be manipulated with color LUTs. Also, depending on the energy values, we artificially add lens flares, glares, chromatic aberration, and other lens based artifacts that augment the feeling of seeing the game through a camera. These manipulations increase immersion from a cinematographic point of view, but also influence the emotional response of the player when, based on the game state, contrasts or tints are added to the scene (i.e. high intensity leads to more contrasts or warmer tones).

Because we use no hardware support for multisampling, the image needs proper in-house anti-aliasing. Our implementation is a temporal anti-aliasing solution, where every pixel of the current frame is projected back in previous frames, and is then blended, with some weight of confidence, according to how much we're correctly blending spatially coherent data or just blending in wrong values. For example, wrong values could appear because of trying to fetch the color of a surface that wasn't visible in previous frames. The heart of our temporal anti-aliasing resides in a good metric to decide how much to blend the current pixel color (which is always valid)



On the PlayStation 4 Pro, the overall resolution has been increased, aliasing reduced, all without compromising the frame rate or the overall gaming experience.

with the previous frame's pixel value (which could potentially be wrong). All this blending removes the very high frequencies from the frame to prevent under sampling and aliasing artifacts, but it can be very aggressive. To counter balance it, we added a little sharpening filter to boost high frequencies that are still visible in the anti-aliased frame.

The final image manipulation we add on top is solely used for gameplay purposes. Some effects are needed to guide the player in his many options that DXMD offer. For example, depending on the choices of augmentations the player unlocks during their play through, we added some UI elements on screen, such as outlining objects that can be interacted with (e.g. ammo, cabinets, etc.). We even transformed the colors of objects, based on their types, to clearly show where the threats were on screen, or where the weak points of enemies were located.

Conclusion

There we go! It was a long short journey from simple polygon description to final pixel color on the screen. Remember that most of the choices were guided by artistic decisions and performance constraints, but all with the goal of ensuring the vision of delivering the best possible experience to our fans, within the 33 millisecond rendering time constraint, was achieved. In order to create the great images our players expect to see, we continue to upgrade our rendering technology, with the goal of using it in our future projects. Of course, when we play and enjoy the game, we don't think and analyze all these details in real-time. One can sit back and enjoy the final result and play the game as, in the end, it matters most. However, we hope you enjoyed the ride with us as we went down the GPU pipeline of one frame of Deus Ex: Mankind Divided.

Jean-François Dufort



FABRAZ

A STORY OF DEVELOPMENT

Fabian Rastorfer explains how he and some friends founded their own studio in New York, and how one idea evolved over time to represent entire worlds.



Fabian Rastorfer
is Founder of Fabraz.

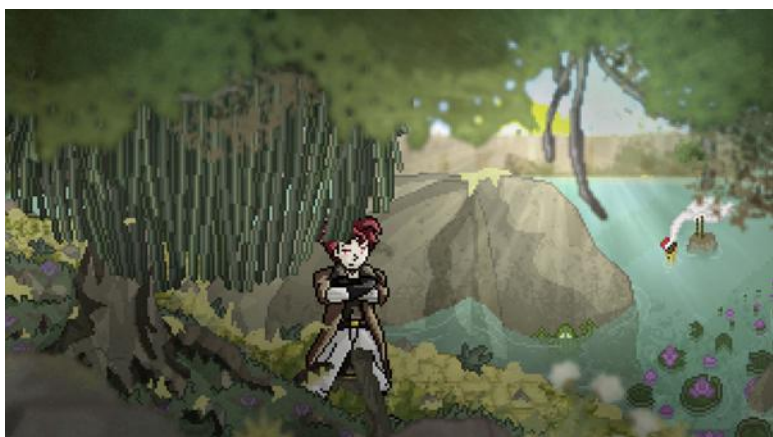
Fabian Rastorfer, Swiss by passport, grew up in international environments. He attended primary school in Cologne, continued his education in an International High School in Zurich and then graduated from Parsons in New York. Fabian founded Fabraz and actively works on all projects associated to the company. His primary skills are game design, graphic design and marketing.

When we were first approached for this article, we were asked one simple question: What is Fabraz? Fabraz is a video game company, but there's more to it than that. At its heart, Fabraz is a collection of developers with a passion, but it's also a collection of stories and worlds to many of our players. Worlds like those of our award-nominated »Cannon Crasha« or »Planet Diver«, enjoyed and explored by thousands worldwide. Most of all, Fabraz is simply fun (Trademark pending?!). To define what

Fabraz truly is, we'd like to talk about how we got here and where Fabraz is heading next.

The closest Thing to Magic

At the beginning Fabraz wasn't any of the above, there was just me, a lil' kid called Fabian Rastorfer who really enjoyed video games. A kid who'd ride his bike as quickly as he could after school to play some »Super Mario World« or »Pocky & Rocky« with his best friend. There was just something about video games that seemed magical to me. One of my father's favorite anecdotes is when he asked me whether I wanted to become an artist, noting how much



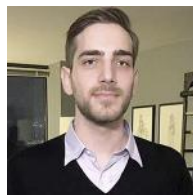
A large poster showcasing the diverse and eccentric cast of Wild Wild Pixel (left) and one ingame screenshot showing a character in the swamp (right).

I sketched in my notebook during classes. My answer, apparently, was this: »Drawings are not enough to be entertaining.« He asked me what I meant by that after which I followed up with: »Today people want more than just drawings, they want moving images, music and sounds, they want to move in them!« And that's the key, really. Video games can put you in a space, they allow you to interpret that space but they also invite you into that space. A video game can tell a story like no other. It doesn't even necessarily need text or voices, the simple fact that a player can interact in an environment allows the player to derive context from it. It's ... the closest to magic, really. Little did I know that this was my first step towards becoming a full time, self-employed video game developer. The next was calling my character in »World of Warcraft« »Fabraz«, a combination of the first three letters of my first and last name. FABian RASstorfer. The S was changed to a Z, ironically, because I created a second character after Fabraz.

Hundreds of Practices – and one Team to meet them all

I continued using Fabraz as a personal alias for all of my artwork up until High School, when the itch to create larger worlds and tell stories became strong enough for me to start my own webcomic called »The Tale of Aeria« in 2010. I wrote an entire manuscript and teamed up with an artist online called Songwut Ouppakarndee to release a page every week. The protagonist? Why, Fabraz of course! Suddenly Fabraz moved on from being my alias to having his own identity, Fabraz was now a character. A character that people started identifying with, who people followed every week to see what happened next. This was a fundamental change in how I, and the outward facing public, perceived the name Fabraz. The Tale of Aeria still runs strong today, with over 2,500 readers every day enjoying Fabraz' shenanigans. A webcomic was the first channel I needed to create worlds but it wasn't enough. The next logical step was to finally

The Team



Ben Miller: Ben Miller, American by passport, grew up in Boston. He acquired a bachelor from Eugene Lang and graduated with a masters from Parsons in New York. He became the second core half of Fabraz during the work on Planet Diver. His primary skills are game design, programming and puns.



Edgar Castro: Edgar Castro, American by passport, grew up in the Bronx. He graduated with a Design & Technology Bachelors from Parsons in New York. He was the primary tester for Fabraz first, but thanks to his design sensibilities, eventually joined the core team of Fabraz. His primary skills are level design, game testing and being the neutral arbiter between Fabian and Ben.



Markus Jost: Markus Jost, Swiss by passport, grew up in Zurich. He graduated from the University of Zurich with an Information Technology degree and worked with Microsoft Research on the »Path of Go«. He was the second half of the core team working on Cannon Crasha. His primary skills are game design, programming and being relentless about 60 fps.



Songwut Ouppakarndee: Songwut Ouppakarndee grew up near Bangkok, Thailand. He's done several breathtaking projects, involving anime and manga, and is the primary artist behind the Tale of Aeria. His primary skills are illustration, animation and a keen sense of narrative structure.

take the first leap towards proper video game development. I came up with a concept of two castles facing each other with a comically large cannon trying to destroy each other as quickly as possible, which eventually took shape as the game called Cannon Crasha. I wanted to see whether the concept had merit, so I posted some style frames to reddit.

An Idea only truly comes to Live once there is an Audience to appreciate it

It reached the frontpage within two hours, gaining over two hundred thousand views. This was all the confirmation I needed and I started seeking out a partner to work with. I was lucky beyond words to have met Markus Jost online,



Screenshots from the game The Silhouetted Sovereign where the character is to encounter the mysterious being of the crown (left) and is looking upon a lost soul (right).

The left image shows the introductory cutscene of Mutiny on Samovar, while the right image is set aboard the Mutiny space station, seconds before our two soldiers try to outmaneuver each other.



an established and experienced game developer, who decided to team up with me. During those one and a half years of development, the game grew in scope, and our team grew with the inclusion of the two composers Mischa Perella and Red Ochsenbein. Now Fabraz was no longer my alias, nor was it simply a character. Fabraz now represented a group of people! This was another major change in how Fabraz was perceived and that became particularly clear when we were invited by Pro Helvetia to show off Cannon Crasha at the Tokyo Game Show in 2013. Journalists referred to Fabraz as a group of people, players asked if Fabraz had made any other games together. It was fundamentally exciting to see this shift occur, as it made Fabraz larger than life to all of us. Cannon Crasha released as a one dollar title in 2013. The game has been downloaded over 80k times since then and that number

jumps significantly if you include pirated copies. It was nominated by Apple numerous times. It was a huge success!

Finding the right Partner(s) is Key for Success

During the last few months of development, I met Ben Miller in my college classes at Parsons in New York. He joined Cannon Crasha as one of the primary testers, and we quickly noticed how well we work together. In my mind, that was the next stroke of luck when it comes to Fabraz' history. Finding the right partner to team up on for these huge projects is very rare and Ben brought a new identity and perspective to Fabraz that was both challenging and infinitely rewarding. This was only reaffirmed through a collection of smaller game projects that we worked on together for fun, such as

The Tale of Aeria

The Tale of Aeria is set in a world occupied by endless sky. Scientifically-minded humans survive as nomads, wandering these endless skies until discovering a new home in the floating island of Aeria. However the island already has residents – the spiritual race of

beast-folk called the Amarog. The two races clash in a great war, leaving the Amarog as second-class citizens. The story-proper begins hundreds of years after this conflict, following Fabraz, a unique human able to make use of the Amarog's shamanistic powers.

Fabraz could care less about this distinction however, content with his carefree life with his adoptive family: the Jackal Sky pirates. Yet, all good things must end, and his powers will carry him through tragedy and into adventure.



The Games of Fabraz

CANNON CRASHA



Cannon Crasha: Two opposing castles on one battlefield. Destroy each other with a comically large cannon, armed units and an armada of spells! See the destruction on each castle in real time and strategize your cannon shots by using the right artillery, watching the constantly shifting wind, and aiming for the essential parts of your enemies castle! Up the ante by rushing towards your enemies with strategically summoned armed units, and react to the enemy's actions with defensive maneuvers and spells!

PLANET DIVER



Planet Diver: Planet Diver is about an adventurous daredevil tackling her newest obsession: Interstellar wingsuit diving. With her close robotic companion Buddy she'll travel across space to seek out the most dangerous planets and their respective chasms to dive in.

SLIME SAN



Slime-san: Slime-san was minding his own business, sliming around in a peaceful forest when suddenly ... A giant worm appeared and gobbled him up! Now deep within the worm's belly, Slime-san has to face a difficult decision: Be digested by the incoming wall of stomach acid ... Or jump, slide and slime his way through the worms intestines and back out its mouth.

»Wild Wild Pixel« and »Silhouetted Sovereign«, which we show off on our website, and we both decided to file a company together after graduation – the final step.

One is never enough – when creating Worlds becomes Part of your Life

Fabraz now represented a group of people across the world, it now was a company that created games. Soon we were joined by Edgar Castro, another classmate turned game developer from Parsons. We moved into an office space and started up our now industry-standard 10 to 12 hours a day schedule. We worked intently on old projects and new large projects or jam games. We were and continue to be excited to create the games we're passionate

about. It was around the time we got settled into our new office when we came up with our next game: Planet Diver – a game about a daredevil addicted to wingsuit diving in space!

This game was meant to be a multi-platform release from the start – a lofty goal, releasing both on mobile and PC at launch. We had to iterate on the core game concept several times to get past many of the hurdles we encountered. For one, we wanted to create a game that can be played with one hand on the subway, yet, remains engaging and challenging on PC. The obvious answer was an endless runner, but the genre was already too well trodden, so how did we differentiate ourselves from others? Control over how fast you went instead of it being the primary escalation of difficulty. Missions that

Screenshots from Andari Prime, where an andari, a race of shapeshifting aliens, enjoys the view high atop a skyscraper (left) and where the protagonist is aiding the demolition of a town district (right).



Impressions from several conferences and trade shows.

gave you specific goals with an endless run as a secondary game type. We also had to make sure the game scales well between the two platforms. Difficulty had to be manually tailored for each, unique menus were created for vertical phones versus horizontal computer screens. The closer we got to launch, the more we started to become active with gaming conventions.

Learning from Players and Developers – the Importance of Events

I cannot state enough how fundamentally important these events are. We had booths for Planet Diver at Game Developers Conference (GDC), gamescom, Casual Connect, Momocon, Playcrafting and more. It introduced so many people to our games, but it also let us engage with players personally, and see what impact our games had on their lives! We saw which jokes landed, where players excelled or struggled, and take that knowledge back with us. There's also nothing more satisfying or mind-blowing than people telling us that the humor and positivity found in Planet Diver cheered them up when they felt down. We feel the most fortunate, however, to have met with so many other fellow developers. We've made real, valuable friends in this industry, and I have no doubt that we'll help each other grow even bigger! Planet Diver released as a 5 Dollar title in 2015. The game has been downloaded by over 20k players and sits at a 100 percent approval rating on Steam. It was also nominated as a finalist for the Indie Prize, twice, and the MomoCon Indie Awards. There was even a special collector's card that was bundled with the IndieBox service and it was part of the official selection at the Indie Arena Booth at gamescom. Another success!

Sometimes all you need is a good Laugh

We began work on the next game one week after the release of Planet Diver. At this point, making games is genetically hardwired in our DNA for everyone at Fabraz. And if you've been following us on Twitter, what that game is will be no secret to you: »Slime-san«! We've been very open during development; posting gifs every day, engaging with local events like Dan Butchko's Playcrafting, and attending larger

conferences like gamescom. Thanks to that, we've already established a large fan base eager to get their hands on the game. We get especially excited when people like »Nitro«, a YouTube speedrunner, replay the first level for half an hour, just trying to perfect their high score! We've been told numerous times that people enjoyed the humor in our games and Slime-san's story is all about that. Slime-san is about a slime that was minding his own business until a giant worm appeared and gobbled him up. The choice is simple, be digested or slime through the worm's intestines, back out its mouth! This might be one of our most ambitious titles yet, in terms of scope. We're working with a sound designer, Britt Brady, who's making phenomenal sounds through the use of such complex tools as mashed bananas. No, really! We're also working with over 14 composers, including chiptune giants such as Adhesive Wombat, Tiasu and Inverse Phase to create a soundtrack for the ages!

Last but certainly not least, we've teamed up with Headup Games as our publisher to get the soundtrack on Vinyl and the game onto the PS4 and Xbox One. Fabraz now encapsulates more people than ever and we're so excited to release Slime-san in April 2018! It was already part of the phenomenal Indie Arena line-up at gamescom, and was a finalist at the Indie Prize in Tel Aviv.

Passion alone does not guarantee Success

We're so proud of our past and are incredibly excited to see what awaits us next. While Fabraz developed into what it is today, the video game industry has also fundamentally grown and changed. Kids now grow up surrounded by games, they go to schools that can teach to code. They're a rising generation interested and eager to release their own games as soon as possible, the creative capacity found in every other Minecraft video being just the tip of the iceberg. The entry point for creating games is lower than ever, with applications like Unity and Game Maker, and the threshold of releasing a title is lower, too, thanks to the App Store and Itch.io. Indie games now compete with AAA titles, for better or worse, and there are game conventions you can attend on a nearly weekly basis. That's exciting! But

also, slightly scary, as there are more games than ever. The market is downright saturated, so how do you stand out? The path that we at Fabraz took might not be replicable anymore. The most important thing is to persevere! Create the game of your dreams, test it with users, and make sure to not neglect marketing and networking as skills! Attend conventions, spread the word on social media, and stick to it no matter what! We have this one philosophy we always like to share with fellow developers: You have to work really hard to get into a position where you can get lucky. What do we mean by that exactly? It's useless to blame the lack of success on bad luck, but it's also naive to assume your success didn't slightly depend on it either. You have to work hard, every day, and try your very best to achieve success. To get into the position, where success could happen and someday it might!

The many Worlds the Future holds

So what's next for Fabraz? For now, we're all working hard on finishing up the whacky world of Slime-san to make sure it's oozing with personality. We've gotten incredible feedback from fans of our previous games and we want to make sure Slime-san remains a magical memory for them as well! We want to make sure that the game delivers on its promises and meets the expectations of our eager fans! The number of players we've gathered is simply staggering and yet, sometimes the smallest e-mail or video from a player touches us the most. E-mails like the one from a Japanese player named »Tomo«, who wrote us the following: »Planet Diver has caused in my heart fireworks of emotions!«. Or ten-year-old »Logan the Potatoe«, who plays the game on YouTube and giggles at every silly joke we throw at him. Small interactions like that truly make us happy, to have an impact on someone's life, no matter how insignificant, is just ... magical! Video games are just magical!

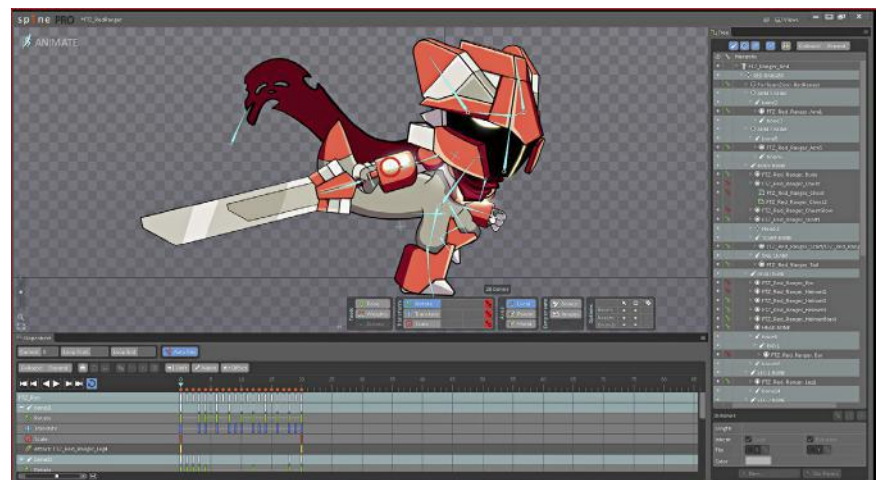
Next Stop: Fabraz' first Sequel

We'd like to thank Making Games for the opportunity to tell you a little about Fabraz

Tool recommendation: Spine

2D and 3D animation are often considered to be entirely different sets of practices, but Spine takes inspiration from 3D animation and applies it to 2D very effectively. It's still the new kid on the block, but it's already rapidly taking over the indie game industry as a primary tool for 2D animation. It takes the 3D concept of rigging up a character with a skeletal bone structure and allows the creator to then animate that skeleton how ever they please. Combine that approach of animation with efficient mesh warping to deform visual images, as well as sprite swapping to switch out assets mid-movement and you've got yourself one hell of an animation tool. Not only does it allow you to create several types of smooth animations, but you can also swap out the skins to reuse the same animations on different models. The fact that it can export to Unity seamlessly through their own APIs is simply the icing on top of an already delicious cake.

You can get Spine at <http://esotericsoftware.com/>



and to finally answer the deceptively simple question of: What is Fabraz? As a final thank you I'd like to announce something very special: We're going full circle ... our next game after Slime-san will be Cannon Crasha 2! The concept will be turned on its head as this time two pirate fortresses will pit each other to establish who's the pirate king! I hope you tag along for all the crazy worlds we've yet to create!

Fabian Rastorfer



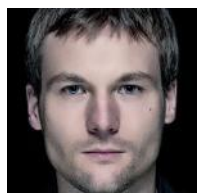
The core team looking tired but satisfied after several successful days at gamescom.



Fabraz' games Slime-san and Planet Driver were nominated for the Indie Prize in Tel Aviv.

SOUND REBEL WITH PASSION

At sound studio Phénix Noir Productions, the fire of the golden era of gaming is still burning. Providing a captivating insight into his work, music producer Patrick Nevian explains what's behind the concept of his company for the present and the future of games music.



Patrick Nevian
Owner of
Phénix Noir Productions, music
producer and pianist

Patrick started taking piano lessons as early as 1987, and over time adopted further skills as a song writer, producer and sound engineer. For a while now, he's been working successfully with popular names from the music and computer games industry.

Only 880 kbit! Back then, this was enough for two downright phat tracks! A floppy disk in Amiga DOS format. And without the Amiga computer I wouldn't be here today. Besides the classical musical education on piano, this computer influenced my professional career considerably. That small plastic disk from 1994 which my first attempts in digital music production were saved on is still working today.

Back then I wouldn't have dreamed of turning my hobby »music creation« with the tracker program »OctaMed« into an actual profession where I can still connect my passion for computer games and sound production to this day.

Unlike the rather rudimentary working conditions of Commodore's flagship of the 80s and 90s, today's working methods and requirements are obviously a lot different. At Phénix Noir Productions, we sometimes work on three to five projects simultaneously, often with very tight deadlines. But our customers very much appreciate the know-how we gained since the 90s. It helps to deliver cost-efficient, customized and yet extremely creative work.

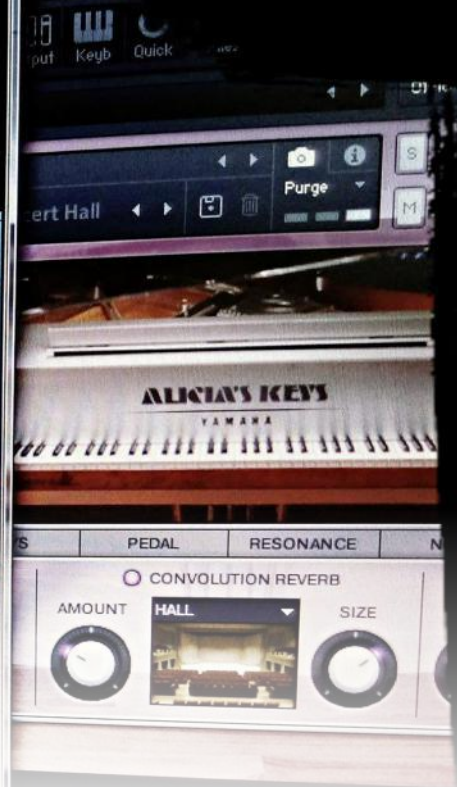
And that's exactly the topic for today: The challenge of limitations during sound productions for computer games and the systematic implementation.

Of course, it's fantastic to have an entire symphony orchestra at your disposal to accompany your arrangements. However, for me it's the jobs I do for mobile and indie games which offer a special challenge, for unlike orchestra recordings you have to deal with limitations and restrictions... almost like during the glorious Amiga days.

It's the mix that matters!

Basically, it's the mobile sector in particular which requires extra care when mixing and mastering compositions since the output devices are rather low-end when it comes to sound and usually only feature a single built-in mono loudspeaker. Nonetheless, the requirements are high, so that a reasonable audio playback ties the players to the game.

Depending on the genre of the product that the sound is to be produced for, the arranger and the sound engineer should make sure to use a balanced number of instruments. What's the point of a bombastic arrangement when



it can't be properly played back on a low-end output? Having a good idea of how the sound material corresponds to the rest of the game is therefore a necessity even in the creative field of music-making. I'll explain this later in more detail.

Phénix Noir Productions produced the sound for the management game »Football Empire« by Digamore Entertainment GmbH. To suit the clearly structured and classy graphics of the football simulation, the soundtrack was to feature trendy soft rock songs that had force and power and would yet be comfortable to listen to in a loop. In addition to good arrangements, the overall sound played an important role here. Dull, powerless drums or too playful sounds would have been out of place.

But how to place heavy drums or guitar riffs in the mix, so that a good compromise could be found for the tiny mobile or the weak tablet speakers? After all, in the end the sound files were even to be compressed in a quality-reduced and memory-saving manner in OGG format, too.

It's indeed the bass range between the percussion instruments and the guitars, which plays a decisive role here. Since a mobile device can't really play back low frequencies properly, sounds like electric or synth bass may take up quite a bit of midrange content. The equalizer shouldn't be turned up too much though, so that the sound isn't uncomfortable and the user isn't annoyed by the music. The push this will bring to the ear at the end is not to be underestimated since it's now a lot easier to follow the song structure.

Less is more in case of the guitars as well since nothing is worse for the sensitive eardrum of the well-disposed gamer than shrill riffs. So better lower harsh frequencies and sensibly use a limiter to drive the axe subtly against the wall.

The drummer, too, needs to be placed in the right spot: A pleasant punch through good compression, the consideration of our bass range and of the attributes of low-end mobile speakers – a factor not to be neglected during the EQ processing of the popular noisemaker – already wins half the battle.

The mobile musician should also pay attention to the soundscapes in a composition for portable systems. Synth pads or broad string pads sound impressive in the studio. But the rude awakening will come after the first sound check on the small mono devices at the latest, for where soundscapes can work their whole magic on big stereo speakers, the entire beautiful range of sounds just collapses here.

In order to keep the richness of the melody and the overall sound, we rather omit extremely broad and phase-cancelling tones instead. If I don't want to miss a certain pad though, it's useful to reduce the stereo width of the sound in the Digital Audio Workstation (DAW).



Once a melody on the piano has been satisfactorily completed, the tracks need to be arranged in the Digital Audio Workstation (DAW).

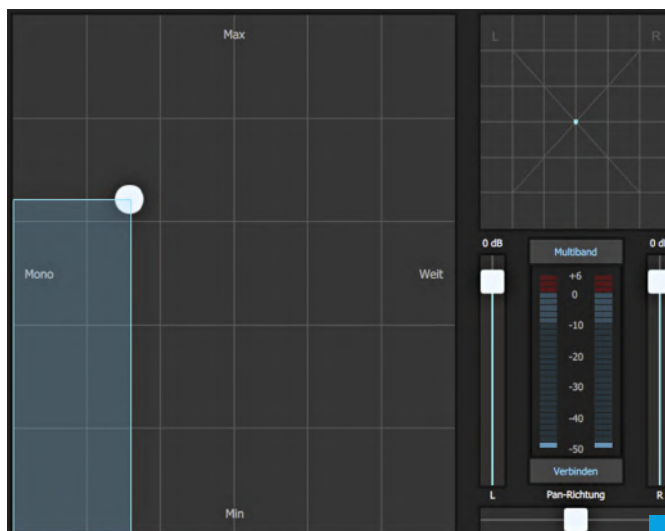
Further nuances may be added, e.g., through EQ Editing in order to match the sound to the original (stereo) sound as much as possible.

All of this already indicates that sound optimization for mobile devices is not only depending on authenticity and perfection in the usual sense of the word. What's basically required are very good skills in song writing and music production in general. But as mentioned above, the attributes of the target platform need to be considered, too.

Optimization in mastering

If initial important precautions regarding the sound design are being taken during the mixing, the mastering offers a good opportunity to finalize the existing material optimally. Each and every music project has always culminated in the editing of the sum signal.

In the field of mobile entertainment, a strong limitation of the final mix plays an especially important role. True to the motto



While the soundscapes of the composition work their whole magic on stereo speakers, the sound just collapses on the mono speakers of mobile devices... but in this case, too, the sound can be modified with the help of the respective tools.



Various tools of the DAW allow adjusting the sound to technical conditions, e.g., by compression of the drums (left) or by editing the master (right).

»Turn it up to 11«, as much sound information as possible is to be pushed through the loud-speaker simultaneously.

Thanks to our balanced and carefully mixed basic sound, we can thus create a perceived loudness (volume) via the (sum) limiter, which helps the player to comfortably follow both the gameplay AND the soundtrack. Of course, the mastering offers further possibilities to influence the sound of the final mix. These procedures are more suitable for a separate series of mastering workshops though. In the context of our topic it might be helpful to suggest though to go slow on running the sound into a brick wall.

For as soon as the customer wants to squeeze the new gem of game music in his already memory-saving app, the sound engineer is put under pressure. If the track sounded nice and smooth at 320 kbit/s, it's actually quite a strain on the user's ears at 128 kbit/s.

So, if reducing the limiter in case of tight file format requirements doesn't audibly result in a melodious song, all that remains is to touch up the mix.

Just a quick word of advice: Treat your customer and the players to a stereo soundtrack. For if ever the headphone is to be used as a sound output device, the qualitatively better sound lets the player delve deeper into the game, and the player will ideally show longer-lasting loyalty to the game.

Another piece of advice: Every DAW allows exporting to memory-reduced formats like OGG or MP3. There are a number of freeware alternatives though, which can be used to

compress sound files and which are certainly sufficient for initial test runs.

A good production is always the base to every composition, before the beautifully wrapped sound file eventually delights the gamer's ears.

It's all about the planning

Forward planning is, as is so often the case, the be-all and end-all and also saves the music producer from sleepless nights, at least as far as the touching up of a production is concerned.

Thorough planning is hence also essential for (music) projects which connects today's gaming generation and the classic computer games. One project is therefore particularly dear to me: the work for a new strategy RPG in the vein of »Fire Emblem«, which is simultaneously developed for PC and, interestingly, for the AGA Amigas, too. Being able to do something like this today, makes me immediately feel like a sound rebel again!

Some tricks will be required in this case, too. The knowledge that, e.g., I can balance the mix and the master of a composition for mobile games in a way that it still sounds amazing even with much reduced, but memory-saving quality, also helps for the implementation of a dual development for modern and 20-year-old hardware.

Sources of inspiration

Normally, graphic concepts, initial sketches, a working engine or the storyboard are adequate sources of inspiration to determine the direction of the soundtrack. Of course, the visions of the publisher or the programmer need to be taken into consideration, too. I always say: The sound design is like a superglue between the graphics and the game itself. It binds the atmosphere and adds an important emotional component to the gaming experience, which helps conveying the game content.

When I joined the team as sound designer and composer at the start of the planning phase, there was already a concept for the game, however, the graphic designer hadn't started working on it yet. So, there weren't any mock-ups or finished game scenes yet. Still, my vision to take the project into a certain creative



direction in a timely manner with the first compositions was appreciated.

In this context, my work as a game designer (I developed two current action adventures for the Amiga) is, of course, also extremely helpful for the job as a music producer since I understand quickly what direction the sound concept for a game must be moving to, even if there are no or only a few graphics or other details available yet.

Let's take the track for the combat sequences of the coming fantasy RPG, for example: The beginning is quite classic: bringing the planned setting into a musical form. What's needed is a basic composition that's energetic and captivating. Something which worthily represents the »combat« theme, has a high recognition value, but still isn't too washed-out. After all, this melody will accompany the player for hours on end. And this shouldn't become too frustrating even when a battle is lost.

Once I have completed the melody to my liking, I need to start arranging the tracks in the Digital Audio Workstation (DAW). In our case, I will cross orchestra sounds with guitar riffs – not too power-metal-like, but nice and powerful with punchy cinematic and real drums. Whether or not I will integrate a choir will be decided once I get to see the graphics of the battle screens. The audio-visual experience should be created from a single source.

After a while, we will have an initial good mix and a test master of the battle theme, and then we just need to export the audio material, and we're done ... but wait!

Pretty tricky: Music on retro computers

After all, this game connects the worlds of modern PC games and the steadily increasing and more and more popular retro gaming scene.

Now, how do I transfer the bombastic composition smoothly onto the Amiga? While their sound capabilities were revolutionary back in the day, unfortunately four lousy 8-bit sound channels can't play back orchestral soundscapes in an adequate way. Not to speak of the available memory of as much as 2 MB!

There are two possible options: Converting the track to an unpacked audio file in 22 kHz/8 bit. Due to its puny 14 MHz CPU, the Amiga

About Phénix Noir Productions

Phénix Noir Productions currently produces the music for the coming mobile game Football Empire by Digamore, among other things, and created a remix for the soundtrack of the extremely successful racing game Horizon Chase. Nevian was also the arranger and performer of Chris

Huelsbeck's The Piano Collection. Besides further mobile apps, PNP's current schedule also includes the soundtrack for a new PC adventure.

phénixnoir
----- productions

1200 doesn't like OGG or MP3 at all. Although this file is rather big, it can still easily be streamed when played from a CD-ROM or hard drive.

Or, in case a floppy disk version needs to be implemented, the time travel back to the 90s starts all over again, connecting modern production techniques with the audio world of the home computer era in a fantastic way:

In the studio, I look for the essential parts of the battle theme, total the most important tracks and export a lot of small sample pieces to a tracker-compatible format. That way, the actual sound and the feeling remain pretty much unchanged apart from a few sacrifices like certain variations and the stereo output.

The sample collection now includes drums for a channel; strings and horns are placed on the second Amiga sound output. Guitars and basses share the third channel of Paula, as the Amiga sound chip is dearly called. I leave the fourth sound channel untouched since that is reserved for the sound effects to be added later. Finally, the whole thing will be put together in OctaMed just like back in 1994 – et voilà: rich sound with no memory strain.

Even though this game project may be an exception: Creativity, innovative concepts and balanced solutions are indispensable in the audio department for current and future projects in the gaming industry as well. Those who are familiar with limitations and able to push the limits, offer modern and competent solution approaches which can benefit both the budget and the final output of a project.

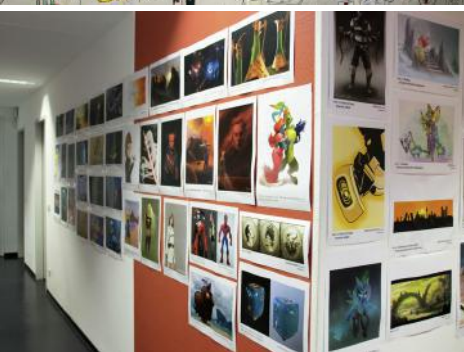
Patrick Nevian

The mobile game Football Empire is just one example that Patrick composed the music for. To suit the clearly structured and classy graphics of the football simulation, the soundtrack was to feature trendy soft rock songs that had force and power and would yet be comfortable to listen to in a loop.



UBISOFT MAKES BLUE BYTE A COMPETENCY CENTER FOR PC

Celebrating its 30th anniversary, Ubisoft invited us into their German headquarters in Dusseldorf to show us what Settlers creators Blue Byte are currently working on.



Impressions from the Blue Byte offices in Dusseldorf.

In 1986, Yves Guillemot and his four brothers Christian, Claude, Gérard and Michel set up the plan to found their own publishing company for video games: Ubisoft. They set up office in a castle in the quaint Breton village of Carentoir and quickly established contacts to foreign companies like Electronic Arts or MicroProse to distribute their products in France. By the end of the 80s, Ubisoft had grown to become the biggest fish in the French gaming pool, moved its offices to Paris and eventually started to create their own games and open the first studios in the 90s. 30 years later, probably only few players still remember the beginnings of one of today's biggest gaming companies in the world. And since there are only a few companies which can look back on such a long history in the gaming industry, Ubisoft Germany invited media representatives into its German headquarters in Dusseldorf in mid-October. The occasion wasn't, as one might think, to celebrate an excessive birthday party, but rather to show what exactly the German subsidiary, which has been around for as long as 25 years now, and especially Blue Byte are doing these days.

Small beginnings, great impact

In 1991, about five years after Ubisoft was founded, Ubisoft Germany opened its doors – metaphorically speaking. At that time, the first employees actually started working from the Blue Byte offices in Mülheim an der Ruhr. Blue Byte was already a successful German developer back then, while Ubisoft was an almost unknown French company. Today, both of them reside in a office complex in Dusseldorf, with Ubisoft Germany employing approx. 70 and Blue Byte nearly 300 employees (with 200 working in Dusseldorf and 100 working in Mainz).

Ubisoft Germany is mainly responsible for the marketing and distribution of the Ubisoft portfolio in the German-speaking countries, as well as for the localization of the products. But what probably many people don't know is that without the German subsidiary and especially the current Managing Director Ralf Wirsing, Ubisoft's portfolio wouldn't include one of

its most important brands which has sold as many as 38 million units so far: In the late 90s, a young German developer team from the Upper Franconian town of Coburg was looking for a publisher for its first game. Wirsing recognized the potential, connected the decision-makers in Paris with the team in Coburg and arranged the deal. Eventually, the first-person shooter Far Cry was released, and Crytek gained an almost legendary status for its technical performance.

Blue Byte joins the family

The same legendary status could be associated with Blue Byte and its brands The Settlers and (by now) Anno. Even players who aren't familiar with the studio would know the two strategy games which have always had a considerable significance in PC-loving Germany. Founded in 1988, Blue Byte quickly became successful with Battle Isle and The Settlers, and eventually joined the Ubisoft family in 2001, followed later by Related Designs and the Anno series in 2013. Subsequently, the studio was renamed to Blue Byte Mainz where the office is located.

Since then, the team in Mainz kept working on the Anno series, while the Dusseldorf crew mainly took care of the Settler projects, when in 2013 they also became responsible for the development and the operation of Free2Play browser versions of the popular strategy brands. All this is history now, as we learned in August 2016. Blue Byte got a new area of responsibility in the Ubisoft universe: The long-established studio is to become the publisher's competence center for PC and to look after the implementations of the big AAA console titles. The first major project is For Honor scheduled to be released on February 14, 2017, while Rainbow Six: Siege has already been in their charge for a while now.

First major project: For Honor

In practical terms, this means that Blue Byte is working on expansions for the shooter, and at the same time maintains Ubisoft's online platform Uplay and takes care of live operations.

The trickier task which is also probably more closely monitored by the fans is that of the PC implementation of For Honor. Particularly



Rainbow Six: Siege and For Honor are the first two big AAA productions for which Blue Byte takes care of the PC version. The port of the latter one will be handled entirely by the Dusseldorf crew.

since the PC as a platform makes up just over a quarter of all Ubisoft sales, the pressure is likely to be high. In the last few years, Ubisoft's PC versions weren't always appreciated by the players and often didn't appear to be original PC developments, but more like quick ports. Now, the experts in Dusseldorf – The Settlers and co. are traditional PC titles – are to take care of all that's important, from the resolution and the higher level of detail to the mouse and keyboard controls, the modding tools, etc.

In this regard, Blue Byte knows exactly what the PC community demands. While users of the console version expect a simple plug-and-play experience – switching on the console, inserting the disc, and off they go –, those of the PC version wish for as much freedom as possible to be able to adjust the game to their liking. This is what makes the PC development a lot harder. For the console version, the developer determines the level of performance that is or has to be reached to guarantee a perfect gaming experience. The PC users, on the other hand, want to determine every single detail themselves, like which slider to move in order to get the most amazing graphics possible or to reach the highest framerate or something in between. Also, the PC version needs to be able to identify automatically what kind of hardware a device includes and which quality settings work for it since not all PC users necessarily want to rake through the menus before they can get started. This again requires the developers to be in constant contact to the hardware manufacturers to make sure that the game runs with the latest drivers and that the manufacturers can optimize their drivers accordingly where necessary.

The ultimate goal for the Blue Byte crew is to provide as many users as possible with the latest technical shenanigans, while covering as many PC configurations as possible – a goal which definitely isn't easy to reach. Blue Byte knows that they have a lot of testing to do to complete this project, be it in the in-house test lab or through working directly with »real« players. After all, they know that a mediocre compatibility is nothing that can still be fixed a few weeks prior to release.

The devil is in the detail

But an implementation of that kind means more work than just dealing with the techni-

cal questions. Once the basic structure is built and the game is running on the computer, it's time to adjust the details to the new platform. That's why, according to Philipp Sonnefeld, producer of the PC version of For Honor at Blue Byte, it's all the more important to get in touch with the lead studio as early as possible. So, the entire Blue Byte team travelled to Ubisoft Montreal to meet and discuss things with their colleagues, to make the daily interaction via Skype etc. easier from then on.

Another big problem for the team were the controls. The appealing thing about For Honor is that it tries to capture sword fights tactically, which is why the right analog stick of the controller is used to determine the position of the sword. Obviously, this function also needed to be converted for PC and its mouse-keyboard combination, which was no easy task.

So, the team started quite early to let users test the PC version of For Honor and thus the conversion of the controls in order to get feedback and collect data. They recorded the mouse movement of the participants, for example. The information they gathered was analyzed in detail to be able to make improvements based on the results. This was the only way to optimize the controls, but also the UI step-by-step (starting with the font size or changes of the button overlays) and adjust them to the special requirements of the PC as a platform – instead of just converting the console versions one to one.

What will the future bring?

The question is: What comes after For Honor? A small group will surely keep working on expansions (like for Rainbow Six) or adjust the finished expansions from Montreal for the PC version. The rest of the sizeable crew isn't idle though: Apparently, there are four new PC titles in the pipeline at Blue Byte. Remove the apparent sequels of The Settlers and Anno, and there would still be two unknown projects. Whether these are other Ubisoft blockbusters which Blue Byte is to make PC-ready, like the next part of the Assassin's Creed series, or if they are projects of their own remains unclear. Anyway, it's a good sign for the German industry that a big publisher like Ubisoft doesn't treat its branch offices like also-rans, but entrusts them with important projects.

Sebastian Weber



Today, Ralf Wirsing is Managing Director of Ubisoft Germany; he also played a decisive role in making Far Cry a brand in the publisher's current portfolio.



The Guillemot brothers who founded Ubisoft about 30 years ago.

STATUS QUO, GAMING INDUSTRY?

In our interview, Hans Ippisch of Computec Media and Stephan Reichart of Aruba Events take a look at the German gaming industry, the effects of free2play, funding, and the future of the industry.



Stephan Reichart
Managing Director
at Aruba Events GmbH

Stephan is Managing Director and founder of Aruba Events which he initiated with the first Quo Vadis conference in 2003. He's been part of the gaming industry since as long as 1999. During that time he developed his own titles as Game Designer at his own Aruba Studios and was a temporary chairman of the federal GAME association.



Hans Ippisch
Managing Director
at Computec Media GmbH

Hans has been working for Computec Media since 1991. As Editor-in-Chief, among other positions, he first initiated the console and youth magazine sector and then took overall responsibility, first as Commercial Director from 2005 on and later as Publishing Director as of 2009. Prior to that, he published ten commercially successful computer games as an independent developer from 1986 to 1991.

Making Games The industry in Germany, but also around the world, is currently undergoing radical changes and is anticipating exciting innovations. What are the big topics which will keep the industry busy over the next 18 months?

Hans Ippisch PlayStation VR. Whether and how Virtual Reality will work with current games right here and now, can already be observed quite well. PlayStation VR isn't the hot topic on our websites though. The hype has already declined, but it's still too early to make any statements yet.

Besides PlayStation VR, there's also the PlayStation 4 Pro in November, Nintendo Switch in March 2017, and later in the coming year the Xbox One Scorpio. Microsoft HoloLens will surely play an important role, too. With the HoloLens at the latest, we will see where the journey is taking us and how popular Virtual Reality and Augmented Reality are among developers and gamers.

Stephan Reichart The big topics the industry will be facing in the next one and a half years are the following: How do we deal with the growth that was driven exorbitantly with a strong focus on investors? Especially in Germany, we suddenly have hundreds of employees looking for new jobs [due to the layoffs at companies like Goodgame and Gameforge], and I think a lot of small studios will now be founded in regions that provide good funding tools. What I find very interesting to find out is who was actually laid off at those companies. Was it the mobile experts because they don't want to be committed in this area anymore?

Or was it the juniors that have been made redundant, who will now probably be knocking on the doors of advertising agencies? At the moment, a striking 50 percent of all academy and college graduates actually don't join the gaming industry.

Hans Ippisch The problem is also how to attract these young folks. When we were young, a lot of things were obviously a lot easier; we got our C64 and just got started. As German Chancellor Angela Merkel put it at the Medientage (Media Days) summit in Munich: On the one hand, there is funding for start-ups, on the other hand programming is to become an official subject at school. When I look at my own sons I see how little they are supported and challenged at school in this respect ...

»A striking 50 percent of all academy and college graduates actually don't join the gaming industry.«

Making Games True to the motto »How do I create my own email account«?

Hans Ippisch Not only, but that, too! That's generally something which needs to change in Germany. Programming and the responsible use of the computer should be taught at school. If the students are engaged in it, it's much more likely that they come up with ideas like creating their own app. That's something that's completely missing and where other countries are far ahead of us. That's where we have to start, even if we have to wait about ten years until we get to see results.

Stephan Reichart I recently thought about whether one could already go as far as to say that traditional game development is dead. With all those [freely available] engines, more and more people are able to make entertain-

ment products, and everything's getting more and more gamified. You don't really have to be a traditional game developer any more. You need a set of good tools and creative ideas, that's all it takes to make a very entertaining product, e.g. for cooking.

You can create learning products without claiming to be a game developer. I think traditional game development is shifting more and more towards blockbuster productions. There will still be classic games we all love. But the gaming industry as we defined it ten years ago hardly exists any more. More and more companies make thirty or forty percent of their turnover with services they provide. Deck13, for example, did a whole range of serious games developments, and Crytek works together with a lot with architects ...

Hans Ippisch ... one game developer in Munich is currently creating an app for the Deutsche Museum. And that's totally okay; after all, our publishing house doesn't only do print magazines any more either.

Stephan Reichart Exactly. I think we're turning into an entertainment industry and are no longer »the gaming industry«. What we do is digital entertainment. At the EGES in Los Angeles, Neville Spiteri of WEVR said that for him it's not about games, but about five-euro experiences. You pay five euros for downloading an entertaining VR product.

Making Games Let's talk a little more about engines. Can you say that the gaming industry has experienced a democratization process in the last few years?

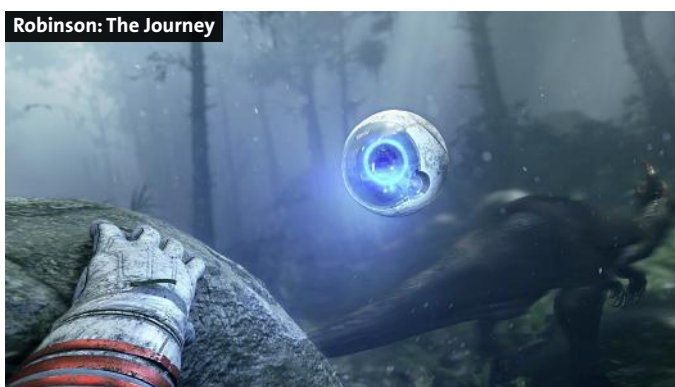
Stephan Reichart A democratization in the sense of »everyone can become a game developer« – yes. A democratization in the sense of »everyone can make a living with it« – not so much. A similar thing is happening especially in eSports: If you want to make money one way or the other, you either have to be a top player or arrange some deals with the ESL.

Hans Ippisch I think you can draw a comparison to the movie or music industries. Basically everyone can make a movie today, even if only with the most basic of tools. But not everyone can produce a Blair Witch Project. Music is also something that everyone can create quite easily, and often enough it even sounds alright. I think there are more game developers today than ever before. But to be able to play in the league of Call of Duty and co. is getting harder and harder.

And yet it may happen that someone lands a big hit with just a few simple tools. I think the chance is still there, no matter which engine you use. What's missing in Germany a bit is the respect for game developers. In other countries you get respect from family and society, while in Germany my impression is that people are a bit hesitant about saying what they do. Whether it's something you can be proud of is still a question of the culture or society, I guess.

Stephan Reichart That moment when you drop the word »game« and say: »I do digital entertainment.«, everyone goes like: »Oh, that's interesting!«. Game developers generally don't have a good standing in society in Germany, which probably also won't change in the future.

»Traditional game development is shifting more and more towards blockbuster productions.«



Germany only has a few developers who can be classified as AAA: Crytek (Robinson: The Journey), Yager (Dreadnought), Blue Byte (Champions of Anteria), and Deck13 (The Surge).



Apart from a few bigger studios in Germany like Crytek or Blue Byte, there are a lot of very small, but quite successful ones. A good example is Studio Fizbin, the makers of *The Inner World*.

Making Games Is the free2play model destroying value, like Lutz Anderie describes in his book *GamesIndustry Management*?

Hans Ippisch Yes, but sadly the old status quo can't be restored either. The problem is similar to the online issue in the media business. The free content devalued a lot of the work done by publishing houses and journalists. But people are used to it now, so it can't be undone that easily, and the old status quo will never be restored again anyway. It's the same thing as getting used to receiving games for free. I don't think I would be prepared again to pay 10, 20 or 30 euros. It's a long process to undo this status. It's clear that game development is laborious and expensive and that it can only be financed with a proper business model, therefore I don't think that running the free2play model permanently and in all segments will work out.

Stephan Reichart I have to agree. I don't think though that the free2play model is to blame for it, as Lutz puts it, but that it was just an inevitable phenomenon. The internet just liberated a lot of things on many levels. As a consequence, many gamers are okay to pay for a product if they think it's worth it. If you get ripped off, you just ignore it. It's a whole different self-conception of the customer. On the other hand, it opened doors for us which we now have to use wisely.

We now have all sorts of micropayment options imaginable. If I once made a renaissance game set in the 16th century, for which I produced tons of 3D content, why should I not go ahead and turn it into a Virtual Reality experience for which you pay 2.50 euros in order to walk through 16th-century Venice. You have to think differently. You have to make use of the buyer behavior and identify possibilities and trends coming your way. People will still spend money on good entertainment, even if that's not the traditional gamer way of thinking.

»Free2play was an inevitable phenomenon.«

Making Games In some other areas there's the idea of a flat rate system. You pay 10 to 15 euros, and in return you get a lot of your favorite entertainment as offered by Netflix, for example. Why is there no such thing in gaming?

Hans Ippisch That's hard to imagine since all game publishers would have to find an agreement. A platform like Steam, which would then acquire the rights from everybody, could be successful. But that's a difficult task; the same thing goes for publishing houses that want to offer flat rates for magazines. They will never be able to come to an agreement, and also this model would be unhealthy for certain products.

Stephan Reichart Although, in principle, the flat rate system is already in use. Many successful games offer a subscription model where you pay, e.g., 8.99 euros a month. Obviously, this is only for one single game, but then again you can only »spend« your gaming time once. If you then delve into your game for several hours per week, it's different than watching a TV series. The way you consume the product is different.

While you can sort of watch a series or a movie while you do something else, you really have to be actively involved in a game. I can imagine that it would make sense to offer an

indie game flat rate where you can play the classics of the past 20 years.

Hans Ippisch That brings us to services like Spotify which I think is destroying the music industry. They aren't creating anything themselves, but make billions by simply using the infrastructure of others. It's a massive effort for the telecommunications providers to provide the networks, the musicians do their jobs with passion and commitment, and Spotify just gets in the middle. Uber is another example of that.

Making Games When talking about the future of the industry, you can't avoid talking about government policies, too. To what extent have relations changed between the gaming industry and state institutions in Germany in the last few years?

Hans Ippisch There have been drastic changes – for the better. Just five or ten years ago it would have been impossible to imagine that high-profile politicians officially support the gaming industry and make an appearance at related events. One can tell from politicians like Alexander Dobrindt, the German Federal Minister of Transport and Digital Infrastructure, and his colleagues that all those people who are in charge today also grew up with games. They're all in their 40s and older and still know all devices like the C64 from when they were young, so they have no reservations in this regard.

The previous generation didn't grow up with video games, so they were a lot more cautious. And I think that's a very natural reaction.



Quo Vadis in Berlin (top) and Respawn in Cologne (bottom) are very successful developer conferences today. Aruba and the Computec portfolio are to complement and support each other on a bigger scale.

However, this new way of thinking is very important since this new openness allows projects to be developed, which would have never been supported by politics before. The financial funding is growing like, e.g., the budgets for the German Computer Game Awards. In this context we should also mention Dorothee Bär, the Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure, who is a strong advocate of funding the industry and always pushing for more. There are a lot more possibilities these days. Game funding still has some ways to go, but things have started to change.

Compared to international standards, Germany is still lagging behind. Countries like Canada have entirely different opportunities. But the climate has changed, and in politics things don't happen overnight either after all. But when looking at Bavaria, we do notice that there's an annual budget of 30 million euros for movies, while games only receive a small fraction. Therefore, we have to keep working hard, so that one day games will receive an equal amount of funding as movies, but it won't happen overnight.

What can be said though is that the technological development is moving towards games. The Ministry of Educational and Cultural Affairs as well as the Ministry of Economics have realized that schools, for example, have some catching up to do. And we're not only talking about games, but about the digital segment in general, no matter whether it's about user interfaces or games. The last five years have brought a wind of change. One has to understand that politics isn't a simple matter. But when I think back to how things were in the 80s and 90s, I could have never imagined we'd get this far. So, in that respect we're experiencing a very good development, which is why I'm confident that someday we will be able to close the gap and catch up with the international competition.

Making Games What will the partnership between Aruba and Computec look like in the future?

Hans Ippisch Aruba now has possibilities which it didn't have before, just like there are now options which wouldn't have been possible for Making Games in Munich. Both parts work hand in hand, and we can now accompany Aruba's growth and lend them content-related support. In this respect, I think we're currently at the very beginning of things we can create together, with Computec, Aruba, Making Games, and Gamesbusiness. There are thousands of developers who require information for their work, and as Computec we can offer unprecedented opportunities in this field.

Besides our consumer offers such as Gamesworld with over 4.3 million users, we try to cover everything at Computec, starting from the development of the game, the Kickstarter support via our media, to the further professional training for developers, events, printed magazines, talent shops, and last but not least to the shipping of the game, and even in-house services for servers. We want to cover all areas, that's our motivation.

At the same time, we want to make sure though that every part keeps its autonomy. Aruba is to benefit from the positive aspects at Computec, from the media and the content,

but otherwise they just continue doing their thing. The same goes for Making Games. We also have new offers in the pipeline.

Stephan Reichart The cross-linking of Aruba events with the content we

produce, with the Computec magazines like Making Games, with the editors, as content creators, at conferences – I'm excited to think about how all this could develop in the years to come.

Hans Ippisch Computec's portfolio is no coincidence either. The targeted expansion involving different activities is intentional – there's a plan behind it. We started the B2B products with Golem, the Linux magazine, and now continue with Aruba. At that time, we already pursued a goal. In the future, we can surely connect everything and make more out of it, and that's exactly the road we are taking.

Interview: Sebastian Zelada

The interview in full length

The interview printed here is just an excerpt from the discussion about the status quo of the German gaming industry. The full-length interview (in German) which also covers the funding of projects or crowdfunding, among other topics, can be found at www.gamesbusiness.de.

»Compared to international standards, Germany is lagging behind.«



Free2play games like Olympus Rising by flaregames or Angry Birds Epic by remote control productions became an inevitable phenomenon due to the liberating effects of the internet. But users will still pay money for good entertainment in the future, too.

HIGHLY EFFICIENT ONLINE CAMPAIGNS

HOW TO EXECUTE THEM WITH THE HELP OF BEHAVIORAL TARGETING

Albert Schwarzmeier explains how marketing campaigns for games can be done efficiently even with smaller budgets, and how different advertising techniques can be combined.



Albert Schwarzmeier
is CEO
at ad2games.

Schwarzmeier has a strong background in ad-tech and company building. Before ad2games, Schwarzmeier founded and led a number of successful companies like the e-commerce platform mysport-group or Groupon Germany. This was preceded by respected consulting roles at Zalando and Roland Berger Strategy Consulting. Schwarzmeier graduated with a Master Degree with distinction in Business & Economics from the leading German business school for entrepreneurial education (HHL) after studying at Universidad del Pacifico in Quito/Ecuador.

Audience Enhancement Campaigns

Audience Enhancement campaigns usually include:

- Programmatic advertising
- Automated media buying
- Identifying users with a potentially high interest in buying the advertised product
- Re-targeting
- Prospecting, aka similar user targeting

Smaller budgets and online marketing campaigns – especially self-publishing developers react skeptically when thinking about possible success and ROI rates of such a combination. Branding and classic online advertisement campaigns only sound right when thinking about investing a certain budget. New targeting technologies, such as programmatic advertising, however allow to spend marketing budgets much more efficiently – and as such to create results also with comparably low starting budgets.

With increasing numbers of competitors, increasing budgetary pressures and the need to exactly know whom to target when and where, publishers and developers have to use new ideas and forge new paths in digital marketing. Besides usual ad campaigns, especially programmatic marketing and behavioral targeting have seen tremendous results with increases in digital media ROI, and a significant decrease in scattering losses. What is programmatic marketing? Simply put: programmatic marketing is a way to automate media planning and to target new and existing users with an apparent interest in the advertised game or product. As a result, it increases the performance of digital advertising investments significantly.

Digital marketer ad2games offers, additionally to classic branding and user acquisition campaigns, a special, unique way to improve online campaigns: Using their internally developed technology Audience Enhancement optimizes campaigns on user groups with a very likely interest in buying the advertised products. Thus, the efficiency of a campaign

can be increased significantly and the costs will be decreased respectively.

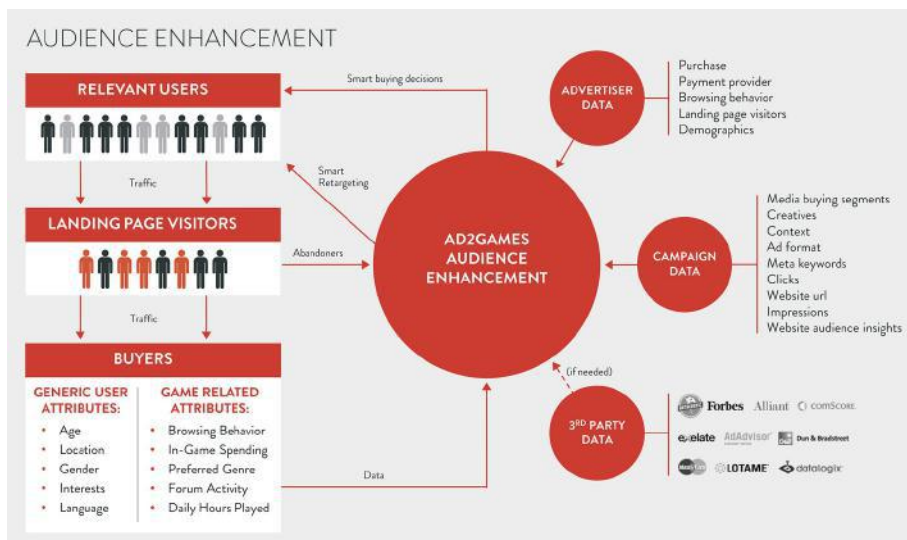
Also, Audience Enhancement campaigns don't necessarily need a 6-digit+ budget or more to work – of course, the bigger the budget, the more the optimization options, runtime and delivery. Still, Audience Enhancement campaigns can work from small to medium 5-digit budgets onwards.

The following wrap up shows how such campaigns can be implemented into a game publisher's marketing plans, to support the launch or even also post-launch phase of a game.

1. Audience Enhancements – the Basics

ad2games' Audience Enhancement campaigns are based on the Cost per Sale model (aka Cost per Order): Only actual sales are being charged, for a percentage of the revenue. That way, premium products such as Pay2Play games, add-ons and also premium packages can be advertised very efficiently.

Audience Enhancement uses existing and researches new intelligence to estimate which users do have a likely interest in purchasing the advertised product. Data is based on users' browsing behavior, gender, age, and genre preferences and gets compared to existing intelligence. The automated solution using artificial intelligence and real-time bidding allows placing individual ads for online display, social media advertising, and video campaigns. A real-time audience can be achieved through tailor made and precise algorithms using a smart combination of sociodemographic, behavioral, and geographic data. In other words, Audience Enhancement is helping to get the best possibly fitting buyers or



An illustration of how Audience Enhancement works in detail.

target group in the easiest and cheapest way. It increases the effectiveness of the campaign and also helps to improve results significantly.

Usually, prospecting and re-targeting techniques are being used. In the case of prospecting new users are driven to a game landing page they haven't visited before. In the case of re-targeting, that means »following users« that just left a game landing page with smart creatives, i.e. delivering advertisements (for the game landing page) on the various other websites they're surfing to.

Audience Enhancement enhances and increases these mechanisms, so that users with strong to very strong buying intention are being prospected from destinations that fit the advertised product well, and are only being re-targeted if their re-action on the advertisement (i.e. clicking or not clicking) signals they're interested in a game.

2. Before a Games Marketing Campaign starts – Planning and Preparation

Intensive planning is key: Targeted Audience Enhancement campaigns are being constantly optimized. Data is collected usually already 4 to 8 weeks before campaign start and additional data is won during a campaign. All these data points are used while a campaign

is active, as well as for future campaigns, to make them even more efficient, and to prepare additional flights even better.

Although ad2games' Audience Enhancement Technology offers automated media booking suggestions based on available data – of course, all decisions are subject to client's approval –, each campaign needs intensive preparation and planning:

Additionally to timing and content, target territories are being defined, as well as target groups, respectively the criteria, and interests on which target groups are being chosen by ad2games' algorithm. When targeting users based on their preferences, much more is being considered than just a collection of tags and demographic data. ad2games' Audience Enhancement Technology also uses actual user data.

When re-targeting users, cookies of visitors of product and company websites are being evaluated, including the URLs of websites users left off to. When of relevance, these are being added to the delivery targets for the campaigns. Real-time bidding for online, social media, video, and mobile advertising spaces applies, securing the most cost-efficient and relevant placements.

In detail, when planning an Audience Enhancement campaign, geo targets and attributes are being defined, which the algorithm will consider for automated media buying

Benefits of Audience Enhancement

Benefits of Audience Enhancement compared to »classic« campaigns

- Real-time system, rules and algorithm to automate the delivery of data driven, targeted and relevant advertising to consumers.
- Flexible and very targeted setup that recognizes the consumer as he moves between channels and touch points.
- The delivery of improved effectiveness also translates into increased relevance for the consumer and greater revenue for the publisher.
- Measurement of campaign results in real-time:
Easy to set clear and measurable campaign goals, usually on a CPO basis. Optimization algorithms process data and make adjustments when the campaign is live. More efficient campaigns and reduced campaign costs.



Some Impressions of the international team at ad2games, a digital marketing company specializing in Pay2Play and Free2Play games on PC and console platforms.



Overview of a campaign for Black Desert Online.

– ranging from generic user attributes such as age and gender via gaming specific characteristic such as preferred genres or average daily and weekly playing time, to insights such as average spending on and in games, as well as forum activity.

So, gathering as much as possible relevant data and insights beforehand will speed up the planning process drastically. At the same time, budgeting will not be such a major concern anymore, since booking suggestions will be chosen using ad2games' algorithm, and all it takes is a set budget for Audience Enhancement campaigns to kick things off.

3. Launch of a Product or a Games Marketing Campaign

Of course, many marketers will want to rely on proven strategies first, granting them more calculable results. At least, that's what the mindset is when executing a campaign. So, adding in an Audience Enhancement campaign shortly before, during or shortly after launch of a game is something marketers recommend – although it leaves less room for planning and optimization.

Still, an Audience Enhancement campaign can kick off and start showing very positive

results quickly without the need of a significantly higher budget. The only cost increase marketers will see is that through quicker booking needs, the real-time bidding system can act a little less cost-effective than with long term preparation.

With a programmatic marketing solution like Audience Enhancement also during the campaign the budget, goals, and attribution model can be defined while the solution rapidly adjusts dozens of variables in real-time based on performance to determine the right campaign settings to achieve the desired ROI. The algorithm that filters impressions based on behavioral data, allows it marketers like ad2games to spend more time being creative and less time reading spreadsheets and helps so to increase results.

4. Post Launch of a Games Marketing Campaign

Sales, discounts, and special packages: As Audience Enhancement campaigns support premium sales very well, post launch campaigns lead to strong results for the advertiser.

Promoting timely limited, discounted sales on own or external stores, or in general the availability of a special package – be it a bundle of products or in-game contents itself – generates extremely cost-effective, direct sales.

Conversion rates can also be increased significantly with re-targeting, fully controlled by solutions like Audience Enhancement. The tool prospects similar monetizing users, engages inactive users, and re-targets non-converting website visitors. According to the experience of ad2games, in the Pay2Play market the average rate of non-converting website visitors is in the range of 90 percent to 99 percent. This means that publishers have been watching 9 to 9.9 out of ten potential customers to get close to completing a purchase and then walk away.

Re-targeting as such means that users who already showed interest in a particular product – e.g. by visiting a product-specific website – will get advertisements delivered when visiting other websites without completing a purchase. Cookies allow »chasing« users for a few stops through the internet, and delivering interest-specific advertising content. Retail giants such as e.g. Amazon heavily use re-targeting mechanisms successfully.

Re-targeting can help to do more than just win back potential customers. User re-targeting can also fuel the discovery of an offered product and can lead to a sale in the end. Another very positive aspect is an increase of the purchase frequency among top customers.

However, re-targeting needs sensitive actions, to not put users off who do clearly not want to make a buying decision at a given time. Re-targeting campaigns need a clear cap to be successful and sensitive at the same time.

What is best to promote?

Ideal contents to promote are:

- New Releases
- DLCs / Add-Ons
- Bundles:
 - Full Game 1 + Full Game 2 + ...
 - Or: Full Game + DLCs
- Premium Packages

RESULTS

RESULTS	EXPECTED	FINAL RESULTS	
CLICKS:	8,334 clicks	21,051 clicks	+252 % increase in clicks
CONVERSIONS:	1,000 conversions	2,817 conversions	+180 % increase in conversions
CPC	0.6 USD	0.24 USD	- 60 % decrease in CPC price
PRICE PER USER:	4.6 USD	1.77 USD	- 60 % decrease in cost per user

A campaign for Rainbow Six: Siege had the goal to acquire new users for the Closed Beta of the game. The results were better than expected.

5. Campaign Examples

As part of one of the most recent Audience Enhancement campaigns, publisher Kakao Games used ad2games' services in Q1 and Q2 2016 to push their successful MMO Black Desert Online. Furthermore, an additional campaign is executed in Q4 2016 in the weeks before Christmas. The planning and execution of the international direct sales campaign in the US, Canada, UK, France, and Germany contained an effective mix of influencer branding, site skin placements, re-targeting, and prospecting.

The goals during the three campaign flights – pre-order, launch, and post release – included an overall increase in brand awareness, maximize sales in the release and post release phase. Generate direct sales with eCPO in the range of 15 percent to 32 percent (of the package sales price) and perform programmatic advertising with combined prospecting and re-targeting setup.

Ad2games used an effective mix of services to maximize the campaign results:

- Influencer activities via video placements on leading US influencer channels as product branding, as well as a CPA based affiliation program for YouTube and Twitch channels (e.g. the »Five Fun« video with ScrewAttack!) through the ad2games' subsidiary and influencer specialist nevaly.
- Execution of a branding campaign on leading gaming websites in the targeted territories to achieve mass awareness by selecting the right target audience and placing high impact site skins.
- Audience enhancement (programmatic advertising) to generate direct sales. Re-targeting on non-purchasing users, collection of consumer behavior data for look-alike targeting, finding similar users with a high probability of purchasing. Automatic optimization of all media buying towards the lowest CPS.

In the end the results were:

- +10.5M impressions and 190k clicks generated on main videogame websites
- +85,000 sales generated at less than 20 Dollar CPO
- +73,000 views generated with ScrewAttack!

Also, Sandbox Interactive reports successful campaigns for Albion Online. Additionally to offering their Audience Enhancement services, ad2games supported with creating landing pages and banners, as well as consulting on selecting geo targets. The global campaign delivered especially high results in Russia and Brazil.

Such campaigns do not only generate important sales for ad2games' clients, but do also bring up precious points for additional campaign optimization, which will be implemented into running and future campaigns. Especially for Pay2Play premium products, Audience Enhancement campaigns allow additional insights, which game publishers usually won't have from other sources. **Albert Schwarzmeier**

RESULTS

RESULTS	EXPECTED	FINAL RESULTS	
VIEWS:	250,000 views	377,157 views	+150.9 % increase in views generated
CLICKS:	10,000 clicks	24,779 clicks	+148 % increase in clicks generated
CPM:	10.00 USD	6.63 USD	- 33.7 % decrease in CPM price
ENGAGEMENT:	Optimization towards maximum video completion rate	40 % midpoint reached	
		32 % third quartile reached	
		25 % video completion rate	

For Far Cry: Primal ad2games delivered qualified users for the game's launch through programmatic video ads, with very good results.

 **ad2games**
Marketing
Services

ad2games offers the following marketing services:

- Campaign creation
Strategic concept and planning
Media buying
Execution
- Programmatic Advertising – Audience Enhancement
- Creative design
- Landing page design

 **ad2games**

THE LANDSCAPES OF VIDEO GAMES MEDIA

Thomas Bidaux from ICO Partners takes a look at gaming media, and delivers an analysis of the landscape, country differences and the most popular games.



Thomas Bidaux
is CEO
of ICO Partners.

Thomas is a consultant for the online game industry and has been providing business intelligence to its clients for many years. He is regularly sharing insights on different topics from ICO's data mining initiatives, including video games PR and crowd funding for games. Follow him on [@icotom](#)



The Witcher 3 was overall the most mentioned game in 2015, while Fallout 4 dominated the English-speaking media. Even with its strong brand Star Wars: Battlefront could not beat those two RPGs.

The video games industry is a complex ecosystem, and its complexity has only grown over the past few years, with new platforms, new genres, and new business models constantly redefining the nature of interactive entertainment. As part of the ecosystem, the media that cover the video games is often a topic that is not much discussed, despite also going through its own changes over the years.

We recently put together an extensive report looking more in depth into the profiles of the online websites specialized in video games in English, French, Italian, German and Spanish (EFIGS). You can download the report for free on our website, but here are the key findings. All the data was collected over one year (January 2015 to December 2015) across 1,300 websites. We only considered websites that cover video games as their main topic and that published at least 52 articles over the year.

Publications Timing

One of the objectives of the report was to be able to look at the video games media across the five different languages and to highlight in which ways they were different. At the highest levels, it is quite interesting to see that there are some very different patterns from one to another, some more obvious than others.

One of the first information that we checked was the time of publication of their articles (see [figure 1](#)).

The ideal timing for sending a press release is a common topic of discussion for companies that want to be able to hit the sweet spot where both European and American media are receiving it, and can treat it the same day.

It is quite apparent that past 6 p.m. (CET), all non-English media see a significant drop in their publications. English-speaking media though sees a constant output, with a significant part of it starting around 4 p.m. (CET). Any communication that is issued past

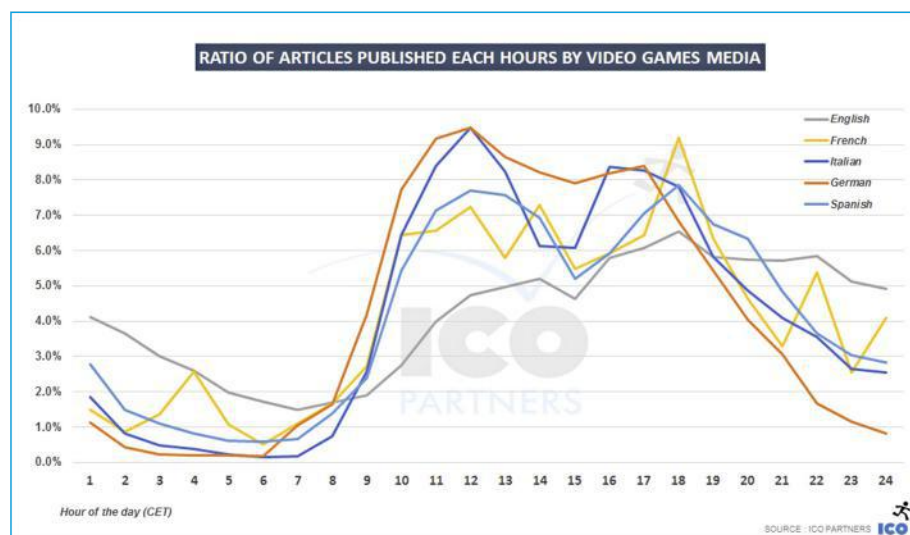


Figure 1: This graph shows the average time of publication of articles.

5 p.m., because of the time required for it to be written, will likely miss the publication time of continental Europe.

Media Sizes and Behaviours

To get some perspective, we also looked at the relative sizes of the different media landscapes. We considered two measures, the total number of articles (see figure 2) published about games and the total number of websites of certain sizes in each language.

When it comes to the total number of articles, there is a first observation that is striking: there are overall fewer articles in French than in any other languages that are published.

And, there are more articles published in German games websites than any of the other languages. But this doesn't necessarily reflect the landscape in terms of the number of media that are producing this output.

We used the Alexa ranking of each website (see figure 3) to determine their popularity and scale, even though we are aware this method proves to have some limitations.

There are almost as many »large« media in English for video games (28) than as all the other languages we studied combined (30). Obviously, it makes sense as the Anglosphere represents a bigger market than the other languages, but we believe there is also an effect related to English media to be very influential, and many media-related activities are focused on them. Or maybe the other way around, the focus on English media has made them more influential.

The larger number of French and German »small« media (respectively 195 and 225) is representative of a stronger dedicated »hobbyist« media of those landscapes that are publishing regularly enough to be included in our research sample.

When taken together, the average articles published per day per website is highlighting two interesting behaviors (see figure 4): French media publish fewer articles on average (1.5 articles per day per website on average), than the other languages. We can put this partly to a higher number of small websites that publish regularly, but not in large volumes, but also to a local specificity where volume is not an objective for the media. At the other end of the spectrum, Italian media have a very high average output (4.2 articles per day and per website on average). This behavior we have observed across Italian websites of all sizes. It could be concluded that obtaining coverage in Italian is easier than in other languages, but that coverage would also be more quickly diluted by other articles.

The Most Popular Games and Platforms

One of the things we looked at specifically is the coverage received by the major gaming



Figure 2: A comparison of the number of articles per language.

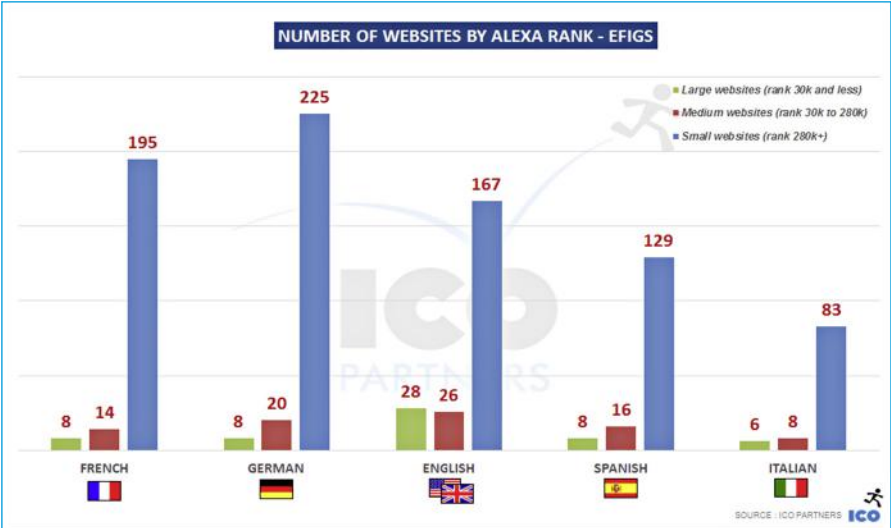


Figure 3: Comparison of the popularity and scale of websites per language.

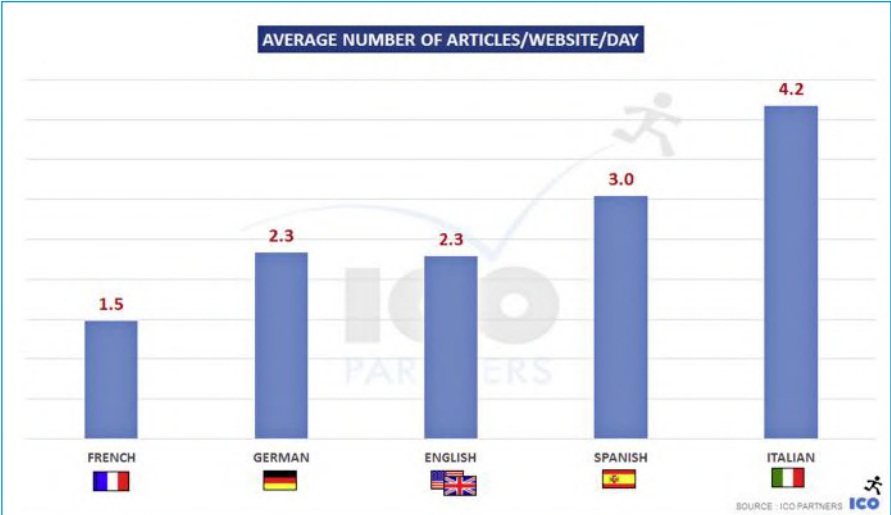


Figure 4: This graph shows the average number of articles per day per language.

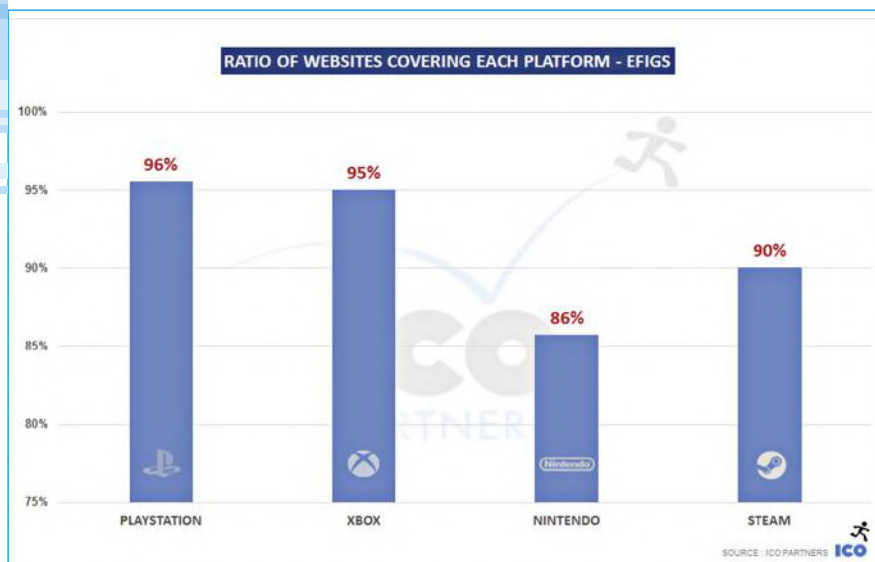


Figure 5: A comparison of the coverage of different platforms.

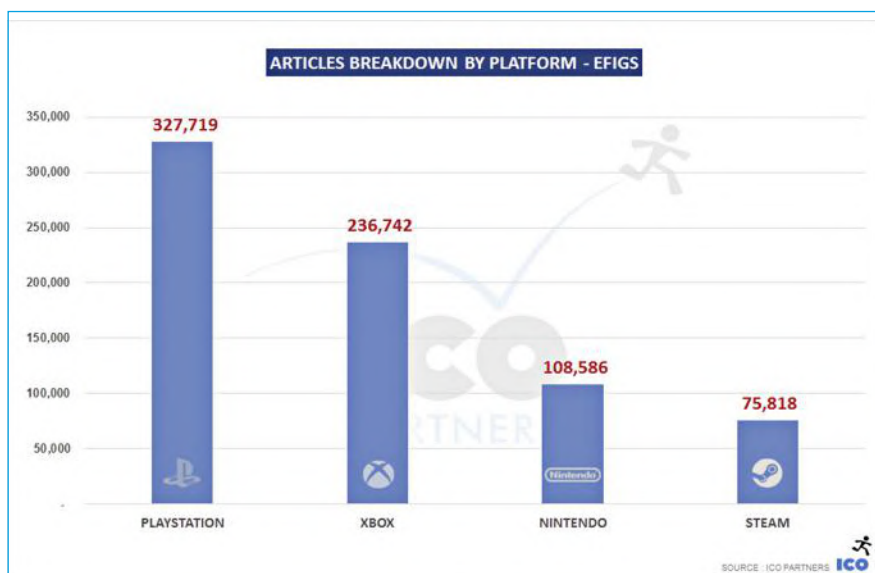


Figure 6: The volume of articles per platform.

MEDIA AFFINITY WITH GAME PLATFORMS				
	PLAYSTATION	XBOX	NINTENDO	STEAM
FRENCH	=	-	+	-
GERMAN	=	+	-	=
ENGLISH	=	=	-	+
SPANISH	+	+	+	=
ITALIAN	+	=	+	-

Affinity is determined based on the percentage of all the articles published in a language covering a platform compared to the global average for that platform.

Figure 7: This chart shows the »media affinity« for a certain platform based on the language of a website.

platforms over a year. There are two things we considered when looking at the relative media presence of those platforms.

First, the percentage of websites that mentioned the platform at all (see [figure 5](#)).

There are two very clear leaders, with both Xbox and PlayStation having 95 percent and more of the games websites mentioning them. The main consoles are so ubiquitous that it is almost surprising that they aren't at 100 percent, to be honest. But you have to account for PC-only media as well, and they are unlikely to have much coverage of the consoles.

More surprising is how Steam, which is not a platform that has a very pro-active communication strategy, still has 90 percent of all the websites mentioning it. This is ahead of the Nintendo platforms (Wii, Wii U, 3DS) standing at 86 percent.

Then, beyond the websites, we also looked at the volume of articles for each platform (see [figure 6](#)).

It shouldn't be a surprise to see PlayStation ahead here with more than 300,000 articles over a year. They have a very strong media presence, and they are constantly ahead of the other platforms in terms of media coverage, and it also echoes with the lead it has built in terms of hardware installs in the current cycle. Looking at the scale, that's still 3-times the total number of articles mentioning the Nintendo consoles (108,000 articles), and almost 30 percent more than the volume of articles mentioning the Xbox brand (236,000 articles).

Steam being behind (75,000 articles) matches with what we were referring to earlier, and the lack of a dedicated communication strategy on the platform from Valve. Much of the coverage is inherited from studios and publishers launching their game on the platform, and without consideration for the brand presence.

One objective of the research is to provide some reference points in regards to how different the media are from one another based on their language and culture. We were able to put together a table that show what we called the »media affinity« for certain platforms based on the language of a website (see [figure 7](#)).

One very interesting pattern is how French, Spanish and Italian media, all based in Mediterranean countries, have a stronger affinity to the Nintendo platforms compared to websites in German or English.

This is not to be interpreted as, for instance, French websites having more coverage on the Nintendo consoles than on the Xbox ones. But in proportion, French media are writing more articles on Nintendo than the German media. I think this is an important consideration – as this helps understand the different sensibilities of the different cultures when it comes to games platforms.

As another example, we looked at the top 10 games in terms of media coverage (number of articles) in English and in German, for the calendar year 2015, set at the same scale (see figure 8 and 9).

On our blog, we did a retrospective of the whole year in terms of media coverage and in it The Witcher 3 was the most mentioned game of 2015, across all the languages we track. But in English it only came second, behind Fallout 4. In German, The Witcher 3 is the clear winner with a third more coverage than the second best game: Star Wars Battlefront. Fallout 4 only coming third in the German media.

Another interesting takeaway is the very strong media coverage in German for World of Warcraft. The game doesn't make it to the top 10 in any other language. World of Warcraft had more articles in German than Metal Gear Solid 5 had in English.

Benchmark: What is a Good Launch?

Part of our process is to slowly build a better understanding of the whole ecosystem. With this in mind, we included a simple benchmark for successful game PR campaigns in the report. Benchmarking communication is really complex, not all campaigns follow the same strategy, have the same number of beats or even the same approach when it comes to assets. There is one element that all games share though: they all have a launch. Launches, across all games (except mobile games), are some of the best beats you can ever have. With this in mind, we looked at 15 AAA games and how many articles they received in the 48h cycle of their launch. And for comparison, we took 20 indie games, with the best media coverage, and looked at their 48h launch cycles (see figure 10).

We had two objectives: understand the scale of the coverage both types of games had, and look at the difference between the two. AAA games had on average 1,494 articles for their launch while our »triple i« games had on average 231 articles. I think it is critical to understand that we didn't compare the blockbuster to minor games ... Having more than 200 articles for any launch should be considered a significant achievement. And it is also equally important to realize that the AAA games operate on a scale of their own, and their media coverage cannot be emulated by smaller games in any way.

We made that report free online to anyone, you just need to head over to our website to get it: icopartners.com/reports

Thomas Bidaux

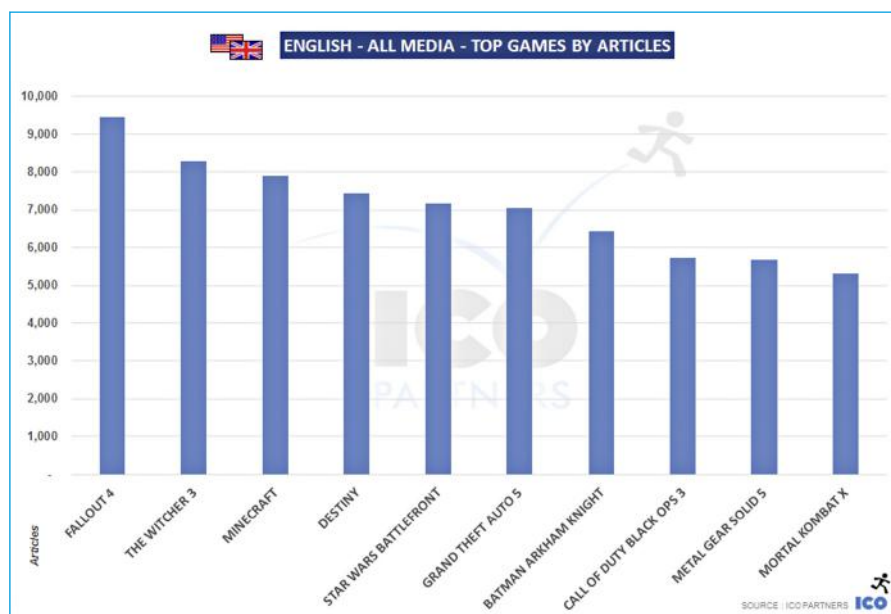


Figure 8: A chart with the top games by article for English-speaking media.

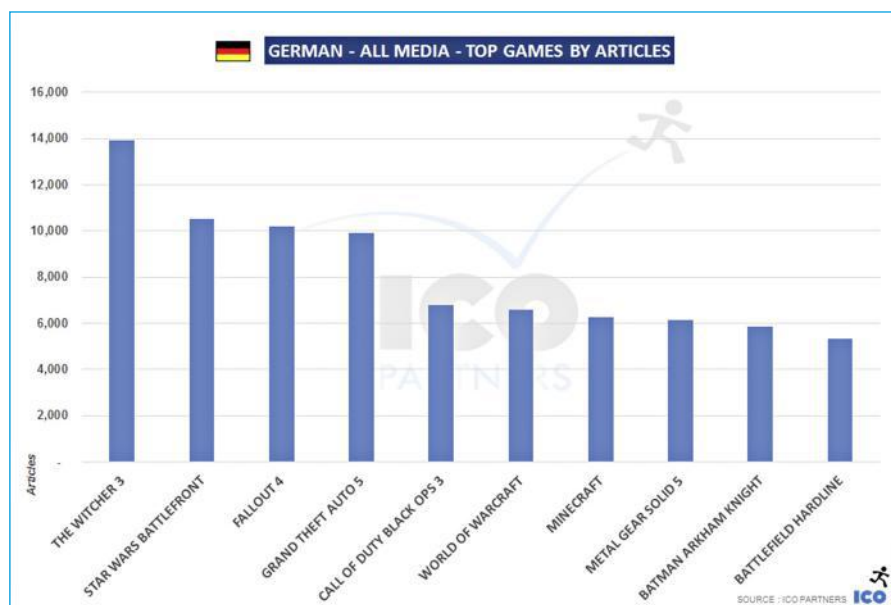


Figure 9: A chart with the top games by article for German-speaking media.

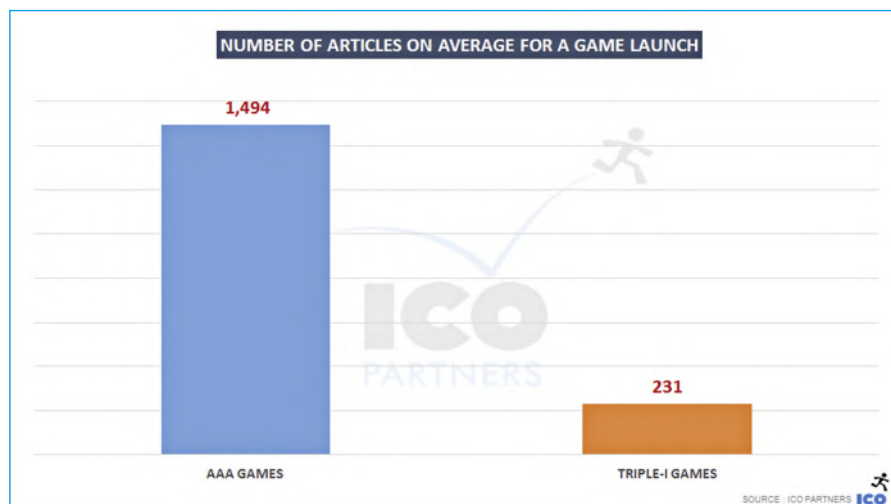
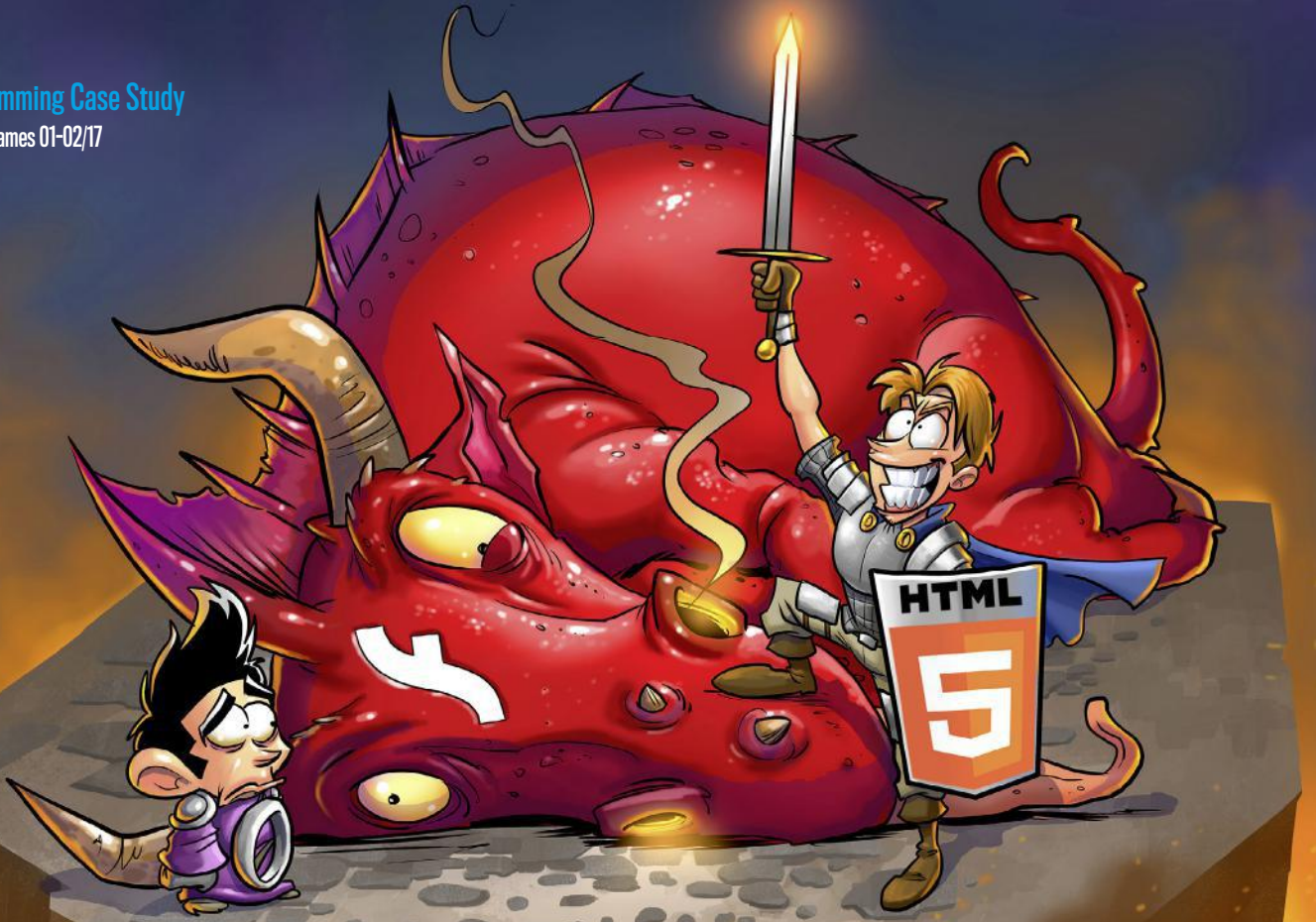


Figure 10: Comparison of the coverage during launch of a AAA game and an indie game.



FLASH IS DEAD! LONG LIVE HTML5?

More and more browser manufacturers shut out Flash and no longer support any related content. The Hamburg-based browser games developer Playa Games took this as an occasion to develop a converter which translates Flash into HTML5, and here they tell us about their experience.



Clemens Brandes-Hell
Head of App Development
at Playa Games

Clemens has been with Playa Games since the founding of the company - more than seven years ago. Prior to the Flash2HTML5 converter he developed the Shakes & Fidget Flash client, among other things, the most successful game to date by the developer and publisher from Hamburg, with more than 50 million registered players.

The issue couldn't be more urgent: For years, mobile and software manufacturers, the trade press and lately even creator Adobe itself have been loudly sounding the death knell for the once widely spread, but never much appreciated web technology called Flash. Even though the plugin with its notorious reputation as a resource killer and malware gateway still hasn't taken its final breath, the end seems now in sight more than ever. Announcements by leading browser developers first to introduce a blacklist for malicious Flash elements and later even a binding whitelist only for verifiably non-malicious elements puts those industries into turmoil which still work with the proprietary technology to some extent today.

Why so many still hold on to Flash

Now, one could argue that those who don't want to accept the demise of this technological fossil from the internet stone age simply don't know any better. After all, in 2014 the day finally arrived that brought us a completed specification for HTML5, which ought to be «the» standard for web applications and thus turn Flash obsolete once and for all. But why have some providers of browser games, e.g., still not jumped on to the bandwagon and completed the overdue migration to HTML5 yet?

Some providers may simply have missed the right moment, and others probably lack people with the required skills and experience with the new HTML5 framework. And some might have a hard time deciding which technology, engine or framework to use. By no means does



Hard to spot any differences: The first image shows the Flash version of Shakes & Fidget; the second one features the HTML5 version (open beta).

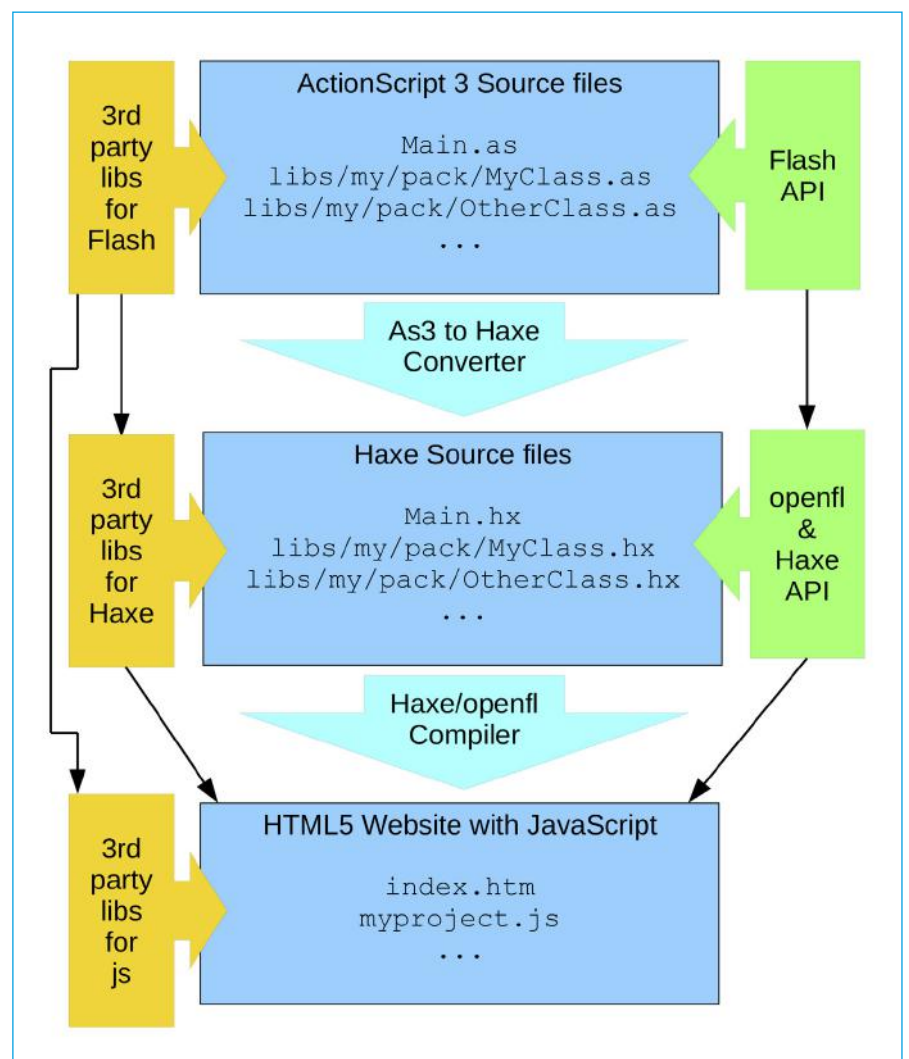
HTML5 include all those functions that the Flash API provided you with. The barebones version of HTML5, i.e. JavaScript, doesn't get you very far yet.

In case of Playa Games, the main reason for holding on to Flash and the related script language ActionScript (AS3) wasn't really Flash itself, but rather the ActionScript runtime module AIR which can be used to create standalone applications for various platforms. Shakes & Fidget which was originally created as a pure browser game soon also became available as an app for iOS and Android as well as a standalone application for Steam on PC or Mac. These applications are all based on the Flash version and are still related to it. What's appealing about using AIR and Flash is the option to utilize a single code base for several – and ideally all – platform applications, including that of the browser. Obviously, some compiler conditionals are required here and there to address platform-specific peculiarities like mouse/touch or different payment interfaces. But all in all, the code, e.g. that of Shakes & Fidget, may be utilized and managed to 95% across multiple platforms, too. This saves a lot of development time and facilitates the timely roll-out of new versions across all platforms.

Adobe as a bottleneck

Naturally, the user of a proprietary technology is entirely subject to the moods and discretion of the provider, in this case Adobe. If there is a bug in the »black box« used, all that can be done in most cases is pray that it will be fixed. Until then, you have to struggle with workarounds. In light of several tickets with a multiannual history and many pages of unanswered »please fix this!« threads, having blind faith in Adobe still being able to get it fixed seems hardly appropriate. It's generally hard, if not frustrating, to try to assess the company's strategy. After all, some time ago Adobe equipped its graphical Flash development tool – bashfully renamed to »Animate« just recently – with the technical possibility to create so-called HTML5 projects. But unfortunately, the innovation, which

may have created a brief moment of euphoria among technically less experienced management levels, proved to be a sham: In no way can an existing Flash project be somehow »transferred to HTML5« as some may have thought or wished for. Instead, Animate may be used as a cumbersome tool to create animated banners



While the elements of the Flash API can be translated automatically for the most part, third-party libraries which aren't available as source code need to act as a substitute on a Haxe or Javascript level, and a little manual work is required, too.

in HTML5, which isn't exactly what the world of browser games had been waiting for.

As an ActionScript developer it can be literally depressing how sloppy Adobe has handled its former market leadership (not to say its monopoly status) regarding »Rich Internet Application« technology. For anyone looking at it from the outside it seems rather strange that there hasn't been any apparent endeavors to overcome their crumbling standing in the post-Flash era. What on earth has kept Adobe from working on a solution for the export of ActionScript projects to HTML5 and thereby being able to provide a rather attractive multi-platform tool in the future, too? I guess it simply wasn't that urgent...

Whatever the reasons may be, here at Playa Games the demise of a core technology that we utilized and that basically lacked any alternative proofed to be increasingly problematic. Basically, there were two possible ways to solve this: either a manual migration or a completely new implementation of the frontends of various games in HTML5 or on a platform supporting HTML5 – resulting in an industrious piece of work; or else some sort of converter – ActionScript in, HTML5 out.

Time to convert!

While doing research for possible ways of migration, we quickly stumbled upon the rela-

tively new language Haxe. Haxe is a language designed for multi-platform development and syntactically related to ActionScript, which can be used to create JavaScript, i.e. HTML5 content, among other things. Also, there is a comprehensive library family for Haxe called openfl which ports the Flash API on an impressive scale.

There are a few other projects which work in similar fashion, one of which is CreateJs. openfl features a rather wide range of functions though, and the API is compatible with that of Flash in large parts.

Upon evaluating the required effort, we decided in favor of Haxe – for one because of the wide range of functions of openfl, and also because of the (superficial) syntactical similarity between ActionScript and Haxe. Instead of a manual migration which also would have required us to break down the frontend code of all games we were looking at an automatic translation in order to be able to use the same code where possible.

There had already been some converter projects at Github, which made an attempt at the automatic translation of ActionScript into Haxe and which we started to scrutinize full of hope initially. Unfortunately, most scripts turned out to be mere string replacers which couldn't measure up to the complexity of a real browser game project like Shakes & Fidget and failed to handle even simple embedded or concatenated terms and references. Even the more high-profile converters which worked with a tokenizer after all turned out useless in practice because they often didn't consider data types and failed to handle more complex terms and references.

In order to keep our own development efforts to a minimum, we first considered to just develop some kind of »simplifier« which could be affixed to a converter to »pre-digest« the syntax so-to-speak. This way, we were hoping we could use an existing converter and achieve our objective faster. However, we moved away from this idea when we became aware of the practical complexity of a functionally equivalent translation. Taking the detour via Haxe to get to JavaScript is to some extent a surprisingly tricky matter. Unlike ActionScript, Haxe, e.g., is typecast a lot more strictly while JavaScript allows basically no typecasting at all.

In order to be able to fully control the translation procedure and to process more complex correlations like data structures, loops or operations correctly, we eventually started to develop our own genuine transcompiler, including all associated modules. It was going to be a laborious and rather unusual project for us game developers, but since no such thing seemed to exist, we saw no other option but to develop a viable tool for our purposes ourselves. Also, we were obviously thrilled by the challenge to get to work on something completely new.

```

3123 public function hx_s510(hx_s51:String, hx_s52:Float = 1):Int
3124 {
3125     var hx_s525 Int = 0;
3126     var hx_s523 Function = null;
3127     var hx_s521 Function = null;
3128     var hx_s519 Function = null;
3129     var hx_s517 Function = null;
3130     var hx_s516 Object = null;
3131     var hx_s515 String = null;
3132     var hx_s514 Dynamic = null;
3133     var hx_s513 Int = 0;
3134
3135     hx_s523 = function(hx_s524:ErrorEvent):Void
3136     {
3137         hx_s516.timeOutTimer.stop();
3138
3139         if(!Std.is(cast hx_s524, IOErrorEvent))
3140         {
3141             hx_s378(cast ('IO Error while attempting to load "' + hx_s516.path + '"', cast 'NEO_ResourceDefineAudio');
3142             hx_s516.status = cast Main.hx_s121;
3143         }
3144         else if(!Std.is(cast hx_s524, SecurityErrorEvent))
3145         {
3146             hx_s378(cast ('Sandbox error while attempting to load "' + hx_s516.path + '"',
3147             cast 'NEO_ResourceDefineAudio');
3148             hx_s516.status = cast Main.hx_s122;
3149         }
3150         else
3151         {
3152             hx_s378(cast ('Unknown error while attempting to load "' + hx_s516.path + '"',
3153             cast 'NEO_ResourceDefineAudio');
3154             hx_s516.status = cast Main.hx_s124;
3155         }
3156     }
3157
3158     hx_s511(cast hx_s525);
3159     hx_s521 = function(hx_s522:ProgressEvent):Void
3160     {
3161         if(hx_s516.sound.isBuffering)
3162         {
3163             if(hx_s516.status != Main.hx_s118)
3164             {
3165                 hx_s373(cast ('Resource "' + hx_s516.path + '" experienced a buffer underrun',
3166                 cast 'NEO_ResourceDefineAudio');
3167                 return;
3168             }
3169             else if(hx_s516.status != Main.hx_s118)
3170             {
3171                 return;
3172             }
3173             hx_s516.timeOutTimer.stop();
3174             if(true)
3175             {
3176                 hx_s516.status = cast Main.hx_s115;
3177             }
3178             else
3179             {
3180                 hx_s378(cast ('Resource "' + hx_s516.path + '" is of an invalid format', cast 'NEO_ResourceDefineAudio');
3181                 hx_s516.status = cast Main.hx_s123;
3182             }
3183             hx_s511(cast hx_s525);
3184         }
3185     }
3186     hx_s519 = function(hx_s520:Event):Void
3187     {
3188         if(hx_s516.status != Main.hx_s118)
3189         {
3190             return;
3191         }
3192     }

```

An example taken from the program code of Shakes & Fidget.

The devil is in the details

If you compare the Haxe to the ActionScript syntax, you first get the impression that the languages are closely related. Only the data types are called a bit differently, and, e.g., in case of the For loop, Haxe apparently felt the need of reinventing the syntactical wheel. Whether certain differences are just »charming peculiarities« or superfluous deformations of proven syntactical concepts is probably a matter of taste. At least, the whole thing doesn't look that complicated at first glance, and yet it does at second glance.

Of course, the devil is once again in the details. There are small, yet significant differences between ActionScript and Haxe, which lead to sometimes unusual issues during translation, some of which I would like to illustrate.

While in ActionScript you can't specify a data type for, e.g., the entries of a hash table (dictionary), in Haxe this is urgently required. Since if I have, let's say, a dictionary including objects of the sprite type, in Haxe I just specify the untyped dictionary <dynamic> as a data type, so when in doubt the Haxe compiler doesn't know which element data type it is dealing with. This leads to the following serious problem: If I want to access characteristics of the element objects like x and y (which are implemented with getters and setters), they won't get properly referenced when specified as dynamic. Instead I get nothing for x and y, i.e. I specify a dynamic characteristic called x or y instead of calling the setter method, which in this case has absolutely no effect on the position of the object on the container.

Obviously, this behavior is hardly intuitive. It relates to the fact that the getters and setters are internally called set_x, set_y, get_x and get_y. If the Haxe compiler knows at one point which data type is used, it will automatically reference the correct getter or setter instead of a dynamic characteristic of the same name.

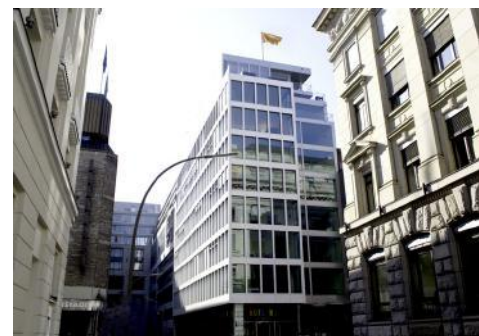
If it doesn't know, it will access existing or non-existing dynamic characteristics, and the consequence are inexplicable errors which make you tear your hair out.

So it takes a certain effort to achieve a typing that goes beyond that of the ActionScript source. Of course, one could simply dictate that additional type information needs to be noted in ActionScript code through meta tags, which the transcompiler then takes over to the Haxe syntax. However, this prerequisite would mean that only specifically adjusted code would be translatable, and we wanted to do everything to avoid having to make manual adjustments to the source code. So for the translation of arrays and hash tables we implemented an internal logging that defined which data type the respective associated elements were of. If the result is clear (e.g. only objects of the sprite type are assigned to a hash table), the transcompiler automatically creates a dictionary<sprite> instead of a dictionary<dynamic>. For exceptional cases where this automatic »guess« of the element data type doesn't work, there is an additional meta tag to push certain values.

When it comes to handling the int data type, Haxe holds a particularly dirty trick in store. In principle, Haxe is very strict with its numeric types. For example, if I assign the result of a division to a variable of the int type, the compiler will complain with an error: »Int should be Float«. If you find this pedantry exemplary or rather annoying probably depends on what you want to translate your Haxe code into later. For our purpose it may have been better if the Haxe compiler had shut up and used something like a Math.floor() for the JavaScript result in order to emulate the int data type that doesn't exist in JavaScript. Instead, we had to instruct our transcompiler to identify such situations and to always insert a corresponding cast. You can never rely on Haxe's »unsafe cast«



Clemens working at his desk.



Playa Games was founded in 2009 with the vision to develop and distribute high-quality mobile and browser games. Today, more than 50 people in the Hamburg-based studio work hard to make this vision come true.



though since in this example the Haxe compiler won't complain, but without any revision on JavaScript level. In this case, float values may suddenly appear in variables which are actually declared as int, which may lead to misleading subsequent errors in connection with array indices and generated bitmap data. »Unsafe Cast« may indeed be useful in a lot of cases, e.g. when generally passing a »function« as callback without wanting to deal with the specification of the argument and return data type in this case, which is common procedure in Haxe, – an information which is usually not provided for a callback function reference in ActionScript. However, unsafe casts are definitely not a tool to get Haxe to automatically do »the right thing«.

In some cases it's required to modify the structure of the ActionScript code automatically. For example, in Haxe it would be rather laborious to implement functions which include a so-called »rest array« (an array from further unknown arguments behind the potentially existing named ones). In Haxe, you basically always just have the option between »normal« named arguments or an array of that kind. If you want both, you have to use tricks and, e.g., declare the formerly named arguments as local variables at the beginning of the function code, whose content then gets »shifted« out of the passed array. You need to pay attention though which potentially existing default values need to be set, if the argument is missing in the respective place in the array. To do this manually for each function would hardly be a pleasant task, especially since it could easily lead to errors.

Additionally, the problem is that in a lot of cases it's not possible to keep a function declaration as a »normally« named function at all. In order to support the aforementioned »rest array« on class level, the function reference needs to be passed to a call of the `PIMethode Reflect.makeVarArgs()`. The return value of this method is then the reference to an anonymous

function which supports the arbitrary number of parameters. In order to associate this reference with the names of the original named function, the reference can, e.g., be assigned to an accordingly named variable of the function type. However, in case of a method declaration this is no static procedure – the assignment of the function declaration to the object variable then needs to be shifted from the class declaration to the constructor of the class.

The modification of a named function declaration into an anonymous one which is then assigned to a previously declared variable of a respective name with the function data type, also proved useful for subfunctions, especially since this way you can make sure that all used symbols get declared in the current scope before being referenced in the code, including that of subfunctions. Unlike ActionScript, Haxe requires the declaration of symbols in correct order, which is, for example, also why two subfunctions directly declared by name can't call up themselves in Haxe – in the code, the function declared second would still be unknown to the respective first one, and the compiler would report an error.

A large part of the additional work is indeed a voluntary one which, luckily, we only have to do once in case of the converter. Certain API calls, especially those which belong to Haxe itself and not to `openfl`, show a different syntax than under ActionScript. Some API elements are completely missing and have to be substituted by helper functions. In other places, helper functions allow similar access to object data types like to hash tables or an analog translation of ActionScript-typical spellings like `if(obj)`.

We try to keep the class structure intact as much as possible. In case of features and paradigms, which aren't supported by Haxe, we have to use workarounds here and there – Haxe knows nothing about namespaces, internal properties, global functions, not to speak of





»inner class« declarations beyond the package body. In these cases we work with prefixes and suffixes to be able to guarantee the original visibility of symbols and characteristics in Haxe, too.

The final step, the creation of Haxe code from the translated syntax tree, is naturally rather trivial. It's important to create a rather readable and similarly structured code in order to be able to debug on the Haxe level, too, if needed. (Unfortunately, the end compilations of the Haxe compiler, i.e. in JavaScript, are already clearly alienated). On the long-term, Haxe debugging should obviously not be required as soon as platform-specific teething problems of the new HTML5 output have been cured. Adjustments on this level, which would always have to be carried out »between the compilers«, are explicitly undesirable and shouldn't be required either.

Conclusion: No to Flash, Yes to ActionScript!

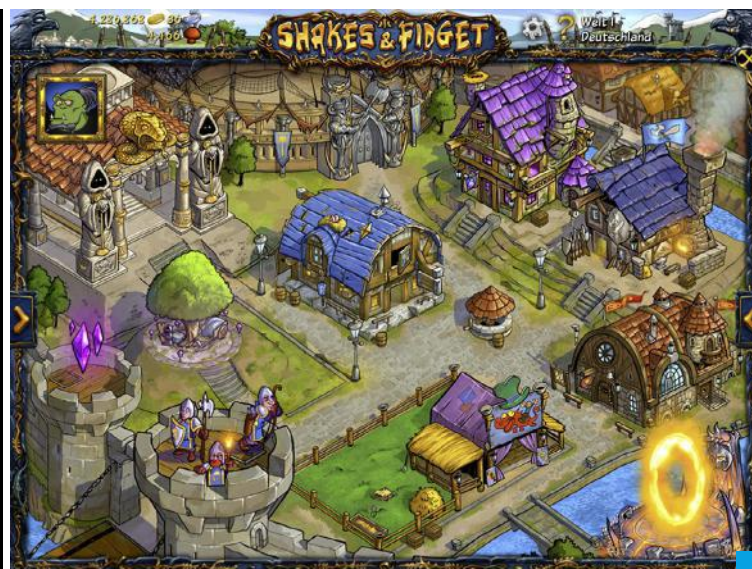
From the very beginning, our goal was to create a tool for regular use, not just for a one-off translation. The transcompiler was to allow us to keep working with our ActionScript code base, thus serving for all platforms, including the browser. It worked out. The automatically translated HTML5 version of Shakes & Fidget with the help of the transcompiler entered its beta phase in September. Initially, we will run it parallel and leave it up to our players whether they want to use the Flash or the HTML5 version. As soon as the beta phase is over, we will start the migration process to HTML5 as the default version. The Flash version will remain available for the users as an option for the time being. It's important for us that our users are able to use the platform that works best for them. Our other projects will be handled in a similar way.

We have long realized that Flash isn't the be-all and end-all. HTML5 is the presence and future for web applications, there's no doubt about that, and everyone needs to decide for themselves which path to take to get there. At Playa Games, we didn't want to throw everything overboard, but rather make our proven work environment fit for the future. And now we have the necessary tools to do it.

Clemens Brandes-Hell

Test the converter for yourself

The Flash-to-HTML5 converter will soon be available from the specifically dedicated website www.flash2html5.com.



Shakes & Fidget - The Game is one of four games by Playa Games, available for iOS, Android, Windows 8 Phone and browser with approx. 50 million registered players.

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McPeppergames	Nikolaus-Molitor-Straße 11a	97702 Münsterstadt	09733 / 781006	info@mcpeppergames.com	
Media Seasons	Liviastraße 6	4105 Leipzig	0341 / 2156752	contact@mediasaisons.com	
Mex IT	Mallinckrodtstraße 320	44147 Dortmund	0231 / 58680722	mex@mex-solutions.com	
Mimimi Productions	Berg-am-Laim-Straße 64	81673 München	089 / 809115070	info@mimimi-productions.de	
Mind Elevator Games	Prenzlauer Promenade 190	13189 Berlin	030 / 91744394	info@mindelevatorgames.com	
mobiventon	Gottfried-Hagen-Straße 24	51105 Köln	0221 / 6778110	info@mobiventon.com	
Moonbyte Games	Wormser Landstraße 17	67346 Speyer	06232 / 8774482	info@moonbytegames.com	
NeoBird	Südwestpark 37-41	90449 Nürnberg	0911 / 3092097	info@neobird.de	
Neopoly GmbH	Hellweg 5-7	44787 Bochum	0234 / 369177-0	info@neopoly.de	
netmin games	Philipp-Reis-Straße 6	55129 Mainz	06131 / 507896	schreiber@netmin.de	
northworks	Stahltwiete 23	22761 Hamburg	040 / 78107075	info@northworks.de	
Noumena Studios	Lützowstraße 33	10785 Berlin	030 / 53148825	info@noumenastudios.com	
NovaTrix / Animedo	Schlüsselwiesen 19	70186 Stuttgart	0711 / 3102770	info@animedo.de	
Nurogames GmbH	Schaafenstraße 25	50676 Köln	0221 / 3988040	info@nurogames.com	
online4ever Limited	Manitusstraße 6	1067 Dresden	0351 / 2063875	info@online4ever.biz	
OFM - OnlineFussballManager	Eupener Straße 60	50933 Köln	0221 / 88892920	office@onlinefussballmanager.de	
Outline Development	Hauptstraße 122	57074 Siegen	0271 / 3131331	webmaster@outline-development.de	
Pappuga	Fürther Straße 212	90429 Nürnberg	0911 / 32378310	info@pappuga.com	
Phobator	Wiesentalstraße 5	90419 Nürnberg	0911 / 9389292	wendt@phobator.de	
Piranha Bytes	Ruhrallee 63	45138 Essen	0201 / 806720	info.nospam@piranha-bytes.com	
pixeltamer.net	Clausewitzstraße 6	10629 Berlin	030 / 34347690	welcome@pixeltamer.net	
Pixon	Jaffestraße 10	21109 Hamburg	040 / 33399430	welcome@pixon.de	
Playnik	Im Derdel 17	48161 Münster	02534 / 9733530	info@playnik.de	
playzo	Heinrich-Herz- Straße 6	64295 Darmstadt	06151 / 6673700	info@playzo.biz	
plazz entertainment	Augustmauer 1	99084 Erfurt	0361 / 2169460	info@plazz-entertainment.com	
Pop Rocket Studios GmbH	Forsmannstraße 8b	22303 Hamburg	040 / 68878691	info@poprocket.com	
Procontis	Am Bauhof 18	64807 Dieburg	06071 / 430111	sales@procontis.de	
Promotion Software	Karlstraße 3	72072 Tübingen	07071 / 91670	mail@promotion-software.de	
Quadrige Games	August-Bebel-Straße 27	14482 Potsdam	0331 / 23189660	info@quadrigagames.com	
Rat King Entertainment	Robert-Franz-Ring 3	06108 Halle	0345 / 6141741	mail@ratking.de	
Ravensburger Digital	Kaflerstraße 8	81241 München	089 / 12228180	tellme@ravensburger-digital.com	
Reality Twist	Berg-Am-Laim-Straße 64	81673 München	089 / 380129500	mail@reality-twist.com	
Realforge Studios	Hofer Straße 15	81737 München	089 / 55069134	info@realforgestudios.com	
RedMoon Studios	Dieselstrasse 16	86368 Gersthofen	0821 / 45598000	info@redmoonstudios.de	
REDOX Game Labs	Jakob-Haringer Straße 5	A-5020 Salzburg	+43 / 662 / 273273	info@redox-labs.com	
remote control productions	Karlstraße 68	80335 München	089 / 21020570	info@r-control.de	
RockAByte	Schaafenstraße 25	50676 Köln	0221 / 80147950	info@rockabyte.com	
SAFKAS Development	Schulze-Delitzsch-Straße 39	04315 Leipzig		mail@safkas.de	
Sandbox Interactive	Bornholmer Strasse 71	10439 Berlin	030 / 40045181	info@sandbox-interactive.com	
Scorpius Forge	Hörvelsinger Weg 29-31	89081 Ulm	0731 / 14410099	info@scorpius-forge.de	
Secret Item Games UG	Himbeerenweg 10d	44532 Lünen		info@secret-item-games.com	
Serious Games Solutions	August-Bebel-Straße 27	14482 Potsdam	0331 / 23189680	mail@serious-games-solutions.com	
Sharkbom Studios	Durlacher Allee 53	76131 Karlsruhe	0160 / 92502633	contact@sharkbombs.de	
Silent Dreams	Kreuzstraße 3	45468 Mülheim an der Ruhr		contact@silentdreams.de	
SilentFuture	Triebelsheide 37b	42111 Wuppertal	0202 / 3935366	info@silentfuture.de	
Simlity	Moritz-von-Rohr-Straße 1a	07745 Jena	03641/3279684	info@simlity.com	
Skunk Brothers	Dieselstraße 12	61191 Rosbach		hello@skunkbrothers.de	
SlipShift	Friedrichstraße 122	10117 Berlin	030 / 27581581	info@slipshift.net	
Snapjaw Games	Dieselstrasse 7	50259 Pulheim	02238 / 4785813	info@snapjawgames.com	
Snowstep Development	Heinrich-Holtschneider-Weg 76	40489 Düsseldorf	0201 / 17848176	business@snowstep.com	
Socialspiel	Schmalzhofgasse 26 / Top 5-6	A-1060 Wien		office@socialspiel.com	
SOLID WHITE design digital media	Mönchhaldenstraße 27A	70191 Stuttgart	0711 / 12375149	contact@solidwhite.de	
Solimedia Productions	Bahnhofstr. 4a	99084 Erfurt	0361 / 658550	hatmut.niemeier@solimedia.de	
space orange studios GmbH	Graf-Adolf-Straße 41	40210 Düsseldorf	0211 / 92416956	info@space-orange.com	
Sparrow Games	Wegenerstraße 1	13088 Berlin	030 / 50915356	mail@sparrowgames.de	
SpinBottle Games	Weidkamp 3	45355 Essen	0201 / 1789614	info@spinbottlegames.com	

DEVELOPMENT					
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Spirit		Friedrichstraße 15	70174 Stuttgart	0711 / 96685510	weyrich@go4spirit.com
Splitscreen Studios		Neuer Kamp 30	20357 Hamburg		info@splitscreenstudios.com
Springwald Software		Alter Eistreff 36	44789 Bochum	0700 / 777464925	info@springwald.de
Sproing Interactive Media	key player	Fernkornegasse 10	A-1100 Wien	+43 / 1 / 60430280	office@sproing.com
stillalive studios		Rosengasse 1	A-6020 Innsbruck	+43 / 650 / 3468942	info@stillalive-studios.com
Stratosphere Games		Gormannstraße 14	10119 Berlin	0177 / 7887699	info@stratosphere-games.com
Studio Fizbin		Hoferstraße 20	71636 Ludwigsburg	07141 / 9923866	hello@studio-fizbin.de
Sunlight Games		Im Klapperhof 7-23	50670 Köln	0221 / 16823466	kontakt@sunlight-games.com
symlCrowd		In der Schleh 27	5224 Eschweiler	0152 / 55878044	apps@symlcrowd.de
Team Vienna Games		Kaiserstrasse 84/1/6	A-1070 Wien		office@teamviennagames.com
TG Nord		Große Düwelstraße 28	30171 Hannover	0511 / 9409208	mail@tg-nord.com
the Good Evil		Gilbachstraße 22	50672 Köln	0221 / 16894248	hello@thegoodevil.com
Thera Bytes UG		Zielstattstraße 10a	81379 München	089 / 74809570	info@therabytes.de
Thoughtfish GmbH		Friedbergstraße 9	14057 Berlin	030 / 692054321	hello@thoughtfish.de
Travian Games		Wilhelm-Wagenfeld-Straße 22	80807 München	089 / 3249150	mail@traviangames.com
unikat media		Eckdrift 10	19061 Schwerin	0385 / 64105688	info@unikatmedia.de
upjers		Hafenstraße 13	96052 Bamberg	0951 / 510908100	mail@upjers.com
VisionaryX		Friedrichstraße 12	71101 Schönaich	07031 / 2850 / 414	contact@visionaryx.com
V-Play		Kolonitzgasse 9/11-14	A-1030 Wien		team@v-play.net
Wolpertinger Games		Karlstraße 68	80335 München	089 / 210205700	contact@wolpertingergames.com
wooga		Saarbrücker Straße 38	10405 Berlin	030 / 32505294	info@wooga.com
Xendex		Mariahilfer Strasse 176/6	A-1150 Wien	+43 / 1 / 89080090	office@xendex.com
XYRALITY		Friedensallee 290	22763 Hamburg	0 / 4035730010	info@xyrality.com
YAGER Development	key player	Pfuelstraße 5	10997 Berlin	030 / 69597660	contact@yager.de
YEPS! GmbH		Methweg 22	50823 Köln	0221 / 30191824	kontakt@yeps.de
zeitland media & games		Mathildenstraße 10/1	71638 Ludwigsburg	07141 / 5050565	contact@zeitland.com
Zeroscale		Schwedter Straße 9a	10119 Berlin	030 / 405057929	info@zeroscale.com
Zone 2 Connect		Fürstenwall 70	40219 Düsseldorf	0211 / 5422400	info@zone2.de
Z-Software		Lindemannstrasse 81	44137 Dortmund	0231 / 33015031	contact@z-software.net
FREELANCER DEVELOPMENT					
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Caspar Siebel		Theresienhöhe 1	80339 München	017661615291	mail@casparsiebel.com
Christian Kuchmeister (3D Artist / Game Design)		Lauensteinstraße 9	22307 Hamburg	0163 / 4841841	ck@ckuechmeister.de
Eric Jannot (Game Design, Game Writing)		Sonnenallee 70	12045 Berlin	0178 / 5223697	
Filippo Beck Peccoz		Franz-Joseph-Straße 19	80801 München	089 / 80033204	mail@fbpsound.com
Jochen Hamma (Producing)		Wehinger Weg 9	78583 Boettingen	07429 / 910793	jochen.hammer@fantastic-realms.com
Jörg Beilschmidt (Game Design)		Berliner Ring 20	21406 Melbeck	0172 / 4311243	j.beilschmidt@creatown.de
Kim Lange (Full Service Agency)		Landwehr 192	46045 Oberhausen	0178 / 2375418	lange@eins2design.de
Marco Sowa (Producing, Development)		Postfach 420566	50899 Köln	0221 / 16916844	mail@marcosowa.de
Martin Linnartz (3D Artist, Game Developer)		Achenbachstraße 19	40237 Düsseldorf	0211 / 17838926	kontakt@ubicity.de
Martin Nerurkar (Game Design)		Durlacher Allee 53	76131 Karlsruhe		mnerurkar@sharkbombs.com
Nico Nowarra (Storytelling)		Friedbergstraße 9	14057 Berlin	030 / 31801899	nno@menintext.com
Niels Bauer Games (Game Design)		Sickingenstraße 37	79117 Freiburg	0761 / 66947	contact@nielsbauergames.com
Pinky Pills (2D-Grafik, Game Design, Concept)		Swindonstraße 162	38226 Salzgitter	05341 / 2886036	pinkypills@arcor.de
Sebastian Zimmermann (3D Character Creation)				0176 / 23844655	contact@sart.info
Thomas Obermaier (Programmierung)		Kapellenstraße 1	86869 Gutenberg	0170 / 3815144	contact@polyforming.com
Wolfgang Walk (Full Scale Producing)		Karl-Leopold-Straße 6	76229 Karlsruhe	0721 / 48399963	wolfgang.walk@t-online.de
PUBLISHING/DISTRIBUTION					
Company		Street/Street Number	Postal Code/City	Phone number	E-mail
505 Games		Brunnfeld 2-6	93133 Burglengenfeld	09471 / 3088792	
Activision Blizzard Deutschland	key player	Fraunhoferstraße 7	85737 Ismaning	089 / 9998170	info@activision.de
ad2games		Rosenstraße 17	10178 Berlin	030 / 240888221	info@ad2games.com
Aeria Games Europe		Schlesische Straße 27, Aufgang C	10997 Berlin		info@ariagames.com
Aerosoft		Lindberghring 12	33142 Bielefeld	02955 / 760310	info@aerosoft.de
Application Systems Heidelberg		Pleikartsforsterhof 4/1	69124 Heidelberg	06221 / 300002	kontakt@application-systems.de
AppLift		Rosentraße 17	10178 Berlin	030 / 240888208	info@applift.com
astragon Software	key player	Limitenstrasse 64-78	41236 Mönchengladbach	02166 / 146450	info@astragon.de
Bandai Namco Entertainment Germany		Carl-Benz-Straße 21	60386 Frankfurt am Main	069 / 24449100	de.info@bandainamcoent.eu
BHV		Noveslastraße 60	41564 Kaarst	02131 / 76501	info@bhv.de
Bigpoint		Drehbahn 47-48	20354 Hamburg	040 / 8814310	info@bigpoint.net
bitComposer Entertainment		Mergenthalerallee 79-81	65760 Eschborn	06196 / 7793810	info@bit-composer.com
Capcom Entertainment Germany GmbH		Borselstraße 20	22765 Hamburg	040 / 6965620	info@capcomeuro.de
Covus Crobo		Schwedter Straße 263	10119 Berlin		info@crobo.com
Crimson Cow		Tarpen 40, Haus 5	22419 Hamburg	040 / 59355237	info@crimsoncow.de
Crytek	key player	Grüneburgweg 16-18	60322 Frankfurt am Main	069 / 21977660	cryengine@crytek.com
Daedalic Entertainment		Papenreue 53-Workport Unit 2	22453 Hamburg	040 / 43261270	info@daedalic.de
Deck13 Interactive		Gutleutstraße 82	60329 Frankfurt am Main	069 / 71671660	info@deck13.com
dreamfab		Domplatz 3	93047 Regensburg	0941 / 569591520	
dtp entertainment		Goldbekplatz 3-5	22303 Hamburg	040 / 6699100	info@dtp-entertainment.com
dtp young entertainment		Goldbekplatz 3-5	22303 Hamburg	040 / 6699100	info@dtp-young.com
Electronic Arts		Im Zollhafen 15-17	50678 Köln	0221 / 975820	
European Games Group		Wiener Platz 7	81667 München		contact@gamesgroup.eu
EuroVideo Medien		Bavariafilmpfad 7 / Gebäude 33	82031 Grünwald	089 / 96244442	info@eurovideo.de
Flashpoint		Valvo Park - Haus 5c / Tarpen 40	22419 Hamburg	040 / 710060	info@flashpoint.de
G2A.COM Limited	key player	36/F, Tower Two, Times Square, 1 Matheson Street		Causeway Bay, Hong Kong	dach@g2a.com
GameDuell	key player	Taubenstraße 24-25	10117 Berlin	030 / 288768211	impressum@gameduell.de
Gameforge		Albert-Nestler-Straße 8	76131 Karlsruhe	0721 / 3548080	info@gameforge.de
GameGenetics		Alte Jakobstraße 85-86	10179 Berlin	030 / 922512769	info@gamegenetics.de
Gameloft		Karl-Liebknecht-Straße 5	10118 Berlin	030 / 20188429	gregory.wintgens@gameloft.com
GameTwist		Mariahilfer Straße 47/1/102	1060 Wien	+43 / 1494 / 5056	3rdparty@gametwist.com
GamesInFlames		Karlstraße 68	80335 München	089 / 210205715	info@gamesinflammes.com
gamigo	key player	Behringstraße 16b	22765 Hamburg	040 / 4118850	info@gamigo.com
Halycon Media		An der Autobahn 24	23858 Reinfeld	04533 / 61090	info@halycon.de
Headup Games		Nordstraße 102	52353 Düren	02421 / 4868700	info@headupgames.com
HitFox Group		Rosenstraße 17	10178 Berlin	030 / 240888200	info@hitfoxgroup.com
IME - Interactive Media & Entertainment GmbH		Leichenstr. 28A	22767 Hamburg	040 / 28472903	
Infernum Productions		Uhlandstraße 175	10719 Berlin	030 / 91201090	contact@infernum.com
InnoGames		Friesenstraße 13	20097 Hamburg	040 / 78893350	info@innogames.de
Intenium		Neuer Pferdemarkt 1	20359 Hamburg	040 / 25494296	info@intenium.de
Kalypso Media Group	key player	Wilhelm-Leuschner-Straße 11-13	67547 Worms	06241 / 5061900	info@kalypsomedia.com

PUBLISHING/DISTRIBUTION					
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Koch Media		Lochhamer Straße 9	82152 Planegg/München	089 / 242450	office@kochmedia.de
Konami		Berner Straße 103-105	60437 Frankfurt am Main	069 / 9855730	support@konami.de
McGame.com		Fürstenwall 69	40217 Düsseldorf	0211 / 63550100	support@mcgame.com
Microsoft		Konrad-Zuse-Straße 1	85716 Unterschleißheim	089 / 31760	kunden@microsoft.com
Millform		Kummelenstrasse 20	CH-4104 Oberwil/BL	+41 61 / 7220712	werner.sala@millform.ch
mixtvision Digital		Leopoldstraße 25	80802 München	089 / 383770925	kontakt@mixtvision.de
Morphicon Limited		Lindwurmstraße 88	80337 München	089 / 45235460	info@morphicon.de
NBG		Brunnfeld 2-6	93133 Burglengenfeld	09471 / 70170	info@nbg-online.de
Nintendo		Nintendo Center	63760 Grossostheim	06026 / 9500	info@nintendo.de
Nordic Games		Landstraßer Hauptstraße 1/18	A-1030 Wien	+43 / 1 / 2365487-0	office@nordicgames.at
Novitas		Frankfurter Straße 2	38122 Braunschweig	02574 / 9270	kontakt@greenpepper.de
Phenomenia		An der Sandkuhl 81a	47445 Moers	02327 / 9970	info@phenomenia.com
Playa Games		Alstertor 9	20095 Hamburg	040 / 76793220	info@playa-games.com
Players Rock Entertainment		Goseriede 4	30159 Hannover	0511 / 3539940	contact@playersrock.com
ProSiebenSat.1 Games		Medienallee 6	85774 Unterföhring	089 / 950710	info@sevengames.de
Ravensburger Digital		Kaflerstraße 8	81241 München	089 / 12228180	tellme@ravensburger-digital.com
Reality Twist		Berg-Am-Laim-Straße 64	81673 München	089 / 380129500	mail@reality-twist.com
redspotgames		Postfach 310464	80104 München	089 / 4036370	info@redspotgames.com
Rondomedia		Limitenstraße 64-78	41236 Mönchengladbach	02166 / 618660	info@rondomedia.de
RTL Games		Achnerstraße 1036	50858 Köln	0221 / 4560	entwickler@rtl-interactive.de
Rumble Media		Kriegsstraße 5	76137 Karlsruhe	0721 / 2018020	info@fettspielen.de
S.A.D.		Rötelbachstraße 91	89079 Ulm	07305 / 96290	kontakt@s-a-d.de
Sega		Rablstraße 24	81669 München	089 / 22848000	info@sega.de
SERU		Industriestraße 8	24589 Nortorf	04392 / 84900	info@seru.de
Sony Computer Entertainment		Frankfurter Straße 233	63263 Neu-Isenburg	06102 / 4330	scee_presscentre@scee.net
Square Enix		Domstraße 17	20095 Hamburg	040 / 30633400	
Take-Two Interactive		Agnesstraße 14	80798 München	089 / 278220	info@take2.de
Thumbr		Pfuelstraße 5	10997 Berlin	030 / 300137100	info@thumbr.com
Tip24 Entertainment		Straßenbahnring 11	20251 Hamburg		info@t24e.de
Tivola Publishing	key player	Oeverseestraße 10-12	22769 Hamburg	040 / 7070063	mail@tivola.de
TopWare Interactive		Rittnerstraße 36	76227 Karlsruhe	0721 / 9151010	info@topware.de
Traffic Captain		Wendenstraße 21b	20097 Hamburg	040 / 23706800	info@traffcaptain.com
Travian Games		Wilhelm-Wagenfeld-Straße 22	80807 München	089 / 3249150	mail@traviangames.com
Ubisoft	key player	Adlerstraße 74	40211 Düsseldorf	0211 / 338000	info@ubisoft.de
United Soft Media Verlag		Thomas-Wimmer-Ring 11	80539 München	089 / 29088175	info@usm.de
upjers		Hafenstraße 13	96052 Bamberg	0951 / 510908100	mail@upjers.com
YEPS! GmbH		Methweg 22	50823 Köln	0221 / 30191824	kontakt@yeps.de
ZeniMax Germany		Schillerstraße 15/17	60313 Frankfurt am Main		kontakt.de@zenimax.com
PUBLIC SECTOR					
Company		Street/Street Number	Postal Code/City	Phone number	E-mail
BIU	key player	Charlottenstraße 62	10179 Berlin	030 / 24087790	info@biu-online.de
BIU.Dev/BIU.Net	key player	Charlottenstraße 62	10117 Berlin	030 / 24087790	info@biu-online.de
FilmFernsehFonds Bayern	key player	Sonnenstraße 21	80331 München	089 / 5446020	filmfoerderung@fff-bayern.de
Film- und Medienstiftung NRW	key player	Kaistrasse 14	40221 Düsseldorf	0211 / 9305000	info@filmstiftung.de
G.A.M.E.		Französische Straße 48	10117 Berlin	030 / 346550980	info@game-bundesverband.de
gamearea FRM		Holzhausenstraße 22	60322 Frankfurt am Main	069 / 94419441	info@gamearea-frm.de
gamecity:Hamburg	key player	Habichtstraße 41	22305 Hamburg	040 / 2270190	info@gamecity-hamburg.de
GAMePlaces		Hanauer Landstraße 126-128	60314 Frankfurt am Main	069 / 21236214	manuela.schiffner@gameplaces.de
games.net berlinbrandenburg	key player	Ackerstraße 3A	10115 Berlin	030 / 24628570	games.net@medianet-bb.de
GDI.Ruhr		Kreuzstraße 1	45468 Mülheim an der Ruhr	0208 / 69801520	info@games-ruhr.com
Hessen-IT		Abraham-Lincoln-Straße 38 - 42	65189 Wiesbaden	0611 / 7748481	info@hessen-it.de
Leipzig eSports e.V.		Postfach 30 15 07	04257 Leipzig	0157 / 54 35 9223	info@leipzigsports.de
medienboard berlin-brandenburg		August-Bebel-Straße 26-53	14482 Potsdam-Babelsberg	0331 / 743870	info@medienboard.de
MfG Medien- und Filmgesellschaft Baden-Württemberg		Breitscheidstraße 4	70174 Stuttgart	0711 / 90715-300	info@mfg.de
Mitteldeutsche Medienförderung	key player	Hainstraße 17-19	4109 Leipzig	0341 / 269870	info@mdm-online.de
nordmedia	key player	Expo-Plaza 1	30539 Hannover	0511 / 1234560	info@nordmedia.de
Northstar Developers		Bödekerstr 84	30161 Hannover	0160 / 97880272	d.brueinig@collision-studios.com
OVUS		Aichhornastraße 14	A-1120 Wien	+43 / 1810 / 328912	office@ovus.at
Stiftung Digitale Spielkultur		Torstraße 6	10119 Berlin	030 / 29049290	kontakt@stiftung-digitale-spielkultur.de
USK	key player	Torstraße 6	10119 Berlin	030 / 24088660	kontakt@usk.de
WERK1 München	key player	Grafinger Straße 6	81671 München	089 / 9952990	info@werk1muenchen.de
EDUCATION					
Company		Street/Street Number	Postal Code/City	Phone number	E-mail
Acagamics e.V.		Universitätsplatz 2, G29	39106 Magdeburg		info@acagamics.de
Akademie für Medien		Balinger Straße 39A	70567 Stuttgart	0711 / 4209444	h.ehlers@amk-net.de
BTK - Hochschule für Gestaltung		Bernburger Straße 24-25	10963 Berlin	030 / 338539510	berlin@btk-fh.de
Cologne Game Lab / Fachhochschule Köln		Ubierring 40	50678 Köln	0221 / 82753095	info@colognegamelab.de
Designhochschule Schwerin		Bergstraße 38	19055 Schwerin	0385 / 5559775	info@designschule.de
EC Europa Campus		Lyonerstraße 34	60528 Frankfurt am Main	0621 / 8425660	
FH OÖ Studienbetriebs GmbH		Softwarepark 11	A-4232 Hagenberg	+43 (0) 5080420	info@fh-hagenberg.at
FH Trier		Schneidershof	54293 Trier	0651 / 8103345	sek@informatik.fh-trier.de
FH Technikum Wien		Mariahilfer Straße 37-39	1060 Wien	+43 / 1 / 588390	info@technikum-wien.at
FH Salzburg		Urstein Süd 1	A-5412 Puch/Hallein	+43 / 50 / 22110	press@fh-salzburg.ac.at
Games Academy Berlin	key player	Rungestrasse 20	10179 Berlin	030 / 29779120	info@games-academy.de
Games Academy Frankfurt	key player	Hanauer Landstraße 146	60314 Frankfurt	069 / 42696460	info@games-academy.de
Gesellschaft für Personalentwicklung und Bildung		Beuthstraße 7-8	10117 Berlin	030 / 9339480	gpb-berlin@gpb-berlin.de
Hochschule Harz		Friedrichstrasse 57-59	38855 Wernigerode	03943 / 659100	tackermann@hs-harz.de
Hochschule Mittweida (FH)		Technikumplatz 17	09648 Mittweida		kontakt@hs-mittweida.de
HTW Berlin		Wilhelminenhofstraße 75a	12459 Berlin	030 / 50190	
Macromedia Akademie		Elsenheimerstraße 63	80687 München	089 / 96160800	ausbildung@macromedia.de
Macromedia Akademie		Naststraße 11	70376 Stuttgart	0711 / 2807380	info.stgt@macromedia.de
Macromedia Akademie		Brüderstraße 17	50667 Köln	0221 / 3108223	akademie.koeln@macromedia.de
Macromedia Hochschule		Gollierstraße 4	80339 München	089 / 5441510	info.muc@macromedia.de
mAHS, media Akademie - Hochschule Stuttgart		Tübinger Straße 12-16	70178 Stuttgart	0711 / 925430	info@media-hs.de
Mediadesign Hochschule	key player	Lindenstraße 20-25	10969 Berlin	030 / 3992660	info-ber@mediadesign-fh.de
Mediadesign Hochschule	key player	Werdener Straße 4	40227 Düsseldorf	0211 / 1793930	info-dus@mediadesign-fh.de
Mediadesign Hochschule	key player	Claudius-Keller-Straße 7	81669 München	089 / 4506050	info-muc@mediadesign-fh.de
S4G School for Games		Gubener Straße 47	10243 Berlin	030 / 96595244	info@school4games.net
SAE Institute Berlin		Soltauer Straße 18-22	13509 Berlin	030 / 43094470	berlin@sae.edu
SAE Institute Bochum	key player	Metzstraße 23	44793 Bochum	0234 / 93451310	bochum@sae.edu

EDUCATION					
Company		Street/Street Number	Postal Code/City	Phone number	E-mail
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SAE Institute Hamburg	key playen	Feldstraße 66	20359 Hamburg	040 / 23688080	hamburg@sae.edu
SAE Institute Köln	key playen	Medienzentr. Ost, Carlswerkstr. 11c	51063 Köln	0221 / 9541220	koeln@sae.edu
SAE Institute Leipzig	key playen	Dittrichring 10	40109 Leipzig	0341 / 3085160	leipzig@sae.edu
SAE Institute München	key playen	Bayerwaldstraße 43	81737 München	089 / 89068771	muenchen.sae.edu
SAE Institute Stuttgart	key playen	Stuttgarter Straße 23	70469 Stuttgart	0711 / 81473690	stuttgart@sae.edu
SRH Fachschulen		Bonhoefferstraße 1	69123 Heidelberg	06221 / 884225	it.heidelberg@fachschulen.srh.de
SRH Hochschule Heidelberg	key playen	Ludwig-Gutmann-Straße 6	69123 Heidelberg	06221 / 882790	Daniel.Goerlich@Hochschule-Heidelberg.de
Zürcher Universität der Künste	key playen	Ausstellungsstraße 60	CH-8005 Zürich	+41 / 43 / 4464646	hs.admin@zhdk.ch
BUSINESS SERVICE					
Company		Street/Street Number	Postal Code/City	Phone number	E-mail
4-REAL INTERMEDIA (Lokalisation)		Ludwigstraße 32	63067 Offenbach	069 / 8090880	info@4-real.com
adjust		Saarbrücker Strasse 36	10405 Berlin	030 / 91460083	
Anakan (Lokalisation)		Pfuelstraße 5	10997 Berlin	030 / 531420450	ana@anakan.de
Aruba Events	key playen	Kreuzstraße 1-3	45468 Mülheim an der Ruhr	0208 / 6982608	infos@aruba-events.de
arvato games task force		Carl-Bertelsmann-Straße 161F	33332 Gütersloh	05241 / 803074	kontakt@gametakforce.de
Beiten Burkhardt Rechtsanwälts-gesellschaft mbH		Westhafen Tower, Westhafenplatz 1	60327 Frankfurt	069 / 7560950	bblaw-frankfurt@bblaw.com
Brehm & v. Moers		Anna-Louisa-Karsch-Straße 2	10178 Berlin	030 / 2603050	berlin@bvm-law.de
Die Hobrechts (Game Thinking)		Hobrechtstraße 65	12047 Berlin	030 / 62901232	info@diehobrechts.de
Dr. Behrmann & Härtel Rechtsanwälte		Kantstraße 98	10627 Berlin	030 / 319984910	info@behrmannhaertel.de
Buschbaum Media & PR		Emanuel-Leutze Straße 21	40547 Düsseldorf	0211 / 5988140	presse@buschbaum-media.com
Clans.de (Network)		Pinnsberg 47	20359 Hamburg	040 / 78800990	info@clans.de
Computec Media GmbH	key playen	Dr.-Mack-Str. 83	90762 Fürth	0911 / 2872100	info@computec.de
CULTURETRANSLATE		Lyoner Straße 34	60528 Frankfurt am Main	069 / 65998000	info@culturetranslate.de
DELASOCIAL		Christoph-Probst-Weg 31	20251 Hamburg	040 / 87979890	contact@delasocial.com
Digital River		Vogelsanger Straße 78	50823 Köln	0221 / 310 88614	sales@digitalriver.com
Effective Media		Josef-Haumann-Straße 10	44866 Bochum	02327 / 22310	info@effective-media.de
Frankfurter Buchmesse		Reineckstraße 3	60313 Frankfurt am Main	069 / 21020	info@book-fair.com
Freaks 4U Gaming	key playen	An der Spreeschanze 10	13599 Berlin	030 / 41719113	info@freaks4u.de
Friedmann Kommunikation		Schanzenstraße 36	51063 Köln	0221 / 5348710	info@fr-k.de
Gärtner PR		Destouchesstraße 68	80796 München	089 / 30766854	info@gaertner-pr.de
gamesbusiness.de	key playen	Dr.-Mack-Str. 83	90762 Fürth	0911 / 2872360	thomas.szedlak@computec.de
gamescom	key playen	Messeplatz 1	50679 Köln	0221 / 8213894	info@koelnmesse.de
Games Foundation		Neuer Kamp 30	20357 Hamburg		info@gamesfoundation.com
Games Quality		Zum Wasserwerk 15	15537 Erkner	03362 / 885688	info@games-quality.com
Gamify Now!		Karlstraße 68	80335 München	089 / 210205715	info@gamify-now.de
GAMINSIDE		Kaiserstraße 2-4	1070 Wien	+43 / 0676 / 5379776	info@gaminside.com
GAN Game Ad Net		Stresemannstraße 342	22761 Hamburg	040 / 67586750	info@gan-online.com
Ganz & Stock (Personnel Consulting)		Westhafentower, Westhafenplatz	60327 Frankfurt am Main	069 / 710456380	a.stock@ganz-stock.de
GDC Europe	key playen	303 Second Street, Suite 900, South Tower	CA 94107 San Francisco	+1 415 / 9476000	info@gdceurope.com
Globaloc		Storkower Straße 158	10407 Berlin	030 / 428075780	info@globaloc.de
GRAEF Rechtsanwälte		Jungfrauental 8	20149 Hamburg	040 / 80600090	hamburg@graef.eu
HoneyTracks (Game Analytics)		Schelling Straße 35	80799 München	089 / 28723995	info@honeytracks.com
IEM Consulting (Business Development, Finanzierung)		Hanauer Landstraße 192	60314 Frankfurt am Main	069 / 15346479	info@iem-consulting.com
IHDE & Partner (Rechtsberatung)		Schoenhauser Allee 10-11	10119 Berlin	030 / 44318660	berlin@onlineilaw.de
INPROMO		Gasstraße 6a	22761 Hamburg	040 / 23881771	kontakt@inpromo.de
iVentureCapital		Wendenstraße 21 B	20099 Hamburg	040 / 8081250	info@iventurecapital.com
LaterPay (Zahlungsdienstleister)		Auenstraße 100	80469 München	089 / 416137319	info@laterpay.net
Lightning PR		Gundelndstraße 13	60435 Frankfurt		koetting@lightning-pr.de
LOVOO		Prager Straße 10	01069 Dresden	0351 / 41889939	boost@lovoo.net
Making Games	key playen	Dr.-Mack-Str. 83	90762 Fürth	0911 / 2872100	info@makinggames.de
Marchsreiter Communications		Guldenstraße 41a	80339 München	089 / 51919942	dm@marchsreiter.com
Medienachse (Full-Service, Businessplanung)		Trappentreustraße 10	80339 München		info@medienachse.de
M.I.T. - Media Info Transfer		Albert-Einstein-Ring 8	22761 Hamburg	040 / 30066890	info@mediainfotransfer.de
MOTHERSHIP - free2play Agency GmbH	key playen	Lichtstr. 26-28	50825 Köln	0221 / 95437306	contact@mothership.de
MOTION AREA		Sommerstraße 3	65197 Wiesbaden	0611 / 56597577	info@motionarea.de
Osborne Clarke (Anwaltskanzlei)		Innere Kanalstraße 15	50823 Köln	0221 / 51084000	info@osborneclarke.de
Partnertrans (Lokalisation)		Leipziger Straße 28	40822 Mettmann	02104 / 172660	info@partnertrans.com
paysafecard.com Wertmarken		Am Europlatz 2	1120 Wien	+43 / 1 / 72083800	sales@paysafecard.com
Phénix Noir Productions / Patrick Nevian		Postfach 110136	46121 Oberhausen	0208 / 3042216	info@phenix-noir.de
Pixelworkshop / IG Computergrafik		Hirschengasse 1/26	1060 Wien	+43 / 1 / 5880118698	info@pixelworkshop.at
Quinke Networks (PR, Marketing)		Bei den Mühren 70	20457 Hamburg	040 / 43093949	mail@quinke.com
remote control productions (Producing)		Sendlinger-Tor-Platz 6	80336 München	089 / 210205700	info@r-control.de
Rode + Mathé (Rechtsberatung)		Henrietteweg 4	20259 Hamburg	040 / 43270432	info@rodemathe.de
ROESSLER PR (Marketing, PR, Consulting)		Walter-Leiske-Straße 2	60320 Frankfurt am Main	069 / 514461	communicate@roesslerpr.de
S&H Entertainment Localization (Lokalisation)		Weidenstraße 10a	82110 Germering	089 / 80076290	stefan@shentloc.com
SCC (Crossmedia)		Orleansstraße 5a	81669 München	089 / 33094660	info@scc-feld.de
Schanz International (Consulting)		Bgm.-Oberhettinger-Straße 2a	67146 Deidesheim	06326 / 6010	info@schanzgames.com
Schulte Riesenkampff (Rechtsberatung)		An der Hauptwache 7	60313 Frankfurt am Main	069 / 900266	schulte@schulte-lawyers.de
Selected Minds (Personalberatung)		Walther-Rathenau-Straße 16	64521 Groß-Gerau	06152 / 1871830	info@selected-minds.de
Serious Games Conference		Expo Plaza 1	30539 Hannover	0511 / 1234560	sgc@nordmedia.de
Sputnic Consulting		Ehrenbergerstr. 11	98693 Ilmenau	03677 7996990	media@sputnic-consulting.com
swordfish PR (PR, Marketing)		Habsburgerplatz 2	80801 München	089 / 96160840	info@swordfish-pr.de
TigerTeam Productions		Drachenfelsstr. 14	76767 Hagenbach	0152 / 5173 0000	info@tigerteam-productions.com
Translation-Taxi		Beusselstraße 28	10553 Berlin	030 / 28371428	info@translation-taxi.com
Turtle Entertainment (eSport)		Siegburger Straße 189	50679 Köln	0221 / 8804490	info@turtle-entertainment.de
Two Pi Team		Gerresheimer Straße 9	40721 Hilden	02103 / 9411914	info@two-pi-team.de
Visibility Communications (PR, Text)		Wichertstraße 16/17	10439 Berlin	030 / 58859941	hi@visi.bi
waza!		Sonnenallee 70	12045 Berlin	0178 / 5223697	jannot@wazaservices.de
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Stefan Köhler (Lektor / Autor)	Am Salgenteich 34	38259 Salzgitter	0176 / 22512273	stefanclemenskoeher@web.de

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Augenpulver (Grafik)	Dotzheimerstraße 164, 4.0G	65197 Wiesbaden	0611 / 94574340	info@augenpulver-design.de
Augmented Minds, Ambrus & Lonau GbR	Königinstr. 9	80539 München	089 / 909002233	info@augmented-minds.com
BiteTheBytes (Middleware)	St. Gallerer Straße 9	36039 Fulda	0661 / 2006899	info@bitethebytes.com
B.TON Medien (Audio, Musik)	Luise-Ullrich-Straße 4	82031 Grünwald	089 / 189425490	mix@bton.de
Centroid (Motion Capturing)	Schlesische Straße 27	10997 Berlin	030 / 69807474	sven.bergmann@centroidanimation.com
Chromatrix (Mobile Gaming)	Kalkofenstraße 2	72411 Bodelshausen	07471 / 740828	info@chromatrix.com
Codecult (3D-Engine)	Kemnastraße 21a	44866 Bochum	02327 / 35474	info@codecult.com
Contentainer (Leveldesign)	Eichelkopfstraße 17	63584 Gründau	06058 / 9178150	info@contentainer.de
Creature Factory	Graefestraße 33	10967 Berlin	030 / 26301330	info@creature-factory.com
Crytek (3D-Engine)	Grüneburgweg 16-18	60322 Frankfurt am Main	069 / 21977660	cryengine@crytek.com
DICO Deutschland	Freiburger Straße 5	51107 Köln	0221 / 20430504	info@dico4u.com
Doublesmith (Art/Animation)	Ranzonigasse 3/3	A-3100 St. Pölten	+43 / 699 / 19447880	mail@doublesmith.com
Dutyfarm	Oranienstraße 6	10997 Berlin	030 / 30368430	info@dutyfarm.com
Dynamedion (Sounddesign)	Barbarossaring 8	55118 Mainz	06131 / 5847895	info@dynamedion.com
eurosimtec	Merowingerplatz 1	40225 Düsseldorf	0211 / 3018560	info@eurosimtec.de
Exit Games (Network Engine)	Hongkongstraße 7	20457 Hamburg	040 / 435960	business@exitgames.com
Eye Rock Media (Design, Animation)	Essenerstraße 3	46047 Oberhausen	0208 / 82858923	contact@eyerock.de
fadeout (Audio Design)	Austraße 6	CH-4153 Reinach	+41 / 7 / 92793244	info@fadeout.ch
fatfoogoo	Mariahilferstraße 50	A-1070 Wien	+43 / 1 / 23622970	office@fatfoogoo.com
Flow Studios	Gustav-Meyer-Allee 25	13355 Berlin	030 / 80929203	info@flow-studios.eu
Games Quality (Quality Assurance)	Zum Wasserwerk 15	15537 Erkner	03362 / 885688	info@games-quality.com
Global Producer (Production)	Hauptstraße 172	51143 Köln	02203 / 97722400	getintouch@global-producer.com
Glare Studios (Grafik)	Mansteinstraße 18	20253 Hamburg	02307 / 4388404	contact@glarestudios.de
Goal Games	Feurigstraße 54	10827 Berlin	030 / 78957102	info@goal-games.de
GreenMamba-Studios (Animation)	Aloysstraße 7	48249 Dülmen	02594 / 7928217	info@greenmamba-studios.de
Hans HiScore (Audio)	Friedrich-Ebert-Anlage 11-13	60327 Frankfurt	0151 / 11616133	info@hans-hiscore.de
Havok	Arbachtalstraße 6	72800 Eningen	0712 / 1986993	info@havok.com
Intulo (3D, Animation)	Lindholz 89	31139 Hildesheim	05121 / 2944022	info@intulo.de
Keuthen	Robert-Koch-Straße 41	55129 Mainz	06131 / 8080890	info@keuthen.net
Konsole Labs	Gritznerstraße 42	12163 Berlin	030 / 23634838	info@konsole-labs.com
Lingona (Lokalisations-Middleware)	Hildastraße 38	68723 Plankstadt	06202 / 4095030	info@lingona.com
Living Liquid Software	Langer Weg 15	A-6020 Innsbruck	+43 / 0 / 512263535	info@livingliquid.com
metricminds (Grafik)	Rüsselsheimer Straße 22	60326 Frankfurt am Main	069 / 7593380	info@metricminds.com
MobileBits (Mobile Engine)	Lerchenstraße 28	22767 Hamburg	040 / 33429566	info@mobilebits.de
morro images (Grafik)	August-Bebel-Straße 27	14482 Potsdam-Babelsberg	0331 / 97996610	info@morroimages.com
Neviso (Tools & Middleware)	Lyrenstraße 13	44866 Bochum	02327 / 8369840	info@neviso.com
Periscope Studio (Audio)	Am Diebsteich 55	22761 Hamburg	040 / 31811767	info@periscopestudio.de
Phenomatics (XNA-Entwicklung, Consulting)	Hafenstrasse 47-51	A-4020 Linz/Donau	+43 / 732 / 90155230	office@phenomatics.com
PIXABLE STUDIOS	Buchenstraße 16b	01097 Dresden	0351 / 56341360	info@pixable.de
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Polygonfabrik (Grafik)	Friesenstraße 21	28203 Bremen		kontakt@polygonfabrik.de
Project-C (HYDRA)	Dorfstraße 50	29336 Nienhagen	05144 / 6988871	kontakt@project-c.eu
Rabcat Computer Graphics (Grafik)	Fernkornegasse 10	A-1100 Wien	+43 / 1 / 5237425	mail@rabcat.com
Razer (Hardware)	Winterhuder Weg 82	22085 Hamburg	040 / 41929300	
Rocketbox Studios (Grafik)	Leonhardtstraße 10	30175 Hannover	0511 / 8984384	info@rocketbox.de
Spinor (3D-Engine)	Agnes-Pockels-Bogen 1	80992 München	089 / 54043980	spinor@spinor.com
The Light Works (Grafik)	Otto-Hahn-Straße 7	50997 Köln	02236 / 967322	info@thelightworks.com
ToBringAlive (Animation, Design)	Ostmarkstraße 49	48145 Münster	0251 / 392312	angerbauer@tobringalive.com
Tektroop (Support)	Dechenstraße 8	40699 Erkrath		info@tektroop.ch
TON & SPOT audiodesign (Sound)	Immanuelkirchstraße 15	10405 Berlin	030 / 92129727	post@ton-und-spot.de
Toygardens Media (Grafik, Video)	Walderseestraße 54	30163 Hannover	0511 / 33659800	akunze@toygardens.com
VCC Perfect Pictures (Grafik, Video)	Doormannsweg 43	20259 Hamburg	040 / 431690	hamburg@vcc.de
Versant (Data Management)	Wiesenkamp 22b	22359 Hamburg	040 / 609900	info@versant.com
Virgin Lands (Grafik, Cinematics)	Gneisenaustraße 10/11	97074 Würzburg	0931 / 8049000	info@virgin-lands.com
Z-Ground Illustration (Grafik)	Oeltzenstraße 17	30169 Hannover	0511 / 1696959	jz@z-ground.com
zuuka! (Audio, Lokalisation)	Christian-Pless-Straße 11-13	63069 Offenbach am Main	069 / 2475700	mail@zuuka.de

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Calined (Audio)	Lange Straße 22	58089 Hagen	01577 / 9508456	business@calined.com
Daniel Pharos (Audio)	Goldistelanger 15	80937 München	0179 / 5210100	daniel@knightsofsoundtrack.com
Johan Weigel (Music)	Christburger Straße 28	10405 Berlin	0176 / 41446494	johan@sonic-gallery.com
Max Schulz				info@xocol.com
Olaf Bartsch (Sounddesign)	Sültstraße 62	10409 Berlin	0170 / 7743432	info@olafbartsch.com
Sabrina Heuer (Audio Production)	Bachemer Straße 191	50935 Köln	0163 / 8604004	sabrina@froschtatze.de
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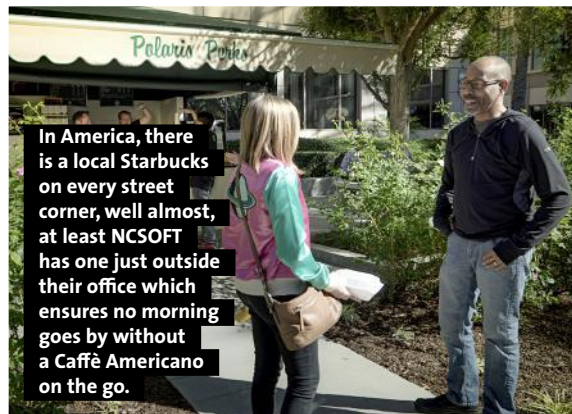
A Day in the Life of ... NCSoft WEST



The main NCSoft reception in Orange County where all guests need to sign in before exploring the local dungeons and embark on quests.



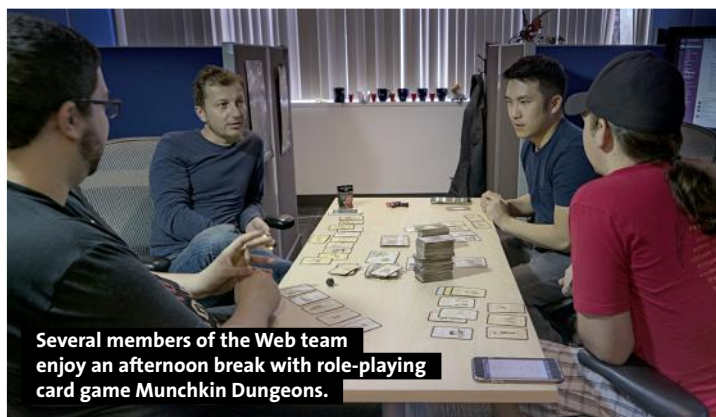
Meanwhile in Europe, Kevin Taylor (Head of Marketing) and Simon Cowley (Senior Sales Manager) plotting world domination.



In America, there is a local Starbucks on every street corner, well almost, at least NCSoft has one just outside their office which ensures no morning goes by without a Caffè Americano on the go.



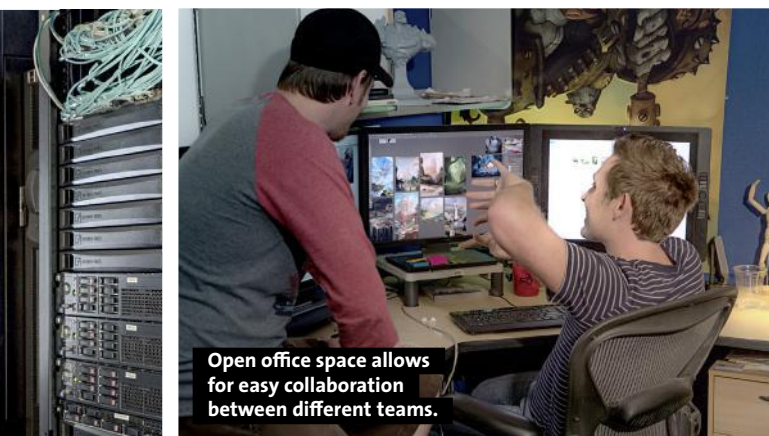
Taking breaks as a team and enjoying some lunch are important factors to a fun workspace.



Several members of the Web team enjoy an afternoon break with role-playing card game Munchkin Dungeons.



Alex Wilcox (Senior Desktop Administrator) ensures everything runs smoothly day and night as not much gets done if servers are down.



Open office space allows for easy collaboration between different teams.



No game is complete without beautiful music – Jeff Kurtenacker (Lead Composer) is behind the critically acclaimed soundtrack for WildStar.

NCSOFT West is the organization responsible for all of NCSOFT's initiatives across the Europe, Middle East, Africa, Americas, Australia and New Zealand. Here are photos from their UK (Brighton) and US (Orange County, CA) offices.



The Community team gathers around Bethany Stout's (Community Manager) desk to check out a content update for Blade & Soul.



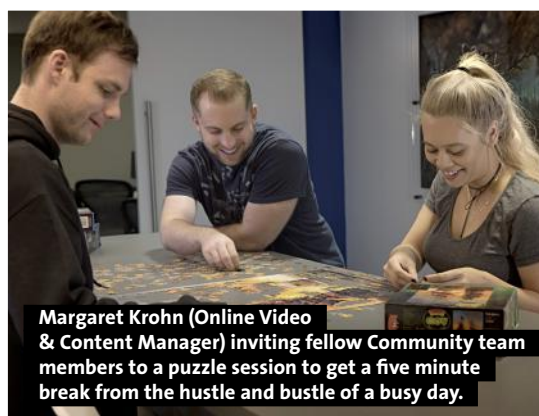
Julianne Harty (Brand Manager for Blade & Soul) and Samuel Cho (Associate Product Manager for Lineage II and Aion) enjoy a friendly match of 8 Ball Pool.



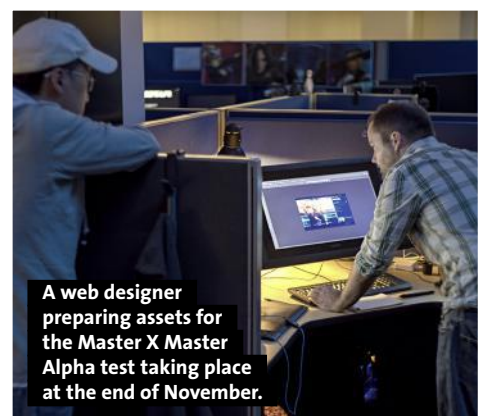
NCSOFT staff enjoying their 2016 summer event at the Irvine Boomers! amusement center.



Members of the Creative team hard at work creating future game assets – the NCSOFT Orange County office is generally dark, even in the middle of a sunny day.



Margaret Krohn (Online Video & Content Manager) inviting fellow Community team members to a puzzle session to get a five minute break from the hustle and bustle of a busy day.



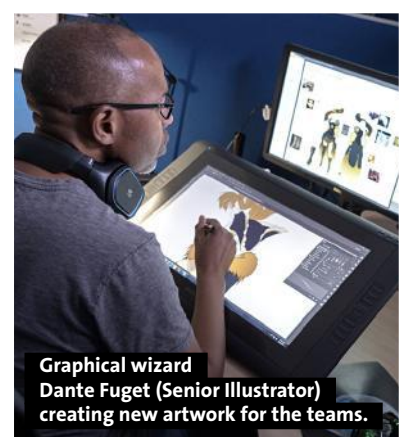
A web designer preparing assets for the Master X Master Alpha test taking place at the end of November.



Every Monday is Donut day, a tradition in the OC office, with a solid selection of fresh pastries being delivered each week.



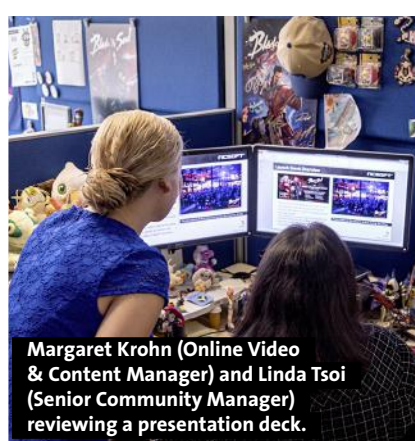
The sunny weather in California allows for outdoor fun during the annual summer event.



Graphical wizard Dante Fuget (Senior Illustrator) creating new artwork for the teams.



The Community team regularly livestreams from Blade & Soul and other NCSOFT franchises.



Margaret Krohn (Online Video & Content Manager) and Linda Tsoi (Senior Community Manager) reviewing a presentation deck.



Collaboration meeting between NCSOFT Korea and NCSOFT West to go through product updates and content plans for 2017.

MAKING GAMES THE NEXT ISSUE

03-04/17

WILL BE AVAILABLE ON FEBRUARY 17TH 2017
MAKING GAMES

Indie games - a recipe for success?

The term »Indie« has been buzzing through the industry for a few years, and it's probably never been easier than today to develop your own game. That's at least the theory. And yet, the big indie hype was quickly followed by the concern that a lot of small developers might be closing their doors just as quickly as they opened them. That's why some studios give an account of the way they follow their dream and how they not only complete projects but also build a community, enjoy success on Kickstarter, etc.

Other topics

Interview with Oculus

Jason Rubin, Head of Content at Oculus, on current developments and the future of VR, Oculus and the Rift headset.

Game Design Case Study

Analysis of different combat systems in role-playing games and how developers should best design them.

Interview on game localization

The service provider MoGi Group explains which pitfalls may occur during game translations and which languages are the most important ones.

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International publications: Poland: COSMOPOLITAN, JOY, SHAPE, HOT, PLAYBOY, CKM, VOYAGE, HARPER'S BAZAAR
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Hintergrundinformationen

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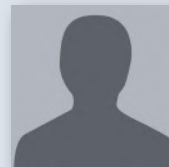
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