# Ratchet & Clank (2016) postmortem

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Sure, it seems obvious now. *Of course* there should be a *Ratchet & Clank* game to tie in with the major motion picture. But *Ratchet & Clank* for the PlayStation 4—designed as a killer one-two punch alongside the film, the ultimate version of an origin story—didn't always seem like such a great idea.

Of course, we were thrilled when we heard that the film was a go. We've long felt that Ratchet, Clank, Qwark, and their Solana galaxy milieu had all of the action, humor, pathos, and just plain
. . . bigness . . . to populate a feature. Or six. Hey, it's a big universe.

But the prospect of making a film tie-in was especially daunting.

First, we had the legacy of the series to consider. This one needed to be a major step forward, but it also needed to retain the soul of the original game. We had 10 Ratchet games under our belts at that point, across the full spectrum: story-driven single player epics. Single player/competitive multiplayer hybrids. Couch co-op. Experiments in form. Experiments in scale. We've had universal successes and noble failures. The most recent title, *Ratchet & Clank: Into the Nexus*, was mostly well received, earning the backhanded compliment/upbeat critique "it was too short, we wanted more." Okay. We'll need to make sure the eleventh one is suitably epic.

> ***"We needed to make a big game that blew away our previous efforts. It needed to sync up with the just-getting-started film. And we needed to ship it in 10 months to line up with the movie release."***

Second, there was the prospect of syncing up with film production. What did co-development of a game and film really mean? A lot of variables, that's what. Sure, the film is based on the original game, and pulls some models from our asset libraries. But the script was in flux (rightly so, it was just getting started). And early conversations pointed to a major cleanup of the backstory, a rework of the character lineup, and the introduction new locations. How would we work out a game macro around that?

And finally, there was our second oldest arch-nemesis, time itself*. We needed to release the game day-in with the film, and time—that grumpy, no-good jerk—was unforgiving. We curled up in fetal positions and hid under our desks for a while.

But ultimately, we uncurled ourselves and climbed up on top of our desks because we love making *Ratchet & Clank* games. And so do a lot of other people at Insomniac. Even after 16 years, there is tremendous interest and excitement in the series. We all grew up doodling robots, reading science fiction, and watching Star Wars, Back to the Future, and Ghostbusters; it's safe to say that we were deeply affected by the sense of wonder and fun in that particular strain of summer movie sci-fi.

So, we needed to make a big game that blew away our previous efforts. It needed to sync up with the just-getting-started film. And we needed to ship it in 10 months to line up with the movie release. **

Okay. We'll stop whining. We love *Ratchet & Clank*. Sign us up.

**Our oldest arch-nemesis is a man named Paxton Crowlers.*
***This changed, thank goodness.*

## WHAT WENT RIGHT

## 1) Balancing the old and the new

Within the first 30 seconds of our first conversation about *Ratchet & Clank* on the PlayStation 4, we knew that we didn't want to make a remaster or an up-res.

We wanted to apply everything that we've learned over the past 15 years. The original game is very much a platformer first and a shooter second. Shooting used a hero-facing mechanic that made it pretty difficult to aim; consequently, there were slower rates of fire, lower ammo counts, and fewer enemies. The weapons that are now the hallmark of the series felt more like gadgets that blew stuff up. Modern third-person shooters are more refined, with a seamless integration of camera and reticle. We felt like it was our sworn duty to modernize the controls, to design the game around a fun and fluid shooting mechanic--but that meant a rework of every weapon, enemy, and setup in the game. It meant effectively rebuilding everything.

Yet we couldn't imagine a take on *Ratchet & Clank* that didn't include hoverboarding on planet Rilgar, infiltrating the Ion Turret on Batalia, or swimming underwater at the Pokitaru resort. We wanted to keep most of the original planets intact, to hit the nostalgia button for our fans *and* to keep our production time manageable.

We ended up building a new game on top of the original foundation. We started with the main story beats. We chose Ratchet's home planet on Veldin, Aleero City on planet Kerwan, Drek's Warbot factory on Quartu, and Drek's Deplanetizer orbiting weapon as our main locations. These would be shared between the game and film, so we reworked each layout from top to bottom (in the case of Veldin and Aleero City) or designed the location from scratch (in the case of Quartu and the Deplanetizer).

These became our narrative tent poles, matched as closely as possible with the film. Our longtime SCEA producer Greg Phillips was invaluable here; he's a bottomless well of *Ratchet & Clank* knowledge.

With the big story points established, we created the gadget-driven progression scheme that opens up new planets. We pulled heavily from the original game. But we gave ourselves permission to diverge. We like the open world planets that started showing up in later games, and we like the jetpack mechanic that we developed for *Ratchet & Clank: Into the Nexus*. So we expanded planet Gaspar with a huge new jetpack area. The film has an action set-piece ship combat sequence in Aleero City. So we added that, too. We threw a boss battle into the Blarg Research Station because we don't know when to stop.

After we established the macro design, we realized that we could get a leg up if we used some of the original layouts. So we enlisted help to extract our PS2 level data and import it into our engine (no easy feat, thanks to questionable archival practices; see "what went wrong"). When designers and environment artists moved on to the project, they started with perfect 1:1 replicas of all of the locators and instances from the original. That sped up normally time-consuming design iterations. We spent our bandwidth scripting encounters and polishing enemy setups for the new control scheme instead of grappling with fundamental layout issues.

All told, the final game included modern controls, two new planets, three extensively reworked planets, eight

returning planets, a new weapon arsenal, new Clank gameplay, new space combat, new boss battles, and a new weapon arsenal, all wrapped in a structure that matches the film *and also* represents our best attempt at capturing the soul of the original game.

## 2) The game based on the movie based on the game

The film is based on Ratchet's origin story from the PlayStation 2 game. Ratchet is a Lombax orphan mechanic. Clank is a robot factory defect. The two meet when Clank's escape pod crash-lands on Ratchet's adopted home planet.

But the story diverges after that. The film tells a story that is more character-driven and accessible than the (admittedly somewhat rambling) original game—Ratchet is nicer to Clank. Clank's origin story is easier to understand. There are more secondary characters and fewer planets.

The new game's macro needed a dramatic revision to match. It had to stand on its own. But it also had to line up perfectly with the film's re-telling of the story. We couldn't have mismatched writing, plot points, or visuals.

> ***"Insomniac concept artists were lead visual designers for both the film and game, so visual consistency was baked into the new characters. Still, we didn't expect to use any film assets at first. We were pleasantly surprised when the pipeline flowed both ways."***

Fortunately, Rainmaker was a great partner. We had access to the earliest scripts and dailies. We had a sense of where the story was headed. Longtime series director Brian Allgeier and series writer TJ Fixman are experts at crafting game narratives that match mechanic progression.

And they had a great idea: why not tell the game story from Captain Qwark's point of view? That freed us up; now we could take a more involved look at the action on the surface of each planet. We could follow the film, but we

weren’t bound to every scene. We could focus on making the pacing feel right for the game.

We shared more than a story—sharing models turned out to be a win, too. Insomniac concept artists Greg Baldwin and Dave Guertin were lead visual designers for both the film and game, so visual consistency was baked into the new characters. Still, we didn’t expect to use any film assets at first. We were pleasantly surprised when the pipeline flowed both ways.

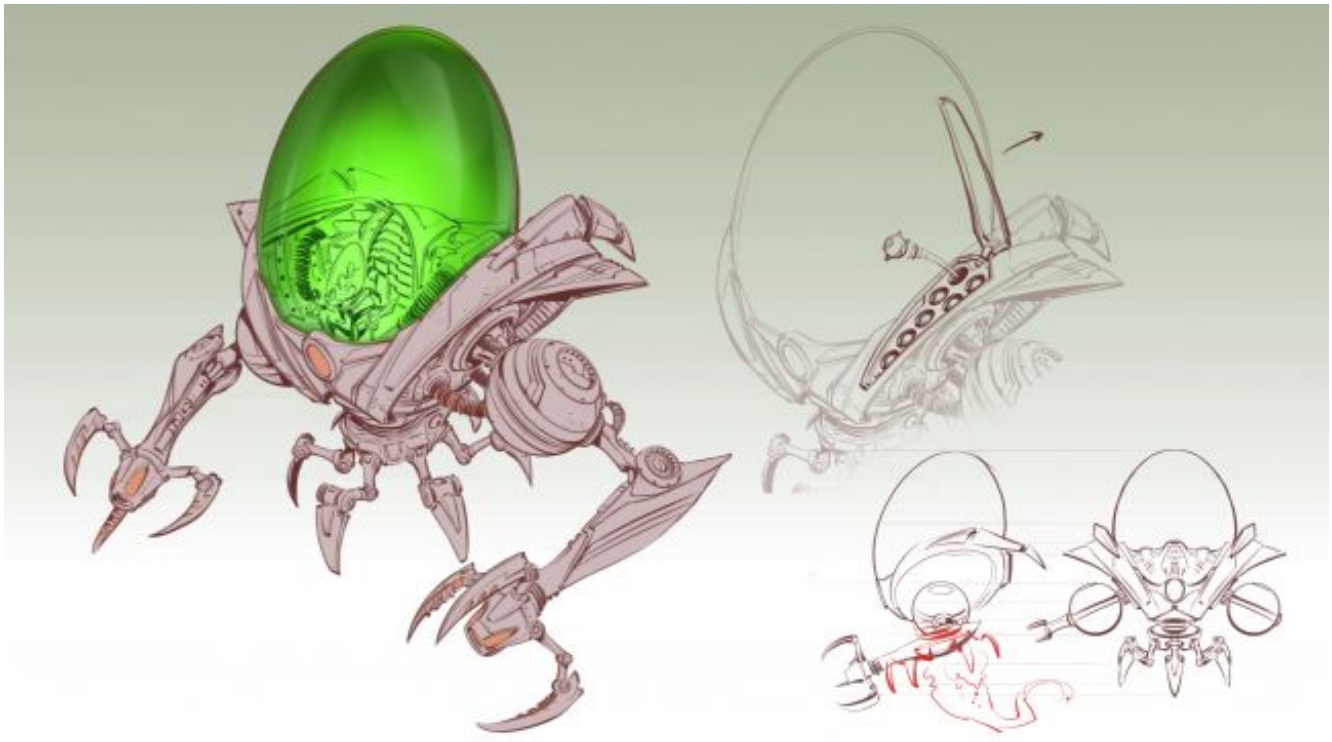
We sent several massive hard drives to Rainmaker, containing every concept image, model, texture, and animation from the PS3 era—a treasure trove of characters, enemies, vehicles, and weapons. We didn’t know if we’d ever see them again. But soon, we received renders back for evaluation. Hey! Clank looks really good—shiny and smooth. And remember that low-poly background hovercar? Here it is again, presented with lovingly polished shaders and film-ready detail, ready for its big-screen debut.

Still, we were big cynics. “Sure, these look nice, but we’ll never be able to use film models in the game,” we surmised. “They’ll need so much optimization, we’ll be better off starting from scratch.”

But we convinced ourselves to try it. We opened a test model up in Maya, and it was like peering into that briefcase from Pulp Fiction.

The models were very, very close to what we’d need for the PlayStation 4—they were clean, quad-based, and in line with our density target. Sure, they needed some work. Textures needed uv space allocation, shaders needed to be authored for our engine, characters needed to be re-rigged for our tools. But getting these character models—*this close* to going into the game, without the usual concept-to-z-brush-to-maya-to-engine pipeline—was a big efficiency. We had our full stable of main characters ready to go before the end of preproduction.

The game-to-film-to-game pipeline didn’t stop there. We had the surreal experience of sending off environment concept images, seeing location renders from the film, grabbing film background models and dropping them in the game, then matching the whole thing up with shaders, lighting, and post effects. This has to be the first hardware generation that this is possible, and it’s glorious. Welcome to the utopian future!



*Nefarious Mech*

## 3) Mature engine and robust code-sharing practices

A compressed schedule, a new platform and our first cross-studio collaboration – any single one of these challenges suggested we were in for challenging production. And yet, *Ratchet & Clank* PS4 turned out to be among the smoothest productions in Insomniac history. Eerily smooth. We still expect to wake up and discover that it was all a dream…

The compressed schedule limited the number of new features we could add to our engine. So instead of the usual laundry list of engine requests we compile at the start of a project, *Ratchet & Clank* PS4 had only a couple: “PS4 support” and, well, “fur rendering” (cuz Ratchet). And while this meant a number of “wants” had to wait for the future, it also meant avoiding the sort of large-scale changes that end up slowing down production.

We also benefited from global code sharing practices. In our old engine, Insomniac was simply not good about sharing code between franchises. For example, the *Ratchet & Clank* and *Resistance* titles are known for their weapons. The underlying code, however, was really different. So while we were achieving the user-facing goal of innovative weapons, we weren’t being efficient about it.

Moving into our new engine, our gameplay and engine leads instituted code-sharing policies that aimed to share as much code as possible between projects. We now regularly percolate shared gameplay and engine systems through all projects. And we encourage programmers to pursue “shared” solutions whenever possible. The result was a huge efficiency boost without detracting from the player experience; both *Fuse* and *Sunset Overdrive* continued the Insomniac tradition of innovative weapons without paying such a big cost.

By the time *Ratchet & Clank* for Playstation 4 kicked off, we had a lot to draw from – hero, controls, weapons and other core systems were already in place. This allowed us to get up and running on the PC in a matter of days – perhaps the fastest start for any Insomniac project. This early momentum continued through preproduction. In just a few weeks, we created an in-engine proof-of-concept that in a short vignette demonstrated the promise of *Ratchet &*

*Clank* on the Playstation 4 (hint: it's hidden in the game and includes a gardening bot). And we wrapped up a 3-month preproduction by delivering a fully-playable proof-of-concept featuring an updated version of Metropolis.

In the end, doing less and sharing more enabled us to establish a solid foundation and build momentum that sustained us throughout the entire project.

*ClankBots*

## 4) Usability testing for casual players

We knew that *Ratchet & Clank* would be the first console game for many kids. If all goes well, we thought, it'll be a formative memory—the beginning of a lifetime of healthy game playing habits.

We took this responsibility seriously. SCEA's well-appointed usability test lab and its excellent staff were a godsend; we tested the game early and often with 7-9 year olds, even during pre-production. Our first test used greybox geometry to make sure that we were on the right track with the new Clank gameplay. We were encouraged to see that kids could articulate solutions to the puzzles, even if they didn't understand all of the component pieces. We didn't need to make the puzzles any easier, we just needed to clean up some of our messaging.

Later tests revealed that very young players tended to ignore the right analog stick; they didn't quite grasp the benefit of moving the camera, and weren't quite coordinated enough to move two sticks at once. So we designed levels with as few sharp turns as possible. And we created a casual control mode that allowed for movement with the d-pad. This broadened our potential audience, with no negative consequences for the other difficulty modes.

Usability tests are not for the faint of heart, and *Ratchet & Clank*'s tests had their fair share of head-scratching mistakes and hair-pulling difficulty spikes. Overall, though, it was inspiring to watch even the youngest players play the game. They couldn't stop talking about it, even when we begged them to stay quiet to avoid skewing test results. By our later tests, the kid groups finished with play times similar to seasoned adult gamers: proof that our difficulty tuning worked.

*Constructobot*

## 5) Cross-country collaboration

Insomniac is comprised of two locations: one in Burbank, CA and one in Durham, NC. Both are lousy with *Ratchet & Clank* experts.

On both coasts, there are animators familiar with every nuance of Ratchet's moveset. Designers with a deep understanding of enemy swarmer behaviors. Programmers well-versed in crate destruction physics. Environment artists deeply imprinted with the visual style tenets of the series. Brian Hastings—credited with the original "an alien travels from planet-to-planet" pitch- resides in Burbank. Dave Guertin—credited with Ratchet's original character design—resides in Durham. We wanted to work with a dream team of all of these people.

By working cross-country, with a development team that spanned studios in almost exactly equal numbers, we tapped into the full power of our collective knowledge. Further, this allowed us to run an efficiently staffed production. We started with a small team in NC during preproduction, grew to a larger size during production, then rolled off most developers and polished with a small team. The headcount chart was a project manager's dream.

But as it turned out, it was a bit of a nightmare for everyone else.

## WHAT WENT WRONG

## 1) Cross-country collaboration

We’re not being glib here. We have to list this in both categories. It was the single biggest win for the project, but it was also the single biggest source of pain.

Why? Because culture.

We thrive on “face time” at Insomniac. When Insomniacs talk about breakthrough moments, they almost always involve a small, multidisciplinary group gathered around a monitor to solve a problem. We use tools like email, IM and yes, even the telephone, when it makes sense. But we ultimately thrive on informal, in-person “collisions” – that’s when we do our best work.

*Ratchet & Clank* for the Playstation 4 wasn’t our first foray into remote collaboration. Over the years, we’ve supported offsite employees and contractors. And a handful of Insomniacs in our Durham, NC studio worked directly on *Sunset Overdrive*, primarily developed in Burbank, CA. *Ratchet & Clank*, however, was a whole new level of remote collaboration.

Going into production, our goal was to support “bi-coastal breakthroughs”, taking what’s worked so well for us over the years and splitting it across studios.

We tried cross-studio, multidisciplinary strike teams. We bought HD cameras for every team member and strongly encouraged video chat over IM or email. And we established on-site leads in each studio so folks had daily in-person contact with their manager.

Some things, like the HD cameras, were a big win; the “face time” helped foster unity on a team many of whom had never met each other in person before. Today, video chat is the tool of choice for inter-office communication at Insomniac.

The cross-studio strike teams, on the other handed, proved more challenging. Despite everyone’s best intentions, iteration time slowed down thanks to time zone differences and communication overhead. The impromptu

brainstorm meetings that are the backbone of our work became formal and rigid. In the end, we reorganized the teams so most members of a feature group were on-site together. Our next cross-studio collaboration, *Edge of Nowhere*, we adopted the “same-site strike team” approach whenever possible and saw a big improvement over our initial approach on Ratchet.

Finally, on the leadership side, we discovered that our flat hierarchy and reliance on individual empowerment doesn’t always work for remote development. So one of the first things we did on *Edge of Nowhere* was creative a “team structure” document aimed at giving people a clearer sense of the decision-making hierarchy and to whom they should go when issues came up.

As the saying goes, “culture eats strategy for breakfast” – we have to be careful in our effort to foster “bi-coastal breakthroughs”. Again, because culture. But we also know that with talented Insomniacs around the world and amazing opportunities on the horizon, we’d be foolish to stop trying.

## 2) Poor archival practices

You'd think we’d value our own work. But sometimes, we move from project to project so quickly that we forget to label and store everything. If I had a time machine, I’d send myself a nasty letter—“give everything a descriptive name and archive it, you idiot!”

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We simply don’t have access to our source files from the PS2 era. Back then, we had a numbers-only naming convention, with number-to-name directories scribbled in private notebooks. We used a home brewed asset management system that we can no longer access. And our directory structure was a free-for-all, with source files

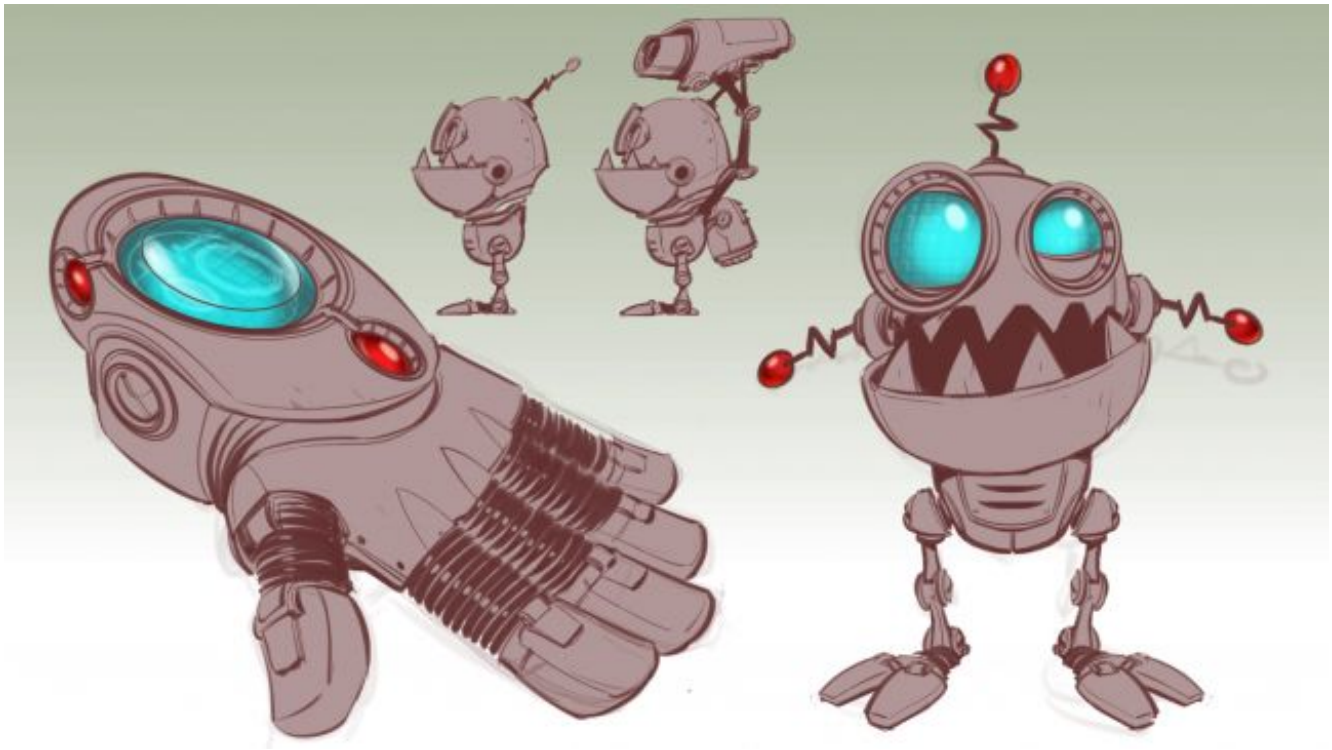
frequently hidden away on local directories.

(You're probably aghast, but that's not the worst of it. We also used Hot Wheels as an asset control system. Seriously—if you wanted to check out a level, you'd grab the corresponding Hot Wheel to signal that it was yours for editing. Level 6 was the 1968 Beatnik Bandit. I always liked that one. Wait, maybe that system was pretty cool).

Anyway, our PS3 era assets are more accessible—we used Perforce at that point, finally—but still plagued by questionable naming practices and haphazard structure. Finding things usually involves messaging the person who made it, which makes asset wrangling the domain of the few people who remember that sort of thing. Thanks goodness for Greg Baldwin and his encyclopedic knowledge of the character and weapon lineup.

Luckily, the PlayStation 3 R&C Collection proved to be our saving grace. Idol Minds went through the painful process of extracting our assets from the PS2 master disc for the collection. We realized early on that we could use those libraries. So we enlisted support from technology consulting firm Tin Giant to extract data from the collection and convert it to our engine formats. Amusingly (to us, anyway) the assets retained metadata from the PS2, so we got to revisit our asset numbering system and remember our fledgling development practices.

We're now a lot better at naming assets, maintaining clean directories, and keeping our data accessible, by the way. We learned the hard way.



*Agents of Dor*

## 3) Underestimating cinematic production time

Here's another one for the depressingly thick "mistakes we make every single time" file.

We're really bad at scheduling cinematics.

We think we know how long they'll take. We base our estimates on the script—one minute per page is a good rule of thumb—plus some lessons learned over the years about dialogue-heavy scenes vs. event-driven scenes. We go

back and forth to make the script manageable. We try to leave some buffer. It's never enough.

We always forget to take ambition into account. We're never satisfied with just the story cutscenes, just the basics. We want elegant transitions between every gameplay segment. We want NPCs to have more fluidity and expression than we initially planned. We want Ratchet and Clank to jump seamlessly into their new Galactic Ranger ship, and then we want the ship to fly to the stars on a custom path authored for that specific level. If we don't have even one of those things, we get very sad and everyone pouts.

Keyframed animation is a big part of the appeal of the series, and squash and stretch takes time. Our animators tend to love the work, so they push themselves hard against an unforgiving schedule. Thank goodness the work is fun, because there sure is a lot of it.

That's no excuse. We need to get better at scheduling this stuff. We're applying a multi-pronged solution: we're now creating animatics for connective cutscenes at the early greybox phase, just as we're wiring up the game. We use the animatics to understand what we're getting ourselves into, with a more rigorous review process that takes character numbers, blocking complexity, and shot composition into account. We derive the schedule from feedback from the animators based on that visualization.

We'll inevitably find scenes that weren't obviously necessary until we played through the game from start to finish. That's just the nature of it. So we'll keep building in that buffer to save us from ourselves.

## 4) Inelegant handoffs

We like to start projects with a small preproduction team, grow for production and then roll people off as we hit Alpha, Beta and then Gold. The extra time on *Ratchet & Clank* PS4, however, really threw a wrench into the gears (knew we'd do that at least once, right?).

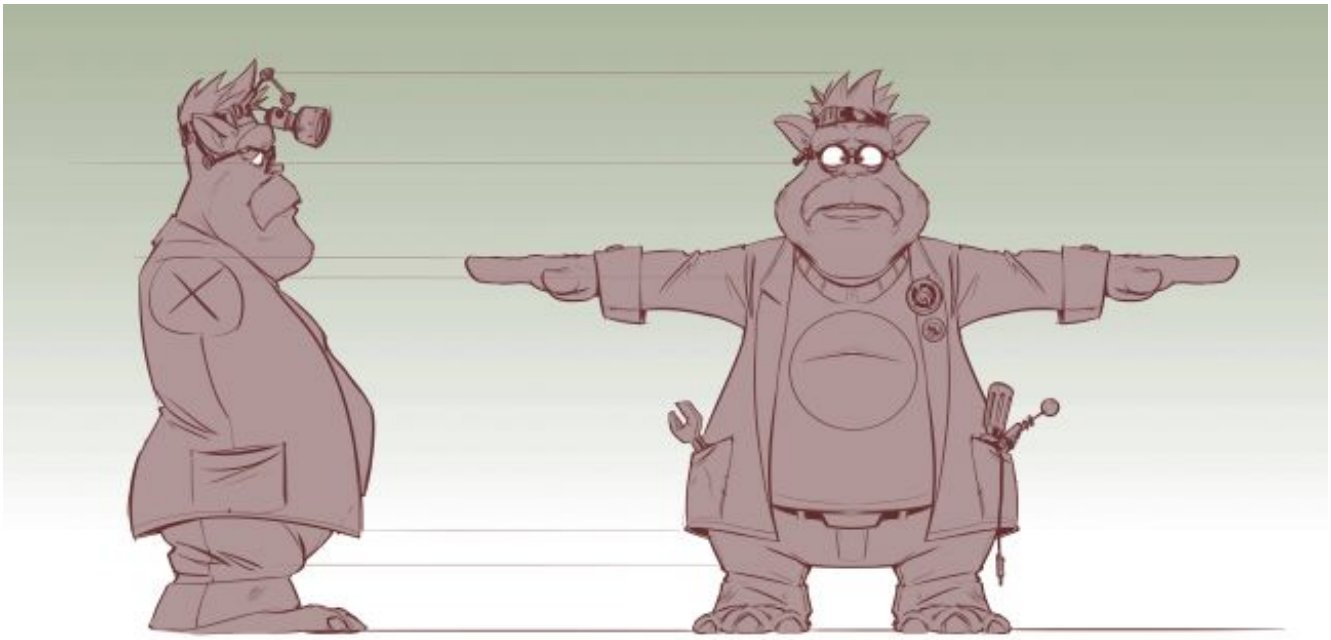
> ***"We had only two programmers, and, for the last few months, only one designer."***

We had the opportunity to extend development by several months. But most of the production team needed to roll onto other projects based on our original Gold and besides, we didn't have the headroom in the budget to accommodate a significant increase in labor.

In order to make it work, we rolled the majority of people off at our original Gold (which became Alpha) and finished the game with a small polish team.

This is *awesome* because at a certain point, you can just get more done with fewer people (our project manager would certainly agree). But it also meant that we had to take the work of an entire, full-scope *Ratchet & Clank* game and spread it among just a handful of people. We had only two programmers responsible and for the last few months, only one designer.

Our tiny postproduction team were champions. They took on a monster of a challenge and delivered as polished a *Ratchet & Clank* experience as we've ever done. In the future, however, we'd like to stick to a gradual rolloff that scales the team size with the work remaining.



*Big Al*

## 5) Moving target release dates

We take pride in our ability to hit our dates and finish strong. So while the prospect of delivering the gold master in ten months seemed a little crazy, it was also the sort of crazy that an Insomniac could get into.

We soon learned, however, that film release dates are far more fluid than those of games. Release windows mean *everything* to a film's success. And given the competitive nature of the market, there's little incentive for distributors to lock down dates too early.

For us, this meant more stops and starts than we're used to. We'd be geared up for a strong finish only to learn that the finish line had been moved back. And while the extra time would ease some of the pressure, it was also a bit of a letdown.

Don’t get us wrong, we’re *thrilled* to have had the extra time and know that it made a difference to the end product. But we also learned that extra time can be as emotionally draining as not enough time.

The Universe is vast and mysterious

*Pool Shark*

## WHERE DOES THE *RATCHET & CLANK* SERIES GO FROM HERE?

At this moment, we have no idea. We’re walking around with VR headsets strapped to our faces.

But we’re delighted by the reaction to the game, amazed and humbled that there’s still an appetite for Lombax and robot adventures after three console generations. For all of our initial hand wringing, we’re proud of it. The lessons we learned during development helped us improve our cross-studio coordination, plan our cinematics with more detail, and move through production cycles more gracefully.

So who knows?

What we do know is that *Ratchet & Clank* games are incredibly fun to make. There is intense passion at Insomniac for the universe and its characters. There are stories to tell, weapons to design, creatures to sculpt, planets to explore. And most significantly, there is a team of talented people here who have come through time and again to deliver games that are full of life and ambition. Above all, that’s why the series endures.