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ELEX

PIRANHA BYTES' CREATION
OF A SCIENCE-FANTASY ADVENTURE



WORLD OF TANKS

7 YEARS OF TANKS



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WORLD OF TANKS

STRONGER THAN EVER
HOW WARGAMING REDEFINED TANK BATTLE



ELEX

MAKING OF



THE BEST TIME OF THE YEAR

Special occasions deserve special attention – and if gamescom isn't such an occasion, then what is? Passionate gamers and people from the gaming industry all around the world come together in Cologne to exchange their thoughts, present their products or to take the chance to finally try them out themselves as well as cultivating relations or socializing. And if that wasn't cool enough already, we may also celebrate the debut of devcom which – in correlation with RESPAWN – will be a more than solid reason to attend Cologne's exhibition grounds two days earlier to listen to the numerous talks and panels held by renowned veterans from the games industry.

Knowing we'd publish this issue of Making Games right before these two major events seemed just too perfect to not put something special in place on our end. And even if we weren't able to realize everything we planned for, we're still pretty excited about the outcome.

Why only one cover story ...

... when you can have two? It was only last year when our friends at Wargaming made it onto our cover with a huge 'making of' of »Master of Orion«. This August they beautify our front page for the fourth time, alongside Germany's RPG heroes from Piranha Bytes who enrich our upcoming issue of Making Games with a second featured story.

So, on one side we have seven years of fierce tank battles in World of Tanks that wish to be celebrated. Wargaming's doing so by giving us detailed insights into the technical evolution of their engine, game and

content as well as all the efforts the studio puts into fostering their community. On the other side we have the creators of »Gothic« and »Risen« who will take us on a journey behind the scenes of their upcoming science-fantasy roleplaying adventure »Elex«, which will hit the stores October 17.

Our heartfelt thanks go out to Wargaming and Piranha Bytes who made our gamescom-edition of Making Games the extraordinary piece we imagined it to be. Managing a project of this size in such a small amount of time, however, could've hardly been possible without excellent preparation and communication. Another huge thank-you therefore goes out to Ingo Horn and Florian Emmerich, who did so much more than just a fine job. Ok, enough with the praising!

On our own behalf

Before we finally let you enjoy the relevant part of this magazine, we want to take the chance to inform you about a small change concerning the release dates of our upcoming issues. Due to internal logistical matters we will prepone issue 11-12/17 of Making Games by two weeks. This one as well as all following issues will therefore be published at the beginning of every even month. Also, our brandnew video section – the »Making Games Academy« at makinggames.biz – is looking forward to your visit.

Ok, that's it, for real now – time to attend to the real eye-catchers.

Enjoy the latest issue!

Your team at Making Games

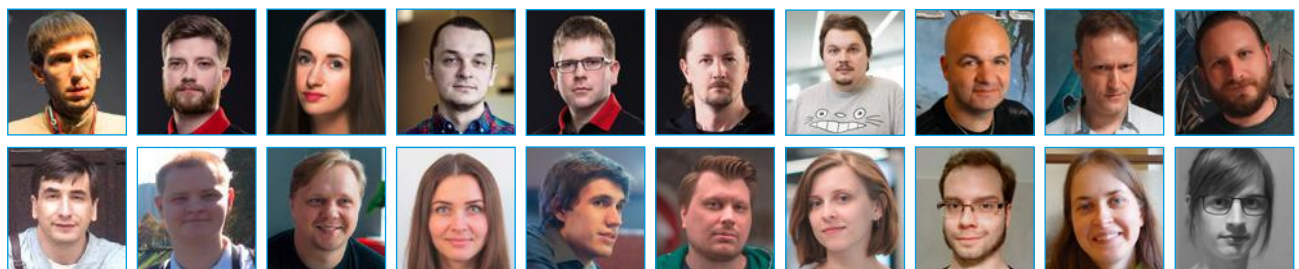


Dirk Gooding
Editor-in-Chief at Making Games Magazine



Nico Balletta
Managing Editor at Making Games Magazine

»Our heartfelt thanks go out to Wargaming and Piranha Bytes who made our gamescom-edition of Making Games the extraordinary piece we wished it to be.«



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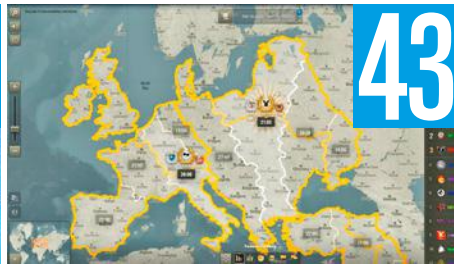


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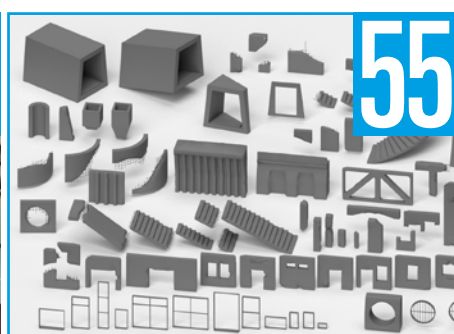




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FOKUS GAME

Campaigning can be so simple

Politicians are discovering their new love for the games industry, but is it more than just another means to a political end?



Timm Walter is Head of Operations at GAME - the German Games Industry Association.

Timm is a political scientist and - as Head of Operations at GAME - responsible for all operational activities of the German Games Industry Association. Before his time in the association, he gained vast experience in politics and the media industry as well as in various associations.

Campaign or no campaign: The industry must not miss out on the chance to present its importance and value to all the renowned politicians who are attending the world's biggest games exhibition. (Quelle: gamescom)



A murmur went through the games industry and the gaming community alike, when just a few weeks ago the BIU revealed its biggest deal for gamescom 2017: It wasn't about any exclusive revealment of some new game or studio that moved us. Neither was it about some Hollywood star dressing up as a cosplayer, walking the exhibition floors to move our industry into the bright spotlight it deserves. No, it was the news that Chancellor Angela Merkel would wander the exhibition halls full of huge, colorful and flashy booths and tell us all, how amazing the games industry is.

Life is full of surprises

Finding a fitting equivalent to this public performance is going to be difficult, but I will try anyways. Imagine Donald Trump visiting the Green Peace headquarters, to talk about the progress made in terms of environment protection. I admit, the comparison may sound a little unfair - after all, hardly anyone would want to be compared to Trump. Up to Chancellor Merkel's final acceptance of the invitation, this whole idea of her opening this year's gamescom sounded just as realistic as some President Trump acknowledging climate change, at least for most of the people.

But wait, there are even more presents waiting for us. If our chancellor's opening speech wasn't already big enough, we are served our very own clash of the titans in the course of the gamescom congress on Wednesday: General secretaries and CEOs of all important parties will express their opinions on the games industry, right within the electoral campaign arena, accompanied and moderated by YouTube stars and community idols like Daniel Budiman of the Rocket Beans or LeFloid. And LeFloid, for example, isn't new at this, as he already got in touch with politics when he interviewed Chancellor Merkel. I am sure that he will come prepared, contributing one or the other important question fitting this topic.

Now some people might ask, why and how we deserve this attention all of a sudden - and the cynics will answer: »Just because of September 24th!« And, of course, they may be right. The scale in which politicians oh so suddenly discovered their huge amounts of love for our industry feels pretty suspicious, and all of that just now, with the elections coincidentally standing right in front of our doors. In the end, however, it remains an enormous chance with huge potential - given we handle it correctly! I have absolutely no doubt that some Budi, LeFloid oder Peter Smits will join this round a 100% prepared, and that Chancellor Merkel will not only be presented some international but also lots of German companies and products should go without saying. And should there be some critical questions or comments coming up, for example in terms of financial support, then so be it - for us it can only turn out beneficial!

Talking of financial support

With both the BIU's as well as the GAME's concept for financial support we've already got two proposals aiming at a topic that is of essential importance for the games industry. Our job is to make politicians understand their relevance, before as well as

after gamescom and for as long as we have reached substantial support.

All important parties have drawn large interest to their campaign contents they broadly laid out. 2018 at the latest, however, we'll find out if it was all talk or if the people in Berlin actually take our industry serious by now. We'll find out if there will be continuous cooperation and real progress over the whole year or if we'll have to wait another four years to be heard again.

Oh, and should all the parties still be on the lookout for some alternative means of campaigning, I recommend the »Player Unknown's Battlegrounds« tournament which takes place during gamescom. 300,000 Euros of prize money sound like a pretty nice start for some nationwide financial aid, don't you think?

»In the end it's an enormous chance with huge potential, given we handle it correctly!«

HAPPY 9TH ANNIVERSARY, GAMECAMP MUNICH

For the 9th time in a row Munich's popular GameCamp and Games/Bavaria Vernissage celebrated games culture - with success that already makes us look forward to their upcoming 10-year anniversary in 2018.

Two days, 200 participants and countless talks: the »GameCamp Munich« is, without bragging, one of the most popular events among games enthusiasts in Munich, accordingly fast tickets were sold out. The weekend was kicked off by the »Games/Bavaria Vernissage« on Friday, where artists and developers were able to exhibit their games and works of art. The so-called »unconference« on both Saturday and Sunday was held in form of a barcamp, bringing together like-minded people who wanted to exchange their thoughts on the wide topic of games. Another peculiar thing is that prior to the event all participants

may propose their own talk or workshop. Every submission is then evaluated before all attendees vote for their favourite sessions, so the event schedule can finally be assembled. Lunch was also taken care of while a party on Saturday night called for more networking.

Next year's party, however, will most certainly turn it up a notch, as the GameCamp Munich is going to celebrate its 10th anniversary. And all of that wouldn't have been possible without the help of sponsors like TeamSpeak or Travian or the numerous volunteers involved in the planning and execution.



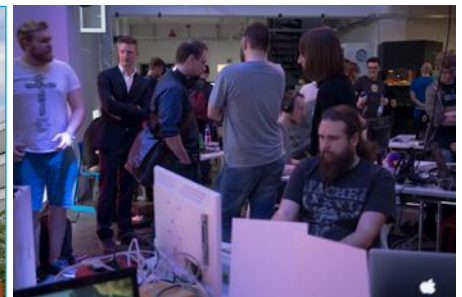
You're hungry and in the mood for a game jam? Then save the date and join the party at the WERK1 in Munich on 9 September.

Gaming, tinkering and grilling

To shorten the waiting time the WERK1 in Munich invites you to its BBQ Gamejam on 9 September 2017. First eight hours of building games, followed by an awesome barbecue. Doesn't that sound amazingly delicious? Then check the following link to register for the event: bbqgj17.eventbrite.de

Please find further information on: www.gamecampmunich.de

Drinks and BBQ-able food will be served by Games/Bavaria.



Games enthusiasts among themselves: the tickets for GameCamp Munich's 9th edition were sold out after just a short amount of time.

Event calendar www.makinggames.biz

Online event calendar with search function and event infos

AUGUST 2017

[devcom \(Developer Conference / Summits / Keynotes\)](#)

Location Cologne Fair
Date 20 to 24 August
Topic Conference / Summits
Fee 199 to 1,199 Euro
Website devcom.global

[gamescom](#)

Location Cologne Fair
Date 22 to 26 August
Topic Conference / Exhibition
Fee 7 (visitor) to 83 (trade visitor) Euro
Website www.gamescom-cologne.com

[BerlinBalticNordic.net @ gamescom](#)

Location Cologne Fair
Date 23 August
Topic Reception
Website <https://www.berlinbalticnordic.net/en/event/>

SEPTEMBER 2017

[IFA](#)

Location Berlin Fair
Date 1 to 6 September
Topic Exhibition
Fee 13 to 36 Euro
Website <http://www.ifa-berlin.de/>

[BBQ Gamejam 2017](#)

Location WERK1, Munich
Date 9 September
Topic Game Jam
Fee —
Website <http://www.games-bavaria.com/games-events/>

[Tokyo Game Show](#)

Location Tokyo
Date 21 to 24 September
Topic Exhibition
Fee 1,000 to 3,000 ¥
Website <http://expo.nikkeibp.co.jp/tgs/2017/exhibition/english/>

Bits & Pretzels - The Founders Festival

Location Munich
Date 24 to 26 September
Topic Convention
Fee 474 to 2,021 Euro
Website <https://www.bitsandpretzels.com/>

OCTOBER 2017

[Global Gaming Expo USA](#)

Location Sands Expo, Las Vegas
Date 3 to 5 October
Topic Exhibition
Fee 225 to 2,499 Dollar
Website <http://www.globalgamingexpo.com/>

[Brasil Game Show](#)

Location Expo Center Norte, São Paulo
Date 11 to 15 October
Topic Exhibition
Fee 75 to 399 R\$ (20 to 108 Euro)
Website <http://www.brasilgameshow.com.br/>

[MEDIENTAGE München/Making Games Conference](#)

Location Munich
Date 25 to 26 October
Topic Conference
Fee 99 to 199 EUR
Website <https://medientage.de/>



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SUMMER BREAK UNTIL SEPTEMBER FOR THE »BIU ACADEMY«

The webinar series »BIU Academy« of the German Games Industry Association in cooperation with Making Games will take its annual summer break, but not without another webinar featuring **Michael Schade (Rockfish Games)**.

BIU Academy« in cooperation with Making Games is a webinar series for developers, founders and all those who are interested in its topics; a training scheme without travel expenses about all topics surrounding game development and sales, like business models, design, management, legal, marketing, and much more.

- **Duration:** 60 minutes
- **Monthly; Tuesdays** at 5pm
- **Fee:** 19,00 EUR (free for members of BIU)
- **Register once at:** www.edudip.com
- **Book a webinar at:** <https://biu.edudip.com>
- **Current information at:**
www.biu-online.de
Facebook: BIUeV
Twitter: BIU_eV



EVERSPACE: From Vision to Direct Marketing

Date and fees

- **Duration:** 60 minutes
- **Took place on Tuesday, June 27** at 5pm
- **Fee:** 19.00 EUR (free for members of the BIU network)



Michael Schade
Co-Founder und CEO of
Rockfish Games GmbH.

With »EVERSPACE« Rockfish Games just recently landet a surprise hit for PC and consoles, but success followed for a reason. It was the result of crystal clear positioning of the new title, targeted marketing in a very early stage of development as well as consequently realizing a vision up until the game's full release. Michael Schade, CEO of Rockfish Games, talks about the major steps during the ideation and conception of EVERSPACE as well as marketing it to publishers, platform operators and, of course, its core audience.

Become a Speaker!

You're an active member of the games industry and there's a topic you know all about and you would like to present in a webinar? Wonderful – BIU is always looking for speakers.

For more information, please contact:

Stephanie Lang
Services Manager /
Consultant for Funding Programs

+49 30 240 8779 0
lang@biu-online.de



THREE QUESTIONS FOR... JANA FREUND

Jana Freund is Project Lead for the annual animago AWARD & CONFERENCE, which will celebrate its 21st anniversary from 7 to 8 September in Munich - the perfect occasion to ask her some questions about the event.

Not too long until the 21st animago AWARD & CONFERENCE: Where do you put your focus on this year? And what are you, personally, looking forward to the most?

This year we're determined to include VR/AR into the conference, without neglecting our classic VFX-topics. Furthermore, we concentrate on offering a well-balanced program including a well-rounded mixture of national as well as international speakers. International highlights, for example, are the talks of Erik Smitt (Pixar Animation Studios, USA) and Matthias Menz (Weta Digital, Neuseeland).

However, what I am personally looking forward to the most, is the boost in motivation from all attending students. All these talks are highly inspiring and all the active networking during the event gives them the chance to meet the professionals up close and personal.

Are you pleased with the number of submissions for this year's awards? You did, after all, extend the submission deadline.

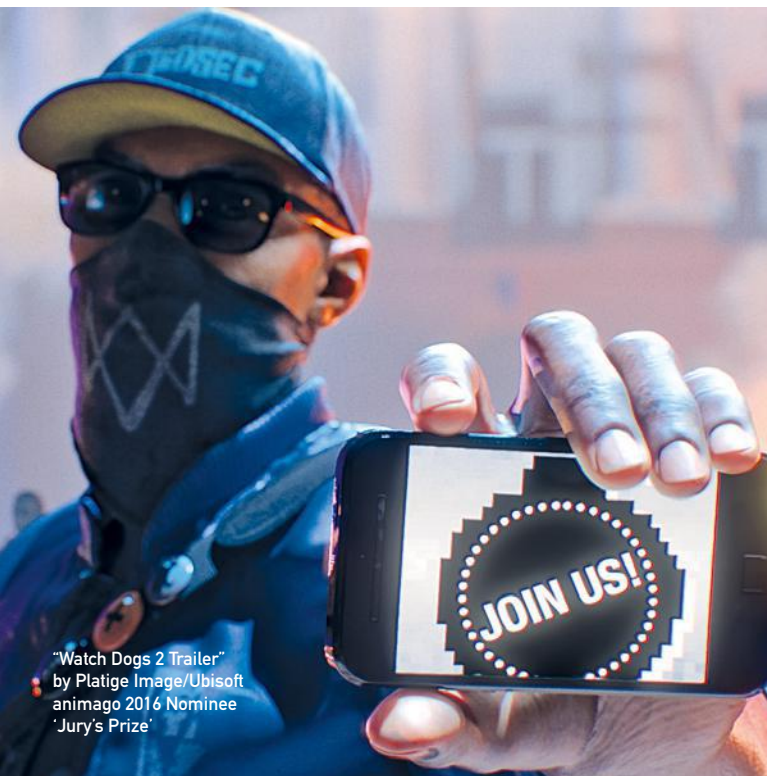
This year the animago AWARD takes place about six weeks earlier than usual, therefore we also had to prepone the submission deadline. Unfortunately it wasn't communicated properly, so a lot of the interested participants simply hadn't finished their projects, yet. So, while more and more submissions came in, we already started the evaluations. And yes, we are extraordinarily happy, with the quantity and quality of all submissions as well as their diversity and originality. 962 movies and stills from almost 60 countries, with a rate of 64% of international contributions. Almost a quarter of all submissions are collegiate productions on an extremely high level.

Did you face any difficulties like, for example, features you had to cancel last-minute?

When you start planning an event you've



always got more ideas than you can actually realize. However, for the most part, we finished the framework for this year's animago AWARD & CONFERENCE pretty soon already. Since then we didn't have to deal with any displeasing surprises. We are incredibly happy with our program, with all the fantastic submissions and, of course, with this year's exhibition scoring with lots of interactive VR-experiences, e. g. from Ignite, Oculus or present4D. And even though there was one or the other idea we weren't able to realize, all of them now simply add to our line-up of features for next year.



"Watch Dogs 2 Trailer" by Platige Image/Ubisoft animago 2016 Nominee 'Jury's Prize'

animago 2017

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‘Start-up looking for investor’ - from a founders breakfast to a major event.

Bavarian veal sausages and beer, some proper Bavarian garbs as well as start-ups and investors. How all of these things fit into one and the same picture? Just perfectly, as this year's »Bits & Pretzels Founders Festival«, taking place from September 24 to 26 in Munich, proves.

From Face to Face

It started as a founders breakfast in Munich's Löwenbräukeller and grew to become a major event attended by up to 5,000 founders, investors and start-up enthusiasts. On the first two days the event's focus clearly lies – besides numerous keynotes, panels workshops, presentations and talks – on the pitches by various eager start-ups that take the opportunity to present their concepts to potential investors. On day 3, however, networking is traditionally done at Munich's Oktoberfest – surely not the worst grounds to get into a conversation with someone!

Sounds good to you? You will find all detailed information on www.bitsandpretzels.com. Plus, you can get your hands on special 3-day-festival-all-inclusive-tickets including a Bits & Pretzels hoodie worth 69.90 Euro. Just follow this link <http://bit.ly/makinggamesandpretzels> und use our special partner-code »PARTNER_NW17«.



Potential founders getting together with investors and international entrepreneurs like Kevin Spacey, who spoke at last year's event. Numerous keynotes, workshops, pitches and presentations form the kick-off to a traditionally jolly finale at Munich's Oktoberfest. (picture credits: Bits & Pretzels)



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SOON ON MAKINGGAMES.BIZ

Every two months there is another printed issue of Making Games hitting the stores - but have you ever wondered what happens in-between?



Whenever we don't work on the upcoming issue of Making Games, we attend to our website makinggames.biz, on which we publish news, recent articles from our magazine as well as some dedicated specials whenever there are some. Here's two of them which we are particularly looking forward to.



Jason Hickey
Lead Environment Artist
at Insomniac Games

Jason Hickey (Insomniac Games)

Lead Environment Artist Jason is currently involved in the development of Insomniac Games' highly anticipated »Spider-Man«. His portfolio, however, includes way more visual blockbusters, e. g. »Ryse: Son of Rome«.



Debbie Bestwick (Team17)

Best known for »Worms« and »Alien Breed« Team17 achieved greatness over more than 28 years. Debbie Bestwick has been with the studio from the start. Now we sat down to talk about the studio's history, milestones and becoming a sustainable business as well as mentoring new talents and numerous upcoming releases such as »Aven Colony«, »Genesis Alpha One« or »The Escapists 2«.



Debbie Bestwick
Co-Founder und
CEO of Team17.



ACADEMY

Missed an event? No problemo.

The MAKING GAMES ACADEMY ist our brand-new video section on makinggames.biz, dedicated in particular to developers. Here you will find videos to all talks and panels held at Germany's biggest developer conferences such as QUO VADIS, RESPAWN – Gathering of Games Developers, devcom and Making Games Conference, sorted by day and channel.

Single clips or the whole package

Missed out on an event? Had to skip to many talks? Want to enjoy your favourite panels once more? Here's your chance: you can either order the whole package or a single video and watch them as often as you like – you decide.

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A dramatic landscape at sunset with tanks in the foreground and a large explosion in the distance. The scene is bathed in golden light, with a large tree in the center and a tank's barrel extending from the right. In the background, another tank is visible amidst a large explosion of smoke and fire. The overall atmosphere is one of intense action and historical warfare.

SEVEN YEARS OF TANKS

Seven years ago a phenomenon was born. A phenomenon that steadily evolved over almost a decade. A phenomenon which today is played by millions of loyal fans of thrilling 3rd person multiplayer battles.



World of Tanks« took the world by storm in 2010. In the years that followed, Wargaming expanded its development efforts globally to hit multiple regions and platforms. New games, new teams and a rapid expansion were successful but eventually development started to show strains. The team became too immersed in the process and lost touch with the player community. The bubble burst with the infamous »Rubicon« update, causing the company to rethink the way they've approached World of Tanks' development. Since the early days

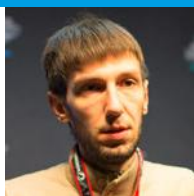
of 2016, the team has been rebuilding player trust, brick by brick. If you've been following the game over the last year and a half, you must have noticed some foundational improvements – but that's only half the story. No one except the team knew what it was like to create a product this big, overcome challenges that came with its rapid growth, and then get sent back to square one.

We reached out to the people behind World of Tanks, asking them to talk us through what has been happening behind closed doors for all those years and pull back that proverbial curtain to reveal what's next for the game.



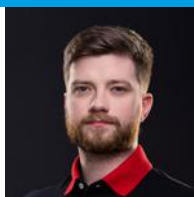
BIRTH OF A LEGEND

Seven years and innumerable battles after its birth in 2010, millions of loyal players are proof that Wargaming's World of Tanks wrote one of the greatest success stories in recent years – time to celebrate!



Anton Pankov
is Publishing Director of
World of Tanks at Wargaming.

Anton started his career at Wargaming as a World of Tanks player, worked as a Community Manager and in 7 years rose to his current position. He champions the company's »Player First« ethos throughout World of Tanks' audience. Anton is a strong believer that any product created for users belongs to them as well, not just to its developers.



Max Chuvalov
is Marketing Director of
World of Tanks at Wargaming.

Max joined Wargaming in 2010. He managed the promotion and marketing of Wargaming's products and services across Asia, building a strong player community. In his current position, Max supervises and directs World of Tanks' marketing, advertising, and public relations globally.

Back in 2008, Wargaming was looking to forge its own identity outside the strategy genre. They had a number of ideas for a new project and seriously considered a fantasy setting, but ultimately chose not to follow the crowd and soldiered ahead with their tank warfare concept. This concept would eventually evolve into »World of Tanks« because, above all else, they wanted to make a game they themselves could spend hours with. At the same time, the company was already taking enough risks by stepping into the free-to-play MMO realm and going with a familiar theme somehow seemed like a safer path. Creating any game, of course, means challenges and the World of Tanks team faced many. From the purely technical struggles of crafting an experience in a genre that was a first for them to the quest of finding a publisher (which did not go exactly to plan), they had a crash course in game development that echoes through every title they now create.

With World of Tanks out in the wild for nearly seven years, the team has taken some time to reflect on the game's beginnings and look back on its evolution post-launch.

Passion Project

»We certainly didn't know that we'd be able to pull it off when we started and, in hindsight, we took a huge risk going against the tide and creating a game which was nothing like your typical MMO with orcs and elves.« Anton Pankov, who started at Wargaming as a tester and is now the World of Tanks Publishing Director, reflects on those days with special fondness. »Victor, Serb, Slava Makarov and Petr Bityukov came up with a general idea of: 'It would be really cool to have a chance to fight it out against real people in iconic tanks.' Everyone on the team had a sweet spot for military warfare and worked on a few WWII-themed projects in the past, so we fell for it almost instantly. From there, it kind of evolved into something that was way more than what we expected when we started.« Turns out this passion for military history and iconic warfare has been driving the team to create from the very beginning. »Victor and I went from just playing »Iron Age«* together to discussing ideas for future games when we figured out we both have a thing for WWII armored vehicles,« recalls Petr Bityukov, one of the key people behind the idea for World of Tanks. »Tanks really brought

us together and I've been on the team ever since. From working as a tester, organizing »Massive Assault« tournaments, creating guides for newcomers and scenarios for this TBS series to working on »Galactic Assault« balance alongside game designers through to the World of Tanks days and being a historical consultant on the project.«

The expertise gathered over the years let Wargaming begin on its best foot, launching the team into a furiously productive development stage. Oddly enough, something else that came in handy at a slightly later point was a prototype for a fantasy MMO. Wargaming initially designed the prototype only to shrug off and instead dive head-deep into a project with a more familiar setting. Probably guided by the »no effort should be wasted« principle, they used it to tell the world about their passion project in one of its early promo videos. If you look it up on YouTube, you'll see an orc briefly triumph over a cadre of Elves; then get literally squashed by an IS-2 Soviet heavy tank.

The team had a strong idea of what they wanted to build. Rather than putting together an elaborate design document, they started by building a rough prototype: the bare minimum to see if what they had in mind would actually be fun in the game. The documents followed later. Back then, Wargaming was a small team of around hundred people, who kept pressing onwards, going from that first prototype to closed beta in just half a year. »Instead of working for forever on something that may end up perfectly polished but would bore players to death, we decided to get it out for a test fast and get feedback for future improvements. Of course, it was an ambitiously bold move but we had to go for it to create a game that really resonated with people,« explains Slava Makarov, who came up with an idea for the game in late 2008, went on to form and head the Wargaming R&D and re-joined the World of Tanks Team in 2015 to become the Product Director in 2017.

Those early days were rich in ambition and oftentimes-ridiculous ideas that never made it into the release version. For example, game designers thought about introducing zombie tanks and making a survival game mode where players would fight against rundown machines. It was definitely something they can look back at now and chuckle about. They had to say »no« to strong ideas, too. »It's a battle every small studio has to fight at a certain point: the fight between how much you want to see in the game versus how much you can afford to introduce into the game.« Slava muses. »Back then, we

were a small team that couldn't afford much and had to cut back on the scope, leaving a lot on the cutting room floor. That was very difficult.« That's the reason Clan Wars was postponed until after the release, for example.

The Closed Beta only offered one mode, three maps and several dozen Soviet and German vehicles. No matchmaker. No crews. Only two types of shells. The game was practically its own bare gameplay formula: tank combat, raw and brutal, but it turned out it was just enough to attract nearly 40,000 people to the test. Four more months of working longer hours and Wargaming propelled World of Tanks to open testing with twice as many vehicles and seven battlefields.

The first World of Tanks players were history buffs from military-themed forums. The game finally gave them the chance to end age-old arguments and find out who would win in a duel between, for example, the T-34 and Panther. Developers kept an eye on community input and spent time on the forums, combing through threads on everything from historical accuracy to map tactics.

Right Timing

The popularity World of Tanks garnered, took the team by surprise. Servers weren't ready to handle such a high load, and Wargaming had to build new data centers and rework the server code to bring the capacity up to standard. A major milestone was the introduction

»It was this really fluid back and forth that was all about passion and drive.«

of multi-cluster technology: it allowed adding several clusters to each server group and provide decent server stability.

»Everything just clicked,« recalls Max Chuvalov, World of Tanks Marketing Director, who has been working on the project since 2010. »High-speed internet was on the rise. The game market began to evolve more towards digital distribution. The audience was hungry for something outside of a fantasy setting. The timing was perfect and we came in with a game that offered a nice middle ground between a casual and hardcore experience with a convenient combat format.«

The combination of first-person shooter, action-RPG, simulator and strategy genres created a fun experience. The general idea was taken from the tech trees that many strategy games use. Players advance by researching new technologies, which in turn open up further areas of research. With this model adapted, World of Tanks players progress by improving vehicles with better modules and unlocking new machines every time they reach a higher level. »The uniqueness of each tank keeps you hooked on,« Max explains. »You play about a few games



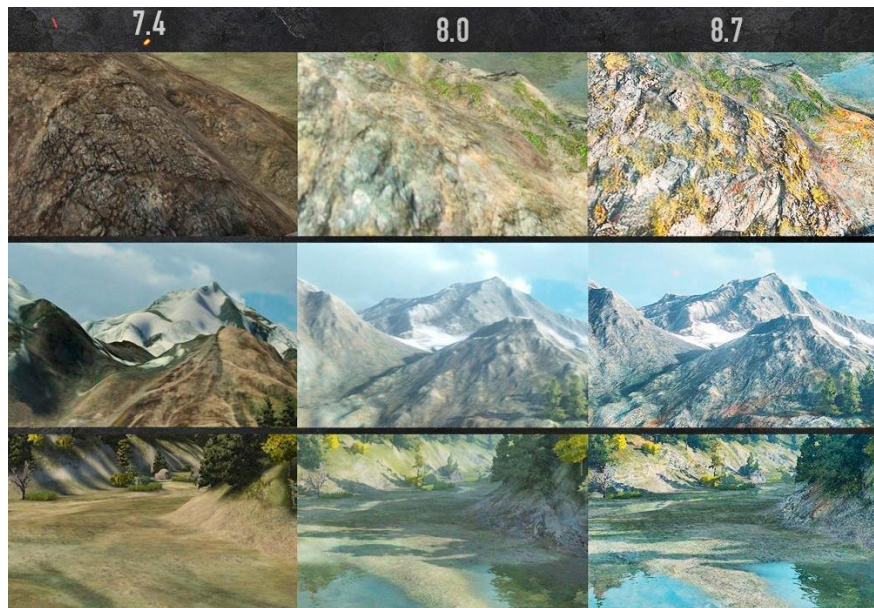
Orcs vs. Tanks?! Initially Wargaming set out for a fantasy setting, before the team decided on thrilling tank battles - a wise choice!



... and growing: World of Tanks' player base is enormous up to this day and Wargaming's connection to the community of utmost importance.

* The turn-base strategy Iron Age is the first game Wargaming created in late 90s. They developed it while still studying at the university, several years before the studio had been founded.

Never standing still: World of Tanks constantly evolved over seven years and numerous updates.



Publishing Director Anton Pankov (top) and Marketing Director Max Chualov (bottom) are with World of Tanks from its very beginnings.

in a certain vehicle and then you unlock a completely new machine to learn. Moving further up the tech trees or moving sideways, you will always find things to work towards. Every day you make progress; you always get better.«

Max calls it a thinking man's game. »The slowness of tanks and the importance of firing angles mean that your strategic decisions taken early on will have a lasting impact on how the battle unfolds. Once the action heats up, it turns into a fast-paced firefight where improvised maneuvers and aiming skill can turn the tide.« It has a slower pace than most PvP action games – with more ground to cover, you have more time to discuss strategy, more time to set up and a better ability to use cover, which gives you more time to learn the mechanics.«

The research system was given some simulation-game qualities. Rather than a single health bar, tanks have different components and crew that can be damaged independently. You can take a hit to your gun or turret, for example, which will cause it to operate more slowly for the rest of match. A damaged track temporarily brings you to a standstill, which can be very dangerous after you've been detected.

Game design elements aside, World of Tanks didn't just bring free-to-play to gamers across Europe and North America – it attempted to destroy the stigma that surrounds the term. »The free-to-play model used to be synonymous with poor quality products, games that aimed at squeezing the maximum amount of money out of players and couldn't offer much in terms of graphics and gameplay.« Max explains. »We went down

the other road and focused on bettering and growing the game. Designing the monetization model, we avoided micro-transactions that messes with the core gameplay and grant an advantage in battle. The payment features are balanced so that no one is obliged to pay. You can play for free and still enjoy the game.«

»The main thing the game sells is time,« Max continues, »is a Premium Account status that gives a temporary percentage increase in the amount of Credits and XP earned per battle, reducing the time spent on leveling.

It makes it easier and faster to unlock the next vehicle in the roster if you simply don't have enough time to research it the regular way.« You can also spend money to purchase customization items to personalize your vehicle or buy rare tanks that will give you a bonus in earnings but don't offer any combat advantages over players who play for free.

»Pay-only items won't grant you success. In the end, it's all about your skills.«

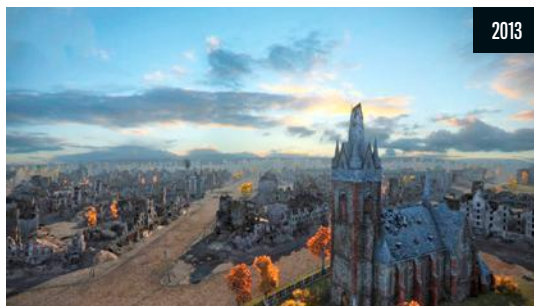
»The experience for a player who doesn't pay should be every bit as enjoyable as that you get spending money.«

No Publishing Deal

The work paid off; players would flock to get hands-on with World of Tanks, but publishers weren't as eager to go with a project that »didn't fit into the grand scheme of things.« The team found themselves in a position many other developers will empathize with. They knocked on a few doors, arguing that what they had could fly, given some marketing support but the big bosses just wouldn't buy it. »We approached them with a free-to-play MMO in the days when subscription was still the thing,« Anton explains. »Basically we were asking them to take a leap of faith and go with the model that was huge in Asia and



2010



2013



2014



2010



2013



2014

totally unknown to gamers in Russia, Europe and North America. No one did and – if you look at where we are today – we must be glad they didn't.« It pushed Wargaming to take another bold move and publish the game on their own. Starting with the CIS, the team set out to prove skeptics wrong in China, Europe and North America.

So, how could a crew of around 100 people possibly manage all that? »By working up to 14 hours a day, 7 days a week,« says Anton Pankov. Motivation was key: »It's not hard when you are making the game of your life.« It was that start-up spirit in its purest form: »Everyone always knew all the hottest current issues. No one needed to be briefed on anything. Each of us was competent across numerous fields and eager to help others.«

The game launch in China turned out to be a lesser risk, thanks to what most consider strict state control of the video games industry. Chinese law obliges foreign companies to find local publishers, which might seem like a downside. However, once found, they can help expertly navigate the regional games landscape. Wargaming teamed up with Kong-Zhong who were ready to take on the free-to-play model; they helped localize the game, and came up with great ideas for regional content, but it wasn't all smooth sailing for every region.

Europe and North America, where World of Tanks officially launched on April 12 2011, proved to be a pretty big hurdle to surmount. At the beginning of 2011, the company had no foreign subsidiaries. Everything had to be done from Minsk, including setting up the European servers in Munich. »The IT team didn't have the required type of Schengen visas and the PR guys went to Germany to do the job,« Max recounts. »And they pulled it off, guided by IT folks over the phone.«

»Versatility was a must,« says Max. »Before we had a marketing department, we were localizing the game client into English one day and translating legal docs the next day. Then you were writing a user guide and after that, shooting, editing and voicing a promo vid. Work was tough, but you received tons of experience in a very short time. Also, in 2011, pretty much everyone in the company who spoke English worked at World of Tanks demo zones at large game shows.«

Growing the Game

Despite the difficulties faced, World of Tanks was quickly gaining momentum. The player base kept growing and the feature list was expanding. In the beginning of December 2011, tanks received their first camouflage. The next year started with French tanks, which proved to be a truly game-changing addition, best explained in a single word – auto-loaders. They soon became the World of Tanks equivalent of conventional MMOs' glass cannons or high-DPS dealers.

Through 2012, World of Tanks kept up its momentum. It was the year Wargaming embarked on a massive head-hunting mission, hiring entire teams, establishing publishing divisions to run operations across Europe, America and Southeast Asia. Reinforced with new talent, the development team could invest more time into expanding the tank roster and evolving the game. At the same time, they set off to bring tank combat to platforms outside of PC. »If someone tells their friends about a new game, they say 'Great, can I play it on my device?', whether it's PC, console, iOS or Android phone, you want the answer to be 'yes,« Max explains.

Anton Pankov, Max Chvalov

The game's quality was high from the beginning, especially for a F2P game, and improved further over the course of just a couple of years.

»When you're making something you're passionate about, you put your whole self into it and embrace the challenge rather than fight against it.«



EXPLORING NEW PLATFORMS

With World of Tanks' overwhelming success on PC, bringing tank combat to consoles and mobile was the only logical step – confronting the team with numerous new challenges and platform requirements.



Anastasiya Pribylskaya
is Console Regional Publishing
Producer at Wargaming.

Anastasiya is responsible for communication with World of Tanks Console players and its financial performance in the CIS region. She has been playing videogames since she was seven, and has a special fondness for RPG and FPS genres. Anastasiya used to be a member of one of the top CS 1.6 eSports teams in Belarus.



Andrew Ryabovol
is World of Tanks Blitz Publishing
Product Director at Wargaming.

Andrew is in charge of all things related to World of Tanks Blitz's operation. He has been with Wargaming since 2013. Before that, he worked at G5, Game Insight and Nival for 6 years, in social and mobile games operation. Andrew enjoys playing competitive online games and watching football (he roots for CSKA Moscow).

Since World of Tanks' breakthrough on PC, Wargaming has shown no signs of slowing down. Having come to grips with the fact the tank MMO has become a global hit, the team expanded to mobile and console. Each platform was a tough nut to crack, but Wargaming just wouldn't budge. Anastasiya Pribylskaya and Andrew Ryabovol open up about the challenges of bringing tank combat to console and mobile.

Rolling out on consoles

»One thing the success on PC taught us on a more general level was that our assumptions about what makes an interesting game were not wide off the mark. It gave us a lot of confidence to keep doing what we were doing,« says Anastasiya Pribylskaya, World of Tanks Console Regional Publishing Producer for the CIS. Wargaming was new to console development and started looking for a third-party team with the necessary experience. That's when the Chicago-based Day 1 Studios came forward, creating a console tank demo in a matter of weeks.

Genuinely impressed with such a head-on approach, Wargaming invited the team to »join the family.« The acquisition deal was closed in early 2013 with Day 1 Studios turning into Wargaming Chicago-Baltimore.

The initial idea of simply porting World of Tanks to Xbox 360 was soon abandoned in favor of developing a similar product tailored to the platform. Creating a new UI and adjusting the controls to best suit the platform's requirements was probably the biggest challenge the team encountered

along the way. The rest of it went smoothly: devs took the time-proven server tech and assets used in the PC version and replicated the tried and tested gameplay and progression.

When the Xbox 360 version launched in 2014, the console was already almost a decade old and Wargaming knew they would have to move on from it eventually. With the Xbox One launch near at hand, they got back to development again.

Two years ago, Wargaming achieved an impossible-for-that-time feat: implementing cross-platform play between Xbox 360 and

»World of Tanks coming to Xbox One didn't mean the abandonment of the Xbox 360 version.«

Different platforms often require a different UI. World of Tanks Blitz (bottom) e. g. offers various options to customize the player's HUD compared to the UI on PS4 (top).

Xbox One. Microsoft had nothing like it at the time, so the World of Tanks team went on to pitch the idea to their partner. Phil Spencer became their champion within Microsoft and convinced the higher-ups there that the idea had legs. World of Tanks cross-play was announced in February 2015, long before the Xbox One launch of the game in July. »The lack of policy was the roadblock,« Anastasiya recollects. »Our console dev team was ready for cross-play long before its announcement. Cross-platform matches aren't very complicated from a technical point of view: the Xbox One and the Xbox 360 versions of World of Tanks use the same server tech.«

Although the gameplay between the two Microsoft consoles had to stay the same, devs leveraged the increased specs to deliver a more authentic experience, enriching every aspect of the game, including visuals. The team added features like volumetric smoke, fully three-dimensional trees and bushes and HDR lighting. Game sounds received a significant upgrade, too. To create a much more immersive soundscape for every battle, the team traveled to the Drive A Tank range in Minnesota to record audio from 16 operational war machines.

»You can play the console-exclusive maps with blizzards, sandstorms and fires on Xbox 360, too, but on Xbox One the weather effects and cinders look much more impressive.« Besides looking good, dynamic weather present on some maps adds to the gameplay. The storms severely limit the view range, giving bold attackers an opportunity to change the course of battle. Another special feature of the console version – large-scale maps – also influences the gameplay, allowing for more diverse tactical gameplay.

Xbox 360 and Xbox One World of Tanks accounts were tied to Xbox Live service, so that switching the platform could go seamlessly. All vehicles, achievements, resources and consumables could be transferred, opening doors to much more visually pleasing experiences on Xbox One.

The team's next step was approaching Sony to bring tank combat to PlayStation®4. They were just as excited as the devs, and the game spread, bringing a slew of new features to the battle. Complete



DUALSHOCK®4 functionality let players feel, hear and touch the battle like never before by incorporating light bar and controller speaker capabilities, as well as touchpad support. Other key platform features included Share Play and PlayStation®Vita Remote Play, as well as revamped controls designed to optimize the handheld experience.

Bringing tank combat to mobile

»Let's just get this out of the way right now:

»DUALSHOCK®4 functionality let players feel, hear and touch the battle like never before.«

although the core gameplay's a lot similar, we're talking about two standalone projects here,« says Andrey Ryabov, »World of Tanks Blitz« Publishing Product Director. »That's the only path we could pursue given mobile platform nuances, which

pose just as many restrictions as they do opportunities. When we decided to do tanks on mobile, the market was booming, with casual games bubbling up, which we knew wouldn't last forever. With smartphones' growing popularity, it was only a question of time that people would want something

Shorter play sessions, lower gameplay pace and a different set of controls - World of Tanks Blitz had to adapt to be successful on mobile.





World of Tanks on Playstation 4 offers quite some exclusive features besides console-only maps, such as special DUALSHOCK®4 functionality like touch-controls.

more sophisticated to while away the time. Plus, we had millions playing World of Tanks on PC, and they would eagerly welcome similar entertainment available virtually anytime and anywhere.«

History pretty much repeated itself: the way they did with PC, Wargaming came to mobile to fill the then empty mid-core niche with short-session online tank combat. Just like consoles, a new platform forced them to revisit the original gameplay concept, tailoring it to better suit a somewhat younger audience. Not to mention the purely technical challenges like, for example, developing a touch-screen UI. The basic mode – Random Battles – shank to 7v7. »It's a mobile game, after all, where the average gaming session lasts several minutes. So the team wanted Blitz fights to fit that span,« Andrey explains.

Because the mobile platform also presents you with a different audience, expectations and style of play, accessibility is king. For Blitz, battles and other in-game features had to be streamlined, stripped down to their core. This meant removing things like modules and even an entire vehicle class: SPGs. The tutorial was beefed up, letting newer players get a better grasp of battle. The physics and shell rebound calculations were simplified, but perhaps an even bigger addition was that, when targeting an enemy via the crosshairs,

weak spots are highlighted. This removes the whole process of scouring the wiki for enemy vehicles' weak areas and just lets you focus on playing.

»Controls were the most complicated element to develop,« Andrew recalls. »It's always the case with mobile action games, especially in real time. The fact that tanks in their essence are slow helped us a lot. We intentionally tried to slow down the game-

play pace to make it comfortable to control the vehicle on a touch device. Player precision and reflexes are still important but they are no longer a decisive factor. It's far more important to understand battle tactics.«

The devs came up with several original solutions to ease the pains of controlling the tank on touch-screen. The game has an auto-aiming system, which helps lead the target, minimizing the number of swipes and lets you fire on the move more effectively. The other one was a smart-zoom system that automatically determined zoom level depending on the distance to an enemy tank.

»We've designed the controls to be flexible and adjustable,« Andrey continues. »In World of Tanks Blitz you can change the HUD layout, adjusting the number of functions so that you only get what you really use. Take, for example, the secondary fire button: newcomers rarely use it, while more experienced players do. Finally, you

»World of Tanks PC and Blitz have more differences than similarities when it comes to detail and exact implementation of core gameplay features they share.«



Direct comparison between Xbox One, Xbox 360 and PC.

can switch between right-hand and left-hand layout.»

When it came to launching the game, the team chose to go for iOS first. »iOS is less fragmented than Android devices. This gave us the opportunity to test the game thoroughly on all possible iOS devices and deliver a quality product in a shorter time. Obviously, players expected us to release the Android version in a few weeks after the iOS release, which was impossible.

Adding a new platform took the team half a year. »We had to add support for 'single tap' Google registration and a few Google services (like Achievements), integrate Google payment system, develop a relationship with the platform (Google itself), take care of compatibility and performance on numerous devices, set up workflows for simultaneous cross-platform and multi-region releases and more.« The mobile team at Wargaming didn't stop with Android and went to adapt online tank combat for Win 10 and Mac OS X, and establish a tradition of exciting specials and events that World of Tanks Blitz is famous for. They made real and alternative histories clash on the battlefield more than once, treated tankers to the Dracula and Van Helsing tanks on Halloween, implementing tanks from »Valkyria Chronicles«, and creating »Girls und Panzer« tanks for all the anime fans out there.

By the time Wargaming brought World of Tanks to Xbox One and explored Mac OS X with mobile MMO action, it would feel the pinch of the technical debt the PC game

amassed over the years. Player frustration grew after a series of arguable updates that added new content but didn't fix issues that bothered tankers the most. The team tried to get it right with the Rubicon update, released in late 2015. Supported with a massive marketing campaign, it didn't live up to player expectations, alienating much of the game's fans against the team, which is perfect for our story, since a success story without major hurdles is just another story. »When things go wrong, you can only try and find where you can improve. That's what we've been doing lately. We are moving on.« Anton Pankov admits.

Anastasiya Pribylskaya, Andrey Ryabovol

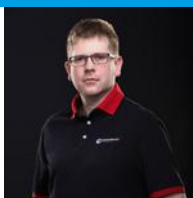
Van Helsing fighting Dracula - with tanks!
Wargaming regularly lightens up the mood by implementing events like the Halloween special.





REBUILDING TRUST

For developers to know what players want means for them to listen to what players have to say. Regaining the community's trust was an important step in World of Tanks' success story and here's how that went.



Milos Jerabek
is World of Tanks Development
Director at Wargaming.

Before joining Wargaming, Milos spent four years at Remedy Entertainment where he started as a level designer and climbed the ranks to become Production Director. As a Development Director, he coordinates communication between teams within the Development Department and ensures they work together to deliver high-quality gameplay experience to players.



Thaine Lyman
is World of Tanks
Product Director.

Thaine joined Wargaming in 2015. Before that, he spent over 10 years at Activision where he worked as Executive Producer for the »Call of Duty« series and as VP of Production. In his current role, he works with the executive team, development and publishing teams, regional GMs, and operational teams to ensure World of Tanks provides a best-in-class experience.

For World of Tanks devs, 2016 began with redefining how they handle game development. If they had a boxed game, they would have taken a break to rethink their approach – but it wasn't an option with an online project like World of Tanks. A little over four months and several small updates after Rubicon, the team made a literally loud comeback with 9.14, delivering on the promise of more realistic vehicle movement physics and taking the experience up a notch with deep and immersive new sound. No longer fixated on releasing an update every other month, they went on to address a few more issues that tankers were vocal about, while working on fundamental problems like SPGs and matchmaker on the newly-launched Sandbox server. Deeper under the hood, Wargaming was going through a massive transition, triggered by Rubicon and touching on every aspect of their operations, both internal and player-facing. The change began with the creation of a Product Group, a small team of executives who now decide where World of Tanks is heading.

We're handing it over to the two of them, Thaine Lyman* and Milos Jerabek, to talk

about the lessons learnt from Rubicon and the transformation the team went through.

Nimble Decision-Making

As a company gets bigger, it's easy for the soul of it to change a bit. For me, the greatest thing about Wargaming is that, although it scaled from 100 to over 4,000 people in several years, it managed to keep its soul intact. The »young, scrappy, and hungry« start-up spirit, which you'd usually attribute to smaller studios, is still here. No matter the differences people have, positions they hold or languages they speak, they're all gamers, driven by a love of games and desire to create experiences other gamers could rally around. They bring their talent and their passion to work every day.

However, the fast growth the company went through, had its consequences. The ability for finding quick solutions was lost as the number of parties involved in decision-making grew and the sole connection between parties became scarce. We ended up with too many people who could block a decision by saying »no« to it and the near absence of dialogue between devs, marketing and publishing teams across offices. So when Rubicon

* Thaine Lyman drove every aspect of World of Tanks operations, including communication with player community, throughout 2016.

happened, it didn't come out of nowhere: it was the direct result of problems that had been brewing for quite some time. We actually passed that point of no return and realized we needed to rethink the way we operate.

A lot needed to be done in a short time and quickly, so we started from the top by organizing a Product Group. Basically, we brought together World of Tanks »founding fathers« forming a steering committee with key people from development and publishing and lead by CEO. It's also when Slava Makarov who then headed the R&D division returned as Creative Director for World of Tanks. The group was to make numerous important decisions, cut through red tape and different points of view, get a plan on paper and implement it. This worked out pretty well and it unblocked us, so we could get moving again.

This larger group that was operating with direct involvement from our CEO had its moment in time. Without it, we wouldn't have overcome the huge initial roadblocks. However, once we were past the crisis and moving to day-to-day operational activities, involvement from so many parties was no longer needed. We created an efficient decision body but getting it into one room was a tricky task. Imagine how hard it was to get 12 extremely busy people (most of them executives) to meet! To stop the Product Group from becoming one of the bottlenecks it was designed to fight, we went on to a more nimble structure.

We scaled it back and went to the four-person group we have today (Product Director, Publishing Director, Creative Director, Marketing Director and Development Director). It enabled faster, more agile decision-making and made us personally accountable for our actions. If it's just five people, it's these five who are either doing it well or messing it up. It's all on this group. They make decisions, they deal with consequences. Of course, it can be hard to get even five people together. It's not an issue with five people fully dedicated to a project and whose lives revolve around it. Even if they are in different places and time zones, they can generally get things resolved quickly.

One Game, One Team

I (Milos) joined the team shortly after Rubicon; found myself in the eye of the storm so to speak – but I was happy. I've been playing World of Tanks since its Closed Beta in 2010 and experienced Rubicon as a player. Like the rest of the community, I couldn't shake off the feeling that Wargaming wasn't listening and being a member of the team now, I was actually able to be a part to change it.

If you look at it from a player perspective, whether you are spending a few hours in random battles, discussing the game on forums,



From left to right: Thaine Lyman (WoT Product Director), Paul Barnett (WoT Deputy Creative Director, Exploitation Research), Harkonnen (blogger), AgingJedi (YouTuber), Quickybaby (YouTuber/Streamer). More than 40 so-called Community Contributors and devs were coming together at Tankfest 2017 to exchange thoughts, feedback and ideas.

or duking it out on the Global Map, it's all World of Tanks to you. Should you stumble upon a feature that isn't working the way it's supposed to and get no response from the devs when you bring up on the forum, will you bother figuring out which department, office or team let you down? Of course not. If there's a fault somewhere, it's the game that is faulty and the entire team takes the blame. It's best worded in the »One game, one team« motto we live by now, and this approach goes far beyond establishing a closer bond with departments outside development.

When I joined, the expertise was spread all around the development unit. Another issue rooted in Wargaming's fast growth led to a problematic situation: team leads weren't managing specialists with the same expertise, so ideas and experience sometimes were not in line with everyone involved. Unfortunately, we had a structure that was working this way. Speaking to designers one day, I was amazed to discover they barely sync with each other. They were sitting on the other floor and would only meet for weekly dev sync-ups to discuss what's going on. It's impossible to preserve and spread expertise with a structure like that in place. If you want it to work, it needs to be programmers with programmers, managers with managers, and designers with designers. We reshuffled the organizational structure, building it around expertise and areas of talent and putting experts in the field ahead of teams. To pull it off, we had to restart the team. There were multiple ways to do this. Choosing between a step-by-step approach and a one-time change, we went with the second. Actually, we didn't have much choice. We had to move on with the game and couldn't allow ourselves to take a break. It's a bit easier with boxed games where

»We're all in the same boat, and if that boat sinks, we're going down with it.«

Artiom and Thaine answering questions from the community during a live-stream at Wargaming Fest.





Slava Makarov (WoT Product Director) and Anton Pankov (WoT Publishing Director) during the Grand Finals live-stream.

To celebrate 100 years of tanks, Wargaming celebrated 100 introduced the Mark I for a limited period, letting players command the first tank ever to hit the battlefield.



you can stop for a month with no harm to the product. Online MMOs are a different story. You can't go to players and say »Guys, we've got some internal issues to deal with so we're taking a sabbatical. No patches for the next half a year.« With an online game like World of Tanks, we're constantly aiming at a moving target. It's not just chasing the train. You're chasing it in several cars, each driving in an opposite direction and all has been done to make our game better for our players.

Dialogue with Players

The player community had lots of questions in the months after Rubicon but we couldn't answer them instantly. Our message wasn't unified across regions. So before making any big steps in terms of development we had to fix both the tone and the content of our communication with players. We had to share the same messages with players, whichever language they speak and have a sound strategy as to what we're saying, how we're wording it and how much context we provide.

Only a year ago, all World of Tanks announcements, news etc. were first written in Russian, then translated into English. One day we sat down and looked at the Russian and English articles covering the same topic only to discover they didn't convey the same meaning. Feeding players just with positive moments would not be honest towards our players and we wouldn't cover difficulties and problems we're facing along the way in just as much detail. The first step to fixing it was admitting the game's fundamental problems.

The very way we shared news had to change. We went from informing the community in pretty much a declarative manner with little to no explanation to providing the

reasoning behind the decisions we make and breaking these reasons and/or changes down in detail, so that players could see our train of thought. If you're playing World of Tanks, you don't want to know what developers are doing; you learn it by playing the game. What you really need to know is why they're doing it, just as you want to know the next steps. Not all problems can be fixed at once, and knowing an action plan lets you see things in perspective. Considering how big some problems were, we openly admitted it would take time and kept the community in the loop as we worked on solutions.

Success for us really comes from player feedback. If we're doing well, the players let us know. If there's room for improvement, they'll tell us loud and clear. It's only in collaboration with them that we could further evolve the project. Every new milestone we reach, we reach it through contributions from both the community and the development team.

Evolving the game together with players is not a marketing stance slapped on as an afterthought. It's becoming a part of our DNA. We've gone from informing and imposing our own opinion and decisions to listening, explaining choices and letting everyone know what's going on. We now actively encourage players to speak up, provide their input and act upon their suggestions when introducing new features and improving the game. We're just getting started and have the guts to admit there's a lot of room for improvement in our communication. For example, we've been doing regular livestreams with developers and meeting with community contributors to ensure we're all on the same page on features and future developments. However, we didn't

pay as much attention to their concerns on balance tweaks to vehicles. We're going to streamline our dialogue on these in the coming months.

Mentality Shift

At one point, basically anyone in the development team could say »No, it's a bad idea.« And then whatever the team was

working on was suddenly thrown into chaos. There was no long-term plan, no clear list of priorities that were aligned between Minsk development, the exec team in Cyprus and the publishing offices across the world.

A lot of the work went into defining the game's biggest holes and problems; what we should be doing, when and why. No one knows the game better than the people who created it. So we started by getting the devs' input around what they felt could benefit the game from a technical standpoint, art standpoint, creative direction and so on. The next step was finding a nice balance between the

»We redefined the way we talk to players building communication around transparency, honesty and consistency.«

devs' ideas on addressing critical issues and cool and interesting new features.

Take matchmaker or arty, for example. They've been the biggest sources of player frustration for years. Every new patch would come out and even if it had cool new features, the first feedback was »It doesn't fix matchmaker.« or »What's with arty? When are you gonna get it right?« We needed to fix the holes in the boat and it's not like the dev team didn't know about these fundamental problems or wasn't capable. In reality, there was a lot of disagreement around what fixing them should involve.

The team (development, marketing, publishing offices, HQ ... everyone!) knew there were serious problems but they were terrified of the impact the changes might have. To help them overcome it, we had to make them see that, first of all, changes were needed; second of all, we were never going to get a 100% positive reaction to some of them but what was happening then was even worse – we're boring our players by not making any changes! Anything's better than that. Slava Makarov and Andrey Biletskiy became the main driving force, pushing through ideas to create a strong holistic vision that allowed the team start moving in the right direction.

Proving Ground

Our players often joke Wargaming can never do anything on the first try and it's completely fine. Is it possible to make everyone happy? Of course not! Take twenty people and you get twenty opinions. What we have to do is find a solution, which would click with as many out of these twenty as possible. The second equally crucial aspect here is reacting on feedback with quick fixes, which is virtually impossible if you're introducing a massive change in a version.

Supertest (the first testing phase of a feature) happens roughly eight weeks before the version release. There's little you can do in eight weeks. If an issue is small, you apply a few changes to fix it but it's so small it's not going to affect the overall experience. If something just isn't working, you can remove it completely but there's no way to fix it in eight weeks. Fixing the game's core with that workflow was an impossible mission and that's when the Sandbox server came about.

It was a completely new idea for the company: a proving ground where we could test fundamental features months (if not years) ahead of their release, together with people who're actually playing the game rather than just our QA team. Testing a fresh-baked feature internally is one thing. People who're directly involved in development view it all from what you would call an insider's

perspective. When we bring in players, we see a much bigger picture.

Getting feedback from people we've never played with, allows us to look into their preferences and get to the bottom of things, discovering issues that we've never viewed as problematic.

Sandbox also attracts players of different cultural backgrounds and with different levels of skill. We aren't limited to testing what's

»We needed to fix the game's core but there was a lot of disagreement around what fixing it should look like.«

nearly finished: we share with them an idea, find out where they stand on it and bury it or keep working on it, depending on their feedback. Another important thing here is that we're being completely honest about what we're doing every step of the way.

We learnt a lot along the way.

Take a look at the 1st iteration of Sandbox. It was way too slow and over-packed with stuff. We didn't have a solid roadmap with the next steps. Finally, we didn't communicate what we were doing properly. Instead of explaining why and how a new system of vehicle roles was going to improve the experience, we focused solely on what we were doing. For the 2nd iteration, the Sandbox server had its own blog, where the dev team briefs players on every new batch of features they roll out, providing the rationale behind tweaks and explaining the hypothesis they're looking to test with them.

When conducting a postmortem for the 1st iteration of Sandbox, we analyzed it from two perspectives: gameplay and the way we presented it to players. The idea we tested was interesting but it didn't click. We tried something that looked perfect on paper thinking »OK, it's got legs, it makes sense, let's go for it.« Had we done it in a version, it would have been Rubicon 2.0. We were wiser this time, so we did it in Sandbox. We tried it on a limited number of vehicles and, without actually rebalancing the entire game, saw that players didn't want it; so went back to the drawing board.

The 1st iteration was an eye-opening experience in many ways. We realized players didn't see a problem where we thought it was: in vehicle roles, which we considered obsolete. So we didn't just go and devise a new solution. We went back to the very beginning, rethinking what the game's key problems were, to formulate what we now call the »unholy trinity«: matchmaking, arty and maps. Once the groundwork was in place, we could start working towards fixing these, putting big teams to work.

Milos Jerabek, Thaine Lyman

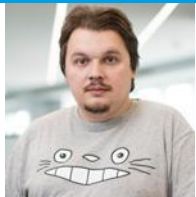


Listening to players, seeking the dialogue and working with the community and thereby rebuilding players' trust was and is an essential part of Wargaming's success.



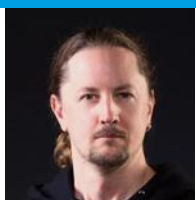
Andrey Biletskiy
is Creative Director for World of Tanks at Wargaming.

Andrey's job is developing a detailed vision for the game and making sure various teams deliver on that vision. He's been with Wargaming since 2014; before that he spent six years at Ubisoft and contributed to the Assassin's Creed franchise. His motto is »Every mountain is unclimbable until someone climbs it; every ship is unsinkable until it sinks«.



Slava Makarov
is Product Director for World of Tanks at Wargaming.

Slava has been with the project since its inception in 2008. He performed many roles, always staying one of key visionaries in company and a living game design encyclopedia. As the Product Director of World of Tanks he oversees the entirety of World of Tanks development and operations.



Thaine Lyman
is World of Tanks Product Director at Wargaming.

FIXING THE CORE

With Update 9.18 World of Tanks experienced some major changes. Listening to the community the team improved not only the matchmaking system, but also took a necessary look at light tanks and artillery.

Months upon months of work on World of Tanks' fundamental issues resulted in Update 9.18, the largest and most significant update the game has seen to date. With it, Wargaming improved the matchmaker and reshaped SPGs (Self Propelled Guns, or artillery – short: arty) into long-range support fire vehicles through the introduction of the stun effect¹, while also stretching light tank branches to Tier X, which ended the frustrating ±3 tier split for them. Acting upon the lessons learnt, they supported the release with massive coverage on the website and forums, walking players through every change 9.18 introduced and explaining them in detail. On its way to production servers, the update went through the total of five Sandbox and three Common tests and was released in North American, two weeks ahead of the global launch. What was the reason for this multi-stage cautiousness? Did it pay off? Slava Makarov and Andrey Biletskiy join Thaine Lyman to dwell on the road to 9.18 and the improvements made following its release.

Open Discussion

Matchmaker and SPGs called for the most thorough investigation and meticulous approach, with multiple rounds of testing. We made a few rushed changes in the past and the last thing we wanted with 9.18 was to shoot ourselves in the foot again. We were taking a huge risk building something that would be totally different from what our audience is used to and we knew we'd need to continually experiment. So, we started working in Sandbox, nearly a year before the 9.18 launch, to take a few cracks at each feature and ensure we delivered a set of changes we believe in and players feel good about.

Before we even got down to fixing the game's core, a big part of getting ready for it was reaching out to the community to discuss problems. We needed to establish a clear and honest dialogue on every single issue they brought to us. Whether we had a solution, were in the process of designing one, or didn't consider a certain concern a problem at all, we shared the next steps and our rationale with players.

¹) Stun occurs when tanks in the SPG burst radius have their characteristics temporarily weakened. Shell burst causes a shell shock to a tank's crew, which worsens a vehicle's mobility, accuracy, and reload time for a brief period.



Thanks to the changes within the tech trees of light tanks gave their popularity a massive push. Two weeks after Update 9.18 almost everyone was playing SPGs or artillery, seriously messing up viable player data.

Take skill-based matchmaking, for example. A few people wanted it, which didn't coincide with the vision the dev team has. Instead of bluntly saying »no« or ignoring their wish altogether, we were pretty clear on why we don't see it as beneficial to the overall experience and we didn't stop there. We created Ranked Battles for players who were longing for gameplay built around individual performance. It's nowhere near skill-based matchmaking but it doesn't disturb the game for those who favour classic Random Battles and lets those who want to prove their mettle against players of a comparable level.

Players have been overwhelmingly positive about this two-way dialogue. They've been welcoming it, and so have we, no matter the feedback we receive. When we fail epically, they let us have both barrels but that's okay, because they're passionate about the game. World of Tanks matters a lot to an incredible amount of people and there's a lot of responsibility that comes with it. The fact that there's this kind of passion is not something we'd ever be upset about. We're grateful for it.

When the time came to talk about fundamental fixes, we didn't spare any details on the changes, why we were making them and the role players have in fixing the game's core. We were open that if players hated a certain idea and had solid reasoning to back how they felt, we would make adjustments to the initial concept. We're making them all the time now.

The 1st Sandbox was a huge success because it saved us from going down the

wrong road. We received player feedback early enough to stop ideas that didn't click, handpick pieces players liked and move forward with them. If it weren't for Sandbox, we wouldn't be able to make bold moves. We would only be acting on small things we were dead certain about. But that's not how you make deeper structural changes that actually fix the holes in the boat.

Release

Matchmaking and arty have been a source of heated discussion for years now and it took us several iterations of testing to transform them into something we were happy to put into players' hands. After a good five rounds of testing, we arrived on a batch of tweaks the Sandbox community felt worked and went on to include them into 9.18. It was the first time we were releasing an update in North America ahead of the CIS.

»When trying something really ambitious, you have to leave yourself an opportunity for failure and experimentation.«

Communication before the Common test was huge. 9.18 became the single largest update the game has seen since launch. A lot was about to change and besides ensuring the version worked, we needed to prepare players for what was to come. We went to great lengths to ensure everyone was on the same page as to what the update

would bring, how it was going to address problems with matchmaking and arty and why we were choosing this particular way to fix issues. It was just as crucial to explain that we weren't going to get the matchmaker, arty, and lights tanks right in one update.

North America (NA) has a good combination of high PCCU and low PCCU, creating a perfect ecosystem for us to test the update.

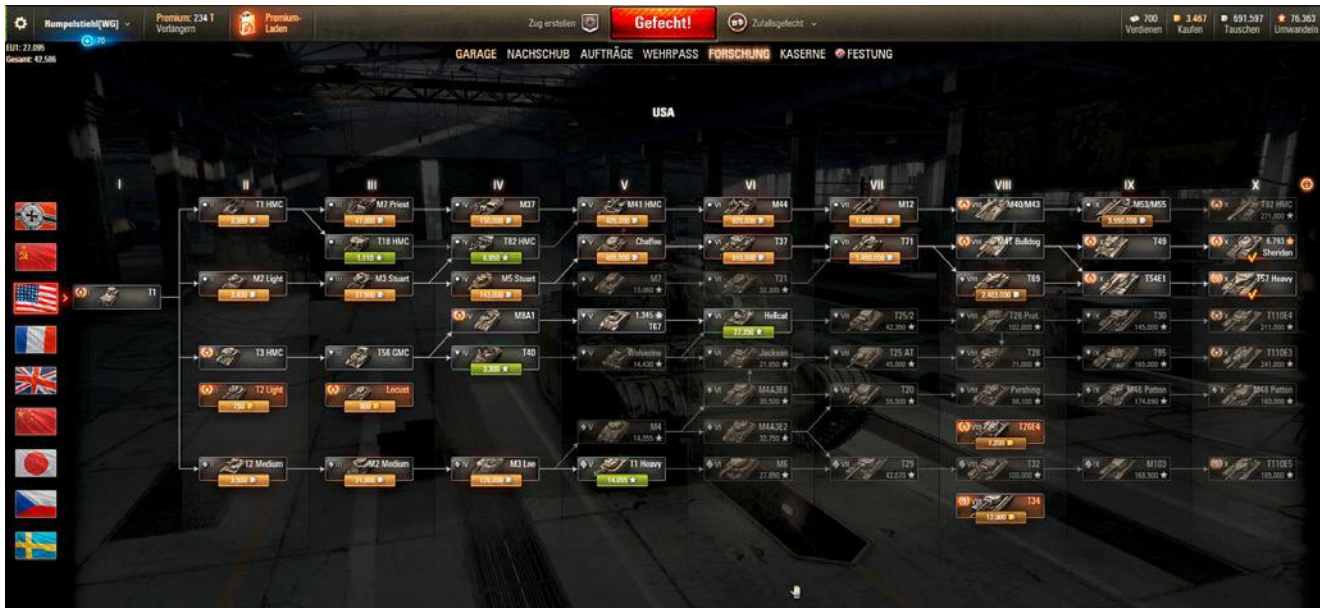
How did 9.18 change World of Tanks?

The update tweaked the game's core elements that had been biggest sources of player frustration for years:

- **Matchmaker:** The team implemented an all-new, template-based matchmaking algorithm that balances an ideal match versus the speed of matching. It analyzes the queue, and gets a player into a setup that's optimal for the current situation on the server. It gets there fast.
- **Light tanks** now reach to Tier X and benefit from standard ± 2 matchmaking, which creates more varied, enjoyable, and exciting gameplay.
- **SPGs:** Comprehensive tweaks to SPGs reshaped them into efficient team players, making this class less frustrating to fight against and more satisfying to play and have on the team.

Players who have no interest in participating in Ranked Battles can still engage regular matches, just like before Update 9.18.





Update 9.18 finally stretched light tank tech tree branches to Tier X, thereby ending the frustrating +3 tier split.

When it went live there, we all started playing alongside the local community to see how it worked and how they reacted to the changes. The first two weeks were completely mad! Everyone was playing light tanks and arty, which messed with the stats a lot. In fact, the influx of SPGs and light tanks was so huge that every rule of the matchmaker failed. It wasn't until the hype died down a little and players got back to normal patterns that relevant data started coming in.

Results and Takeaways

The biggest complaint players had about light tanks was that we actually made changes from the Common test to the release version, decreasing down their effectiveness. If you look at the state of the game today, there are more people than ever before playing light tanks. Their balance

overall is pretty good but we're keeping an eye on it. Players are still learning how these things work, learning the pros and cons and the way they interact with light tanks and SPGs a month into the update will differ a lot from the way they'll be playing them 3 to 4 months later.

»When you make fundamental changes, you can't just take the first two weeks of feedback and assume that this is it.«

The first thing we knew we'd have to fix were arty Platoons². Stopping SPGs from forming and joining them was a tricky decision, which resulted in increased forum chatter. We lifted the restriction limiting their number to just one per Platoon in 9.19.1 as we still have a strong belief that limiting the number of SPGs per Platoon is a good idea. If a Platoon of three SPGs decides to focus fire on one player, it would be a miserable experience for them, a lot like being trapped permanently. You're just as

Ranked Battles are for players who really want to put their skills to the test, but by means mandatory. Players welcomed the this two-way dialogue.





dead as if you were one-shotted³. It's merely a question of how long it will take to destroy your tank. Two-arty Platoons are no better. Allowing one SPG per Platoon was OK, but at that point we wanted to be conservative about it. We needed to do this to measure the effect of the arty revision. Once we did that, we acted upon player requests and brought them back.

Finally, the matchmaker was almost universally appreciated as a step forward. There were some legitimate complaints that we are either acting upon or will be acting upon in future updates.

Is the stun effect perfect? Is the improved matchmaker working just fine? No, there's still plenty of work to be done in regard to both and we're on it. Most importantly, we're open to players and have it in ourselves to say that we know about the areas that require fine-tuning. We're working on them and even if we haven't found a sound solution to a particular issue just yet, we're looking for it. Moving forward and up until we all – devs and players alike – are certain

that the matchmaker, arty and light tanks are where they should be, every single patch will introduce a few improvements to these three. We're past fixes, but there are a few improvements waiting to be made.

Slava Makarov, Andrey Biletskiy,
Thaine Lyman

Update 9.18 brought some essential changes to artillery and light tanks, with the latter being the big winners in particular.

1 arty per platoon only: Groups of SPGs were way too powerful, so the team had to limit the number of artillery in battle to avoid player frustration.

2) A platoon is a small group of two to three players who can enter battles together.

3) One-shooting is destroying an enemy vehicle with a single shell.





TUNING THE ENGINE: POWER UNDER THE HOOD

With World of Tanks growing bigger and bigger over more than seven years, at some point tuning the game engine to fit today's requirements was inevitable - Bronislav Sviglo will tell you all about it.



Bronislav Sviglo
is World of Tanks Render
Team Lead at Wargaming.

Bronislav has been with the company for more than 9 years. For most of that time he has been developing and optimizing the World of Tanks graphical engine. His hobbies include checking out how other games' graphics work, swimming and watching movies. Bronislav's life motto is »never stop learning«.

World of Tanks inherited its engine - Australian-made »BigWorld« - from the fantasy MMO project canceled by Wargaming in 2008. The BigWorld server provides a lot of benefits and has stood the test of time. The client part of the engine was heavily customized - to the degree it may be called a completely new, in-house product. In 2017, the game looks and feels very different from the old vanilla version, having modern visual effects, HD tank models and complex physics.

Bronislav Sviglo, World of Tanks Render Team Lead, speaks about the evolution of the game's engine and explains why the new HD maps matter so much.

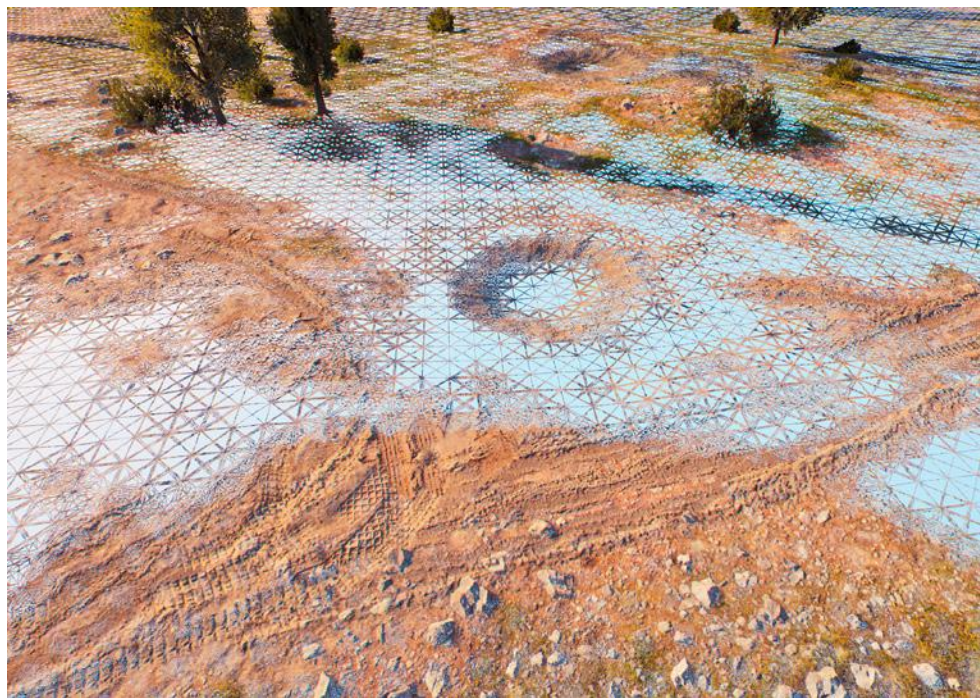
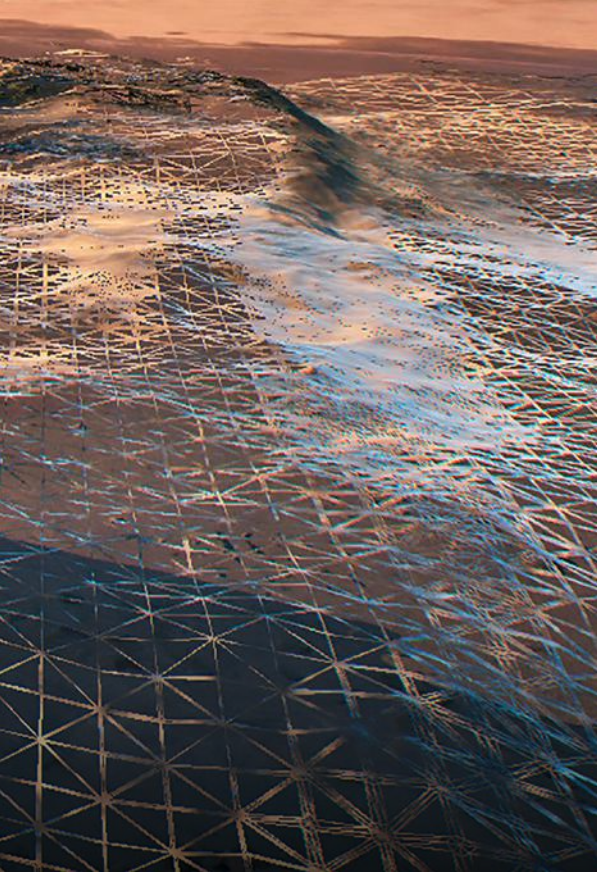
Big World: The Right Choice

I came to Wargaming after graduating from university in 2008. At first, I worked in a team of three that was prototyping an MMO about orcs and elves. We had two engine options: one was BigWorld, the other was the HeroEngine now used by EA's »Star Wars: The Old Republic«. We went with BigWorld: it had robust server tech, used Python scripting language and was very scalable. The

HeroEngine server side wasn't polished yet; also that engine used visual scripting, which was a bit constraining for programmers. Simply put, if you were to make an MMO that did not feature humanoid characters, with HeroEngine it would be complicated. BigWorld on the other hand, was probably the best suitable solution for a game about military warfare.

BigWorld allows tens of thousands of players on one shard and lets you group the shards into clusters. Initially, it did not support any real-time interaction between multiple clusters but we expanded its functionality. We were able to do this really quickly when the concurrent player number started to get climb rapidly and it became clear that one cluster wouldn't be enough. Now the server tech allows millions of people to play against anyone in their region.

Another great thing about BigWorld is that it lets the majority of battle-related calculations in World of Tanks be made server side. This lowers lag and prevents certain forms of cheating completely. There are games, where you can extract some info from the client and receive an unfair advantage, but with World of Tanks, the most crucial data is generated on the server



side – unlike some online shooters where it is created on the client side and sent to the server. Due to BigWorld’s structure, in World of Tanks you simply cannot trick the server into believing that you’ve just fired two shells with a single shot.

The BigWorld server core, developed and supported in Sydney, is pretty much the same for PC, console and mobile World of Tanks, which saves us time and effort and lets us apply tried and tested solutions. The game clients are different, so the respective teams work on those.

Customizing the Client

Initially we intended to keep the BigWorld client core intact and make all modifications to World of Tanks’ client »sidewise« so they wouldn’t mess with updating to a new version of the core delivered by the Big World team, but by 2012, we realized that only significant rewriting of the client would let us greatly improve the graphics.

Update 8.0 was our first large step towards this goal. We made the game look modern, by that time’s standards. We

applied deferred shading and decals and heightened texture resolution to make the terrain and objects look better. For the first time, we utilized post-processing effects like high dynamic resolution, color grading and bloom. Bump mapping was applied to terrain, not just to objects; that allowed for flare effects and reflections. The picture

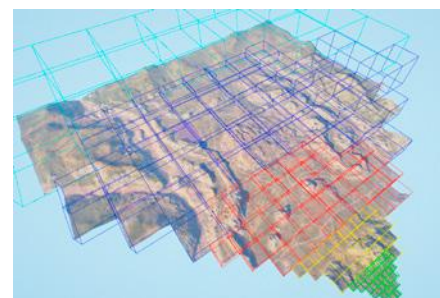
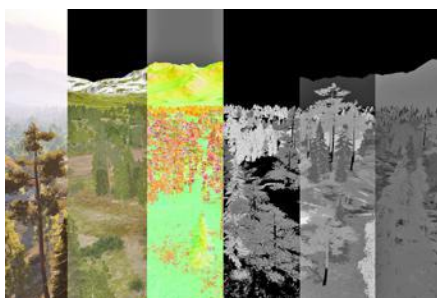
»BigWorld’s scalability saved us during the great influx of players after the launch.«

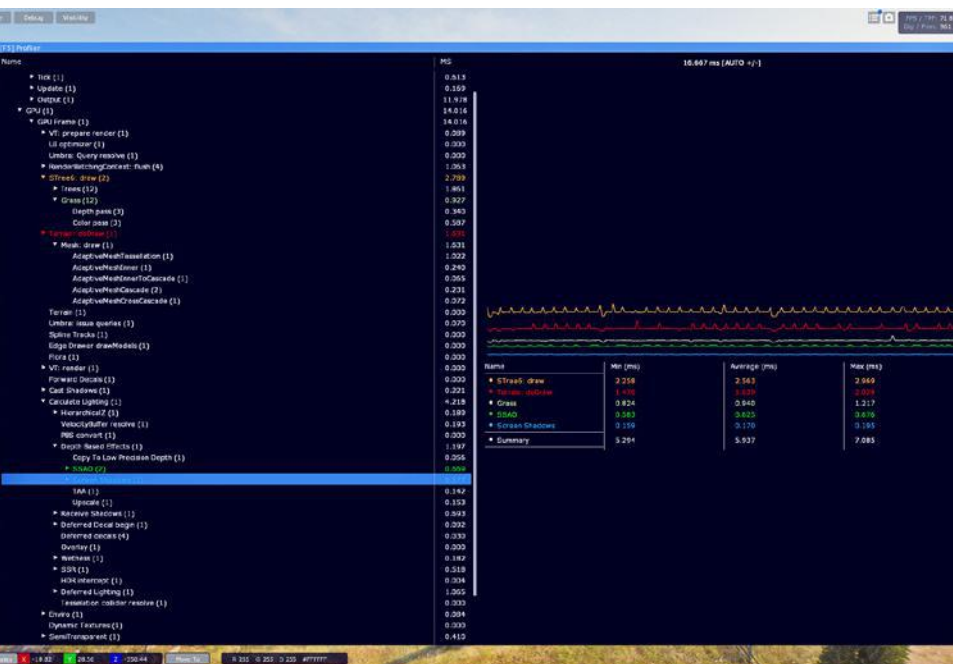
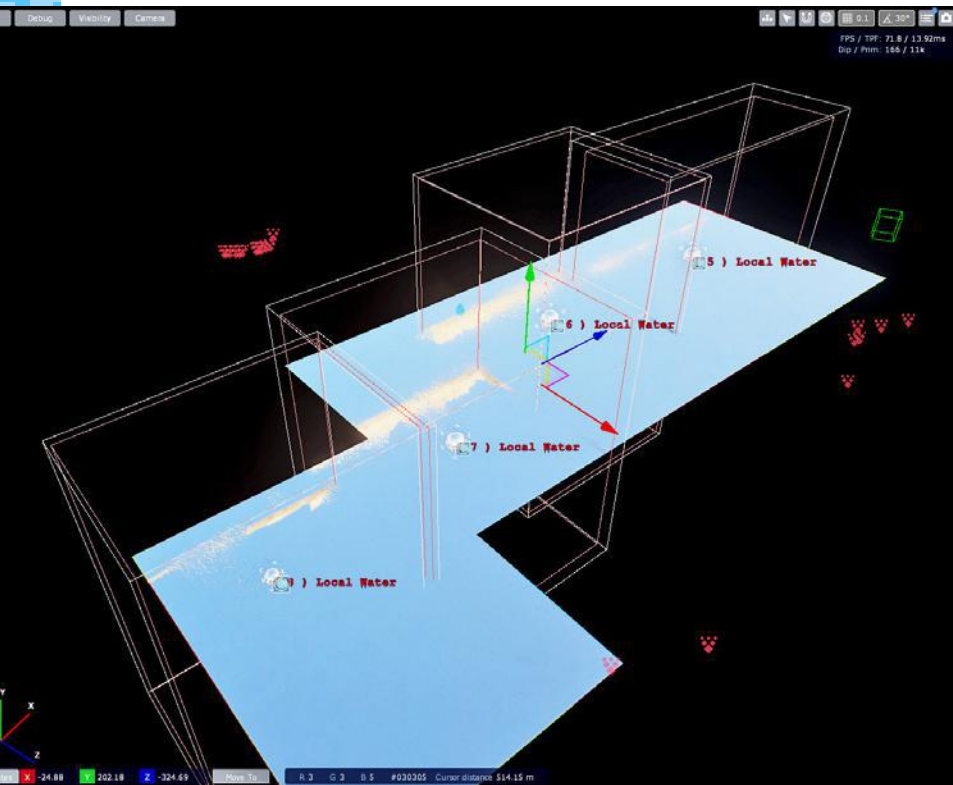
you were seeing while in game became way more attractive. We also added new custom physics: you could push allies, ram enemies and cross bodies of water – or get sunk there. Optimization work had also been done: we divided the shadows into static and dynamic categories and used lots of instancing (drawing the map objects in groups), easing the load on graphic processors.

Graphics changes made the maps look better, so we went for the tanks next. They didn’t have much detail back then: there were no rivets and no specular effects. It was impossible to tell if their metal was polished or rough. So we improved the look of tanks with physically-based rendering.

All new maps are being built from scratch and will make use of all the advanced features of DirectX 11, including HDR and tessellation.

Dynamic resolution, color grading and bloom, bump mapping – Wargaming not only improved the looks and graphics, they also added new custom physics.





Although the battlefields themselves will of course be limited, players will be able to see way beyond the 'red line'.

»When you're making something you're passionate about, you put your whole self into it and embrace the challenge rather than fight against it.«

With it, the shaders can be assigned physically-based parameters like albedo (an object's color in uniform lighting), roughness, and metallicity (how shiny an object is). We also applied high definition textures, so the new models came to be called 'HD'. There's more to them: the constructive materials of the vehicles are complex and realistic and that contributes to their good looks. Upgrading a tank model to this quality requires time and effort, especially by the art team. In April 2014, we only introduced about 40 HD models

with the 9.0 update. We kept releasing HD tanks in later updates.

The client part of the engine underwent so many modifications that at certain point we began to doubt the efficiency of the »complete rewrite« approach. We wanted to measure the custom graphical engine's performance against licensed suites and also see if the game looked better in these. In 2015, we held a study: one of the maps was recreated using Unreal, CryEngine, Unity and others. Our in-house engine turned to be more efficient at rendering than any other. At the same time, its performance scaled much better across all the hardware ranges. There were reasons for that. The World of Tanks engine was so good at drawing armored vehicles and battlegrounds because it was specialized and not universal like the licensed ones. Also, throughout the development it was always being optimized for low-end rigs.

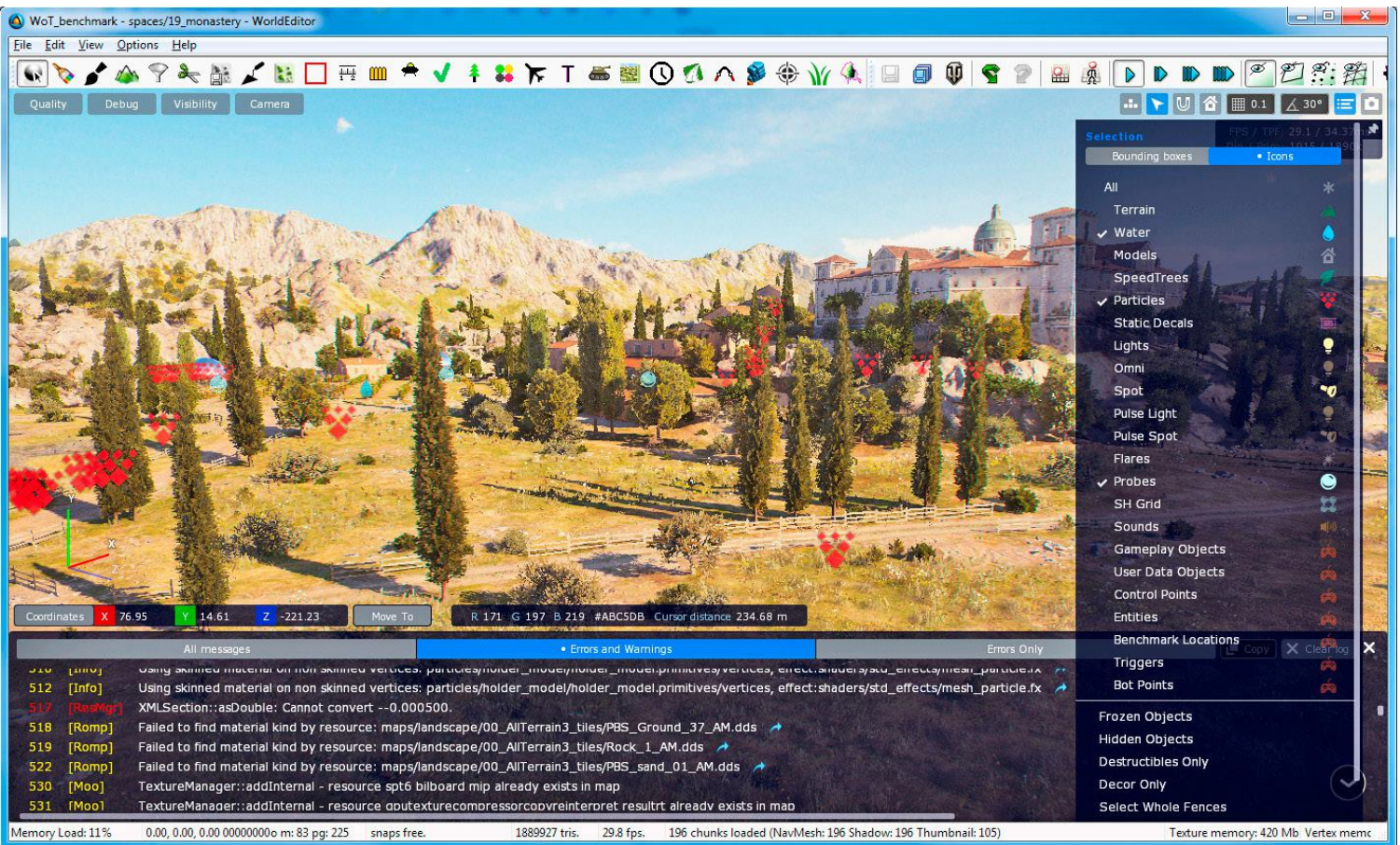
We drew two conclusions from the engines' race. First, we had a solid tech that we could improve even further. Second, switching to another engine and importing our current assets wouldn't give us a better picture. We had to add a few bells and whistles to our tech – and to significantly improve the assets. So we decided to remake the maps completely.

Redrawing the Maps

Over the last couple of years we made a few technical advances with the engine. Some of these will truly shine once the remade maps are released. We built in DirectX 11 support, laying the groundwork for further upscaling. We introduced multi-threading, which lets you move parts of the graphics-related calculations to other CPU cores. We also enhanced movement physics. Now tanks can flip over, and they have momentum so you can feel their weight better when braking or climbing up a hill. Gearboxes are simulated – you can perceive the shift from low to high gears.

Currently, the largest chunk of work is the HD maps and everything that's on them. They will bring the graphical fidelity of the entire game up to the level of HD tank models. We don't want to release the HD maps in batches like HD tanks. It will be a one-time large upgrade with about 30 maps.

The new maps are being built from the ground up: no converters, only modern tech and complete reworking. They will make use of all the advanced features of DirectX 11, including HDR and tessellation. All subsystems are being remade – water, terrain, grass, trees, lighting, clouds, houses, shading. Not a single old object will be left. While on the map, you'll be able to see kilometers beyond the red line limiting the battlefield – no more of that »aquarium«

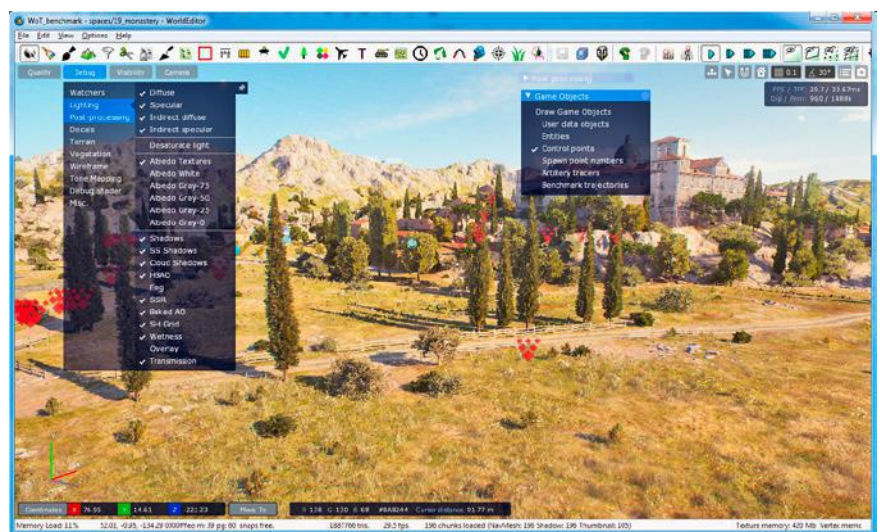


feel. We've been preparing the technology for years; soon it will be time to reap the fruits of our labour.

We are going to introduce Havok physics engine support together with HD maps. We will start with small destructible props like stone hedges and wooden poles and eventually move to larger ones like houses. Now we possess a solid base for improving physics – like the graphics – for years ahead.

The new tech is already working: we let the tankers have a go on an HD map at WG Fest late last year. We only need to put some finishing touches on the content. It'll take some time, but the result should be worth the wait.

Bronislav Sviglo



While remodelled vehicles were released in batches, Wargaming plans to introduce all of the nearly 30 HD maps at once.



SCALING THE GAME

With its »Frontline« mode Wargaming will enable World of Tanks players to engage in massive 30v30 matches that take place on enormous battlefields - a feature that poses a challenge of its own.

Wargaming learned a lot as a team over 2016. »Rubicon« and its aftermath were hard for the company. However, they took that lesson to heart and used it as a foundation to elevate their relationship with players. Being transparent on development and inviting the community to contribute to fixing the core of World of Tanks brought them a step closer to winning player trust again. Addressing the players' biggest concerns, the team also kept pushing for innovation. They approached it with the same »player first« attitude in mind, while also trying something totally new - distributing development to an external partner. The first project developed in cooperation with a

third-party studio entered Sandbox in spring 2017, delivering epic 30v30 battles under the banner of the new Frontline mode.

We caught up with distributed development managers Nadezhda Shavel and Kirill Perekrest to hear the story behind this experiment and discuss how it has panned out so far.

Bringing in Outside Experience

Once you have millions of players out there excited to get more content to play with, you have to be sure you don't leave them hanging for long or they will find other games to play. Things get even trickier if you're working on an online project like World of Tanks, with a rich legacy and technical debt. When it comes to prioritization, we have to strike a balance between increasing player happiness by fixing the





Frontline battles are entered in Platoons consisting of 5 players each, with everyone using Tier X vehicles only.

major issues brought up by the community and sprinkling in delightful new features that we believe our players would love. Fixes have been far more important for the team lately, with the studio's best talent tackling problems with the game's core. We had to find a way to deliver new experiences and high-quality content without distracting the in-house team. So we started looking for expertise outside the company.

As for the idea for »Frontline«, we had to look no further than the World of Tanks forums. Players' have been asking for larger maps and larger teams for years. We worked from there, opened a tender to find a capable team that would be able to deliver to Wargaming standards and ended up with Bongfish¹.

From a technical perspective, the work on Frontline was an insane number of »firsts« for us: first combat scenario outside the classic World of Tanks 15v15 setup, first completely new gameplay feature revealed to players way ahead of its launch and – of course – our first foray into delegating both game design and development to an outside team. Turns out when you try to tackle so many new things at once, it makes for an exponentially more challenging development process.

Before getting down to actual work, we had to define the engagement strategy and provide our partners with a methodology and tools for communication and status reporting of tasks. Bongfish are a small studio of over 50 people and they weren't used to multi-layered security protocols and strict workflows, which could have grown into a stumbling block, had we skipped this somewhat bureaucratic step

and gone straight to development. Outlining areas of responsibility between the Minsk devs and Gratz¹ wasn't a smooth ride either. As a game designer on the World of Tanks team, you want to deliver new features. Your developers want to build new features. Your programmers want to write code for them. Your QA department wants to test them. This is why you're here – you all got into this business to come up with cool new stuff and deliver it to players. Now imagine your reaction when one day you're being told that the feature you've been wanting to create for years (and Frontline was one of those) is getting outsourced to someone else and you're to overlook the process. You can give advice and share expertise but they're making it. What is this sharing of expertise? Where does it start? Where is this thin line between advising and doing someone else's work? Finally, how do you motivate a team whose engagement in the creative process is limited? We had to be very clear and flexible to establish a truly efficient process for the distributed project team we have for this project.

»There needs to be a balance between paying off technical debt and expanding the game.«

We're lucky to have Bongfish as partners. They've gone to great lengths to help us fine-tune communication, introduced work practices that were new to them, and, most importantly, were genuinely invested in building a great experience and ensuring we feel at home every time we visit. They weren't playing much World of Tanks when we started but the game's grown on them. They're part of the family now.

Tackling Development Challenges

The mode was broken into a number of milestones: a map segment (we started



Nadezhda Shavel is Distributed Development Manager at Wargaming.

Nadezhda is the Lead Project Manager for World of Tanks' distributed development, making sure project milestones are met. Before coming over to Wargaming three years ago, Nadezhda worked outside the games industry on digital and e-commerce projects. She is of the opinion that treating gamers as customers is extremely important.



Kirill Perekrst is Game Designer for World of Tanks Render at Wargaming.

Kirill creates new World of Tanks gameplay features, and controls their implementation. Before joining Wargaming in 2014, he worked as a game designer at Game Insight. His favorite kinds of games are MMOs, RPGs, and shooters. Kirill is a big fan of American football and supports the Arizona Cardinals.

World of Tanks' Frontline mode is a brandnew experiment, putting 30 attackers against 30 defenders in epic battles.



¹ Bongfish are located in the Austrian city of Gratz.



The bigger a map, the harder it's on the performance. To avoid major lags, objects in the far distance are blurred depending on a vehicle's visual range.

Each of the Frontline maps was divided into several sectors that were designed separately and put together for final play testing at the end.



from 3X1 and ended up with 3X3), a battle with synchronous victory conditions etc. Game design ideas went from me to the team at Bongfish who then turned them into working prototypes. We would play each, discuss what was fun and what was not and repeatedly iterate until it hit the mark. Once it clicked, we would build on the prototype by adding a new mechanic.

Frontline is »epically massive«: 30v30, with five-man-strong Platoons, all fighting in Tier X vehicles. It gives you that feeling of a huge-scale battle that's really hard to describe. It's just epic! Actually, the initial setup had two teams of 50. However, tests showed that there's no place for tactics in a battle with a hundred tanks. Basically, you would roll out and have a few guns pointed at you right away. You don't even have to move around – forget about flanking. It all boils down to shooting, which is little fun. Increasing map size might seem like an easy way out but in fact it creates another problem: the larger the distance, the harder it gets for slower vehicles.

We created a unique new battleground for the mode: a 9 km² »Epic Normandy«. When working on it, we divided the arena into a number of smaller sectors and developed each of them separately to ensure it's all detailed and varied enough to create an engaging experience. Then, the team created atmospheric sketches for each sector, working off an impressive number of references. Upon completion, all sketches were combined into one and assessed through playtests. Those let us collect actual stats, which is a

must for balancing the mode. Bots are a no go, if you want to get it right. So, we invited our colleagues, the Bongfish team amongst them, to play test Frontline. Guys from across Wargaming offices in North America tuned in to every play test despite the time zone difference. It's 11 hours with Minsk and they would have to set up a VPN to play from home late at night or real early in the morning!

Frontline is a lot heavier on strategy than your regular 15v15 battles and has a greater emphasis on teamwork. There's a team of attackers and a team playing in defense. Attackers need to break through defensive fronts and destroy at least three out of five pillboxes located on the last, third line of defense. Defenders should prevent them from capturing bases and advancing through the battlefield. If they fail to stifle the attack right away, they should keep at least three out of five pillboxes intact. As you can see, it's pretty similar to what you get in Random Battles' Assault mode. However, in Frontline, teams move across

the map in stages, fighting over one front at a time.

To promote more movement, tougher decision-making and team coordination, we also introduced respawns, repair and resupply zones. You have several lives for each stage of the battle. Attackers begin with two, defenders have just one and each player

receives an extra »life« every 5 minutes. Once your vehicle gets destroyed you can choose any other Tier X in your Garage, set up its configuration, pick a respawn zone to continue the battle from, and get back into the game. Repair and resupply zones are where

»You have to make sure you're not solving a problem with a problem, which is a common pitfall.«



World of Tanks' 30v30 battles are fought in stages: attackers have to break through different frontlines and destroy at least 3 out of 5 pillboxes, while defenders have to prevent just that.

you can restore your HP pool, repair modules and replenish ammo during the game.

Probably, the greatest challenge for us now is bringing the mode's performance up to the production servers' quality standards. We are talking about maps 9 times as large as what we are used to and twice as many players in battle at the same time. Here, we used special technology to make the mode run without major lags. In simple terms, this solution has distant objects all blurred until they are within your view range. Let's say, you've got the view range of 700m. So, you'll see every detail within 700m, while vehicles and environments located beyond this distance are blurred. As you move forward, they clear up. This solution lets us save PC resources and takes us a step closer to ensuring performance that is just as smooth as 15v15 battles.

Engaging Players at an Early Stage

Working with our players directly on SPGs was a great start for Sandbox, but it was reactive. We wanted to be proactive with the community, so we attempted to apply a similar testing approach, but this time it was a completely new feature. When you haven't launched, it's a little easier to noodle around with »possibly fun« ideas and see what might stick. Using a mix of our own experiences as heavily-engaged World of Tanks fans, validated by player data, we could iterate the game design concept so that it resonates with players.

We are positively impressed with player enthusiasm towards the new mode.

»The true test of success is in the hands of the players.«

Talking numbers, nearly 92% of testers like Frontline and want to see it on live servers. Looking at their feedback, it wasn't just the completely new experience and gameplay pace that made it thrilling. The rank system we introduced to stress the importance of individual performance got positive reviews. Moreover, testers sent lots of great suggestions on evolving this component, and some of them will make their way into the next iteration.

In the coming months, we'll be optimizing Frontline's technical performance, working on the economy, iterating on the defense gameplay, and evolving the map layout to ensure all vehicle classes have a meaningful role, including slower tanks. As for the grand scheme of things, there's nothing better than learning from your experience. The collaboration with Bongfish taught us a lot and we're moving forward with the whole concept of distributed development. Now that we have an established development pipeline for third-party studios and Sandbox to work proactively with players, I believe we're in a good place to keep growing our dev partner network to broaden gameplay depth, quality and variety with new features and modes.

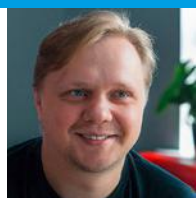
Nadezhda Shavel,
Kirill Perekrst





MUSICALLY MATURE

Music and sound effects in games are so much more than a nice-to-have feature. Not only do they help players get into the right mood for battle, they can even become an important tactical element.



Aleksey Tomanov is World of Tanks Audio Team Lead at Wargaming.

Aleksey has been in game development since 2006. He worked as a game and sound designer at Floodlight Games. Aleksey came to Wargaming in 2013 and delivered audio concepts and sound design for World of Tanks Blitz. In 2015, he became World of Tanks Audio Team Lead and is now in charge of World of Tanks' sound on PC.

When World of Tanks launched, its audio team consisted of just one person. Wargaming couldn't afford to record real tanks, so the vanilla sound effects were mostly improvised. The game was constrained by the limitations of its first audio engine, FMOD. It didn't allow for spatial positioning of sounds: tankers could not gauge the distance of an explosion or what side the enemy shells were coming from, and had to rely on visuals only. The sound effects were static: your favorite tank's cannon always banged exactly the same way. The musical themes were static, too.

Aleksey Tomanov, World of Tanks Audio Team Lead, tells us how the game's sounds

were made more realistic, varied and informative – and what the new musical soundtrack will be like.

Building up the Sound Library

I've been playing World of Tanks since launch. When I was hired by Wargaming in 2013, I had been in tens of thousands of battles. As a player, I wanted the tank engines to growl like they do in movies and explosions to sound different every time. As

an audio engineer, I knew that high-quality sounds could be obtained by recording real vehicles, and their fluidity and depth could only be achieved with a new audio engine. The most effective way of improving the game's sound effects was to gather the source material while implementing some

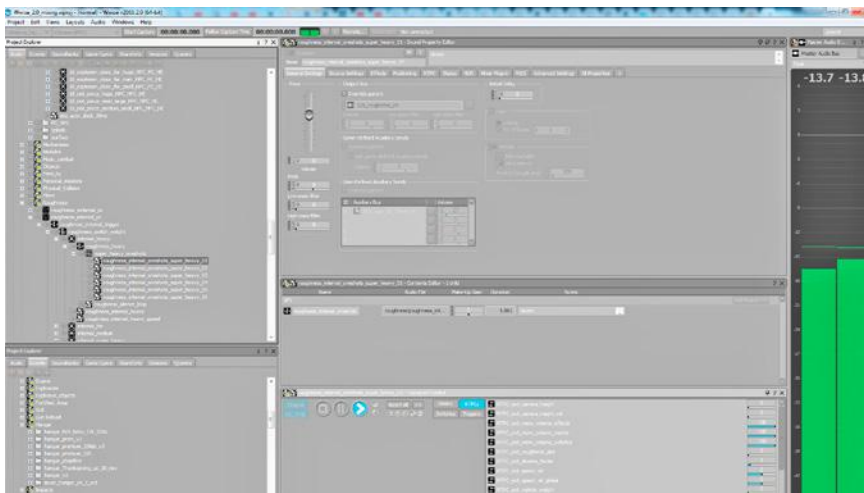
»A tank cannon sounds like a tank cannon, in any era.«

The Sabaton Rollout

The songs of Sabaton are often dedicated to past wars and famous battles. Therefore the Swedish heavy metal group is often hailed as a founder of a new musical genre – »battle metal« – and has quite a few tankers in its fan base. The Swedes even use a tank model as their drummer's riser at their concerts. All five band members play World of Tanks because they love to »blow stuff up«. So the partnership of the group and the game was just meant to happen.

»The Sabaton collaboration is not only about music,« says Alexey To-manov. »Many in the audience like their songs so much, that playing the game while listening to them is not enough for these people. They want more, so the Sabaton tank with the Sabaton crew was made available. Of course, besides the portraits of group members there is also recorded speech.«

The partnership started in June 2017 and we have lots of things created in cooperation with the band which will surprise our community.



Integrating all the recorded sound material into the new sound engine Wwise was a ton of work, but totally worth the efforts.

new effects in the old engine and then switching to the new one.

The work on the library of live tank sounds had started before I came aboard but I participated in the bulk of it. The company was sending us on long trips abroad with hi-fi recording equipment. We captured the engine sounds of the StuG III, the T-26, the KV-1 and the Valentine in the »Kubinka Tank Museum« near Moscow. The Patton, the Hetzer, the Chaffee, various Shermans and other vehicles were recorded in the Virginia Museum of Military Vehicles and the Museum of the American G.I. in Texas.

We recorded the cannons' sounds in a desert tank firing range in Jordan. Having access to that place proved indispensable, as there were guns of different calibers. It did not matter that most of the vehicles – for example, the Chieftain main battle tank – were of a later period than the one we cover in World of Tanks.

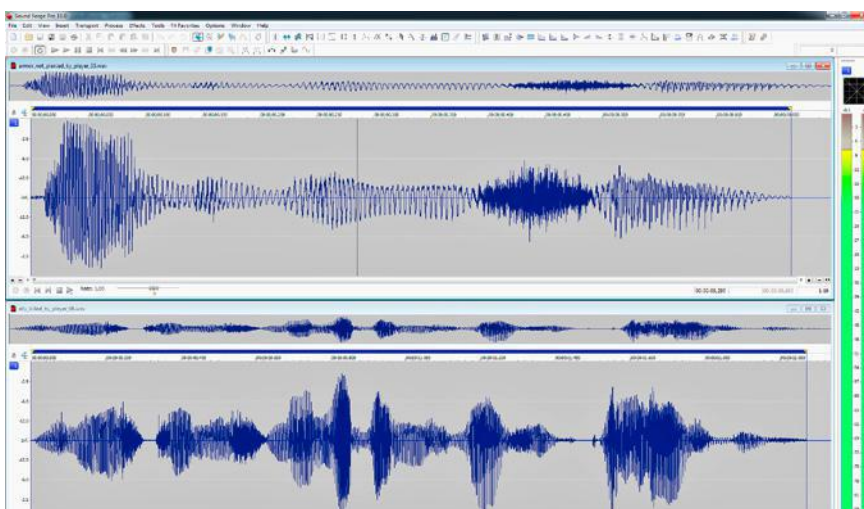
The gun of a Scimitar light tank booms just like those on classic French tanks with

oscillating turrets. We had time to record the gun and engine sounds from various distances, moving our mics all over the desert. Later, when we switched to the »Wwise« audio engine, these recordings proved very useful. We even captured the sound of tank armor being hit. A rocket-propelled grenade was fired at the broken hull of a SU-100 tank destroyer and a pretty expensive microphone was set five meters behind it. Had something gone wrong, we could have lost an insane amount of money. But the SU-100 armor didn't cave in and we got our reference sound.

»Ad-hoc solutions rarely allow you the greatest graphical fidelity.«

New Sound

We completed collecting the tank sound library by autumn 2014, and started to integrate the new audio engine – Wwise – into the game. It took us a year and a half: we had to fine-tune and optimize, making sure the new engine wouldn't impede the performance on PC's with single-core processors. Most of the time was spent bringing the new audio content into Wwise.



Real sounds from real cannons: On a tank shooting range in Jordan the team recorded real cannon fire from different positions and distances, even ricocheting rocket-propelled grenades.

Cover Story: WoT – Sound Design Case Study

Making Games 09-10/17



Everchanging just like flames: The main battle theme will evolve in real time, made up by randomly chosen fragments from a map's sound asset pack.

Akira Yamaoka, the composer of »Silent Hill«'s legendary soundtrack, contributed a track to the World Tanks soundtrack - a gift to the tankers community.



We spent days and nights in the studio honing the sounds.

The engine switch came in 2016 with the 9.14 update. It substituted more than 80% of sound effects in the game with realistic ones based on our sound library material. The Wwise engine helped us bring variation to hits, shots and tank explosions. Every such sound now consists of 10 microsounds, chosen randomly from separate containers, each holding 5 different files. The sound layers are randomly shifted by microseconds relative to each other. All this makes every sound effect unique.

Wwise has spatial positioning of effects, and you can assess the distance to a shooting or exploding tank and also perceive the direction. The engine allows for a 360° sound panorama, and you will instantly know which side of your tank has been hit. You can also hear how hard the blow has been: the sound depends on the share of your total hit points lost and has three degrees. The subtraction of 300 HP produces a scratching sound for the Maus heavy tank and a loud boom for a Tier X arty, because in the first case you lose 10% of your HP and in the second, it's about 50%. Unlike hits, ricochets have their sounds tied to the attacker's cannon caliber: how hard you may be struck the next time is the most valuable and relevant info in this case.

New Music

At the time the 9.14 update came out, the audio part of the game was like a stock tank: it had great potential to be unlocked. And that's what we're currently doing – rebuilding the music along the same lines of the sound effects. »New music«, as we call it, is a completely new soundtrack with map themes that play differently every time and

depend on what's happening to your team on the battlefield.

What we want is to take both the soundtrack and its scope to the global level. Musicians from all around the world created the source material for the new soundtrack. They composed short, original pieces representing their countries' musical heritage. New music fits the nature of the game: the play sessions are brief but overall the players spend lots of time in it, so they should never get tired of the melodies.

In the process of working on the new soundtrack we discovered that music is one of the many talents that our passionate community has. There are several globally known talented musicians representing our community of tankers, such as the Swedish heavy metal group Sabaton or Akira Yamaoka, the composer of »Silent Hill«'s legendary soundtrack. Working closely with these famous and incredibly talented musicians was a great experience for us all. Yamaoka-san

»What we want is to take both the soundtrack and its scope to the global level.«

has been working on a track, which will be added to the OST – as a gift to the World of Tanks community which we will present to our audience very soon.

Sabaton are a band of passionate and dedicated World of Tanks players. In cooperation with them we created

a stylish World of Tanks video clip which was released on August 16th. The clip was directed by the famous German music video and commercial director Zoran Bihac who is greatly known for his work on many videos such as »Mein Herz brennt« by Rammstein or »Praise Abort« by Till Lindemann. The music video itself features Sabaton's most famous song »Primo Victoria« and focuses on tank battle emotions and tank rock content. We like to call it the birth of a new music genre: #TankMetal!

Alexey Tomanov



GOING THE EXTRA MILE

A game like World of Tanks is best played in team - with people you know and trust right at your side. With Clan Wars, Global Map and the Stronghold mode were just what tankers needed - so they got it.

Despite its many hurdles, World of Tanks retains a massive following and manages to deliver a fresh and exciting game balancing the player's need to belong, urge to compete, and desire to excel at all costs. Inherently team-centered, the game offers several scenarios built atop multiplayer and ranging from the somewhat-more-organized strategy of «Clan Wars» through to the mode designed around solo performance: Ranked Battles. Both rooted in the community, they broaden the World of Tanks tier framework, each catering to a demographic. In this segment, the team reflects on the game evolution going beyond Tier X.

Clan Wars

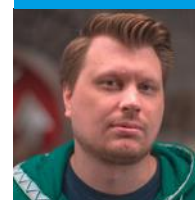
«World of Tanks has attracted a diverse community that has built a strong bond over the years. Clan Wars is a unique part of the experience that nurtures deeper social connections by design,» says Clan Wars Product Manager Dmitry Grigorov, adding to that, he himself joined Wargaming through Clan Wars, coming all the way from pitching Global Map events to the team to leading the team's efforts to deliver them. «Let's compare it with the

real world: you can encourage a friend to try out the game, which is a lot like urging them to visit a country you've been to lately, returning with loads of great memories. On the other hand, inviting a friend to join a clan is more like hopping in a car and going on a road trip together. You rely on one another, share victories and work through challenges together.»

»Relying on friends is extremely powerful in driving engagement.«

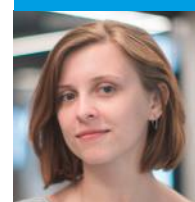
Coming from a background in PC strategy games, it's no surprise Wargaming first discussed adding a strategic layer to the game long before its launch. Forced to drop the idea due to limited resources, they would return to it later, this time fueled by player requests for a more close-knit teamwork mechanic.

When people began playing World of Tanks, they quickly realized how difficult it was to maintain a high win rate in Random Battles. «You're basically trying to juggle the various things your tank does well or poorly with the map you're on and whatever your teammates are doing,» says Dmitry. «You need to keep a whole lot of possibilities in mind when playing, teammates among them. They can either help you or drag you down. So, obviously, having a trusted bunch by your side is a lot better than playing with random people.»



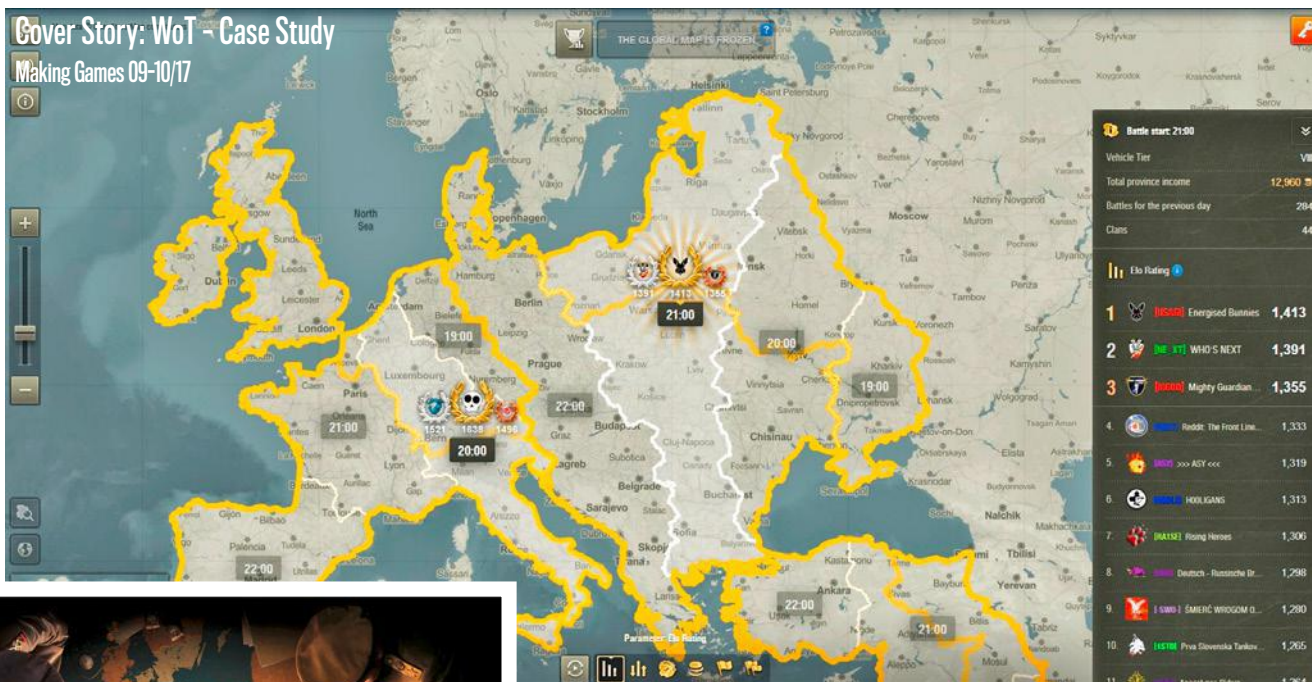
Dmitry Grigorov is Clan Wars Product Manager for World of Tanks at Wargaming.

Dmitry has been with Wargaming for 4 years. He is responsible for all clan-related game modes and also heads the Wargaming clan in the CIS region. Dmitry has been an avid gamer for 24 years, since the age of 7. He is also into football, being an ardent supporter of Spartak Moscow.



Olga Fadeeva is Product Manager at Wargaming.

Olga is in charge of World of Tanks Ranked Battles mode and other features. Before joining the Wargaming dream team three years ago, she worked as a Ruby developer. Olga plays World of Tanks, «League of Legends», «The Witcher 3», «Diablo III» and lots of other games. She is also a diving enthusiast.



Global Map is a strategic browser game that lets clans fight over adjacent territories in series of real-time tank battles.

Soon there were a few groups of tankers who would set up clans and battle in training rooms. Seeing the demand, the team took the initiative back in their hands, creating an ecosystem for clans: Global Map. This turn-based strategic browser game combines 15v15 PvP combat with diplomacy. »You have a world map divided into hundreds of provinces and clans (that often

form alliances to increase their chances of victory) battling for control over territories,« Dmitryi explains. »When a clan attacks an adjacent province, they meet with its current owners in World of Tanks and decide if the province changes an owner over a series of battles.«

But there's more to Clan Wars than just fighting for control over provinces: clans maintain and develop their land to ramp up their earnings, establish trade relations with neighboring lands, ransack enemy territories to get their hands on their income etc. Players went on to drive Clan Wars' evolution, motivating the dev team to organize regular events on the Global Map. »By the end of 2011, clans started to organize improvised activities, throwing various map challenges at each other,« Dmitryi recalls. »It pushed us to improve the metagame, introducing unique and memorable events, which would encourage you to fight and also give the 'been there' feel. We went from Gold rewards to crediting players with an exclusive vehicle to mark their excellent performance throughout Global Map campaigns.«

The number of clans grew steadily, and this time around the devs were ready for

it when rolling out the Strongholds mode, which gave smaller clans a chance to boost their resources and capacity in the game anytime they had a team ready. »Strongholds added a new layer of gameplay to Clan Wars,« Dmitryi continues. »You could hone your tactical skills by participating in Skirmishes, sharpen your strategic thinking by developing Strongholds, and boost your in-game progression with special bonuses.« Strongholds reinforced Clans to engage in Random Battles, while also opening the metagame to tankers who didn't have a clan. They could enroll as Legionnaires.

The team never stopped working on Clan Wars and Strongholds, tweaking to lower the entry barrier even further and simplifying the rules to help newcomers. »Everyone should have an opportunity for rewards on the Global Map, including small and medium clans,« says Grigorov. »With a larger map and three Fronts the map currently fields, we have many more clans on it, and way more action.«

»With Strongholds, we lowered the barrier to entry, opening the metagame to a wider audience.«

Ranked Battles

»There will always be players that value individual results above team performance and that's completely fine,« says the product manager in charge of Ranked Battles, Olga Fadeeva. »Why try to change people by forcing social features on them if you can adapt the game, giving them just the experience they long for?« Ranked Battles is nowhere close to Clan Wars: the mode ties success with individual contribution, providing tankers with a nice tool to measure their performance against others right in the game: the »Season Leaders« leaderboard.



»We didn't have to reinvent the wheel here, we just sprayed it in a different color,« Olga continues. »Basically, we took the Random Battles 15v15 setup and tweaked it, leveraging the experience towards individual results. We placed the system of ranks at the core of progression, added an extra rule for the matchmaker and limited vehicles to Tier X.« Unlike Random Battles, your success in Ranked Battles depends more on you than your team's results. The more successful you are in battle, the higher your rank in a leaderboard, and you get matched with players whose rank is similar to yours. »So, the higher your rank, the higher the competition that you face,« explains Olga. »Most importantly, it's all on you this time. Your individual performance can elevate you to the very top, even if you end up with a team that's holding you back.«

Game rules remain similar to Random Battles until the winning team is decided. That is when the new progression mechanic steps in and defines who moves up, who takes a step back, and who remains where they were, depending on the amount of XP each tank earned in a battle. Getting in the Top 12 by XP on the winning team earns you a chevron, taking you a step closer toward earning a new rank. So does getting in the Top 3 on the losing team. Even if your team lost but you personally did great during a battle, you get rewarded. If your team wins, but you end up in the Bottom 3, you don't earn a chevron¹ but you don't lose one either.

The toughest and most resilient tankers make it into the Season Leaders list. »Your ultimate goal is getting into the top 50 % of Season Leaders, divided into 3 so-called prize leagues, and staying there until a season

ends,« Olga smiles. »The top 10 % are in the 1st league. The 15 % that rank lower are in the 2nd league. Finally, 25 % are in the 3rd league. The league you are in defines your rewards.« During the Beta Season held this past June, Ranked Battles' best players left with a tidy sum of Bonds², plus a whole pack of useful in-game items.

»Ranked Battles gives you a chance to show exactly how great you are at Tier X combat.«

The new mode is still in development, with the team busy tweaking its setup, structure, and economy off feedback from the Beta Season. »We won't settle for lower quality only to get it out of the door quickly,« Olga explains. »The Beta Season proved that the idea's got legs, and helped us outline a few areas for improvement. We're honest and open with our players and will keep them in the loop as we move forward.«

Olga Fadeeva, Dmitry Grigorov

Doing battle with a trusted team allows for more tactical approaches in combat. Besides: isn't playing with friends simply a lot more fun?

World of Tanks' Stronghold mode is particularly attractive for smaller clans. Players who aren't part of a clan at all, may participate as Legionnaires.



¹ Chevrons are stepping stones between ranks. The more of them you earn, the closer you get to achieving a higher rank. The higher you climb, the more chevrons it takes you to progress.

² Bonds are a new in-game currency, only available in Ranked Battles for now. Moving forward, the team will introduce more ways to earn them in other modes, including Random Battles.

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Cover Story: Elex - Retrospective
Making Games 09-10/17



ELEX

THE JOURNEY FROM VISION TO FINISHED ADVENTURE

To bring an open world adventure the size of Elex to life is no piece of cake - and the journey from the first idea to the final game is terribly exciting!



»The fictitious term Elex came from the term elixir of life. Elixir... Elex. A substance that influences everything - a great power that comes with equally great dangers.«

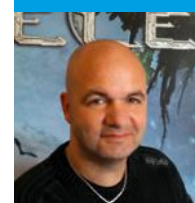
People often ask me how to develop an open world RPG. Where do you start? What do we need to think about in detail? Do we have a grand vision from the start? Which features were planned from the beginning and which ones were developed on the fly? How do we implement the concept? And how do we design the main story plot?

In the beginning was the word: Elex.

The fictitious term »Elex« came from the term »elixir of life«. Elixir... Elex. A substance that influences everything - a great power that comes with equally great dangers. It exists in many forms, all of which have special characteristics. Everybody wants the Elex. People even wage wars against each other just to get it. This was the basic premise of our game. Little did we know at that point that Elex was to become the actual title of our game. For a few months, the working title was »Evolution«, since this name was reflective of both flora and fauna as well as the game content. In the end, we agreed on using the »pure« term Elex.

The World

The next question was in which world man should fight over the substance. If you're familiar with Piranha Bytes, you know that we've been producing open world RPGs for many years, all of which traditionally feature a fantasy setting. Thus, fantasy was to be a core element of Elex, but we also needed something fresh and new for ourselves. We've been building medieval worlds for many years; it was time for a fresh breeze, and so we added sci-fi and post-apocalyptic elements.



Björn Pankratz
Lead Game Designer and Project
Lead at Piranha Bytes

Björn Pankratz is Game Designer, Story Writer and Project Lead at Piranha Bytes since the development of Gothic 1, and Lead Game Designer for Gothic 2's add-on Night of the Raven, Risen 3 Titan Lords and Elex. In addition to that, he's been privately creating music for over 20 years, and was Sound Designer and Composer for Elex. He originally studied Engineering and then switched to a teacher training for Physics and Chemistry, before joining the games industry in 1999. Having started out in the QA department for the original Gothic, he quickly became one of the key people for both the game design and the story, and eventually took over project lead responsibilities. When he's not busy developing games, he spends time with his family and his other passion - music - while writing a book about his 11 years as a bouncer.



Thanks to the mighty Elex, even sword-fighters can match the futuristic gear of their enemies.

This decision immediately created newfound enthusiasm among the entire team. Everybody was full of ideas and really keen on creating new game content. Of course, we knew that it would be difficult to mix different eras and to create such a hybrid setting in a believable way. The more individual elements we assembled though, the more comfortable we became with the world and its rules. The sci-fi setting in the post-apocalyptic world of Elex became our mission.

The Guilds

Next, we covered the topic of which types of people should battle over the Elex. In large parts, the setting defined which type of characters we would deal with. We had everything, from medieval sword fighters all the way to futuristic soldiers and their laser blasters. It was pretty easy to find the means for the right balance between all the weapon types of the different groups of people. Similar to the magical ore that made a sword fighter almost invincible in the previous Gothic series, the Elex was supposed to give the sword wielders magical powers – but how do you reconcile all of these things?

It's hard to imagine battling a fireball with bow and arrow. On the other hand,

there are already many examples that were sources of inspiration for us. An entire garrison of stormtroopers in »Star Wars« makes a hasty retreat from the Star Destroyer when Darth Vader and his son Luke fight each other with their lightsabers. It's the power of magic that makes this possible, and so it became obvious: Our medieval sword fighters had to be the most powerful mages in the world of Elex, while the outlaws would gather more conventional weapons and represent a group of survivalists and cutthroats. Now the futuristic soldiers of the next guild needed an individual trait, and so we made them the biggest fanatics in the world of Elex. Devout believers with a knack for military order. In addition to that, the clerics should also become highly talented technicians and scientists who balance out their lack of numbers by robots and modern technology. This allowed us to design the various groups of characters completely differently.

Levels, Flora and Fauna

Needless to say, the different eras needed respective regions and climate zones, including flora and fauna. We wanted everything, from a wooded Central Europe – an atmosphere all the way to frozen wastes – a rough profile of the extremes of our planet. This also applied for the monster population of this world. Every type of creature imaginable for such a bestiary was considered – and we had our eye on a few pretty bizarre creatures. Not everything that we thought of managed to make it to the character pipeline though, since despite all creativity in terms of monster

»Many gamers ask for a consistent challenge, while others primarily want to enjoy the story.«

design, we had to remember that we were creating a third-person, open-world RPG in which you should be able to fight against every creature. That's why all of our beasts had to move relatively realistically and at an appropriate speed, so they could chase the hero reasonably well. Traditionally, we Piranhas look for two- to four-legged companions. They make up the largest part of the animal world and come in all sizes and versions. At first, we roughly defined the necessary categories for each climate zone, from tiny crawling animals to oversized, muscular humanoid.

The design team then collected ideas and proposals in the respective design documents which were named in the same process and completed with reference materials from different image samples as well as short behavior descriptions. Afterwards, everything is transferred over to the art department which first reviews the many design proposals in terms of feasibility before creating artworks for the different beasts. Once the first iteration of the artworks is ready, the folks who work on the combat system come into play. They redesign the creatures so that they fit the concept of the different combat styles. Only

then can the proxy mesh of a creature and the respective rig be created. And finally, textures, skills and animations are added. There are lots of dependencies in the field of creature design, and it takes a lot of time for a finished monster with all its skills to make it into the game. And even then, other things are still being added, like the distribution in the game world or the daily routines. But the creation of humanoid enemies and characters that the player meets in the world is even more elaborate.

In addition to all the tasks that need to be done in order to create a monster, humanoids also require individual faces and hair styles, facial animations, tons of daily routine animations (sitting down, hanging out, going to bed, etc.) as well as animations for melee and ranged combat and of course clothing and similar components. And on top of all that, one needs to consider and plan the respective cutscene and dialogue gestures. A lot of work that needs to be planned and executed well.

The Story

So, setting, factions, combat system and climate zones are all done – but what is this game all about after all? The plot with all its main and side quests is being designed by the story department simultaneously with all other areas of the game. In order to get a coherent picture, the story is one of the first elements that need to be finished as so much is dependent on it. Because of the very time-consuming voice recordings, all quests and dialogues need to be finished at about the third quarter of production, so there's enough time to test them in reasonable fashion and optimize them if necessary.



The world of Elex features different climate zones, from deep forests to snowy arctic wasteland to barren canyons - always equipped with the appropriate flora and fauna.

Ever-changing weather conditions like heavy rainstorms add to the atmosphere.





Whether monster or human - humanoid enemies are even harder to design than regular beasts because of additional facial animations.

Long story short: The story writers need to start first and be finished first with the core content. But that doesn't mean that the tasks of the story department are finished - far from it. After the writing, there are lots of other tasks that need to be taken care of. This includes bug fixing or the distribution and placement of tons of items, monsters, daily routines of NPCs and many other things.

And let's not forget that crafting, determining the values of characters and monsters as well as all other parameters that influence the fine-tuning are again a completely different chapter.

»When it comes to balancing a Piranha Bytes game, the biggest challenge is the immense scope.«

The Balancing

When it comes to balancing a Piranha Bytes game, the biggest challenge is always the immense scope and the long play time we create because of our content. In addition to that, we offer a lot of very different weapon

types, all of which the player should ideally be allowed to learn and master. The respective guild which the player decides to join on top of that is only adding to the complexity. It should also be noted in this regard that each of our games can be played using extremely different tactics. There is no linear way to play from beginning to end. It's almost completely unknown to us at which point in the story the player decides to level up his character to join a guild. There are players who want to rise up in the ranks of a guild as quickly as possible to get to better weapons and armor, ideally after just five hours of playing. Many others finish random missions all over the world for 30 hours and decide at a very late point which road they really want to take. This level of freedom is something we want and even have to make possible. In a game

world that is completely open from the very start, each location and each NPC can potentially be the very first a player meets.

The common thread of the main story line though is weaving brilliantly through the world and you come across it over and over again, but you're able to ignore it for a very long time and just do your thing.

Based on all of this, how do you balance the power of the enemies and even more importantly, the power of the hero? Many players want a continuous challenge, while others prefer to mainly enjoy the story. Sure, you can build in a difficulty level, and



Cute: It doesn't matter if it has two, four or more legs - the design of monsters and other enemies takes an incredible amount of time. After all, each creature and each character needs to be integrated reasonably well in the game world.



we do that, but this only helps a little to keep the direction for that many different types of players. Many enjoy being the most powerful hero and not having to worry about money anymore at the end of the game. Others consider this exactly the point in the game where it starts to get boring. Hence, we continually play and test the game internally and externally and adjust the values as well as their distribution until we find the right mixture. The normal difficulty setting of the final game should be challenging, but still fair. Since we don't like dynamic difficulty levels that automatically adjust the power of the enemies perfectly to that of the hero, we usually decide for fixed values for the monsters, so the player notices instantly that he's gotten stronger and better.

Authenticity is one of many key factors to create immersion. This is of course also true for the beginning and the end of the game, including an open-ended end game afterwards.

Pure Masochism

A smart person once said that developing a true open-world RPG is pure masochism since it's many games in one and each element needs to deliver. Well, compared to a game that focuses completely on a distinctive core feature, we Piranhas make a broad sweep across many genres in gaming: third-person, shooter, jump 'n run, story-driven, adventure, and many more. Each element is always under the microscope by certain groups of players and is also being directly compared to other games that offer similar features. And



For a monster to make it into the final game it needs to prevail in a huge number of tests and be made to fit in existing mechanics like the combat system.

this leads to one of the most important aspects of game development: When you incorporate something into the game – no matter what it is – it needs to do one thing primarily: It needs to be fun. Only when we notice that a feature has that certain mojo, we expand on it and add all those cosmetic touches that makes it presentable in the end – because what's the point of a cosmetically beautiful game where the players ask themselves after a short period of time why they even play it?

Carrot on a String

Pacing is extremely important. We need to confront and occupy the player in reasonable intervals with as much different content as possible. Have a conversation with a

»It takes a very long time for a finished monster with all its skills to make it into the game.«





A new setting breeds new enthusiasm: Post-apocalyptic and sci-fi elements brought a fresh breeze to the team at Piranha Bytes.

character, then fight a mighty battle with a horde of monsters, afterwards grab some loot, then distribute the skill points you just gained, watch a quick cutscene that advances the main story, then further explore a small and twisted area, etc. etc.

This is a special challenge since we never know where the player is at any given time.

We like to use the analogy of the carrot on a string. The majority of players automatically follows said carrot. Our job is to always point that carrot to where the main plot of the story continues, constituting the ideal path through the game. The player only sees this big carrot very late in the game though, maybe only at the very end. That's why we always have to place smaller carrots all over the place that keep the player at least somewhat happy, so that he's still motivated to follow the other small carrots and, in addition to that, the big red one.

If the donkey (in a figurative sense, don't be offended!) already had its fill with the

small carrots, he loses interest in the big red carrot and gets bored. If there aren't enough small carrots though, the player feels stultified, doesn't get enough sense of achievement and also stops playing in the end. Thus, well-timed and well-proportioned pacing is essential.

The Team

In many statistics, our team often doesn't even show up. Too insignificant? Well, we are a very small team compared to other studios that tackle similar projects. We're just about 30 people and each member of our team is an expert in their field. Also, a project like Elex means there is an exceptionally high number of tasks that need to be tackled that also sometimes

turn out to be extremely varying. We rise to this challenge by each of us handling a number of different tasks. Based on the phase of the projects, our personal tasks become very interesting and diverse, and the communication channels are very direct, which helps the motivation of each team member. At the end of the day, there's one thing to be said: For us, being a game developer is the greatest job in the world, especially when everything works out as planned in the end. One thing it isn't though: easy! Even though it may sometimes look that way.

»For us, being a game developer is the greatest job in the world, especially when everything works out as planned in the end...«

Happy Piranhas: Elex will finally hit the stores October 17.



Björn Pankratz



NEW CHALLENGES FOR THE ENVIRONMENT ART TEAM

Creating a believable game world for the players to explore and live in is essential for a game like Elex. Lead Environment Artist Victor Karp can tell a thing or two about it.

Unlike our two previous titles »Risen 2« and »Risen 3«, »Elex« once again offers a large coherent world which can be explored completely with no load times at all. Although the islands of the previous games may have been practical in terms of being enclosed locations, after a while we kind of lost interest in setting up new beaches, ports and big main locations again and again on each island. Hence, for Elex we decided to return to one single land mass.

Plus, we wanted to mix the old fantasy traditions up a bit and integrate modern elements mixed with sci-fi components as new settings in Elex. Since our Environment team of about six members is rather small, we had to revise our existing workflows in order to be able to make this giant project work.

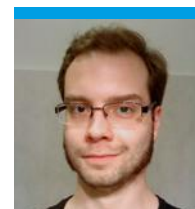
Texture generation 2.0

For the last Risen game, we generated our textures exclusively from photo resources in Photoshop or in Mudbox by projecting textures on high-poly objects. By the end of the development, PBR Rendering had gained more and more importance in game

production, and Quixel's nDo and dDo had become more and more popular. In the prototype for Elex, we took our first baby steps with this tool and quickly realized how much time we could save without compromising on quality. Not only were we able to complete things faster, the graphics were also looking better than before.

In contrast to the old workflow, we could now bake ID masks from our high-poly meshes onto low-poly meshes and try them out quicker with material presets in dDo to see what looked good and what didn't. Adding late changes to the color or material of several objects no longer resulted in confusing layer adjustments in Photoshop. Obviously, the transition didn't just happen overnight; it took us a while to get adapted.

During the production of Elex, we made the transition from dDo to Substance Painter since we were quite impressed with the number of features and the simple handling. However, this meant that the old data was no longer compatible with the new tools and all textures we had created had reached a technical impasse. We had to live with this problem for the time



Victor Karp
Lead Environment Artist at
Piranha Bytes

Victor Karp is working on Elex as Lead Environment Artist. In 2012, he joined the industry as an intern at Piranha Bytes, supporting them in the development of Risen 3. He completed a training in Digital Media Design and became head of the Environment department in 2015. His interest in level design stemmed from the first »Quake 3« map in 2006. Creating home-made levels for »Quake«, »Counter-Strike« and »Unreal« is still one of his hobbies today. More information about Victor can be found at: www.victorkarp.com



Before/After: On the left you can see parts of the world of Elex in an early stage, on right the polished result in the final game.

being, which we eventually managed to solve during the polishing phase towards the end of the development by reworking the textures from scratch in Substance Painter wherever necessary. If you compare old screenshots of the game to new ones (top), you will see that the texture quality has continuously improved since we gradually worked our way through it to create a consistent look.

We create more and more tileable textures used on large areas such as (house) walls or terrains with Substance Designer. This way, we are no longer dependent on suitable photo textures, and sometimes it also replaces the need for high-poly sculpting. The Designer lets us create materials from scratch and revise them again and again until their look meets our demands.

You don't have to bake it all

Due to the team size in the Environment department, we had to realize that we

weren't able to create as many high-poly sculptings and meshes as we had done for the previous projects. Somehow, we had developed the basic idea that an acceptable quality could not be reached without high-poly baking. Due to the scope of Elex, we had to get rid of this mentality, and we started to realize that we often did unnecessary extra work which the players didn't really notice in the end. A lot of objects in Elex were still created by high-poly baking, however, we skipped this step for a large number of items and props this time and textured the low poly directly. Thanks to the large number of features in Substance Painter, the objects still have well-defined graphics and don't stand out negatively when looking at the overall picture.

Manual UV mapping abolished

No matter how fast you can create textures with the new tool, you still have to do the layout manually. That job is neither

rewarding nor fun – and what’s even worse: It takes up valuable time! Those who have created a complex UV layout for a mesh before and realized in the end after having almost completed the puzzle that there are pieces missing, will know that depressing feeling.

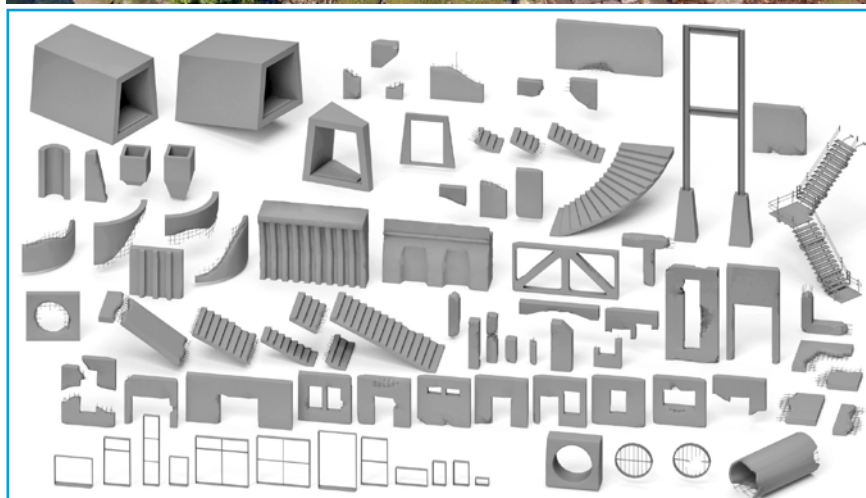
Our Tech Artist Mario Röske decided during production that he wanted to automate this necessary deed and simply went ahead and wrote a fully automated UV Packer which, unlike the integrated Packers of ordinary 3D tools, makes successful use of space and is faster and more efficient in packing than any artist could do by hand. What was meant to be a small project to save our studio time turned out to become a successful product by the name »IPackThat«, which is now used by many big gaming companies throughout the world.

Tile sets for more variation and volume

In Risen 3, we still had a very manageable number of large buildings which were all used as individual objects in the world. There was, e.g. the fortress of the demon hunters on Calador, the mages’ camp on Taranis, or Shani’s treehouse on Kila. The only true tile sets were the old ruins which occurred at the beginning of the game on Crab Coast and again later in the spider cave on Kila, as well as the great prison on Skull Island. For the large number of ruins in the old world and the new factions in Elex, we needed more objects which could be reused and expanded. Hence, we created more tile sets for the old ruins of the lost world, the buildings of the clerics, the connecting corridors of the Albs, the medieval fortresses and the great metal pipes (right). That way, we could freely arrange scenes directly in the engine and produce additional parts as needed. In addition, we still used large, individual objects like the houses of the berserkers or the radar station at the beginning of the game.

A new vegetation system

Elex’ great land mass requires a new vegetation system which automatically generates grass, pebbles and flowers. In Risen 3, we still had to do this step manually on each of the islands and use a brush to paint the grass and pebbles on the height map. If the height



Without the creation of tile sets, building such a large number of objects like ruins in the game world of Elex would have been -logistically - very unlikely.

map was modified later, all vegetation had to be removed from the respective locations and redrawn from scratch. For Elex, we’re using a system which works automatically and can be manually fine-tuned afterwards. Depending on the foundation material (e.g. grass, gravel or ashes), the vegetation is spawned based on a set of rules. The rules stem from a hand-written XML file with a hierarchical structure where zones and sub-zones can be defined, so that grass is growing on flat land, interspersed with flowers,



The world of Elex confronts the players with various climate regions, from forests to deserts to icy arctic regions.

and pebbles appear on slopes. As needed, we can draw a particularly large number of flowers in certain locations or make the grass grow higher or lower or remove it completely.

Another new automatism are vegetation modification volumes which can be attached to any given object. This way, we can make some plants grow only under certain trees or prevent grass from growing underneath chests, which would then grow through the bottom of the chest when opening it.

Better tools for streets

Large roots grow through Edan and roads are winding through the world where rusty crash barriers remind us of the lost world. The fact that they can do that is owed to our team of programmers which added a spline system to the editor. This system allows us to create curves in the editor where any kind of meshes are spawned. Without this innovation, we would have had to build, form and export all streets individually as meshes, which would have been impossible from a logistics point of view. Our spline system allows the definition of objects at the beginning and the end of the spline, which aren't used in the middle part (like the end of a long root) as well as a series of parts exclusively for the middle part, which the system selects automatically. This allows for variations on long splines without having to deal with the settings once everything has been configured.

Water on!

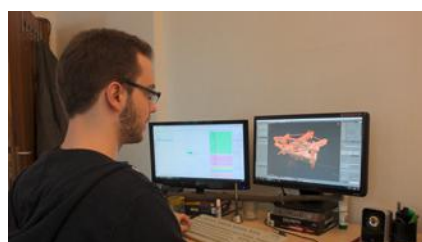
Another indispensable innovation was added to our river system. While nothing changed in regard to the controls, a flow map is now created underneath the hull for the entire world. Before that, it was really difficult for us to bring together several rivers since the seams were always visible, a fact that we had to cover up with lots of particles and objects. The flow map generation not only seamlessly merges all rivers and oceans; the system also automatically calculates the speed of the river depending on the incline, transports color changes caused by mud with the water and visibly runs around obstacles as opposed to, as before, right through them.

Where does development go from here?

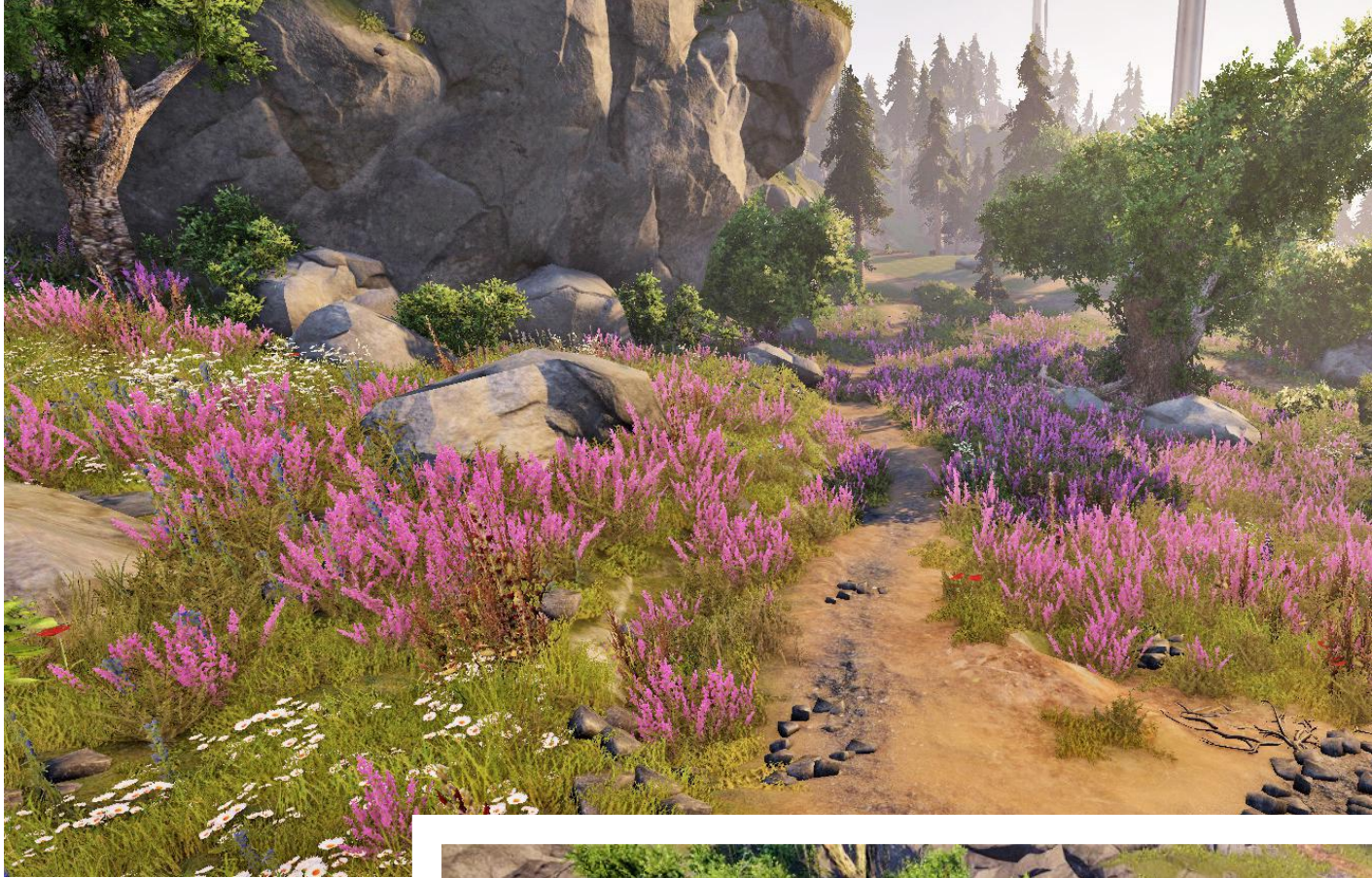
In Elex, both our workflows and the engine have made a big step forward. For our next project, our goal is to optimize

the Environment department even more to be able to produce better content with less effort. To get there, we will set our asset generation pipeline completely to the substance tools Painter and Designer and terminate the company tradition with 3ds Max (which we had been using since Gothic 1) and replace it by Blender.

Blender can now match the big competitors, but is still only slowly picking up in the games industry. I followed the development in the last few years with great interest



Victor creating the Berserker Ballista: The Lead Environment Artist and his team are responsible for the creation of the gigantic game world of Elex.



and made a complete transition during the development of Elex, both privately and professionally. I regard the high update frequency, modularity and the large number of ever new features as a promising alternative to the existing industry standards.

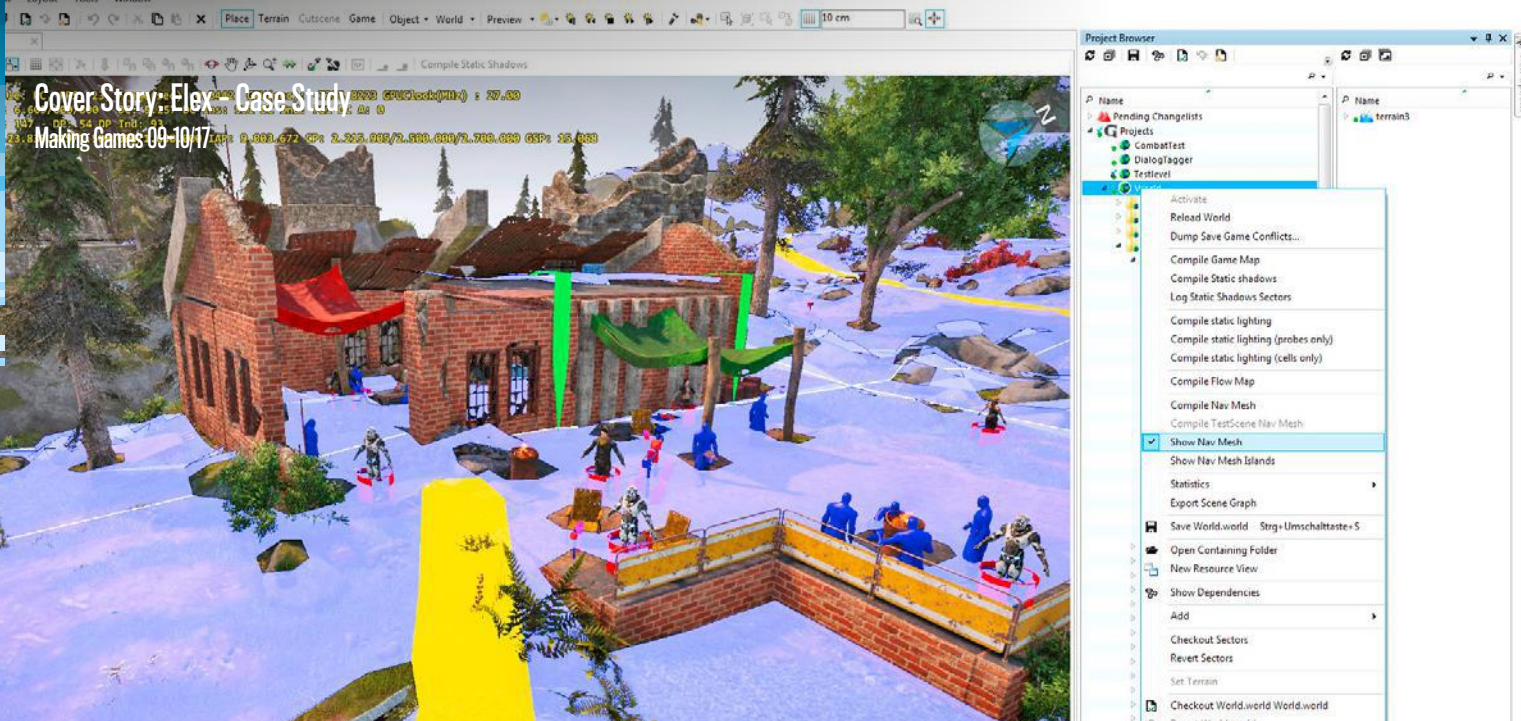
Our goal for the next project is a well-organized material database which we want to generate with the Substance Tools. We can then use this catalogue for new objects instead of having to reinvent the wheel all over again for each new object. When modifying the database, we can update all of those objects at once. That way, it will be a lot easier and more streamlined to try out different looks. Additionally, in terms of meshes, we're planning an object catalogue of smaller attachments to use when creating large objects. This gives us the opportunity to create large objects with simpler geometry and attach small, more detailed objects like buttons, knobs, levers, switches or trims, without having to texture or build them from scratch every single time. Blender's feature to import objects from other scenes in instances will come in handy here.

We want to use the experience we gained with the tile sets in Elex and build on them for the next project since this is where we see one of the major factors for more content and less stress on the developer side. At the end of the day, not just us, but the players also will be able to benefit from that.



Various automations make building the vegetations, streets and rivers significantly easier.

Victor Karp



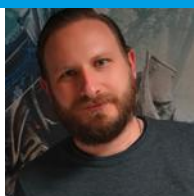
THE GENOME EVOLUTION

Piranha's very own Genome Engine was first used for Gothic 3, developed further and further over the years, and is now the core of their latest role-playing adventure.



Kurt Pelzer
Senior Software Engineer
at Piranha Bytes

As a Software Engineer, Kurt has been developing engines for games and 3D real-time simulations (Codeculcs Codecreatures Engine, ZenGIN, Genome Engine, and more) for 18 years. Prior to that, he studied mathematics. Since Gothic 1 he works on games for Piranha Bytes and is also a consultant to start-ups. Kurt is author of a large number of tech articles which were published in book series like Game Programming Gems, ShaderX and GPU Gems, among others.



Philipp Krause
Lead Programmer
at Piranha Bytes

Philipp took his first steps on the C64 and later programmed demos and games on the Amiga. He joined the games industry in 2000, working on the Codecreature Engine for CodeCult as Tool Programmer and later on »Söldner« and »Söldner: Marine Corps« (later renamed to »Semper Fidelis Marine Corps«) for Wings Simulations. He joined Piranha Bytes during the development of Gothic 3, where he was appointed Lead Programmer in 2006. For Elex, he was primarily responsible for graphics programming and optimization.

Genome is the name of the engine which we used for our soon-to-be released game »Elex«. Previously, it was used in »Gothic 3« as well as »Risen 1, 2 and 3«. The development of the Genome Engine started in-house at Piranha Bytes in 2003, prior to the project start of Gothic 3. Parallel to that, the team was working on the »Gothic 2« addon »Night of the Raven« which was still based on the technology used in Gothic and Gothic 2.

The Genome Engine has undergone fundamental changes in the last 14 years. Most components were revised and extended from project to project, while others were replaced completely. In the current version, there are hardly any components left from those early days.

Historic development

In the following, we will first provide a brief description of how our Genome Engine has developed over the course of the past projects, and then talk about two components in more detail.

Gothic 3

Developing an engine from scratch and simultaneously working on a game like Gothic 3 using said engine is a huge challenge and caused us quite a few problems.

Since parts of the planning and development already took part during the production of the addon »Night of the Raven«, the basic structure was ready at the beginning of the development of Gothic 3, but a lot of important parts of the engine and game were still missing. Apart from the engine, we also developed the editor to fill the world with life and to tell the story of Gothic 3. Another challenge was the game world, which was massive compared to other games at the time, and the resulting memory usage. Due to the programming effort and the huge amount of data that we had to create the project was delayed, which was why Gothic 3 could only be completed under enormous time pressure and with the help of enormous amounts of coffee. The tight schedule and the number and complexity of the modules that we needed to develop unfortunately took their toll: Some systems were immature and prone to bugs, which was reflected in the quality of the final product.

Risen

The technical issues of Gothic 3 raised a lot of criticism, most of it justified, which we took very seriously. Hence, for Risen we decided to focus on stability in the further development of the Genome Engine. During the development of Gothic 3, all

programmers were responsible themselves to integrate their modifications in the editor or make them available for new editors. More often than not, this was more work than working on the engine itself and led to an inconsistent functionality of the editor. That's why we not only revised large parts of the engine, but also fundamentally our tools. We replaced some modules like the streaming, event, interaction, movement and physics systems and moved our focus to the stability and maintainability of these systems. We also significantly rebuilt the Genome Engine in terms of graphics: Apart from HDR Rendering and Cascade Shadow, Risen was given a databased post-processing pipeline to be able to implement new effects like Screen Space Ambient Occlusion or better depth cueing. Risen was also the first game of Piranha Bytes to be released on console, which resulted in even more substantial changes to the engine.

Risen 2

After we had reached the target we had set ourselves – to release Risen as a stable and largely bug-free game – we were able to move the focus to the further development of the engine for Risen 2. One of the most significant changes was the transition of the animation software from EMotionFX to NaturalMotions Morpheme. With this step, we hoped to achieve considerable improvements of the animation quality since Morpheme allowed for a databased generation of complex animation processes. Additionally, we developed a Cutscene Sequencer to create and play cutscenes using in-game graphics. We also completely replaced the game camera with a databased system. While in the previous games the entire landscape was created manually in a 3D program, a Terrain Engine was first used for Risen 2. The title was released for both PC and Xbox 360 as well as PlayStation 3.

Risen 3

In the final part of the Risen series, our focus moved back to the further development of the graphics engine. Like in Gothic 3 it was based on DirectX9, but was switched to a Full Deferred Renderer and extended by physically-based shading. This allowed for a more realistic presentation of various materials like metal, stone or fabric. We also invested a lot of time in environmental effects like volumetric fog with shadows and an improved water presentation. One of the biggest changes in Risen 3 though was the integration of a polygon-based road

system to navigate the NPCs. This saved us both a lot of time and nerves since the road system could now be generated automatically from the collision geometry and was less high-maintenance and prone to bugs.

Risen 3, too, was released for Xbox 360 and PlayStation 3. The release was followed by a port to the then newly launched PlayStation 4, which was released together with a graphically modified 64-bit enhanced PC version. Apart from higher-resolution textures, this version featured volumetric clouds, depth cueing with Bokeh and a revised bloom effect.

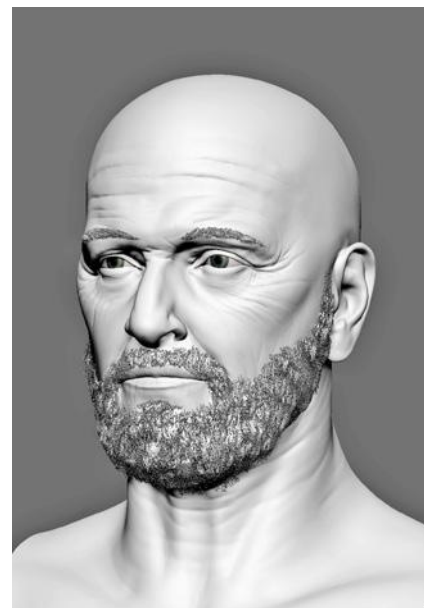
Elex

For Elex, we had made some big plans. Apart from the unique setting – a mix of fantasy and science fiction – we also ventured into completely new territory in terms of gameplay and graphics programming. We changed the

Genome Engine from DirectX9 to DirectX11, which opened up a lot of new possibilities in terms of the graphical development of Elex. The material system was replaced completely and expanded by new techniques like tessellation. Plus,

»We revised not only large parts of the engine, but also fundamentally our tools.«

we implemented a series of new effects like Line Sweep Ambient Obscurance, physically-based volumetric light, volumetric clouds, flowmap-based water for all water surfaces and global illumination. Additional features that were made available for Elex are spline meshes (structures running along any given curved line for large roots, roads, pipelines, etc.) as well as an automatically (rule-based) operating vegetation system. While Risen 2 and 3 were set on several small islands, for Elex we decided to go with one large coherent land mass – for the first time since Gothic 3. In order to deal with the resulting



Most NPCs are created in the engine via morphing. All varieties of heads are based on the same topology.



Line-Sweep Ambient Obscurance



Elex uses spline meshes, e.g. to create road courses.

Without GI and Bouncelight, interiors are hard to illuminate; after the GI implementation, all materials were correctly illuminated, adding to the ambience.



data volume (the uncompressed height map alone took up 4 GB!), we also had to rewrite the world streaming from scratch. We also revised the AI of the NPCs: We switched from a completely script-based implementation of the NPC perception to a data-driven perception system which, triggered by stimulations, leads to the desired reactions. Elex will be available for both PC as well as for PlayStation 4 and Xbox One.

The navigation

Over the course of the various projects, comprehensive modifications needed to be done to the navigation system.

For Gothic 3, we devised a new system from scratch according to a concept of our own which was based on zones («fenced areas») and paths connecting these zones. The corresponding data had to be inserted manually into the editor and maintained. Also, the entities in the world caused additional static and dynamic obstacles like trees and NPCs. By the time of the launch of Gothic 3, the system worked, but the zones were not always placed according to the rules, which led to bugs and performance issues. For Risen, this meant that critical constructions had to be marked while editing. Additionally, an in-game visualization in the live game was made to make the debugging process easier. The system was extended by »free navigation« outside the defined areas. This helped us get rid of the remaining bugs.

Basic performance optimizations were then tackled during the development of Risen 2. With the project start of Risen 3, it became clear that we wanted a future-proof system which would generate the required data automatically by evaluating the level geometry and objection. Navigation meshes generated through »recast« and reduced to the parts actually required in a second step, have since been the basis of our pathfinding system. Since we also wanted walking NPCs on rocking and moving ships, we

enabled the system to navigate on moving objects as well.

The massive coherent world of Elex eventually required further additions. Now, only the parts of the navigation mesh are loaded and used which belong to the corresponding area where the player or the game camera is currently at. Additionally, we implemented a compact net derived from the detailed navigation mesh,

including a smooth change between both variants. This enables performant pathfinding beyond the currently loaded parts in the entire game world.

»We had made a lot of plans for Elex and ventured into completely new territories in terms of the unique setting, but also with regard to gameplay and graphics programming.«

The renderer

The renderer is the part of the engine responsible for displaying 3D objects and their illumination. Usually, the scene as seen by the camera is »rendered« in a texture, later supplemented with all sorts of effects during post-processing, and finally displayed on screen.

Over time, the renderer of the Genome Engine underwent a series of modifications. While a forward renderer was implemented for Gothic 3, meaning all objects were directly illuminated during rendering on the texture, we used a light pre-pass renderer for Risen 1 and 2 where, in an additional pre-pass, information about the material properties for all non-transparent objects is rendered in a texture to help generate the illumination in another texture. This texture will later be used on the same objects during the forward pass. The advantage of this technique is that lights and 3D objects can be separated from each other, making it possible to display more per-pixel lights.

In Risen 3, the renderer was then switched to a deferred renderer which allows for more complex material properties vs. the light pre-pass technique. The forward pass for non-transparent objects is completely left out here. Instead, all material information will be rendered in several textures (the G-buffer) which will then be used to generate the completely illuminated image. Since neither light pre-pass nor deferred renderer naturally support native anti-aliasing (MSAA) (with a significant memory usage it is possible though) and the display of complex materials like hair and skin is very complicated and expensive, for Elex we decided to go with the old concept of the forward renderer. Thanks to DX11 it was now possible to display a large number of lights directly during the rendering of the objects. Since this technique is an upgrade to the classic forward renderer, it is also called Forward+. The innovation here is that all lights that are potentially visible on the screen, are inserted in a 2D (tiled lighting) or 3D texture (clustered lighting). Every pixel in this texture represents a part of the screen and refers to a list of lights relevant to it. Another advantage of this technique is that transparent and solid materials can be equally treated. Since the forward+ renderer was implemented and functional, we had a lot of problems with the speed of this technique though, especially on the consoles and older PCs. It turned out that the complexity of the shaders was a considerable cause of these problems since all necessary calculations

like material properties, illumination, shadow and fog had to take place in a shader. In order to reduce the complexity of the shaders, we decided to switch back to a deferred renderer. Due to the timing of this decision, this wasn't exactly easy since the volume of features and the data which had already been generated were to remain the same. The solution was the tiled deferred technique which is also used in Uncharted 4, among others. It divides the G-buffer into 8x8 pixel-sized parts. For each of these parts, it checks the occurrence of material combinations and correspondingly enters the parts in a list for these combinations. Later, the parts of the shaders, optimized for the material combinations, will be illuminated and displayed, separating the material properties (G-buffer) from the illumination. Also, any further required calculations

»While the development of the Genome Engine started with a difficult initial phase, it was pushed further and further over the course of the various projects.«

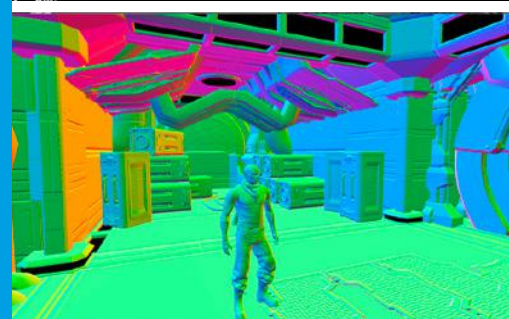
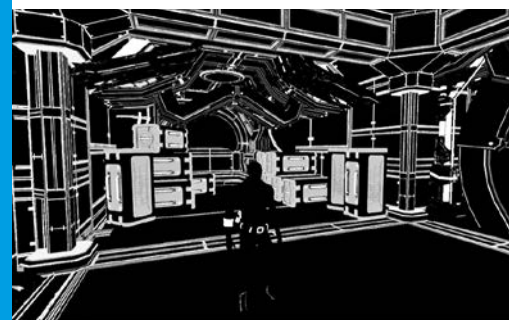
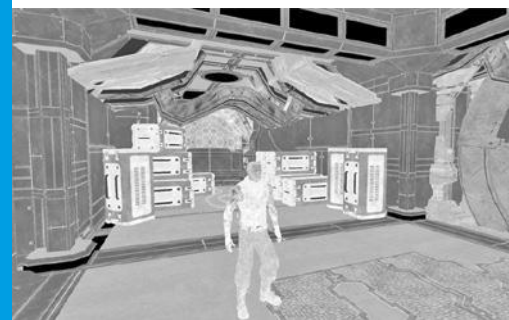
like sun shade and fog can be excluded from the still very complex shaders in pre- and post-passes, which improves the speed even more. Since the renderer was originally meant to be a forward renderer and the most »Forward+« techniques like clustered lighting resulted from the transition, the advantage was that there were only minor differences to be seen between »deferred« rendered (solid) and »forward« rendered (transparent) objects and big parts of the implementation remained the same.

Conclusion

A lot has happened in hindsight. While the development of the Genome Engine started with a difficult initial phase, it was pushed further and further over the course of the various projects. Ever changing requirements, new possibilities due to the changing generations of consoles and PC hardware and, last but not least, new and improved software technologies gradually led to the current status quo.

We wish you a lot of fun and exciting times with Elex which we built on that engine. We also would like to thank all developers involved again.

Kurt Pelzer, Philipp Krause



This image shows the material properties of a fully rendered image and the corresponding parts of the G-buffer (Albedo, Roughness, Normal).

AAAAAND... ACTION!

CUTSCENES IN ELEX AND OFFLINE

Having worked on both Elex and the movie »Offline - Are You Ready for the Next Level?«, Cutscene Artist Claudia Keen now knows just how similar working on video game cutscenes and movies really is.

The work of a cutscene artist is comparable to that of a movie director in many ways. It covers not just the cinematic aspects of the camera placement and the timing, but also the complete planning work of all cutscenes. This includes the screenplay and the story board as well as the overseeing of the motion capture recordings and the implementation of all elements into the cutscenes. And yet there are a number of significant differences which I would like to cover in this article.

The making of a cutscene Creative preparations

Each project starts with research with regard to the visual imagery and cutting rate used in games or movies with similar themes. As soon as the main story is done, a list of potential cutscenes is being discussed with the story department. Based on this, I create a comprehensive screenplay in which I also include screenshots from movies and games. This makes the communication with the other departments a lot easier since it allows us to share the same vision from early on. This screenplay is then being checked for potential stumbling blocks:

- Not too many actors per scene – this would make motion capturing a lot more difficult.
- Are there any in-game resources that can be used for some scenes instead of

using effects, objects or animations which have to be created specifically for the cutscenes?

- As little dialogue as possible in cutscenes. Because of the system, we need to ensure that the length of each dialogue audio file is relatively similar in each language version.

The story content that's being shown must not change after finishing the planning process. Content that isn't 100% final should thus not be shown in cutscenes. The limiting element here are the animations. Once they've been recorded, it's time-consuming to make big changes later or create new animations manually. Still, it happens that new cutscenes have to be created at a later stage or that existing ones need to be worked on content-wise. Ideally, this step takes place prior to the motion capturing, so that it can still be considered in the planning phase. If that doesn't work anymore, we need to work with animations that were originally considered for regular gameplay only. Using clever camera positioning and timing of animations, harmonious cutscenes are still possible. Once the screenplay has been approved by the story department, story boards are being created for all cutscenes.

Planning phase

With the help of these story boards, animation lists for all characters and monsters are being created. These include the name of the



Claudia Keen
Cutscene Artist at Piranha Bytes

Claudia studied Media Informatics and has since worked at Piranha Bytes on the cutscenes for »Risen 3« and »Elex«. »Offline - Are You Ready for the Next Level« was a detour she took into the movie world.

mesh, a description of what's happening, the objects which are being interacted with and the number of seconds estimated for each animation. The more detailed and pedantic people work during the story board phase and the more they sync with other departments, the less changes need to be made to the cutscenes later.

Since a cutscene consists of many different elements, I need a lot of groundwork from other departments. The work that needs to be done is compiled in detailed lists. In addition to the aforementioned animations, this includes effects, sounds, objects and locations. Since rather than building unique locations for cutscenes the normal game world is being used, these need to be roughly built and marked in the game as soon as possible. The positioning of objects in a scene and (if applicably) pitch angles of the ground need to be determined early. It's not always guaranteed that the specifications stay the same until the end of the project. Every once in a while, there are adjustments of the level architecture that need to be applied. The level group should, however, discuss changes of special locations with me. Still it happens that big trees all of a sudden appear right in the middle of the camera's field of vision and block the view. In that case, one needs to grab an axe and remove the problem. More often than not, additional ideas pop up that way that may even contribute to the improvement of certain aspects of the cutscenes. These ideas are being integrated iteratively in the screenplay and the story boards. Especially boss monsters require one or the other meeting in this phase, during which a number of questions need to be clarified:

- How does the player interact with the boss?
- What are the touch points, especially if the monster is very big?

- Is what's being planned realistic, i.e. in time and on budget?
- Can it be created by motion capture or keyframing?

Once all preparations are done, the rough blocking in the editor can begin (figure 1). This means that all cutscenes need to be created for the first time, including all cameras, the cuts and all characters and monsters in the t-pose. Mistakes or small blemishes from previous steps can still be corrected easily in this phase. It's important not to try to be as quick as possible, but to also prepare the files correctly. Each mistake in naming or wrong dependencies of objects among each other could cost precious time later, since they then have to be corrected later.

Motion Capture / Animations

Now the motion capture recordings need to be prepared. They are done externally in our case, which means we have to prepare a lot of things in advance, to work in a time-effective manner. The studio requires not just a list of animations, but also a list of objects with which the actors have to interact, including their measurements so they can be built in life-size. Early versions of already existing digital game objects like weapons, armor or locations can also be taken to the studio. During the recordings, they can be displayed live together with the animations. This allows us to get an impression of the scene early on (figure 2). Also, to be taken into consideration is the question whether it's really required to use five actors in one take. There is only a limited number of actors and stuntmen present, each of them featuring a different skillset. We need to consider ahead of time, which roles are needed the most.

A description for each character should be created, so the actors know how to act.

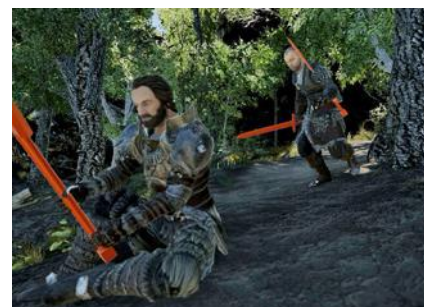
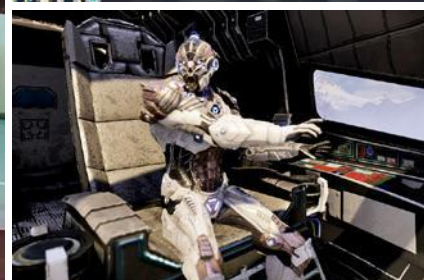


Image 1
From top to bottom:
From blocking to the final product.

Image 2
Top: Motion capture recordings.
Middle: Live picture during recording.
Bottom: An animation built into a cutscene.



1 A "take" is an animation sequence recorded at a stretch.

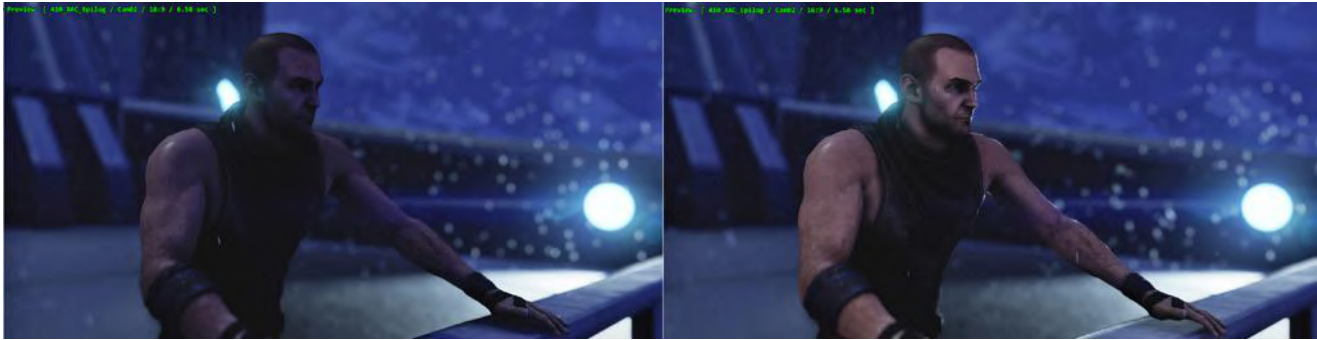
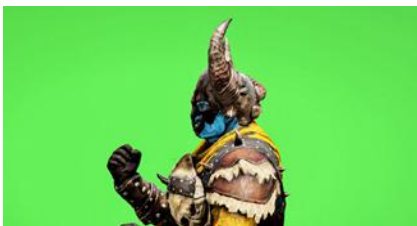
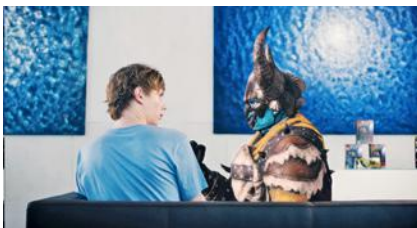
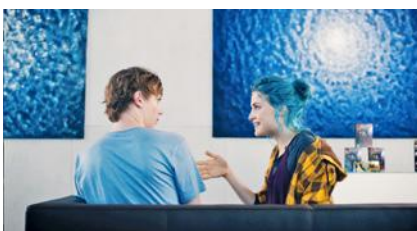


Image 3

Left: Ambient light.
Right: Illuminated.

»The work of a cutscene artist is comparable to that of a movie director in many ways.«

Top/Middle: Stills from the movie. The yellow and blue color accents of the actress can be found again in the armor of the video game character.
Bottom: A video game character in front of the green screen.



The order of the recordings should also be predetermined. In this regard, you should be mindful of when each actor needs to be on site, and which recordings require specific setups, e.g. safety ropes for the stuntmen or structures which they have to jump from. The blocked cutscenes should be rendered beforehand to give the actors a template. This helps to determine precisely on set from which camera angle something is being shown later. Once it's time for the actual motion capture recording, ten attentive people in the room expect precise directions. If unprepared questions still come up, a solution can usually be found quickly thanks to experienced colleagues and stuntmen.

During the recordings, it's very important to stick to the timeframes – time is money and each second is expensive. Special attention needs to be given to the connections between individual takes. The position of arms and legs as well as the viewing directions of the actors are common stumbling blocks. Since consecutive animations sometimes have to be shot on different days, it helps to take pictures of the end positions after each take.

Once back at our desk, the motion capture takes have to go into post-production. This includes first and foremost the selection of takes and seconds of the actors that need to be delivered to us. During the recordings, evaluations and comments are already being added for each take. This makes the selection of scenes a lot easier later. While waiting for the delivery of the data, the timing of the cutscenes in the editor can already be adjusted to the animations. The preparations don't always match the actual recordings – an animation of 5 seconds may last 5.3 seconds in the end.

Implementation and feedback

Once the animation files have been received, they need to be checked for mistakes first. Foot placement, interactions between characters as well as between characters and objects are especially error-prone. Once everything is in order, the data can be imported into the cutscenes. Sometimes there are cutscenes where there is a strong

dependency between animations of humans that have been created via motion capturing and animations of monsters that have been created via keyframing. Since it's not exactly easy to find a giant mutated rat acting as stuntman, the animators often can only begin to create the monster animations at this point. At the same time, the first revised objects, new armor and faces, effects, sounds, more elaborate locations and monster meshes start to show up. All of them are being implemented directly, and I give feedback where applicable. Additionally, the animations can now be tagged with sounds and effects. This allows the cutscene system to e.g. start explosion sounds at the right places as soon as the animation starts. Often, it's only then possible to start proper rounds of feedback. Before that – when all characters are moved around in their t-poses and everything looks the same – this is rather difficult. Over the remaining course of the project the cutscenes are revised over and over again, the cuts are being refined, and changed situations are being integrated. At this time, the facial animations are being created, the final music is being added, the Sound Listener2 is being animated, and for some cutscenes a set time and weather is being created, and these scenes are being properly illuminated. On these occasions, lights are primarily being used for the accentuation of the edges as well as directional lights to make faces in the shadow visible (figure #3).

A movie in the making

When movie production Rat Pack contacted us in 2014, I had no idea what I was getting myself into. They asked for our support for a movie project called »Offline – Are You Ready for the Next Level« in which real-time filming and video game sequences were supposed to be linked. During a first meeting with the director and producer, our respective ideas of a collaboration were presented. With the support of a story board we brought along we estimated the effort of the realization of the project. Some mass scenes were removed because of technical limitations and we thought about which

² Usually the direction and volume of the sound is being defined based on the camera position. If this isn't desired, the microphone needs to be animated separately from the camera.

»During this collaboration, the movie team supported me with their immense knowledge and many alternative solutions.«

requests could be visualized by existing locations, outfits or animations from Risen 3 and which ones needed to be adapted. We quickly realized that we wanted to be part of this project and agreed.

Working on the movie turned to be somewhat different than working on cutscenes for video games. A complete game world with finalized objects and animations already existed and we could do what we want in it. We could change and adapt everything without having to worry about the rest of the game. So, we changed textures, remodeled locations, and redesigned characters from scratch. For some characters, we changed textures and their composition. For example, for one character we used a Shadow Warrior, painted him blue and slapped human armor on him. The color palette was supposed to create a close resemblance between the actor and the video game character (figure #4). We needed to make sure that the viewer would always be able to establish a link between the scenes of the real world and the video game world whenever they switched. The scenes where a real person sits in front of a screen and talks to an in-game character or fights him required specific attention in regard to the line of sight. Some of the locations in the movie were taken from Risen 3 as they were, others had to be built almost completely from scratch, like the fighting arena at the end of the movie.

In addition, it was possible to illuminate all scenes in a defined way. In the cutscenes of Risen 3, the lighting had to work for all times of day. The dynamic day and night cycle didn't allow us the same amount of impact on the lighting as we had while working offline.

Since the movie was cut externally I didn't have to worry about that when creating the cutscenes. Specifically the more complex combat scenes were built once and then copied in their entirety, so they could be shown from different camera perspectives. They could be cut and edited at will in the editing room. This is a good example of the difference between real-time rendering for video games and the pre-rendered

sequences used in movies. But there are aggravating factors as well: We couldn't implement new animations or objects in the game because the entire production pipeline of the engine was already being adjusted to Elex. This led to many creative solutions and misappropriations.

A handful of scenes where a video game character was integrated into the real world in the movie deserve a specific mention. To make this work, a green screen studio had to be recreated in the game. Since, as mentioned previously, new objects could no longer be imported into the editor, an object that featured a neon green color in one area was scaled up hugely, and a room was constructed from it. To track the camera movement for these scenes I used rocks that were placed in periodic distances in front of this green screen.

During this collaboration, the movie team supported me with their immense knowledge and many alternative solutions as well as new directions for my work on Elex. There is a surprising number of movie tricks that can be ported from the real to the digital space and vice versa – an incredibly exciting experience.

Claudia Kien

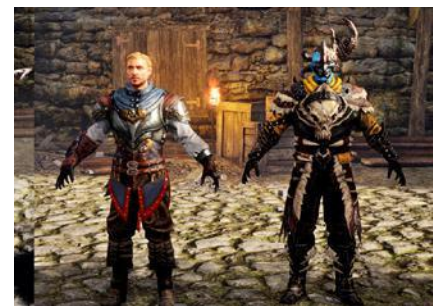


Image 4

Top: Shadow Warrior from Risen 3.
Middle: Player in his original form and Shadow Warrior with human armor.
Bottom: Player and Shadow Warrior with redyed textures.

Image 5

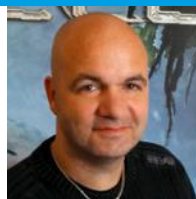
Left: Combat arena for offline.
Right: Original location from Risen 3.





THE RIGHT SOUNDTRACK FOR A WORLD FULL OF STARK DIFFERENCES

Whether it's driving and stirring or calming and soothing - the perfect soundtrack is essential for the success of a game. Hence, it's no surprise that Björn Pankratz made it his personal mission to compose it.



Björn Pankratz
Lead Game Designer and
Project Lead at Piranha Bytes

Björn Pankratz is a Game Designer, Story Writer and Project Lead at Piranha Bytes as well as a passionate musician. Now, this passion came into effect professionally for the first time as Björn was responsible for the soundtrack during the development of Elex.

Even for game development veterans like me, composing the soundtrack for Elex was a very special challenge and a milestone, too. I've been making music for 25 years; however, so far my private music projects were mostly for myself or people around me. I rarely had the chance to use my knowledge professionally in this area or even make it one of the biggest cornerstones of my life. All this changed with Elex. I was incredibly honored that the team had faith in me to compose the soundtrack for our RPG Elex. My dearest thanks go out to all who believed in me and supported me.

A new challenge

Composing is an incredibly demanding and complicated matter - especially since everyone who listens to your musical work

has an opinion about it and judges it. It's understandable though since music has a lot to do with mood, personal taste and emotions. Obviously, everyone can join in the discussion and precisely describe their impressions. Music is no digital matter, and every feedback a composer gets is absolutely valid in its own way. Even a professionally perfect song is not automatically well-received by the audience. On the other side, a sloppily composed song may be great fun and manage to create a very particular atmosphere, and that's what makes the job so intriguing - but also really demanding.

Therefore, it was really helpful for me to receive feedback from my colleagues and other musicians at a very early stage of the soundtrack production. I think it's essential for a project of such scale to have an ongoing process of composing and seeking feedback.

If you hide in your little room for months, composing and not letting anyone have a listen even once, you can easily get on the wrong track and do all the hard work in vain. Generally speaking, this goes for all sorts of project work and is always true. Luckily, I had great and capable people around me who always led me back on the right path whenever I got lost.

Countless possibilities

There are countless ways to add music to a video game, and although it seems there is no silver bullet, the procedures of creating a video game soundtrack resemble one another. So, what to do when there is no right or wrong?

In the beginning, it's a good idea to seek some inspiration from the work of other musicians, while trying to leave your mark in doing so. This may happen via many parameters. There's e.g. the selection of instruments and samples, the tempo, the choice of music genre in general, the composing of melodies, the mixing, and much more.

In order not to lose track of things, at the beginning it's best to focus on the big issues and then to gradually take it from there. Every musical piece influences the next one since eventually everything is evaluated in one overall concept, even if you may not realize it at the beginning of your creation. It can happen so easily that you complete every single detail of a track, absolutely love it, only to find out that what you've done so far just isn't enough. Then you have to do it all over again since the track may be too far from the overall concept. And each new track adds to moving this overall concept in a certain direction. This usually happens a lot with projects the size of Elex.

Tile effect and annoying samples

For a start, music is allowed to be everything but annoying. This means that the choice of usable instruments is limited to those that don't move in extremely high or low frequencies too much, among other things. The older players among us often don't really hear this high-frequency range too much, so that I, being one of the older representatives of my profession, am dependent on the help of younger listeners to avoid such mistakes. And yes, I did use one or the other shrill sound which I didn't really perceive as such myself.

Another thing that's also often considered to be annoying is the so-called »tile effect«. That's what I call the special circumstance that always happens when very concise elements of the music repeat themselves again and again in short intervals. It's a bit like a catchy tune you think of in the morning and can't get out of your head for the rest

of the day. While you may enjoy it for the first few hours, it becomes more and more annoying the longer it lasts. When you now start humming the song and annoying others with it... well, then you probably have to put up with one joke or the other. It's similar with musical pieces in a video game. The more concise and obtrusive a sample, a melody or even a single sound, the less it should be repeated, otherwise it will soon start to cause an uneasy feeling in the player. Some of you may be familiar with that: You're really fond of a game and play a lot of it. But at some point, you realize that, while the gameplay is still fascinating, you're more and more fed up with everything around it for some reason. Somehow you don't want to play it any more, without really knowing why. Often in such cases, it is the music or a very concise sound

»Musik hat viel mit Stimmung, persönlichem Geschmack und Gefühlen zu tun.«

that's responsible for that – see if you notice it next time you play and this happens. It's an incredibly important aspect which is not to be underestimated when composing.

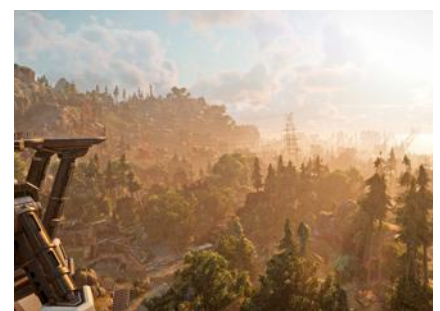
Science Fantasy: The name speaks for itself

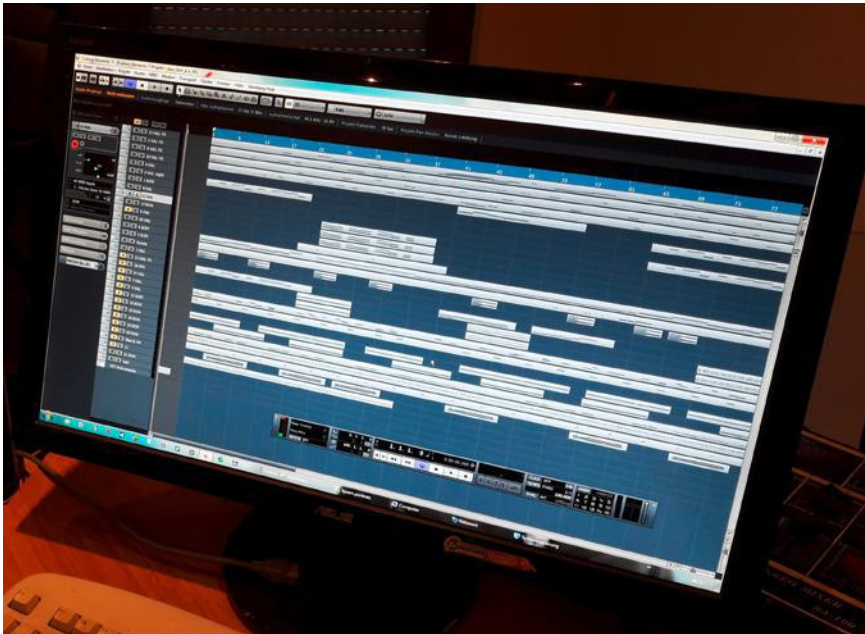
The undoubtedly biggest challenge when creating the soundtrack for Elex was the special setting of the game. Our science-fantasy mix set in a post-apocalyptic world contains a large number of locations which couldn't be more different. And every single one of those locations demands a very special atmosphere – from the crumbling ruins of an old world to a lovely enchanted forest to futuristic company premises full of battle druids and machines. The prevailing mood in these locations is very diverse and should sometimes have a threatening and other times welcoming effect on the player. This again means that the soundtrack must reflect a spectrum ranging from idyllic background music to discouragingly depressive melancholy. The tools I was provided with consisted of a large series of instruments and sounds, and selecting and arranging them are the big challenges to be mastered when composing. In order to make the soundtrack sound like a whole and not like a random collection of tracks, it was important to choose as many supporting instruments as possible, which are well-represented in all tracks and yet reflect the very different moods – like strings or special percussions, timpani and other instruments. No easy task considering the large range of eras and different locations the players can find themselves in in the world of Elex.

Dynamic music system

Another important parameter apart from the prevailing mood of a location is the respective gaming situation our protagonist

The music of Elex is not only to accompany specific situations, but also the many different stylistic facets of the science-fantasy world.





A lot of songs consist of so many tracks and components which most players probably won't even perceive consciously.

is in. Is he currently on a lookout platform and casually going through his inventory, venturing into a dark cave or being attacked by a bunch of feisty creatures and fighting for his life? The music needs to react as well as possible to the current life situation of our protagonist. At Piranha, we use a dynamic music system which controls this procedure and transfers the music into the respective situations. For that, we use different musical pieces which can be blended and exactly match in terms of their length and beat.

For each location, e.g., there is a day theme for exploring the world, which lasts for several minutes and is continuously played in a loop. There is also a respective battle theme which runs parallel to the day theme in the background and is always faded in and becomes dominating when the player gets into trouble with the enemy. Once the situation eases again, either because the enemy stops following or has been defeated, the slower day theme is again brought to the fore. That way, the players always know whether they can afford taking it easy and leisurely exploring the surroundings, or whether they have to be on alert for an ambush.

Our games have always had a day-night-cycle, which is obviously also to be reflected in the background music. That's why each ambient track also has a night theme in addition to the battle theme, which reflects the mood of the respective location after sunset. These night themes are usually a bit quieter, less hectic and feature a more limited selection of instruments to accompany the current situation – usually the corresponding

day theme, just with less instruments and punchy sounds, if applicable. The individual passages of the tracks still need to be mixed and edited, turning the night theme of a location track into a music piece of its own, which also requires special handling.

Action and battle music

As mentioned already, parallel to the epic, idyllic, quieter and sometimes melancholy ambient pieces there are punchy, action-packed and violent alternative variants. These battle tracks always cause the most work for the composer, due to the number of selected instruments alone, which is a lot larger for such a musical piece compared to the rest of the tracks. This simply means that the sheer number of different tracks not only has to be properly mixed, but should also convey a feeling of threat and a significant increase in movement and action. Increasing the speed of the beat sequence is not an option, if the battle music is to be cross-faded in accordance with the day theme. The themes not only have to have the same length, their content should also mesh. But since they should still convey a feeling of movement and stress, classically more timpani and percussions are used in such cases.

Another way is to mix in more dissonances, if the whole sound picture should appear broader. If I spend let's say a day just composing an ambient track, that time often doubles or triples when tackling the equivalent battle piece.

Deterministic melodies

The soundtrack for video games like the one we are doing not only consists of ambient and battle music though, which brings me to the scoring of cutscenes as well as certain scripted scenes, such as dialogues with our characters in the game. It's about adding sound to strict image sequences and the resulting moods. The benefit of knowing what exactly is happening on the screen is the biggest challenge at the same time. Creating the cutscenes in games is something like the signature of the game. Short but elaborate image sequences are to tell the story on the one hand and convey a number of emotions to the player on the other. What's the game about? How's the protagonist controlled by the player feeling?

»Wir Piranhas sind große Idealisten, die alles an Energie in ein Projekt einbringen. Ich denke, das merkt man dem Ding auch an.«

Which challenges and fates is the protagonist dealing with in the respective part of the story?

Often, we musicians rather use elements of classical music because of its incredibly great potential to reflect and trigger emotions. Obviously, there are other options, too, for example in rock and pop music. The classical way seems to be the most popular though. Adding elements of other music genres to this classical music then results in incredibly interesting combinations. In most cases, the dominant part should be taken over by classical music though – simply because you can reach a beautiful, consistent picture of the entire soundtrack that way.

Personalized music

For the first time in one of our projects, I took the chance to use a lot of personalized melodies and gave some of the main characters and also special dialogue situations individual musical pieces and melodies. This led to a significant increase in scale, i.e. the pure amount of music. I ended up with three times as many minutes of music as we usually had produced for a game. But at the end

of the day, the whole game benefits from that. If you have grown particularly fond of a character in the game or if you regard a certain group of characters as particularly threatening, it's always cool when they are accompanied by their own matching music theme. Just think of Darth Vader's »Imperial March« or the emotional theme of Luke Skywalker and the Jedi, which is always played in the »Star Wars« movies when there's lots of action on the screen – it's simply magnificent! Other times it's only very subtle, but in the overall concept personalized background music like that emphasizes the overall impression of a scene tremendously.

As mentioned already, it was a great honor for me and an awesome experience. At Piranha, we're big idealists, investing all of our energies into a project, and I think the game reflects that.

Björn Pankratz



Always in accordance with the situation: When fighting enemies, the speed and volume of the music are picking up to convey a feeling of danger and stress.

The soundtrack is always in accordance with the corresponding situation and location to always create the right and perfect feeling within the players.





This game automatically saves your progress. Please do not turn off your console when this symbol is visible.

CONSOLE REQUIREMENTS PORTING PITFALLS

To release a game on numerous platforms isn't possible without satisfying the specific requirements of the first parties. Maki Dieffenbach reveals what they are.

Video game development for consoles includes a number of technical requirements that one can easily overlook or underestimate when working out the development schedule. This isn't even about the hardware specs, but about the list of requirements from the hardware manufacturers, which a product needs to fulfil. Whenever a game is submitted to the major console manufacturers, it's tested to make sure it reaches a certain quality benchmark. If the developer doesn't pass submission, the submitted product may be rejected at first. Since we wanted to release our new game »Elex« also on PlayStation 4 and Xbox One, we had to tackle all kinds of potential issues.

Getting an overview

It's advisable to get an overview of all affected areas and requirements early on. Much like when it comes to tutorials, the entire process is often underestimated and pushed back towards the end of the production cycle.

Taking a look late in the production process can quickly become like stepping

on the proverbial lego: if the requirements aren't known in time, it often ends with a very painful surprise. Depending on which features a game has to offer, there are a number of areas that need to be planned for very well.

Elex is purely a singleplayer game without coop or other online features. This is why we were able to scratch some of the requirements at the very beginning. Three areas remained: Our biggest areas of concern were user management, UI requirements and PlayGo2 on PlayStation 4 / streaming installation² on Xbox One.

Readable UI und user management

Apart from the fact that a game should never crash (and of course it doesn't), there are certain directives to make sure that the player is convinced about this. For example, each loading screen should play an animation to prevent the user from thinking that the application doesn't work anymore. It should also be mentioned at this point that the requirements from the console manufacturers shouldn't be viewed as restrictive, but as »best practice«. The game should have



Maki Dieffenbach
Programmer at Piranha Bytes

Maki studied Applied Computer Sciences and afterwards specialized in games programming. After her entry into the industry through a start-up browser game company she joined Piranha Bytes. Here she's working on the engine and parts of the console ports of Risen 3 and Elex.

¹ PlayStation 4: TRC – Technical Requirements Checklist, Xbox One: XR – Xbox Requirements

² Offering the player a part of the game while the download or the installation isn't finished yet.

context-sensitive information ready for the player, which is easy to read, rather than spit out cryptic error messages. This concerns e.g. corrupt save games or a missing connection to input devices.

Piranha Bytes already integrated many of these structures into their home-made engine thanks to long-time experience with console games. We encountered many challenges that needed to be solved in the past while working on the Risen franchise. The engine grew steadily and was iterated a number of times. Risen 3 was first ported to Xbox 360 and PlayStation 3 and then, for the Enhanced Edition, to PlayStation 4. Some of the engine systems weren't ideally adapted for all requirements because of their complexity and the lack of time, for example the old UI system didn't feature dialogue stacking³. User management, save game systems, achievement manager and many others were worked on separately for each console platform and integrated on completely different levels for all systems.

The biggest challenge for us is typically the pretty complex account management. Even though this isn't necessarily applicable for every console, the UI should always be able to offer clear output to the user. What happens if the player opens the console menu, logs out from his account, while the battery of the controller runs out, so the player switches to a second controller to keep on playing on a different account?

In this regard, it's important among other things to be able to stack dialogues without losing messages. The system needs to understand at all times which user on which input device is able to control the player character. If dialogue stacking isn't an option, it can become quite complicated to manage all messages at once. In the end and at the cost of a few more grey hairs, we figured out how to control these issues, but the systems were scattered all across the engine – far from ideal.

For Elex we rebuilt the entire UI system and centralized the management of users, save games, input devices, achievements and the installation of content and settings, and standardized it as much as possible for all supported consoles, Steam and the PC retail version. A good example is the save-game system of Elex (figure 2). All data relevant for save games is collected on the script and game level and stacked in an archive. The naming of the save games, the display of UI elements like the »Saving, please don't turn off the system« logo, the pausing of gameplay and all other settings are being processed in standardized fashion and have nothing to do with internal console processes. Only then is the archive being passed on to the subsequent specialized systems.

Those systems don't care about what

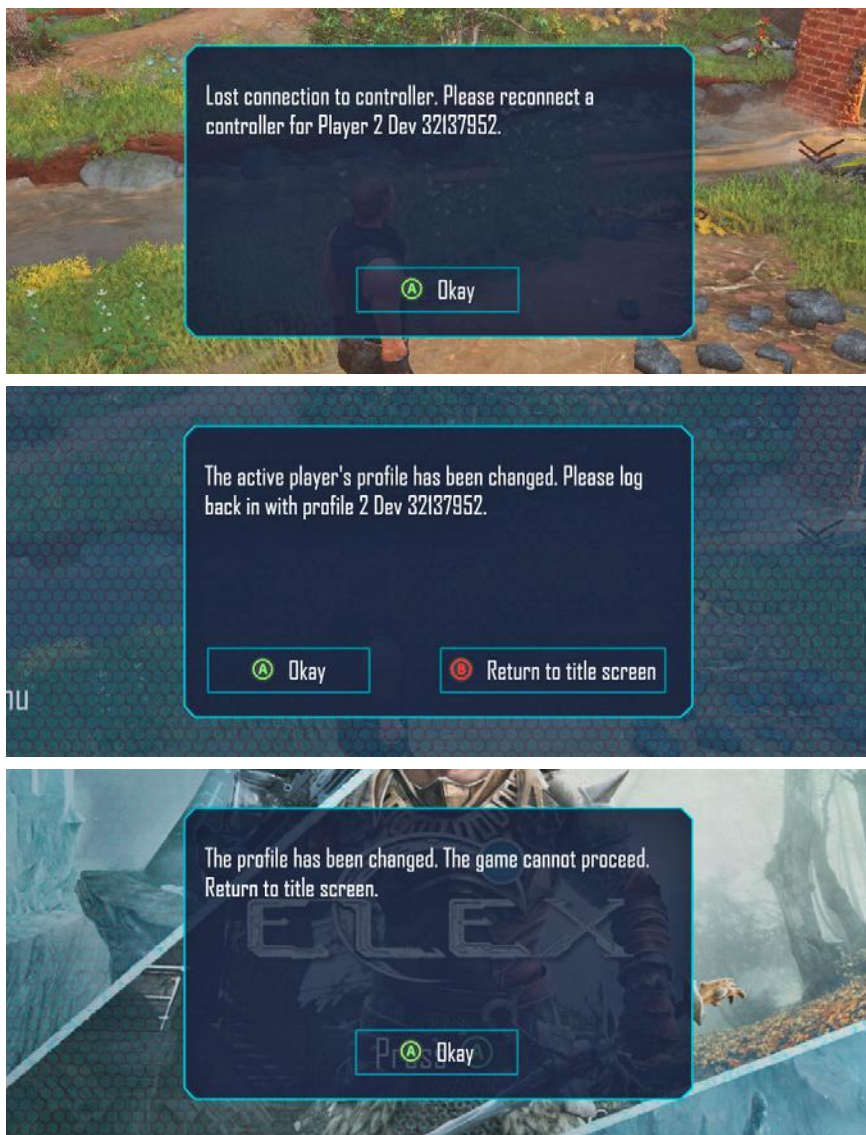
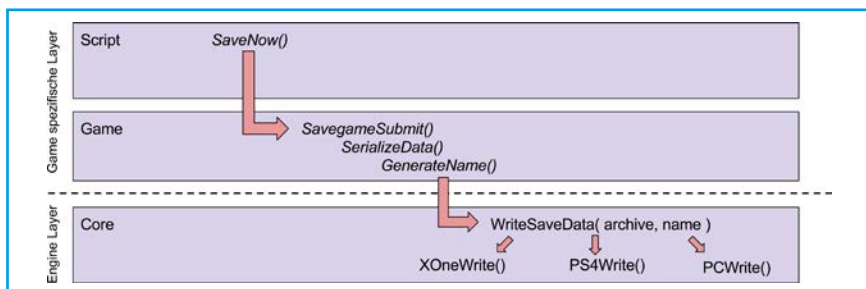


Image 1: Examples of UI dialogues that make the player aware of current conditions of the game.

»The game should have context-sensitive information ready for the player, which is easy to read, rather than spit out cryptic error messages.«

Image 2: A heavily simplified illustration of the collaboration of system layers during saving.



³ Hints as message boxes which can overlap and be shown one after another or over one another.

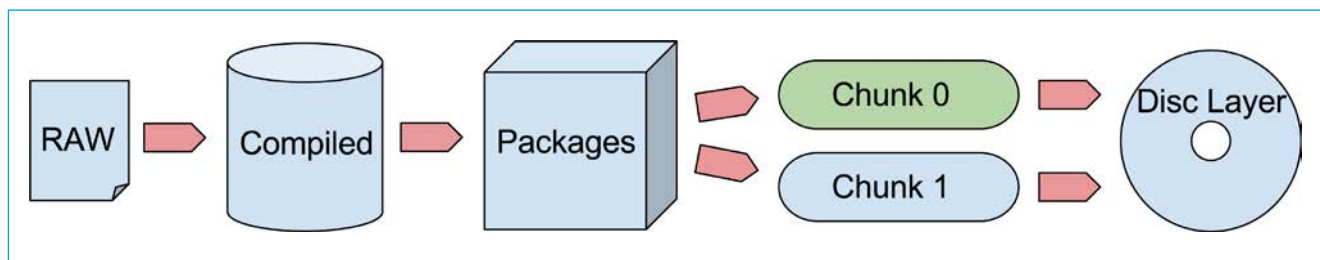


Image 3: Processing of data for PlayGo and streaming installation.

happens in the game and don't know its UI classes. They simply accept and archive unknown data. The mounting of folders, the writing of the data and all required processes are being done in their own core system for each platform. Once the writing of the data is done, the game or script layer higher up in the hierarchy is being notified via callback with an added error message, if necessary. Now the UI is able to react. If different error messages arrive in the UI at the same time, they are being placed in a queue and presented one after another. This allows us to react a lot easier to bugs and errors and to let the player know. The fact that the core systems work independently from the game and that they can easily be reused for any kind of application is a big advantage. Bugs that show up during testing are typically issues that happen in the unified systems of the engines higher up in the game layers. As such, they can be removed for all platforms at once – and without causing more grey hairs, too!

The world divider: PlayGo and streaming installation

A very specific requirement which becomes relevant for games of a certain size is the option to already start the game on Microsoft or Sony consoles even before the download or the installation has finished completely. Meeting this requirement is a much bigger challenge for open-world games like Elex. The biggest problems we faced were the voice over data and the static scenery (world data, terrain, static objects, etc.). The former became an obstacle due to the complex connection of characters with dialogues via quests and scripts, the latter because of the sheer size and distribution of the data.

When creating a game build, first all raw files are stacked in compilers. Those compilers are then combined in packages and compressed, if necessary. In the final step, our prepared data is being split up in individual chunks⁴ and then further processed using the platform tools of the manufacturers (figure 3). Our combined packages are recognizable by name and can be automatically placed in the correct chunks. It's easily possible to flag which chunks should be installed during the live game. The toughest part of the entire process though is to first

figure out how the data should be distributed when building our packages.

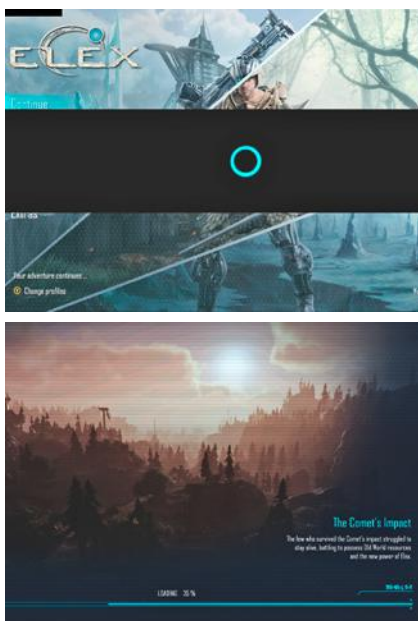
This poses a number of challenges, including not just the preparation of the data and the dynamic loading and mounting of resources into the live game, but also the overall approach via the game design. If the developer is working on a game with linear and self-contained levels, which offers separate game modes like singleplayer and multiplayer, a line is drawn rather easily. We were able to do just that in Risen 3. The first island, our first level so-to-speak, could be viewed completely independently, cut off from the rest of the game world. Afterwards, the player would receive a loading screen or an indication that the rest of the world wasn't fully prepared yet. This meant a clear boundary which we could use for the system. Elex on the other hand offers a huge game world without any zones or loading times, including buildings and caves.

In order to extract the correct data from the world, the process for Risen 3 was to analyze the game while running it. The resource system wrote all requested and necessary data into a list that we then took into account when building the final version of the game. Loosely speaking, chunk 0 contained all data from the first island and chunk 1 all data from the remaining islands.

The downsides are obvious: Since we didn't have an automated process that could play through the game independently, the process had to be done manually through an actual person – and let's not forget that this process had to be repeated after every change.

Dependencies

Since the game world of Elex is much more open than that of Risen 3, there was no clear cut that we could use for the integration of PlayGo or the streaming installation. Also, it wasn't sustainable for us to play the game manually in order to create a list for the chunks. The size of the open world alone makes it almost impossible to go through all paths and all options. So, we created a process that we could integrate into the automatic build process of the game. For that, we expanded an existing tool we had written earlier. The dependency tool helps our content producer to find dependencies



Please wait - the system hasn't shut down! Specific animations and progress bars help understand the current loading status.

⁴ Grouping of data which is then moved to specific layers or areas on the disc.

of resources, for example which objects in our world use the same texture. To use the tool to analyze all resources, it had to be expanded. To keep the tool operational, the »GetDependencies« interface had to be integrated for each new resource. We split up these resources in certain categories. Effects, texts or XML files that required very little memory weren't filtered by us, but moved directly into chunk 0. That's the chunk that is being installed first before the game can even be started. The two biggest stumbling blocks here are the sounds (dialogues in three languages) and static scenes (terrain and static objects). The »Dependency Tool« (figure 4) finds all game objects in an area we defined before and filters the existing dependencies. Those can, e.g., be textures, animation data and meshes. If there are sub-objects attached to the objects, they are being examined iteratively until all dependencies are found. Voice data makes things especially complicated since each NPC and the player character himself has hundreds, if not thousands of lines of spoken text. In this case, a complicated query is necessary that analyzes all quests and possible parties. We don't want to integrate every single sentence of our protagonist in PlayGo/streaming installation chunk 0 as this would mean hundreds of megabytes of data. Only spoken text from the defined area is relevant. This is where the quest system comes in. Each quest (which exists in the form of XML data) includes all dialogue as well as the names of all possible participants which our dependency tool can dissolve

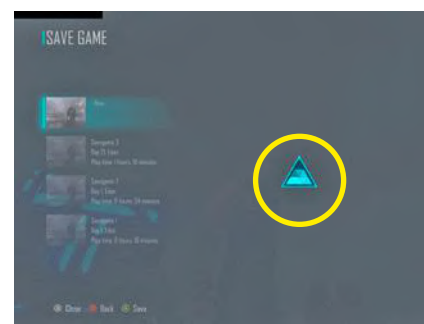
»The size of the open world alone makes it almost impossible to go through all paths and all options.«

and filter iteratively. The result is a list of resources which we can convert to the physical data on the hard drive using paths in our resource system. In case of the spoken text, all relevant spoken languages are also taken into account. If the player enters a location outside of our zone, he is being asked to turn around until all relevant data is available.

The previously defined area that is being viewed has been determined through analysis of a number of playthroughs. The idea is to keep the average player away from this barrier for as long as possible. Typically, the player shouldn't reach this point before the installation or the download is finished. Of course, this can't be avoided completely because the player can choose his own path and ignore quest sequences, so we had to find a compromise that works for as many players as possible.

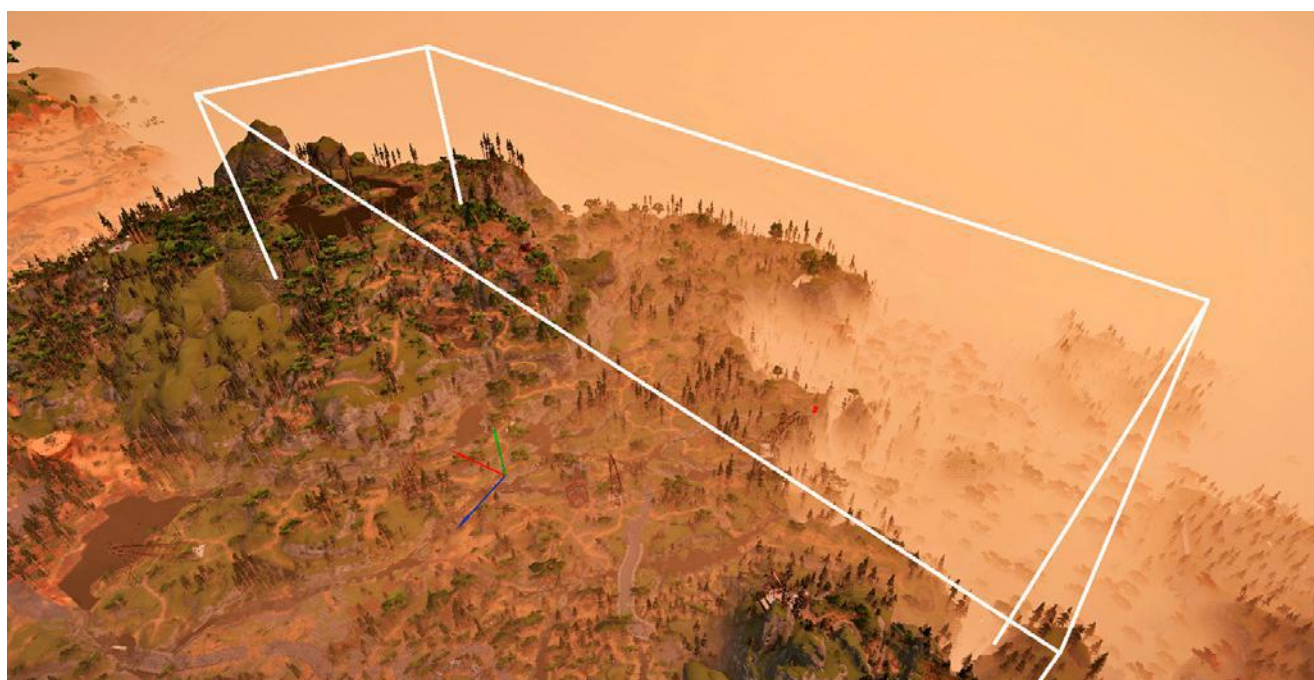
There are many ways to build these systems and meet the requirements, but it's advisable to get acquainted with the ever-changing tests as early as possible. Depending on the size of the projects there are many potential unknowns. Lots of engines typically offer specific libraries or interfaces for the development on consoles, but they can't always meet all requirements. But what's that old saying? There are no problems, only solutions!

Maki Dieffenbach



Don't turn off! The save symbol shows when the system mustn't be turned off to avoid the loss of data.

Image 4: A defined PlayGo / streaming installation area.



THE INDUSTRY AT A GLANCE

COMPANY INDEX

Forget about the directory assistance! Here you will find all known publishers, developers, service providers, educational institutions and unions of the German speaking games industry.

DEVELOPMENT					
3d-io	Albrechtstraße 46	65185	Wiesbaden	0611 / 5829602	info@3d-io.com
5d lab	Güterhallenstraße 4	79106	Freiburg	0761 / 28533385	info@5dlab.com
Adrastea	Bielefelder Str. 5	90425	Nürnberg	0700 / 42300000	info@adrastea.com
Aesir Interactive	Grafingerstraße 6	81671	München		w.emmer@aesir-interactive.com
Animation Arts Creative	Ankerstraße 3a	06108	Halle (Saale)	0345 / 4700274	info@animationarts.de
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Assemble Entertainment GmbH	Georg-August-Zinn-Strasse 2	65183	Wiesbaden	0611 13 57 82 30	info@assemble-entertainment.com
Bad Monkee	Grindelallee 100	20146	Hamburg		info@badmonkee.de
B-Alive	Panoramastraße 23	88444	Ummendorf	07351 / 441307	admin@b-alive.de
Beardshaker Games	Wartenau 16	22089	Hamburg	040 / 28471900	contact@beardshaker.com
BIGITEC	Theaterstraße 22	53111	Bonn	0228 / 42976585	info@bigitec.com
BIGPOINT	Drehbahn 47-48	20354	Hamburg	040 / 8814130	info@bigpoint.net
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Black Forest Games	Maria-und-Georg-Dietrich-Str. 2	77652	Offenburg	0781 / 31057910	info@bfgames.biz
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Blue Byte	 Adlerstraße 74	40211	Düsseldorf	0211 / 338000	info@bluebyte.de
Blue Byte Mainz	 Römerpassage 1	55116	Mainz	06131 / 554470	studio-mainz@bluebyte.de
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Crenetic	Kreuzstraße 3	45468	Mülheim an der Ruhr	0208 / 4442142	info@crenetic.de
Crytek	Grüneburgweg 16-18	60322	Frankfurt am Main	069 / 21977660	info@crytek.de
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Dachshund Games	Turmstraße 48	10551	Berlin		team@dachshund-games.com
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Decane	Marienhöhe 157	25451	Quickborn	04106 / 1282400	info@decane.net
Deck13 Interactive	Gutleutstraße 82	60329	Frankfurt am Main	069 / 71671660	info@deck13.com
Deep Silver Fishlabs	Großer Burstah 50-52	20457	Hamburg	040 / 8888000	business@fishlabs.net
Destrax Entertainment	Merkurstraße 10	33739	Bielefeld		info@destrax.de
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Doublesmith	Wiener Straße 20, EG Haus 4	A-3100	St. Pölten	+43 / 699 / 19447880	mail@doublesmith.com
dreiNET	Bergedorfer Straße 96	12623	Berlin		philip@dreinet.org
Dutyfarm	Oranienstraße 6	10997	Berlin	030 / 30368430	info@dutyfarm.com
East Forge Entertainment	Baumannstr. 3	04229	Leipzig	0341 / 5940359	info@eastforge.com
eelusion	Feldstiege 78	48161	Münster		contact@eelusion.com
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Frame6	Heyestraße 41a	40625	Düsseldorf	0211 / 95763955	contact@frame6.de
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GameArt Studio	Bismarckstraße 107	10625	Berlin		kontakt@GameArtStudio.de
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Goal Games	Lindenstraße 24	29223	Celle		info@goal-games.de
Goodgame Studios	Theodorstraße 42-90, Haus 9	22761	Hamburg	040 / 2198800	pr@goodgamestudios.com
Greentube Internet Entertainment Solutions	Wiedner Hauptstrasse 94	A-1050	Wien	+43 / 1 / 90171	office@greentube.com
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iLogos Europe	Pezoldamm 98a	22175	Hamburg	0171 / 6246160	info@ilogos.biz
Independent Arts Software	Münsterstraße 5 / HAMTEC Haus 2b	59065	Hamm	02381 / 488818	info@independent-arts-software.de
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kr3m. media	Kaiserstraße 158	76133	Karlsruhe	0721 / 18395918	
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mobiventon	Gottfried-Hagen-Straße 24	51105	Köln	0221 / 6778110	info@mobiventon.com
Moonbyte Games	Martin-Luther-Straße 63-65	67433	Neustadt/Weinstraße	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	info@netmin.de
northworks	Waterloohain 9	22769	Hamburg	040 / 78107075	info@northworks.de
Nurogames GmbH	Schaaftenstraße 25	50676	Köln	0221 / 39880840	info@nurogames.com
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	Obere Seitenstraße 22	90429	Nürnberg		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	Nuthestraße 67	12307	Berlin	030 / 66932212	info@pixeltamer.net
Pixon	Jaffestraße 10	21109	Hamburg	040 / 33399430	welcome@pixon.de
Playnik	Im Derdel 17	48161	Münster	02534 / 9733530	info@playnik.de
playzo	Nina-Simone-Weg 7	64297	Darmstadt	06151 / 62931111	info@playzo.biz
Plazz AG	Maximilian-Welsch-Straße 2b	99084	Erfurt	0361 / 2169460	info@plazz.ag
Ploonymoon Studios	Akazienstraße 3	86438	Kissing	08233 / 389458	mail@ploonymoon.com
Pop Rocket Studios GmbH	Forsmannstraße 8b	22303	Hamburg	040 / 68878691	info@poprocket.com
Procontis	Am Bauhof 18	64807	Dieburg	06071 / 4306925	sales@procontis.de
Promotion Software - Studio Tübingen	Karlstraße 3	72072	Tübingen	07071 / 91670	mail@promotion-software.de
Promotion Software - Studio Potsdam	August-Bebel-Straße 27	14482	Potsdam	0331 / 23189660	mail@promotion-software.de
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 Solutions	Adalbert-Stifter-Str. 8	70437	Stuttgart		contact@realitysolutions.de
Reality Twist	Franz-Joseph-Straße 11	80801	München	089 / 380129500	mail@reality-twist.com
Realmore Studios	Hofer Straße 15	81737	München	089 / 55069134	info@realmorestudios.com
REDOX Game Labs	Jakob-Haringer Straße 5/E06	A-5020	Salzburg	+43 / 662 / 273273	info@redox-labs.com
remote control productions	Karlstraße 68	80335	München	089 / 21020570	info@r-control.de
RockAByte	Schaaftenstraße 25	50676	Köln	0221 / 80147950	info@rockabyte.com
Sandbox Interactive	Pappelallee 78	10437	Berlin	030 / 40045181	info@sandbox-interactive.com
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Sharkbomb Studios	Durlacher Allee 53	76131	Karlsruhe	0721 / 97698422	contact@sharkbombs.de
SilentFuture	Triebelsheide 37b	42111	Wuppertal	0202 / 3935366	info@silentfuture.de
Silver Seed Games UG (haftungsbeschränkt)	Sandtorstraße 23	39106	Magdeburg	0391 544 861 937 2	info@silverseedgames.com
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Sparrow Games	Wegenerstraße 1	13088	Berlin	030 / 50915356	mail@sparrowgames.de
Springwald Software	Alter Eistreff 36	44789	Bochum	0700 / 777464925	info@springwald.de
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Electronic Arts	Im Zollhafen 15-17	50678	Köln	0221 / 975820	
European Games Group	Wiener Platz 7	81667	München	089 / 44449318	contact@gamegroup.eu
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McGame.com	Mansfelder Straße 56	06108	Halle (Saale)	0345 / 51646001	support-de@mcgame.com
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games.net berlin/brandenburg	Ackerstraße 3A	10115	Berlin	030 / 24628570	games.net@medianet-bb.de
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MAKING GAMES PREVIEW

11-12|17
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There's our upcoming issue, stealthily sneaking around - two weeks earlier this time, and accompanied by deadly assassins!

The Making of Shadow Tactics

Mimimi Productions won a truckload of awards for their assassination-adventure »Shadow Tactics: Blades of the Shogun«, a tribute to fans of tactical stealth classics like »Commandos« and »Desperados«. The game's been out on PC since December 2016 and just recently made its debut on consoles, now challenging and enchanting players on PS4 and Xbox One with tactical depth and gorgeously beautiful levels. And as we were just around the corner, we took the chance to visit the Mimimis in their natural environment.

Monetization Best Practice

In his second article about »Online Monetization« Stephan Payer from CipSoft illustrates the advantages of having your own payment systems for your online-games.

3D Modelling Best Practice

Would you like some advice on »Vehicle Modelling«. Martin Posch might have some for you.

The Making of Slime-san

He's green, he's slimy and incredibly jumpy - we take a look at how Fabraz brought their latest indie platformer »Slime-san« to life.

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