JUMP POINT

FROM THE COCKPIT:

If you've gotten this far, you already know there are plenty of developments in the land of **Jump Point**. Let's start with the obvious. Will Turner, Marketing Art Director and graphic designer extraordinaire, has created a new and strikingly different look for **JP**. After five years, it was certainly time for a change. I'm tempted to go through, page by page, and describe what he's done, but . . . you've got it in front of you, so I'll leave that to you. Bottom line: I like it — a lot! What do you think?

We're also changing up the usual content. In general, we're shifting to more of an emphasis on the game and its development, rather than the fiction behind the game. So we've got a couple of "Behind the Screens" discussions this issue, both about the Squadron 42 Vertical Slice, one from Design and one from Cinematics.

We've also got a new slant on our Work In Progress article. Rather than the raw (and sometimes a little obscure) developer conversation, Ship Pipeline Manager Ben Lesnick narrates the development of Tumbril's Nova Tank, from initial discussions to final polished concept.

And we're kicking off three new short features, but only one of them this issue. That first one is "Galactapedia." The Galactapedia is going to be an actual thing in Star Citizen, and we're going to start posting Galactapedia entries about new and interesting features found throughout the galaxy. Cherie Heiberg, Archivist, supplies our first ever entry, on the Xiphopod, with art by Forrest Stephan.

The other new features will debut next month, and I'll have more to say about them then. (I will say that I'll be looking for input from you to help make them work.)

As we kick off a new chapter in the life of **Jump Point**, it's worth taking a brief look backwards, as well, especially since the game itself has also just achieved a major milestone. I have spent five years working with some of the best and the brightest in the field of game design, and it has been, and still is, a real kick. Some I've known for a long time, starting with CR, and some I only met when I signed on with CIG. The lore team, in particular, have been great to work with — their enthusiasm and dedication have been a large part of why this 'verse feels so real, and it's always great to include their work as part of **JP**. But the new and revised **JP** is going to be giving others the opportunity to contribute as well . . . I think you're going to like the new, updated **Jump Point**. Take a look, and tell me what you think!

Hold on, it's gonna be a wild ride!

David.

THE SQ42 DESIGN TEAM

JUMP POINT: *Let's start with introductions. Could each of you please give me a brief description of what you did on the Vertical Slice?*

NICK ELMS, CREATIVE DIRECTOR: Day-to-day direction of content and liaison with other departments around the company … and dodging producers. :P

JOSHUA HACKETT, PRINCIPAL LEVEL DESIGNER: I owned the mission from the flight down to Gainey moon and Chemline Solutions.

DEC TROUGHTON, SENIOR DESIGNER ON S42: I've been working on the AI setup within the Idris for the VS.

PHIL MELLER, LEAD DESIGNER: Chief pest in realizing CR's grand vision.

SIMON VICKERS, LEAD LEVEL DESIGNER: Looking at the overall flow of the VS and coordinating the other designers to best implement their individual areas of responsibility.

ROSS WILDING, SENIOR LEVEL DESIGNER: My focus was the mission flow, key scenes and conversations on the Idris, as well as some of the AI activities and behaviors.

CHRIS PARRY, PRINCIPAL DESIGNER: VS WORK: Primarily focused on the space flight sections between takeoff from Stanton, up to the flight down to the moon, and helping out with technical setup aboard the Idris where needed.

ROSS WILDING   PHIL MELLER   SIMON VICKERS   CHRIS PARRY   NICK ELMS   JOSHUA HACKETT   DEC TROUGHTON

JP: *Obviously, there's a lot of directing, managing, and helping others get their job done. But for this next question, I'm not asking about that. When you're not directing, managing, helping others — when you're designing, yourself — what specifically are you doing? What sort of tasks do you have? How do you go about it?*

NICK: Lol … mostly answering emails. Arguing about resources with other directors. Pestering leads about video updates to share with the directors … and generally annoying the dev staff with nitpicking comments and suggestions, such as characters not looking at the player when talking to him. :)

SIMON: From a lead perspective, a lot of it comes down to making sure everyone has the information and support they need, from other disciplines and within.

Feedback comes in the form of playing through either the entire VS or individual sections and being able to say what is and isn't working. From there it's a case of providing suggestions on how to improve an area or make it better fit the experience as a whole.

DEC: My work generally involves setting up the behaviours for the AI in social spaces such as the Idris,

so what the AI will do, how they go about doing it, and whether they interact with the Player or other AI as they go about doing their thing.

I tend to approach setting up and AI as if I were actually that character — say I'm setting up an Engineer's behaviour, I'll roleplay it a bit and think about what an actual engineer might do as part of their day-to-day and go from there. To do that setup, I jump between the editor and Subsumption as well as dip my toes in Dataforge every now and then.

PHIL: For me it was making sure that the scripted Performance/Motion Capture was correctly featured in the Chapters. Also taking part in multiple review sessions, chasing up the feedback.

SIMON: As an example as to why I was so important, I told Dec to roleplay as an engineer.

ROSS: I spend a lot of my time working in Subsumption, our main scripting tool, to get the desired behaviours and flow working / feeling right, then reviewing those over and over to make sure we don't miss anything. The first part of VS is heavily driven by the narrative and there are tonnes of AI, so it's import-

ant that everything feels natural and believable. We've also been using VS as a benchmark for developing the necessary tech to achieve this, so a bunch of my time has also been spent working with coders and other departments to develop that tech.

JOSHUA: Getting stuck in to Lumberyard, DataForge and Subsumption to build out the core player experience. The core role of a level designer is inherently to bring all disciplines' work together in such a way that feels coherent to the player experience. Because of this, it is impossible to get away from the managing aspect and is a delicate balance of chasing down and feeding back on content/features as well as implementing them. The day-to-day for me away from this mostly involved playing, testing and iterating over core logic and layout, making improvements where I could and building in key features when they became available.

Some examples include:

• Building out the combat zones and developing the AI behavior previous to combat

• Setting up gameplay puzzles, such as the power

states to enable access to the base

• Setting up and maintaining core systems such as gravity and atmosphere

etc. …

CHRIS: Adding or moving things around in the level editor (from clothes lockers, to quantum travel destinations, to disabled ships), then updating or adding mission scripts to make use of those changes, then jumping in game and testing the changes, evaluating them, then repeating the process until it's at a good enough point to show others, either in person or via a video capture.

Discussing in depth with systems design and coding the requirements for a mechanic or system, to make sure where we're going is matching Chris's direction and everyone, from design director, to level designer, to the programmer implementing it, is on the same page, and going over the progress made and changes still required.

Walking over to a programmer's desk to discuss in-progress setup, what isn't currently possible and

the solutions that work for both of us (sometimes I've done something wrong, which is an easy solution, sometimes code changes are needed). Creating or opening test levels to review and iterating on specific objects and their behaviour (player opening a locker, AI opening a locker), or testing an AI's behaviour.

Entering information on blocking issues (whether it's that the editor or game crashes, or that the tool or mechanic I need to work doesn't), collating those issues from myself and others, and bringing them up in production syncs (typically a quick Skype call with production from every studio).

JP: *Also obviously, this Vertical Slice is a major step forward in many ways. What are the most significant design developments that we were able to implement in it?*

SIMON: The Vertical Slice for me is much less about the individual parts and more about bringing them all together. It's the proving ground for a lot of our key elements and is a glimpse of the experience Squadron 42 is trying to deliver.

This includes seamlessly moving from one location to

another, plus a ship's worth of characters we can interact with or just observe going about their daily lives, all while maintaining a really cinematic experience.

JOSHUA: We got a great chance to stress test our pipelines and processes on what was a core part of the game, involving every discipline. For me, the most important part is seeing what worked and what didn't and how we can improve them from large scale dev pipelines such as the conversations and animations to small scale quality of life improvements, both in development and in the gamer experience. Also, getting AI combat in is now giving us a good understanding of our core gameplay loop and where we want to be going with it for all of our missions.

JP: *Give me an example of a small scale quality of life improvement.*

JOSHUA: General optimizations to help the game run faster not only improved the overall experience for the player but also improved day-to-day testing and loading times, easing developer pain.

NICK: There is an incredible amount of technology that we have had to get to a functional state for the VS to

even play out. The Shubin Archon Station that we blaze past is over 10 kilometers long, for example. To have play spaces of that size we have had to refactor large elements of the engine. We also need a way of scaling the detail on ships for both geometry and AI, so that if you fly away from the Idris, we are not still maintaining over 80 AI characters. This meant that we break elements of the ships and AI into Object Containers, that can be streamed in and out as required. You can see this working in the area where Donna Atar is speaking to the player over the "render to texture" comms screen, but if you fly right up to the ship you can also see her talking in the cockpit of the Reclaimer.

That is just an example of the general VS requirements pushing our Engine technology forward in many directions.

JP: *I know I sound like a fanboy, but I am constantly amazed by what I see and hear each time I get in game.*

DEC: The VS is a culmination of a lot of our systems all working together at once to provide something engaging for players — it's helping us move closer to what the final product of S42 is and helps us understand how we're going to go about crafting the rest of the game going forward, using the tech and thinking developed as part of the VS process.

One of the takeaways I personally like seeing from a VS is that we step ever closer to the holy land of best practices. Throughout a VS, we're up against a ton of problems that we need to think of solutions for. We work away at those problems until they're solved, and afterwards we come out of it with knowledge and experience that we can take into the rest of the development cycle.

ROSS: Before focussing on VS, a lot of the game's systems and tech had been worked on in isolation, so the Vertical Slice was our first chance to bring everything together and figure out the problems we had to overcome. One thing for me that's really come along in the past several months is the behaviour of our AI. Every character on board the ship has their own routine or schedule, which systemically updates depending on events, situations or changes in the mission flow. For example, we have guards such as Lars Neuer who you can see guarding the bottom of the elevator during the opening minutes. Then as we progress through the mission flow we see that he's been called down to the hangar for the arrival of several prisoners.

PHIL: For me it was finally seeing the building blocks fall into place. It was a chance to showcase a fully functioning Idris in all its glory: getting a chance to see the crew going about its daily business and acknowledging you; heading to the armory and selecting a weapon of your choice ... not via menu but actual one-on-one conversation choices. Another big goal achieved was conversations with the crew (getting to see that beautiful art up close), them reacting to your choices, seeing the performance. And that's just the Idris.

SIMON: We have a really big space cloud. I think a lot of us took for granted that making a space cloud would be easy. How hard it was explains why you don't see many in space.

NICK: Haha ... yep ... you really can't appreciate that until you actually start to move at Quantum speeds. :)

SIMON: Yeah, even though it features as a big hero location, it had been really ... fluffy... for a while as to what it would actually be like in game. Without the tools to actually get it in game and all those systems in place to see how we'd navigate around, it was really hard to nail down. As soon as we had it in game, all these unknowns just started to become much more real.

PHIL: I've been waiting a long time for that Coil.

JP: *Coil?*

SIMON: The aforementioned space cloud. I don't think I did it justice with that introduction.

NICK: Yes ... there is still a lot of work to get in on the "Coil." Turbulence, effects on ships' UI and internal systems, lightning strikes, etc. ... but I think there is a feature coming on ATV on the Coil soon ... SO DON'T SPOIL IT! :P

PHIL: Not merely a space cloud. Dave Haddock would kill you.

SIMON: It's a character in and of itself. If we had a movie poster it would get top billing alongside Gary Oldman and Mark Hamill.

NICK: I'm sure the writers will have a book about the demise of Planet Odin I ... as the star turned into a White Dwarf.

DEC: Yeah, once we got the Coil in, it definitely made looking out the windows of the Idris a little more pleasant. :D

JP: *It's always better to have a visual point of reference, especially out in the deep dark. Bonus if it's as neat as the cloud.*

PHIL: Nothing pleasant about the Coil.

NICK: ... maybe from a distance.

SIMON: But that's just it! You start off in this crazy detailed ship and you have a nosey out the window and you think "that's pretty."

PHIL: A bubbling cauldron of death.

JP: *Much of space is better when viewed from a distance (see: Odin I).*

SIMON: It's only once you're out in space blasting around that you suddenly realise, it's not just a backdrop.

CHRIS: A lot of the developments for Design (as in the department) came through in the form of tools and tech that were available to us; there are numerous pipelines that were created or improved upon to enable us to implement the content seen in the video. The render-to-texture video comm system came on leaps and bounds in terms of how we implement it, but also its look and feel. There are numerous new systems that support a systemic approach to the behaviour seen, from the AI walking around the Idris, from markup around the ship to give them points of interest to look at whilst walking around, to their queuing and going through the steps of picking up cutlery, a tray, food, etc., and then sitting down to eat, all through generic setup, rather than bespoke scripting.

A lot of the cinematics seen in the video were possible because of a new interface between our cinematics tools and our mission scripting & AI tools.

They allowed ships and AI that have been generated via missions or generic markup to be fed into and controlled for specific, high fidelity scenes.

There's also a lot that you didn't get to see in the video, because it's not quite ready yet, that's super exciting, and we're really looking forward to leveraging and improving the game with them.

Flying from the wreckage in orbit, after rummaging through Trejo's ship, down to the moon's surface, definitely hits that home.

JP: *Now that the dust has settled a bit, what moment in the Vertical Slice are you most proud of?*

PHIL: Concerning what we showed in the VS. That was the abridged version, still plenty to see. Player and Trejo's escape, another 2 Nav points to explore.

NICK: The ongoing work on making the Idris, a living breathing ship, with places of interest and people that you can interact with in all areas. But also that all the NPCs have their own schedules and downtime that make the whole environment come to life.

SIMON: Oof! Generally, just seeing it all come together. You spend so long looking at these tiny details that you often overlook the bigger picture, until you take a step back.

PHIL: Proudest moment ... tough. I'd like to say it's the seamless transitions from the Idris to space, Space to Gainey moon, then into Gainey base. But the horrible gore hound in me loved the knife kill before rescuing Trejo; I never got bored of that.

JOSHUA: I am most proud of getting Chemline Solutions to a playable location with active AI. We have a lot of improvements coming for it and how the location can be tackled by the player, but overall the entire team involved with Chemline Solutions brought it a long way and pushed hard for it to be ready for the live stream.

DEC: It was nice to finally see our AI working a little more how we intend them to work in the future. The way a lot of them were set up was in such a way that there's a lot more logic in what they're doing, rather than moving from point to point with no real thought behind it other than rolling the dice to see where to go next. We made some big strides in a lot of the behind-the-scenes setup which really sets us up nicely for working on AI in the future.

PHIL: Got to say, I loved the VS Commentary track from Chris, Sean and Dave. That had me beaming with pride.

ROSS: I think just the fact that the VS has everything in and working at a stable frame rate with seamless transitions is a huge accomplishment. Throughout the whole of VS, there's way more going on both inside and outside the current playspace. One thing I do have to mention, though, is the whole briefing sequence between the player, Old Man, White and Wexler. We worked on this for months trying to get everything perfect and the tech right. For example, the part where we see a holographic version of Wexler is an actual projection of him playing his part from inside Shubin Station, not just an animated texture.

CHRIS: It might sound daft, but some of us sat in one of the meeting rooms and watched the livestream on a big TV (usually used for conference calls), and just seeing it play from start to finish, with so many people commenting on it in chat (good and bad), seeing the video end, with the knowledge that lots of people had

finally seen an hour-long chunk of what we've all been working so hard towards, was the point where the feels™ really kicked in.

JP: *That leads me to my next question. How closely have you followed the community reaction to the VS demo?*

SIMON: Ha, I watched it multiple times with family and friends, and there were still bits that just made my skin tingle over and over.

DEC: A lot of us were watching the live stream either as it happened or the next day after catching up on some sleep!

SIMON: Approaching Trejo's Avenger ... the MUSIC! Oof. As for community reaction, I'm going to be completely honest, the next few days were spent rejuvenating. You get close to these things when you work on it so closely and so hard.

ROSS: Yeah, I'd actually travelled back to visit family on the day we showed the live stream, so being able to watch the whole thing with them was great.

DEC: Thinking about community reactions, I remember seeing a few wildlines triggering in quick succession on Kelly while we were on the bridge and seeing the chat light up a bit ...

NICK: Too much ... we watch the videos from other Youtubers and Twitch streamers. Read the Reddit posts etc. ...

But I really think that Chris, Dave and Sean covered a lot of the issues with the directors' commentary. We were asked to contribute to that, but to be honest we

could barely say our own names at that point having done 3 all nighters. |-)

SIMON: Once I'd had 48 hrs sleep though, I was picking through Reddit and the forums. It was really heartening to see the support and understanding from the fans.

We're on-going with the development of the VS and the technology, so there were elements we chose to show, warts and all, that we could have hidden away with smoke and mirrors. But we trusted the community and a lot of that trust has been bounced back to us. It's very humbling.

ROSS: And for me it was similar to Simon, really. I spent the next few days resting up over Christmas and seeing family, then dove back in to see people's reactions. You get so close to something after months of work, so when you see people saying great things and loving it, it makes the added effort feel all the more worth it.

DEC: Yeah, I think generally the response was pretty positive — there were a lot of great reactions from seeing characters such as Old Man and Captain White for the first time, too.
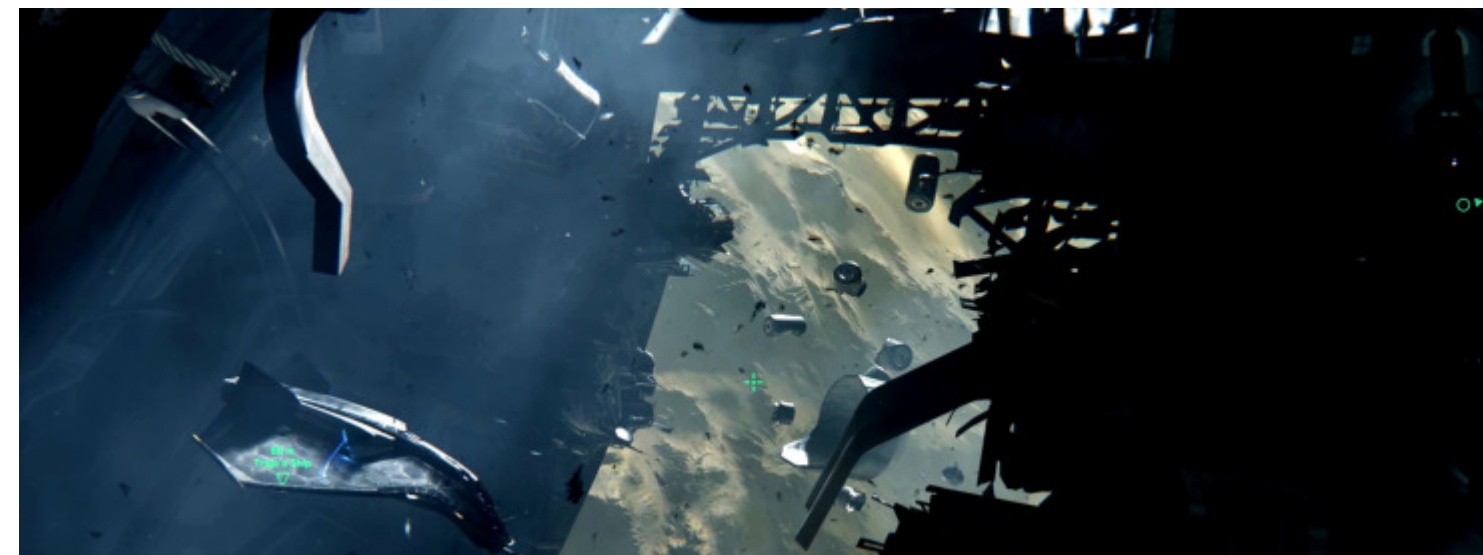
SIMON: Man, Captain White.

DEC: I think he's my favourite character in the whole game, you know.

SIMON: I would have him as an estranged father any day.

PHIL: Don't get me started on Old Man's hair. Magnificent.

JOSHUA: It was great to see a lot of the positive commentary and feedback on

the stream. I think we have a community that wants us to succeed, so all commentary was positive or constructive. We are lucky to have a non-toxic environment to develop for and I hope we can continue to meet and try to surpass their expectations.

SIMON: I'm a fan of Karl Libit myself. Expert deck crew and all-round great guy And handsome.

DEC: Is that the NPC that has your face?

SIMON: And body. Sorry, things are getting weird.

JP: *Umm ... sometimes realism can go too far ...*

PHIL: Yes. Stop it ... now.

CHRIS: After the livestream went out (and reading the chat throughout), I went back to Wales and spent some time with family, no computer, plus their house is in the shadow of a big hill, so not even a mobile phone signal, and did very little. After that I did even less before coming back to start the new year, so I didn't follow too much after the event. We get global emails from our community team though, and it was great to go through the comments they'd collated.

JP: *Now that we've released the Vertical Slice, what new developments are you looking forward to? That you can mention? Is there any more work to do on the VS itself?*

NICK: As anyone who watched and listened to the directors' commentary will know ... we have loads of work to get into the VS going forward. The great thing about that is that almost all of that work will be refactored in other chapters of the game and push all of our game mechanics and systems forward.

SIMON: As Nick says, there's still a lot to do on the VS, but I'm hyped to see the rest of the game rolled out to that level of quality.

ROSS: Even though VS is looking great, there's still more we want to continue tweaking and polishing to get it feeling as awesome as possible. Outside of that though, I'm really looking forward to getting stuck into some of the other exciting levels we have planned for Squadron. There's one in particular I really can't wait for, but I can't say anything more about that just yet ...

DEC: Yeah, our work on the VS isn't over quite yet. We figured out a lot of stuff but there's still plenty more to figure out. :) The live stream was more of a progress update and the VS as a whole is something we're still working on to make it as smooth and shiny as possible before we're ready to say "yep, this is what Squadron 42 is." I'm looking forward to having the VS behind us so we can bring everything we've created for it into the rest of the game. There's a lot of really cool stuff in the other chapters that I genuinely can't wait to see finished and have in my hands ready to play.

CHRIS: I'm really excited about the changes coming to radar, and the addition of scanning; some of the flow seen in the video will differ once you have the ability to search for hidden or low-powered ships through your radar, or are looking for a person of interest, secured in an unknown base. A lot of messaging will be done through the player's ability to scan their environment and see something's state; why isn't something working as I need it to? What does something else have within it that's useful? Discovering the location of certain objectives, and how to reach them, will be driven by the player, rather than spoon-fed them, which is something I love.

PHIL: "Looking forward to" ... that's something you do when you daydream about "what's for dinner." VS was a WIP glimpse at what we have planned. My one goal moving forward is finishing this game and delivering on the hype.

NICK: YES! Drill sergeant, SIR! :)

JP: *And now time for full disclosure. :) Were there any easter eggs or interesting nods in the demo?*

DEC: I think we did one as part of Chakma's setup, right?

NICK: Well, the obvious one was the Terminator reference. Which Dec is far too young to have got, or watched actually.

NICK: ... but there may be more?

SIMON: As I may have subtly touched on ... we have a few of our staff scanned and in game.

DEC: And some aren't scanned, but we've got their voices in. I think at one point you can hear one of the designers, Robbie, chatting away through a speaker on one of the bridge consoles.

SIMON: That's more of a power fantasy for the staff though. It's a kick seeing yourself alongside A-list actors.

DEC: Or getting shot at by A-List actors.

SIMON: I once saw Phil spend most of a morning staring at the back of his own head when he was turned into Eckhart.

DEC: There was also that time Phil insisted on being in the Morrow Tour so we made him salute the player and Morrow as they moved around a corner ...

NICK: Look ... it's his avatar now ... he bullied the character team to turn the clock back 10 years!

PHIL: Stop this NOW.

JP: *Perhaps we should move on to the final question. :)*

We're just about done here; thank you very much for your time. Do you have any last words?

SIMON: Just to say thanks to everyone out there who's been supporting us this whole time. It's been a wild ride, but getting it out there and sharing it with the community makes it all worthwhile.

CHRIS: Massive thanks to all the backers and **JP** subscribers; you're what makes all this possible. I'm excited as a dev and a player about what we're striving for, and really looking forward to your seeing more.

NICK: Only just to thank everyone who is part of this fantastic community for allowing us to all work together on making this epic game.

DEC: It was awesome to see all the feedback and passion for what we're trying to achieve with the game, and I can't wait for people to get their hands on it. Big thanks also to the team working away on all the different areas, it really is the best team I've worked with! Cheers!

JOSHUA: Thanks to the community for the support, but also thanks to all of the devs that took part and put a lot of effort into making a great section of the game we showed off last month.

PHIL: A big thank you to all the S42 team for putting in an epic shift, and a bigger thank you to the Backers for making this madness possible.

ROSS: It's been a great ride so far. In the 10 years I've been making games, I've never been a part of something with such a passionate and pleasant community. I can't wait for what's to come.

Also, I'd like to shout out to my cat, Ico, for putting up with me coming home at all hours.

JP: *I think we're done here. Again, thank you all very much.*

SQUADRON 42 CINEMATICS

BEGIN TRANSMISSION →

JP: *Let's start with introductions. Could each of you please give me a short description of what you did on the Vertical Slice?*

MATTHEW SLATTERY, JUNIOR CINEMATICS DESIGNER: I did the intro blockout, takeoff, Reclaimer and AA turret cutaways for the VS.

HANNES APPELL, DIRECTOR OF CINEMATICS FOR SQ42 AND SC PROJECT: I supervised all of the cinematics and cutaways for the Livestream VS demo.

That included Old Man's intro scene for the IGN teaser, the Stanton intro sequence, the Captain White briefing scene, the launch sequence, the OMC prisoners arrival, several in-mission cutaways and Agent Trejo's rescue scene on Gainey base. I concentrated mainly on Old Man's intro and Captain White's briefing and dialed in lighting for several scenes.

Our **LEAD CINEMATIC DESIGNER MICHAEL NAGASAKA,** who cannot join us for this interview, also worked on the prisoners' arrival and the Stanton/Shubin intro scenes, and guided our two cine designers with their scenes as well. We also had a commercial for the HAMMERHEAD ship during the run-up time to live-stream demo and that is where his main focus was for that time.

JP: *Thanks! And while we're on basic questions, what exactly is "cinematics"? What do you mean when you say, "I did this scene"?*

HANNES: Traditionally "cinematics" means filmic story sequences in a game, most often taking over control from the player for their duration.

A lot of our game's scenes are very complex, so they can change hands several times.

But generally they involve previs/blocking, then setup with performance captured animations into the actual environments, blocking and polishing the cameras filming the sequence, and then dialing in lighting and VFX for the scene.

HANNES: In SQ42 we have pretty much all types of "cinematics": 3rd-person filmic sequences without player presence, 3rd-person sequences with the player in the scene, 1st-person cinematics in full control, but also 1st-person scenes on-rails or with partial control for the player. Most of them are in real-time in the actual level.

MATTHEW: Cinematics primarily comes down to setting up cameras for a scene, but it also incorporates a lot of other things. That includes AI animation triggers, creating cinematic lighting sets, props/scene blockout, PFX emitters and actually all implementing that goes into the game in a visually superb way that gives good performance (FPS).
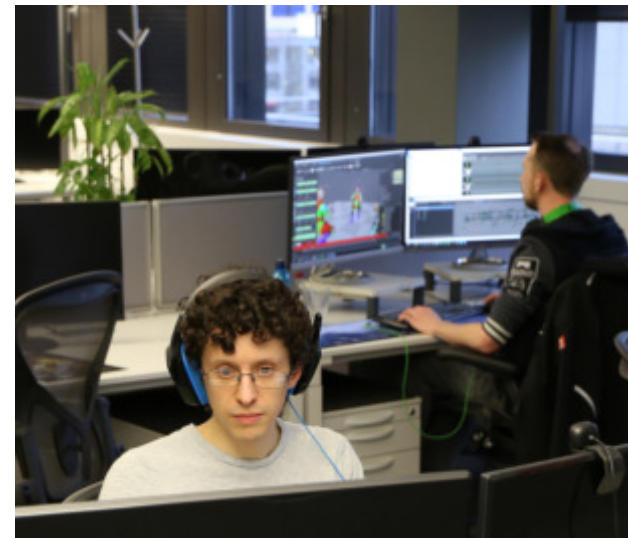
A lot of it also comes down to working closely with others teams (Props, VFX, Design) to ensure this all flows together well and runs fine in-game. As a result of this, cine ends up touching most factors of the game.

HANNES: Yes, we are pretty much entangled with all other teams, including Character Art, Environmental Art, etc., and we rely on a lot of tech and systems to work. Cinematics are usually finished very late in a game's production

JP: *So (for example) you determine when a character moves from Point A to Point B, and you assign a walking program to get there, and then determine when the character speaks, when he or she pauses, and so forth?*

MATTHEW: For the majority of the time that's determined by the actor's PCap.

HANNES: What you describe is more in line with AI behavior design, something which we tie into or go back into after our scenes,

but cinematics mostly rely on performance capture at their core — something that is an actor's performance and that has no AI decisions in it.

MATTHEW: For some scenes we do determine when a character speaks, i.e., in Old Man's takeoff, when it feels best for him and Seetow to deliver their lines during the cutscene.

HANNES: As our cinematics are real-time a lot of the time and our conversations with in-game characters often involve branching, we and our cinematic animators do a state machine for each scene, though. So they break up an actor's performance into states of "idling," "introduction," "idling_waiting for choice1," "choice1 response" and "conversation end."

JP: *As you describe it, I begin to understand why Hannes used the word "entangled" ... it's real hard to define the boundaries between what you do and what*

lots of others do.

HANNES: Yes. CR specifically did not want the simplicity of "just" pre-rendered cinematics, where you could afford the luxury of workflows that are staying away from the actual game production. CR wanted to push boundaries in our area as well, of course!

We basically wanted pretty much all of our narrative scenes between characters to be based on performance capture, while still aiming for the player to have as much interaction and immersion in that as possible. Which can only be done if you have the player be a part of scenes and being able to influence them.

MATTHEW: That real-time interaction gets really interesting and pretty mind-blowing sometimes. You could walk behind Captain White during the briefing scene from the VS and dance. Then it hits you that this isn't a pre-rendered cinematic, even if it looks just as

good as one.

JP: *I thought this was going to be a pretty straightforward discussion, but I'm seeing that this isn't your father's cinematics.*

HANNES: This actually sometimes gives me and the designers headaches. Of course we want our narrative to shine and the performance to be seen and to come across. Allowing the player to not "be a part of the scene" by just fooling around during a scene is not something you want. So in some crucial scenes we are trying to either sit the player down, box him in or (if needed) will force him into position.

MATTHEW: Yeah, it can definitely be immersion-breaking, but if used right it can be awesome. For example, if you took out an enemy ship and it crashed in the background, that same ship would still be there during a cutaway. Perhaps less dancing behind your superior

ating a dramatic pause in his line delivery. I pitched it to CR with previs, he liked it and we went with that setup.

We also used live-mocap feedback on our shoots and most of the time I was responsible for that as well. Live-mocap feedback means we are seeing the scene play out live in our actual in-engine environment that we have at the time of the shoot. Sometimes this can look almost like the finished cinematic already, when a ship we are shooting in is final and we already have the scanned actors models in the engine, but sometimes it can look rough and early still. But CR and I found it ultra helpful, especially with a metrics-heavy game as ours.

JP: *Imagining all this in my head, I'm realizing how much more flexibility you have with a motion capture recording than you do with traditional filming. Once it's all recorded, you can shift the camera angle any way you want, giving you many more options … but also giving you many more choices to make. Does having so much more flexibility make your job harder?*

Matthew S: I personally think it's a huge boon. Some teams will use 'mocap cameras' where they actually record the camerawork for the game live during the PCap, but I feel that's very restrictive. It definitely gives an authentic camera experience, but if you know what you're doing, you can achieve that with a keyframe approach as well, like we do.

I could never bring myself to complain about more freedom, even if tough choices need to be made.

HANNES: It does give a hell of a lot more freedom than shooting traditionally, but it can also be hard at times to keep focused on what counts — the actual actors'

performances and their faces.

There is so much tech involved on set that you need to make sure it all just works and blends into the background and you can concentrate on your circle of actors in the middle of that room: almost like a theater stage play, only with absolute high tech all around. :)

If you do the base previs first — and you made your choices about sides, half-circle rule, lighting directions and transition in-out of the scene or things like how to funnel the player into the scene correct — actually taking the PCap material and starting to click together the final scene should not be headache-inducing, but rather a smooth process. :=

Matthew is right in his thinking. If we had tried to get "simulcam" style setup going where we would have tried to capture the camera at the same time as the actor,s we would have lost focus on what counts.

JP: *What is a "keyframe approach"?*

Matthew S: A keyframe approach is where you animate the camera by hand in-engine. A keyframe in one position at 0:00, a keyframe at 0:03... the engine will interpolate between the two positions to create movement. Think of that on a really large scale with dozens of keyframes for all the subtle movements of a human being using a camera — overshooting, mis-framing, re-focusing, shaking, etc. And then tweaking the interpolation to give a more authentic result.

JP: *This is starting to sound like work. :)*

Hannes A: Also "simulcam," meaning capturing the camera at the same time as the performances, sounds

nice in theory, but it is really not needed in our work-flow. Our camera tools are solid in the engine and it is just a lot better to do it after you captured.
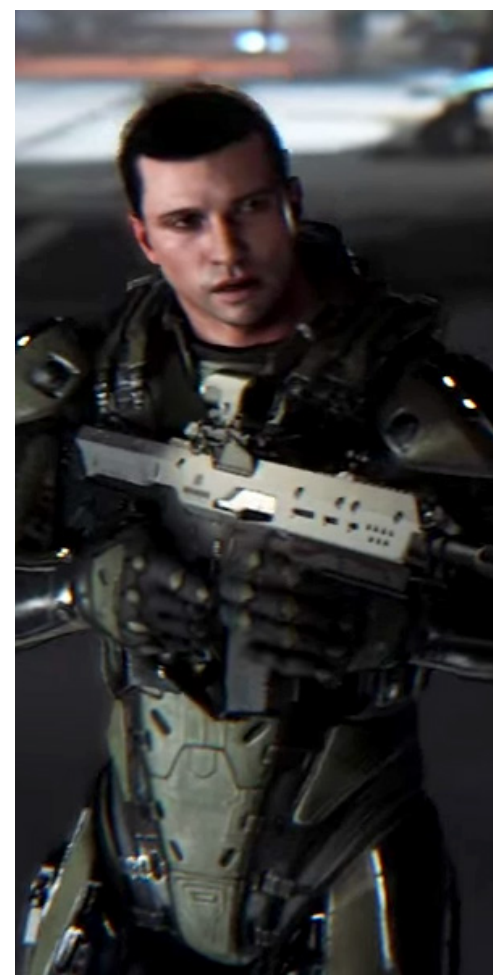
Our game with its vast spaces also would not allow us to use "simulcam" recording often. We would have to fiddle with the camera motions being at a certain scale then, and you quickly lose focus away from the actors towards your camera, which you should REALLY not do with an A-list cast and only a certain number of days with them on set.

Matthew S: Both methods definitely have their bene-fits. One is incredibly quicker but adds another degree of error to PCap. For example, you could have the perfect performance but your MoCap camera was off, or an actor tripped, or whatever else could go wrong. The alternative takes longer but gives more freedom, ability to focus on what you deem important, and it has no influence on the PCap process (which is already complex, as-is).

And Hannes makes a brilliant point, it would be near impossible to PCap cameras in space … it would feel like there's an arbitrary ground point or be awkward.

HANNES: I think a lot of productions have moved away from "simulcam" recordings. For example, James Cameron usually loves doing camera work and keep-ing control over that, found that as well. He made it a habit to go into the MoCap volume alone, after a day's capture, and fire up the data and then do the camera work without the stress of a live set with dozens of actors and crew. That's also an interesting approach.

But yeah, in our case I have trust in Matt's, Mike's, Philip's and my abilities to steer and animate the cam-

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officer, and more being consistent with the environ-ment between gameplay and cinematic.

There are some scenes where it's more a burden than a blessing, though. You just need to ask yourself, "Does this actually benefit the player's experience?" Obviously we can't PCap for every single muck about the player wants to do.

HANNES: I think we are trying to ride a fine line right in the middle to avoid the extremes on both sides:

One extreme would be too many pre-rendered cinematics with no player agency, where players get bored.

On the other side having too much player agency and player freedom, and putting that above the written story of SQ42, also would not work. So yeah, it is a balancing act but we are managing it. :)

MATTHEW: It's definitely a challenge, but I think the payoff is totally worth it!

HANNES: In a sense we also found that when we do scenes in "real-time," in the actual level, we can also "have our cake and eat it too," so to speak, meaning:

We cut to a filmic 3rd-person camera sequence showing the narrative in the best light possible, but the player can optionally "wiggle free" out of that camera and would then view the scene from where he/she is standing.

JP: *Yeah, I am all for player freedom, but bottom line,*

you're a pilot on active duty. I can see restricting the op-tions to what a character in that situation would actually consider doing.

What are the pieces that you specifically start with — what materials do you have available — and what are the results when you are done with your part?

MATTHEW: Above all, we start with the narrative and the PCap. So we have what occurs in the script, what our actors are doing … and we work around that. Usually the next step would be camera blockout (or set if really needed). Then from there the rest of it falls into place; we add lighting blockout, VFX blockout, any extra props or things needed. Just doing whatever's needed to tell the rest of the team visually what we want to achieve.

We don't step away when we're done with that, though. We work closely with VFX, Audio, Design, Art and everyone involved to capture our vision for the scene as intended. From there we'll also work from a technical aspect of implementing the scene correctly, working closely with our level designers. Usually we're working on the scene right up until it's time to plug it in game. Even then, I've often been the one to test and verify it works in-game.

HANNES: I have to start earlier than Matthew. My work starts long before the shoot, at least for more important scenes.

I start with nothing more than a bunch of stand-in character models and do previsualization before the actual performance capture shoot. We move these

characters around a set — often just a white box or grey box set — and start thinking about the overall staging, where would everyone be standing to enforce the scene's intent? Also, how to get the best out of the sunlight, or the base ship lighting? Is the environment and where it is headed good for the scene? Do I want to try to get it changed? Lots of thoughts like that.

I then present the previs of the scene to CR and we go to set with that.

We show the previs to the actors, which informs their performance as well. We use it for physical set build-ing and to check that our metrics are correct.

Once we then have the actual actors' performances, we wait until they are delivered and cleaned up. Usual-ly environments are further along as well at that point, and then we start getting the scene together in its final form, first by blocking it all in roughly and iteratively, and slowly building towards final results.

JP: *Do you work with the actors during the shoot?*

HANNES: CR basically takes care of their line deliv-eries if he likes their performances. I am basically his DOP on set, making sure the staging will work with the set we have.

I will occasionally also talk to the actors, give them more physical feedback about positions or speed, but always speaking about everything with CR first.

So for example, for Old Man's intro, I came up with the idea of him sliding down that maintenance ladder, cre-

era in the engine.

JP: *I have the impression that the AI is constantly being improved, and more features added to it. Does that affect the cinematics (and your work on it)? I'm guessing it ratchets up the degree of difficulty.*

MATTHEW: For the most part, AI has a pretty minimal impact on us, as we're working almost purely with PCap. AI is very unpredictable, so it's not ideal for cinematics with pre-keyed cameras.

HANNES: In general, we are trying to do a proper handoff, so an AI behavior gets paused-ended when our scene starts and reactivated after it. Designers are usually not trying to have active AI be part of a scene that also features performance capture, as that can lead to issues.

But yeah, for example, one of the issues we still need to tackle is AI "photobombing" our scenes. So even when they are not part of our scene, they like to walk into the background or otherwise stir up a scene (no pun intended).

So for that we have exclusion zones on our roadmap: a scene area gets very expensive for an AI to walk through and it will just not go there anymore, choosing another path.

MATTHEW: A good example of that is Old Man in the takeoff. He's AI to enter his ship, then once he's in during the cine it switches to cinematic control to time his dialogue and movements with our camerawork, then as he leaves the Stanton he's handed off back to AI.

HANNES: Active AI normally means "decision-making process" and that is the precise opposite of having

perfect control over a scene. So yeah, we often have words with our AI programmers how to retain that control we need for our scenes.

AI vs. puppeteered ships are also a big part of our daily lives. How we can get them to behave in scenes, how to hover, how to fly along a spline we created for them, etc.

JP: *"Puppeteered" = moved by hand?*

HANNES: Ship puppeteering means we are basically taking over from an AI pilot and can precisely tell the ship where to be in space and time, usually utilizing a nav control spline.

It also involves being able to trigger all kinds of ship states, articulated parts and light states. So it is quite a big tech endeavor to get perfect control over them and it is still an ongoing process. The launch sequence that Matthew mainly worked on was a nice test bed to test out certain control features like a landing gear track or a navspline transitioning the Gladius ships from the Idris hangar zone to outside space.

JP: *Now that the dust has settled a bit, what moment in the Vertical Slice are you most proud of?*

Matthew S: I'd be torn between the Takeoff, as it was a very daunting scene to tackle. While it has a long, long way to go, it was phenomenally inspiring to see it in action during the livestream … and the Reclaimer scene. I've got a lot of love for the Reclaimer, and working with the setting of that scene was just something else entirely.

HANNES: I was really happy to see Captain White's after-briefing scene working so well, particularly the bit where he talks about time with his son and how

he'd wish to have more.

It was nice to see that after all the animation state break-up and editing, the scene environment art changing from what we had on set to final, the lighting and his costume going through iterations, as well as his head and beard, after all that, Liam's performance survived our pipeline unscathed and we can have these subtle moments of real acting in our "little" game.

MATTHEW: The expression on White/Cunningham's face as he said, "That would be … complicated." the pause as he considered continuing, all the detail was brilliantly captured.

JP: *You may have already answered my next question — what was the most difficult part of the VS for you to create?*

MATTHEW: The most difficult part for me was the technical side of the takeoff sequence. I spent weeks working closely with Design. One of our senior animators, David Peng, even flew out from Austin to focus on the 'Deck Crew Dance' for that scene. As well as audio, character art, VFX all the while working on my camerawork, lighting and direction for the scene. It was a mad juggle. We were using new tech, a crazy hybrid of PCap, AI and cinematic, and really pushing the envelope on how complex a cinematic can be. I was also very nervous about having such a big scene be my first public piece from SQ42.

It was a really long and tough process to get it right, and there's still a long way to go with it. But what we achieved so far, while difficult, I'm pretty happy with.

HANNES: That is one of our big challenges: We are doing cinematics for an absolute tech-heavy game

where key tech is still being built, with cinematics that are entangled and even traditionally are finished pretty late in the process but we also want to show off our progress to the backers and then we don't want to show narrative that is half-baked, not lit well, or with big pieces missing. So it is definitely a challenge, but at the same time, even though we control space ships, it is not rocket science — yet.

JP: *Meanwhile, how closely have you followed the community reaction to the Vertical Slice demo?*

MATTHEW: Admittedly not all that closely. I was super nervous to see if everything would fall into place. Would my scenes look fine? Would we mess something up? But taking a look at some of the comments and praise was truly inspiring. Sometimes I wonder if a 'behind closed doors' sort of game would be less pressure, but the community continues to remind me we're doing something special, and they make it worth it.

HANNES: In regards to the community reaction, not too much I have to admit, I'm already busy on other cinematics and during the Xmas and New Year's break I make a habit of not checking up on the Interwebs every day.

I read up on the StarCitizen Reddit occasionally, and found some funny meme style .gifs with Captain White or Old Man sliding down the ladder, so that made me smile.

MATTHEW: Those were phenomenal. I'm so glad that's caught on as of late. Also the in-joke comments. I remember seeing one response to one of those gifs, "Nice. Not as nice as a Bengal, but nice."

JP: *And now time for full disclosure. :) Were there any easter eggs or interesting nods in the demo?*

MATTHEW: There was the Terminator reference, but I think everyone caught that

pretty well. :D

MATTHEW: https://gfycat.com/HelplessEcstaticIntermediateegret

https://gfycat.com/CraftyRigidIbex

HANNES: We have a bunch of silly easter eggs or cinematic dialogue that reference other pop culture in the final game, but I don't want to spoil it.

JP: *No, don't mention anything that wasn't in the demo. So, what's next on your to-do list? Is there still work left to do on this segment of the game?*

MATTHEW: Definitely, a huge amount of polish to go pretty much across the board. And with cine, I wouldn't be surprised if we kept working on the VS demo on the backburner for a long time.

HANNES: *There are a bunch of smaller scenes on Gainey's base that we want to finalize to cross that part of the game off the mental to-do list for now, and we want to revisit some of the scenes where we still used "hacky" setup and work with tools and engineering to not have to do this, but generally we are moving on to other chapters now.*

JP: *We're just about done here; thank you very much for your time. Do you have any last words?*

MATTHEW: Shoutout to Jamie, may you one day get a 'mind-boggingly-beautiful' Gladius. :D

HANNES: I'd like to thank the team, for having the will, concentration and talent to pull this off, all within our not so little "verse.".
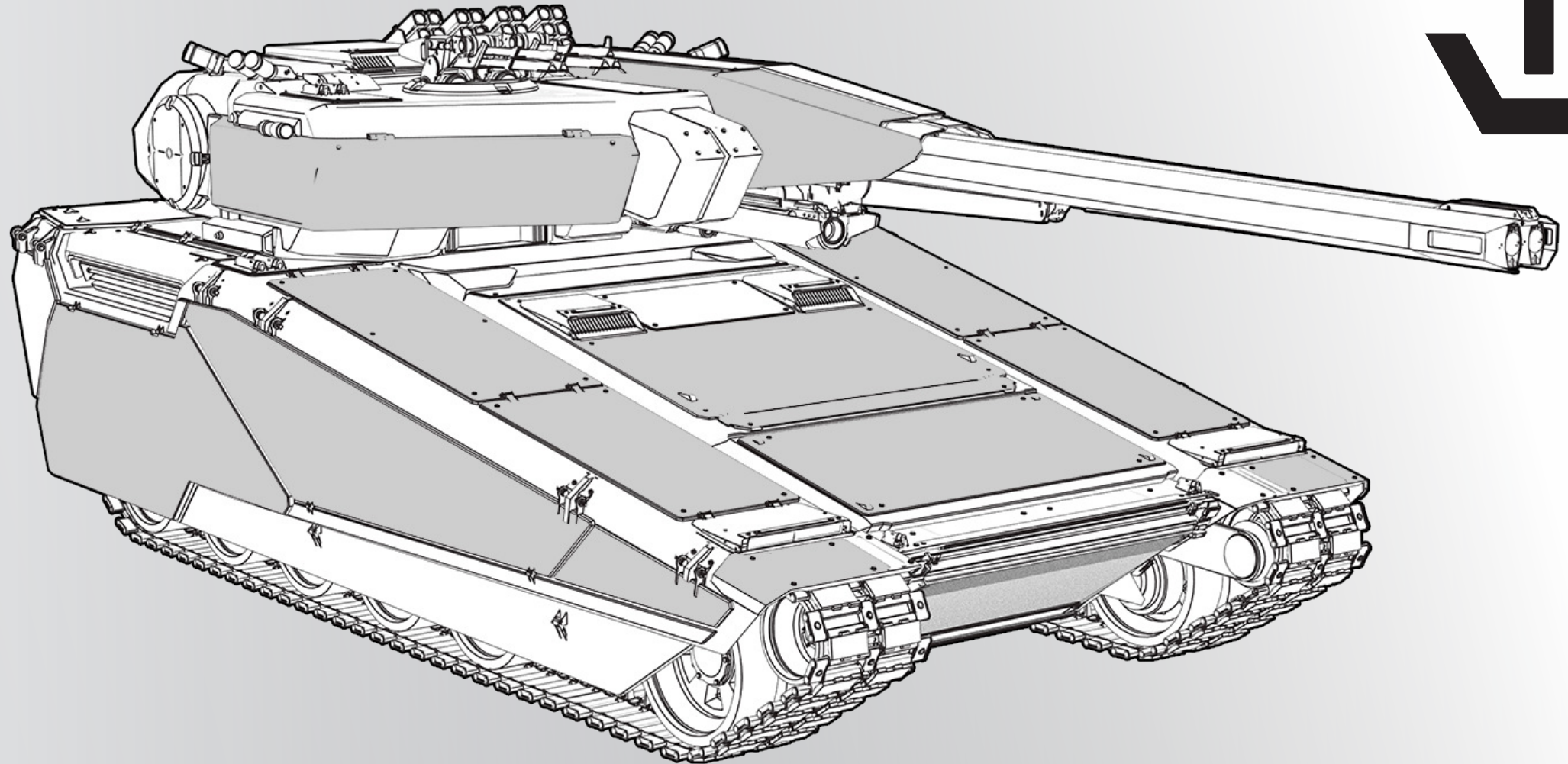
WORK IN PROGRESS...

THE TUMBRIL

NOVA

KEY CONTRIBUTORS : CONCEPT ARTIST: TOBY LEWIN
DESIGNER: CORENTIN BILLEMONT
ART DIRECTOR: PAUL JONES

AIMS

Heavy tank, big gun. Also includes AA capabilities (full rotation).

Large AA turret (guns + energy missiles) can be put on different bases (like T-54, Armata, etc.).

No windows, really limited interior space, but well protected.

AESTHETIC

Pretty sci-fi, slick and well armored.

Natural evolution of modern tanks/anti-aircraft vehicles + influenced by new planets and alien species cultures.

Length	At least 12m*
Width	Around 9m*
Height	A bit more than 5m* *To have a tank that makes sense in terms of proportions and decent armour, this is the minimum
Mass	Unknown
Speed	20
Crew	3 Driver Gunner Commander/Engineer that oversees the systems
Powerplants	1x Small Bigger than a vehicle.
Shield	1x Small Like the rover, it should have a basic shield.
Armour	Heavy

Weapon Hardpoints	3 (1x S4 ballistic cannon + 2x S2 laser repeater + 8 x S2 missiles). • Big main gun, AA turret, missiles, and a possible mini turret against infantry. All remote. • The main gun would be -5 to +20 pitch and some small yaw like nose guns on ships. • AA weapons would be swappable by the player, and work like remote turrets on ships. • Mini turret would need a good pitch and full rotation, since it'd work against spaceships and infantry alike. • Missiles TBD. Energy variant (technically unlimited ammo)
Interior	3 seats, access to most components, not a lot of height. Ship components that need space and be accessible behind wall panels or have interior built around them so they're always visible/featured: • Small Powerplant x 1 – 0.5m*0.75m*0.5m • Small Shield Generator x 1 – 0.25m*0.75m*0.25m • Medium Avionics x 1 – 0.75m*0.5m*1.0m (medium needed due to 3 functional seats) • Small Cooler x 2 – 0.5m*0.75m*0.25m • Small Radar x 1 – 0.5m*0.5m*0.25m • Small Life Support x 1 – 0.5m*0.5m*0.5m • Small Gravity Generator x 1 – 0.5m*0.5m*0.5m (needed due to having accessible interior)

THE GROUND INVASION BEGINS

Ground vehicles are not a new concept in the world of Star Citizen. When it comes to developing vehicles beyond the expected types of spacecraft, necessity has always been the mother of invention. Star Citizen's first drivable vehicle, the Greycat PTV Buggy, was introduced in 2013 with the Hangar Module, allowing backers with extremely large hangars the ability to quickly travel from ship to ship. Another pair of ground vehicles, the Ursa and Lynx rovers, were concepted alongside the Constellation variants, with the Ursa intended as an essential tool to allow the Aquila to perform its newfound job of exploring distant worlds. With that, development of new ground vehicles seemed to go silent. But a tectonic shift was coming!

Ground warfare in Star Citizen is not a new idea, either. Early on, before procedurally generated planets became possible, the team developed plans for battlefields that would function like smaller maps. The fiction behind these 'flashpoints' would be that they were select areas (such as orbital platforms and sections of terrain) which would be continually disputed. Players could travel to them and, if desired, join the fray. While these arenas would initially be similar to the Star Marine levels playable today, the immediate hope was certainly that these would expand further and further as time went on and eventually bring about the need for more fighting vehicles.

By the end of 2015, it had become clear that something bigger was in the works. The development of technologies that would allow the creation of procedural planets had been more successful than anyone had ever dared hope. Now, the Star Citizen team could create entire, fully-explorable worlds… which meant the previously ship-focused vehicle team would be needed to help populate and add gameplay on these worlds. As a result of the advancement of procedural technologies, the ship team focused a portion of their 2016 concept work on vehicles that would be useful interacting with the planets that would premiere in Alpha 3.0. Some of these, like the Consolidated Outland Pioneer and the Aopoa Nox bike, were traditional space vehicles (with a few twists)… and some of these, for the first time, would be dedicated ground vehicles offered separately from spacecraft.

At a vehicle pitch meeting, designers from around the company proposed their ideas for what ground vehicles to add to the game first. The need for an all-purpose 'pickup truck' style buggy that could transport individual players and small amounts of equipment or cargo around giant landscapes was agreed upon early in the meeting, eventually becoming the

Tumbril Cyclone. But with the obvious first choice out of the way, what direction would planetary vehicle development take? Different groups made different pitches that ran the gamut from dedicated mining and terraforming equipment (a favorite of persistent universe director Tony Zurovec) to anti-aircraft vehicles intended to counter the expected threat of attacking spacecraft (a concern of lead designer Todd Papy) to heavy artillery weapons that could be used to besiege newly constructed outposts. More esoteric fan favorites came up as well, from boats to submarines to simple future delivery trucks. A list of options was agreed upon and presented to Chris Roberts, who quickly made the final decision: a main battle tank.

And so was born Tumbril! With the Cyclone buggy and the Nova tank now on Star Citizen's long-term vehicle schedule, the lore and art teams made the

ARMOURED PREDATOR

A NOVA ON THE MOVE WHILE LAUNCHING A BARRAGE OF HEAVY FIRE AT DISTANT TARGETS

decision to create a new manufacturer to cover these and future vehicles. Distinct from Star Citizen's existing manufacturers like Roberts Space Industries and Origin, Tumbril would focus solely on rough and tumble ground vehicles and their associated hardware. Developing a new manufacturer was a task Star Citizen's artists relished, as it meant defining an entirely new style, history and a general sense that would tie these vehicles together. In seemingly no time at all, Tumbril had a visual corporate identity (down to a strong association with a particular shade of orange!). Artists would then go on to use that background to inform their work while writers and other developers would work to incorporate Tumbril into Star Citizen's living backstory.

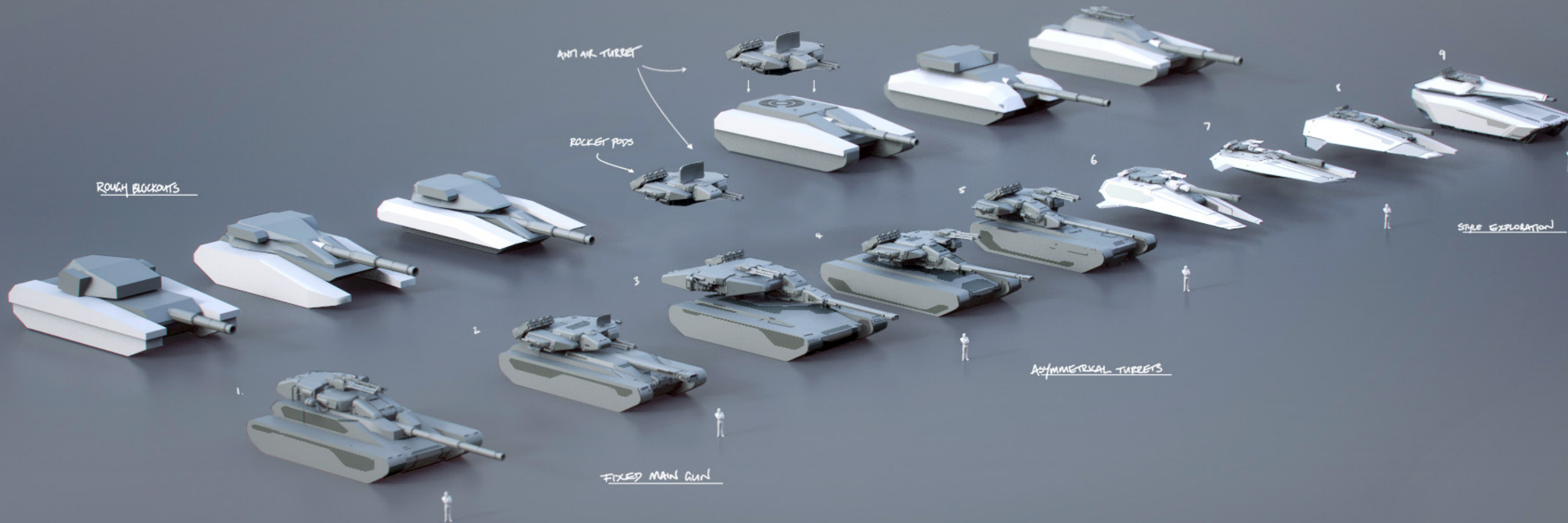Next, it was time to start building a tank. Planned for a late 2017 reveal, the Nova would have plenty

of time to breathe as the Cyclone and two additional ground-oriented bikes were unveiled to the public ahead of it. While ground vehicles may seem distinct from spacecraft, they are built much the same way: the designers create a brief, block them out to ensure that components are properly placed and functional and then move the task to an artist who determines the look and feel. In the case of the Tumbril tank (not yet named Nova) the task was assigned to veteran designer Corentin Billemont and the job of developing the vehicle's visuals went to outsource artist Toby Lewin under the direction of Paul Jones. Working together and using feedback from stakeholders across the company, these men would make the fantasy of driving a heavily armored space tank on a distant alien moon a reality for Citizens everywhere.

WHITEBOXING

ANTI AIR TURRET

ROCKET PODS

ROUGH BLOCKOUTS

STYLE EXPLORATION

ASYMMETRICAL TURRETS

FIXED MAIN GUN

BUILDING FOUNDATIONS

It's not just the whales, it's the water: the Nova tank was built from the ground up as part of a larger, planned system of vehicles and supporting mechanics that will help to populate Star Citizen's massive planets. This meant that the team needed to avoid massive 'wall of armor'-style tanks that are sometimes common in science fiction, in favor of something with a more realistic footprint that would allow it to function alongside future transport spacecraft and other planned vehicle movers. Just as successful modern tanks are designed to be carried aboard specific aircraft or to drive through crowded city streets, the Nova needed a specific set of maximum dimensions for future carrying purposes. With a set of dimensions from Design for the footprint in mind, artist Toby Lewin developed rough concepts in over a dozen different directions, ranging from traditional tracked tanks that might be at home today to hovering 'patrol boats' that offered more of a speedy, futuristic vibe.

THIS EARLY BLOCKOUT WAS USED TO DEVELOP THE TANK'S PLACE IN THE OVERALL VEHICLE SYSTEM AND TO PLAN OUT REQUIREMENTS LIKE CHARACTER ANIMATIONS AND INGRESS/EGRESS PROCEDURES. THIS VERSION FEATURES A REAR LADDER THAT CHARACTERS WOULD CLIMB TO ENTER THROUGH THE TURRET.

EARLY ON, DESIGNERS EXPERIMENTED WITH DIFFERENT WAYS FOR THE NOVA TO MOVE AND WITH DIFFERENT TURRET CONFIGURATIONS. IN THIS VERSION, THE TANK FEATURES A HEAVY TURRETED GUN AND A SET OF ZERO G REPULSORS INSTEAD OF TRACKS. TRACKS WERE ULTIMATELY CHOSEN INSTEAD OF ANTI-GRAVITY; ALL THE BETTER TO SHOW OFF THE NEW PROCEDURAL PLANETS!

THIS VERSION REDUCES THE OVERALL SIZE OF THE TURRET AND DEDICATES IT PURELY TO ANTI-AIRCRAFT TASKS, WITH THE BALLISTIC CANNON BUILT INTO THE BODY OF THE TANK. A MAJOR CHALLENGE IN DEVELOPING THE NOVA WAS BALANCING THE WEAPONS NEEDED WITH THE RELATIVELY SMALL AMOUNT OF REAL ESTATE AVAILABLE TO THE TANK CREW.

DESIGNERS BEGIN THE INTERIOR DESIGN PROCESS BY DETERMINING WHAT COMPONENTS MUST BE ACCESSIBLE TO THE PLAYER AND THEN PLACING THEM IN A ROUGH BLOCKOUT LIKE THIS. IN THE CASE OF THE NOVA, IT NEEDED TO (SNUGLY) FIT A CREW OF THREE PLUS MUNITIONS AND COMPONENTS LIKE A SHIELD GENERATOR, POWERPLANT AND RADAR.
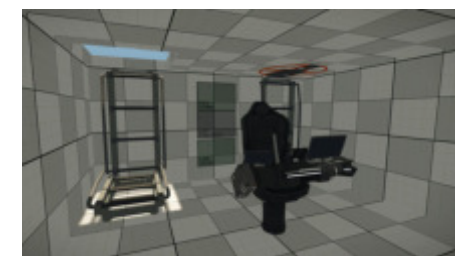
IT'S NOT ENOUGH TO SIMPLY PUT ALL THE PIECES INTO THE VEHICLE'S BODY; THE REQUIRED COMPONENTS NEED TO BE AVAILABLE TO THE PLAYERS WITHOUT REQUIRING A LARGE NUMBER OF ADDITIONAL ANIMATIONS. IN THIS BLOCKOUT TEST, MOVEMENT IN AND OUT OF THE TANK IS TESTED TO ENSURE IT ISN'T TOO CROWDED.

GRAYBOXING

SHAPING THE NOVA

The Nova is intended to be Star Citizen's version of a main battle tank. For the first half of the 20th century, tank designs were typically organized into their overall size and power: light, medium, heavy and superheavy. Rapid advances in armor, construction and powerplants coming out of World War II combined these roles into a single category by the 1960s: the main battle tank. Instead of fielding an array of different size tanks, militaries now operate a more standardized vehicle and support it with other types of armor (such as APCs). Essentially, the Nova was to become the United Empire of Earth's standard tank design, a standard bearer upon which future vehicle development could be based.

But what makes a future tank a future tank? The team behind the Nova looked to both science fiction and military history to answer that question, examining everything from real-world light tank destroyers to fantasy stories about massive treaded mountains of armor. Many future stories opt for a futuristic 'hover tank,' while heavy, linked treads are a defining factor of real world tanks. While Star Citizen's world does feature gravlev technology and a hovering tank would be perhaps easier to animate, the decision was made to work with treads instead. There's something extremely satisfying about the thought of leaving a mark on one of Stanton's moons in your battle tank! Instead of making the Nova feel like a 30th century technology through its method of movement, the decision was made to emphasize sleeker lines than a present day tank in the shaping of the turret and body. The graybox phase went through several iterations to adjust the treads and to add a more tapered silhouette for this purpose.

ROLL OUT!

THE NOVA ENTERS THE GRAYBOX PHASE LOOKING READY FOR A FIGHT. THIS IMAGE WAS USED TO COLLECT FIRST ROUND FEEDBACK FROM CHRIS ROBERTS AND THE TEAM.
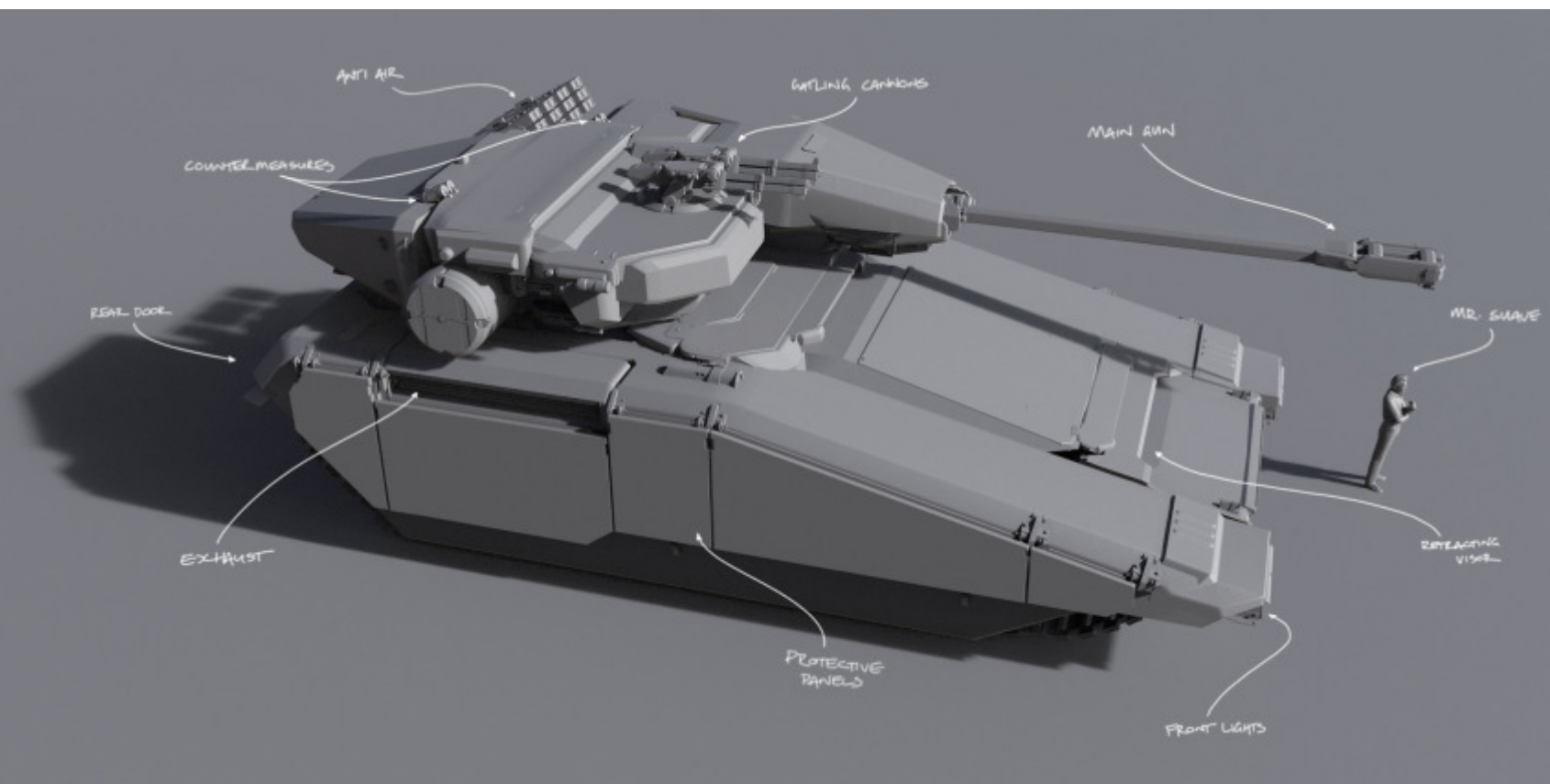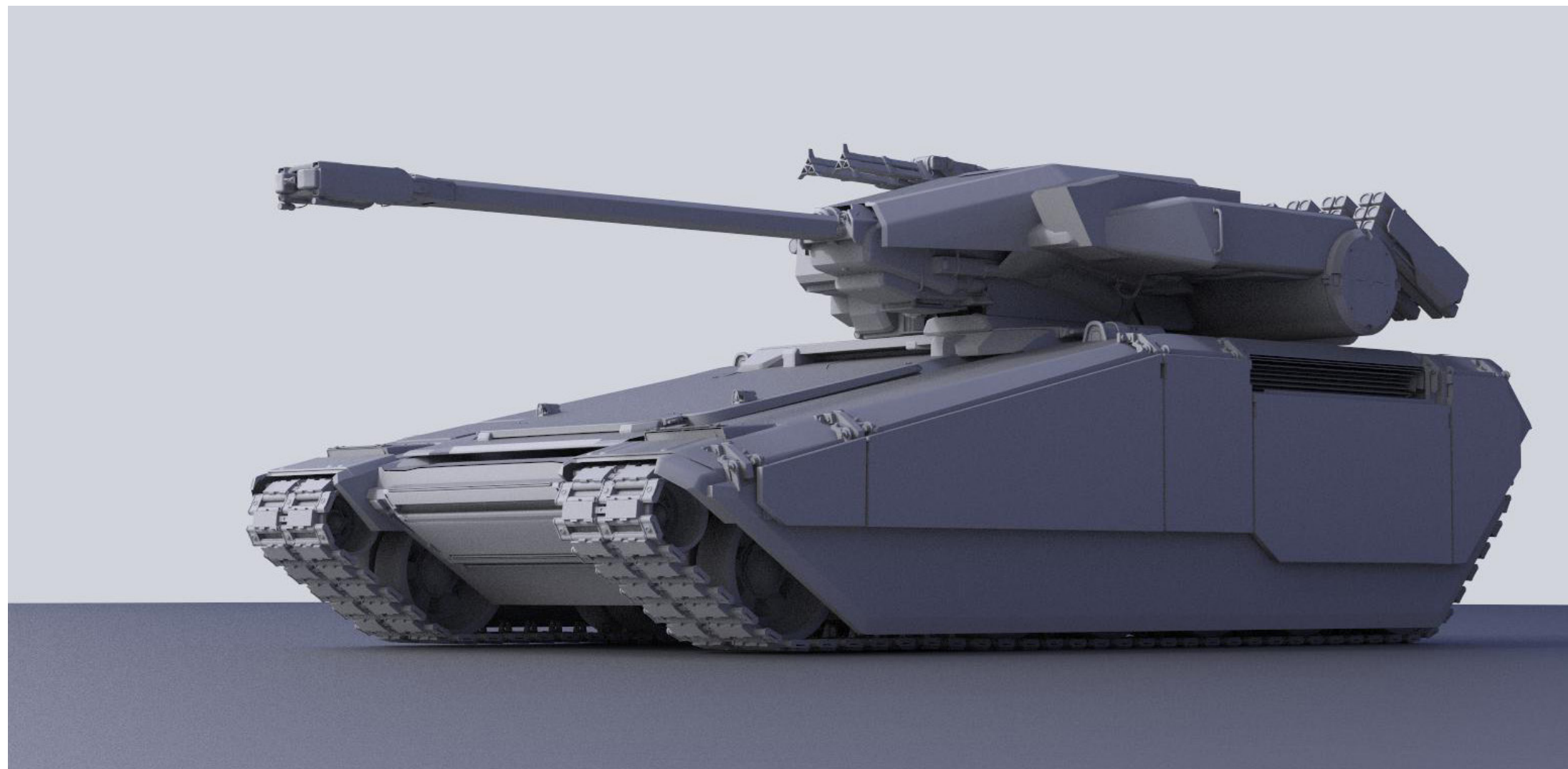
IN THE LINE OF FIRE

THIS TRIO OF INITIAL GRAYBOX RENDERS INDICATE THE TANK'S SCALE AND THE FIRING ARC OF THE NOVA'S MAIN GUN, BUILT TO THE SPECIFICATIONS PROVIDED BY THE DESIGN TEAM.

WHAT'S IN A TANK?

THIS OBJECT PLACEMENT GRAPHIC ALLOWS DESIGNERS AND ANIMATORS TO QUICKLY UNDERSTAND HOW MUCH WORK WILL GO INTO MAKING THE NOVA MOVE.

KEY FEATURES

From the start, there was no debate over who the manufacturer for the tank would be: Tumbril was created by Star Citizen's loremakers specifically to provide a shared background for the series of military and utility vehicles now in development. In addition to a corporate look and feel, work on the Cyclone buggy generated a comprehensive history of the Tumbril corporation that would go on to define background for the Nova... when it finally earned that name!

When Star Citizen's tank first took shape in early 2016, it carried only a placeholder name: TUMBRIL TANK, leading to some confusion with the TUMBRIL BUGGY also in development. Star Citizen's lore and design teams worked together to come up with a host of possible options to match the feel of the 'verse.

A number of different options were considered, including storm names to match the Cyclone buggy, including Maelstrom, Vortex and Buran. Another idea that was seriously considered was to give the vehicle a formal designation instead of a proper name, the Tumbril C-Series (C138.) Naming the tank after a future general was also considered, following in the footsteps of American tanks like the Pershing or the Sherman; this line of thinking resulted in Mitchell. In the end, the decision was made to focus on the sheer firepower of the tank instead of its connection to history. Warlord, Lighthammer and Nova were discussed, with Nova taking the final honors.

GRAYBOX PHASE, SIDE VIEW:
THE NOVA'S SILHOUETTE SHOWS HOW THE TEAM MIXED THE LOOK OF A TRADITIONAL BATTLE TANK WITH SLEEK, FUTURISTIC LINES.
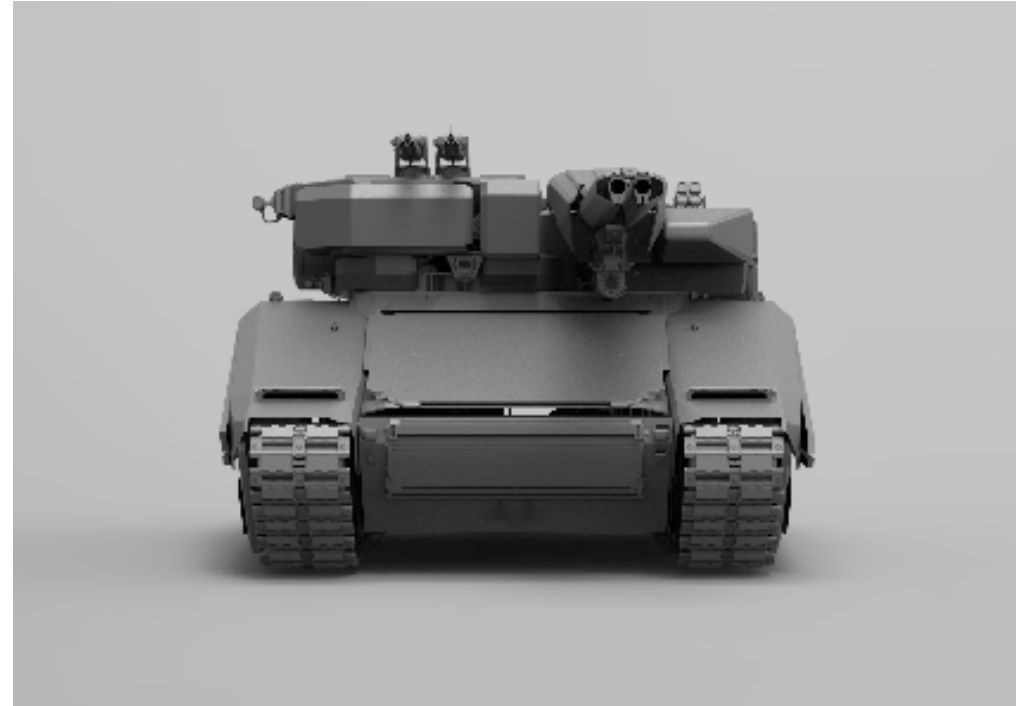
GRAYBOX PHASE, FRONT VIEW:
SEEN FROM HEAD ON, THE OFFSET NATURE OF THE NOVA'S TURRET BECOMES CLEAR, WITH AA LAUNCHERS ON THE LEFT AND THE MAIN GUN ON THE RIGHT.

GRAYBOX PHASE, REAR VIEW:
THE NOVA'S MAIN CANNON CAN NOT ARC TO THE REAR, BUT THE RAISED GATLING WEAPONS ARE POSITIONED TO READILY STOP AN ATTACK FROM BEHIND.

A NEW KIND OF TURRET

The challenge: create a vehicle capable of pounding targets on the ground while also being able to protect itself from enemy spacecraft. The Nova's initial design brief promised a varied selection of weapons to account for this gameplay: "[a] big gun locked on tank's orientation... also includes AA capabilities (full rotation.) Large AA turret can be put on different bases."

The next question: energy versus kinetic for the main gun. This decision would significantly impact the internals of the tank; would it need powerful batteries to power a large energy weapon or ammunition storage for a more traditional gun? The mission profile determined the answer: a size four ballistic cannon made the most sense as the Nova would most frequently be targeting ground vehicles and installations. The need for more physicalized resource management would also speak to the tank's final gameplay: future tank aces would be expected to take their large weapon more seriously rather than filling the battlefield with rechargeable energy

bolts. To protect the Nova from airborne threats, the team armed it with a Size 2 energy repeater and two Size 3 missile racks, offering a grand total of 24 anti-aircraft energy missiles.

To carry all of these weapons and still immediately say 'tank,' the art team considered a number of different options, including a standard turret with smaller weapons mounted on the top, or mounting the AA weapons elsewhere on the base. The final decision was to build a modular, off-center turret which could carry all of the needed weapons while still visually 'saying' tank. The main gun, being the heart of the tank's role, is static, while the missiles and energy repeater can be swapped and upgraded like a familiar ship component.

THOSE WHO ARE ABOUT TO DIE SALUTE YOU!
A PAIR OF NOVA TANKS RAISE THEIR PRIMARY BALLISTIC CANNONS TO THEIR HIGHEST POSSIBLE FIRING ARCS.
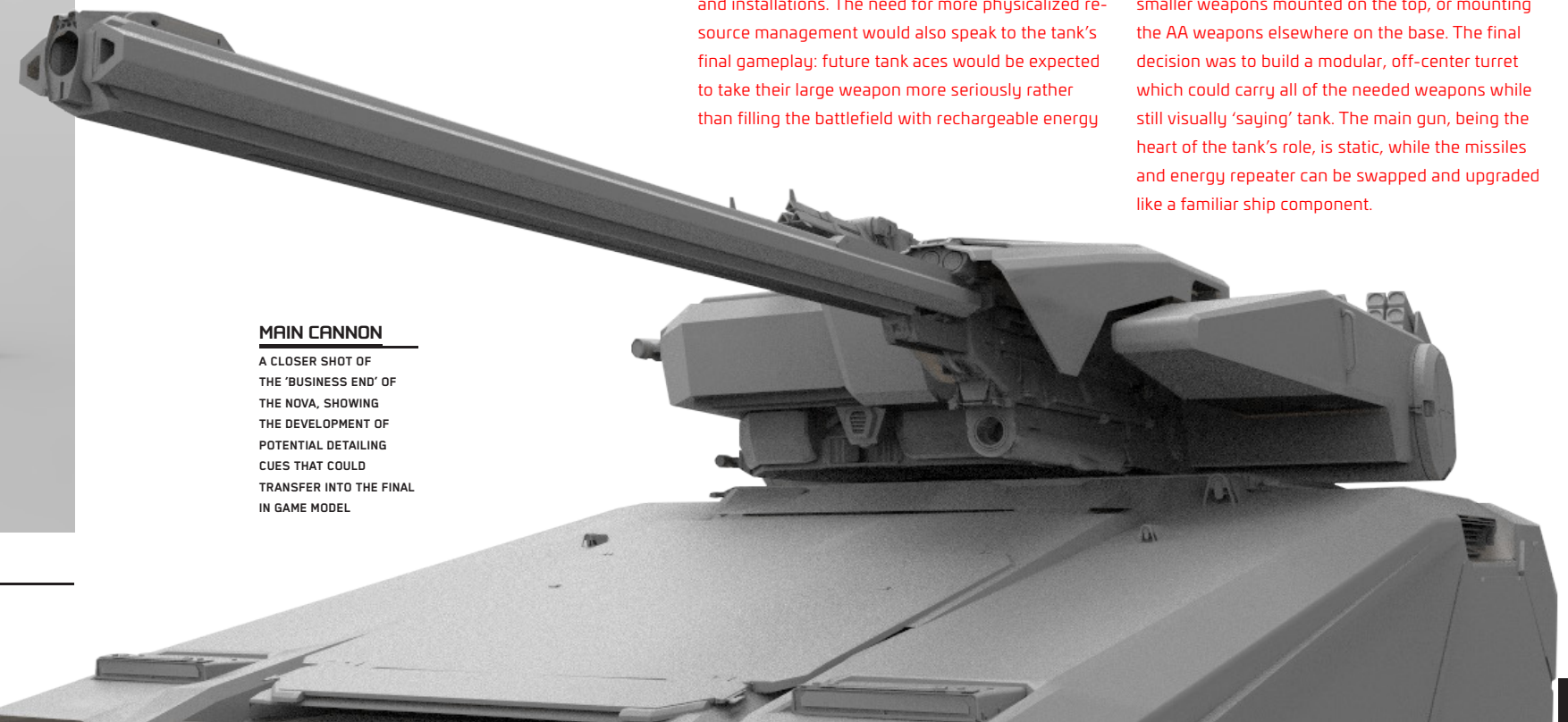
MAIN CANNON
A CLOSER SHOT OF THE 'BUSINESS END' OF THE NOVA, SHOWING THE DEVELOPMENT OF POTENTIAL DETAILING CUES THAT COULD TRANSFER INTO THE FINAL IN GAME MODEL
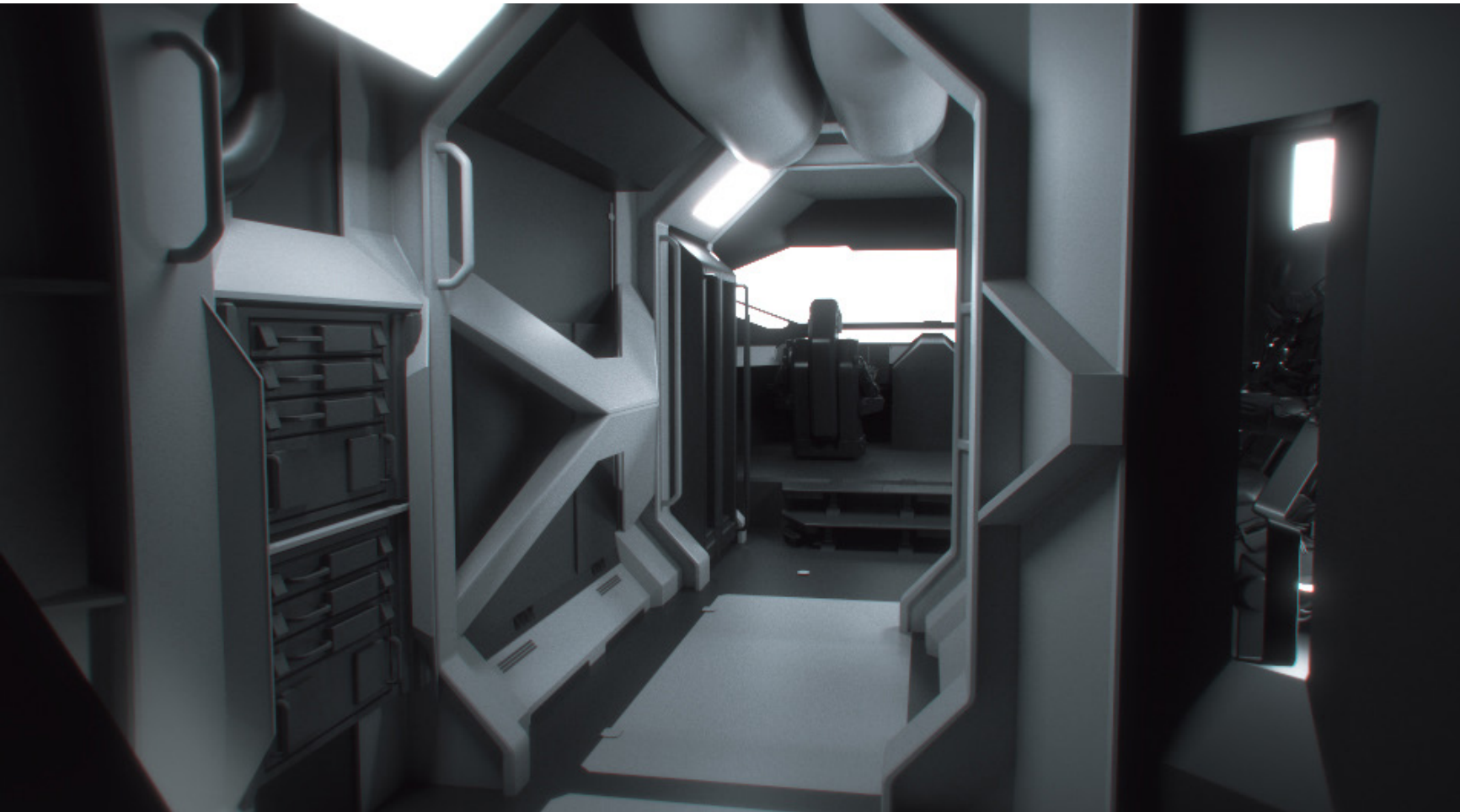
INTERNALS

BLOCKOUT & ERGONOMICS

As part of the initial design meetings, the Nova team developed a set of metrics and templates upon which to build the tank's interior. This information provided both the assigned artist and the overall designer with a sort of checklist that included every piece of equipment that needed to be available to players while they are aboard a Nova, as well as a list of expected animations that would need to be created for characters operating the tank. The pitch specified that the tank should have a crew of three and that these characters needed access to the powerplant, shield generator, avionics equipment, cooler, radar, life support and gravity generator (the latter because the tank would likely operate in low gravity environments such as moons, in addition to normal planets). All in all, the Nova

'on paper' was shaping up to be one crowded vehicle!

During the blockout phase, the metrics generated by Design are used to play a sort of 'vehicle Tetris' which roughs out the interior, allowing the character access to all needed seats and gameplay components. It can't just be a snug fit: these components have to exist with enough room for character models to conduct any number of animations. As a result, the look and layout of the tank should be familiar to anyone who knows Star Citizen's space vehicles: a pair of forward seats for piloting the vehicle then a rear engineering and gunnery area. The rear section gives a standing crewman access to any functional components such as the powerplant and shield generator during operation. The finished layout is

tightly packed; don't expect to be carrying any cargo aboard a Nova.

A three-person tank crew can work together for maximum efficiency, with a dedicated gunner able to remote operate the turret and the co-pilot acting as an engineer who can keep the vehicle's subsystems functioning during combat. While the tank is nominally designed to support a maximum of three players (or NPCs) it has also been thought out with a single user in mind. The gunnery controls can be taken over by the forward seated pilot with the main ballistic cannon slaving forward to operate somewhat more like a ship's fixed guns than an artillery turret. Whether you're part of a Nova tank crew or a lone driver, you'll find that the team has put plenty for you to do into a very small space.
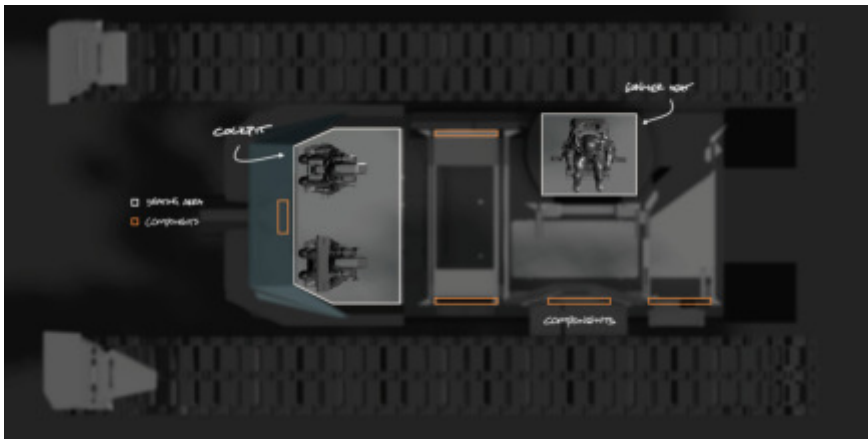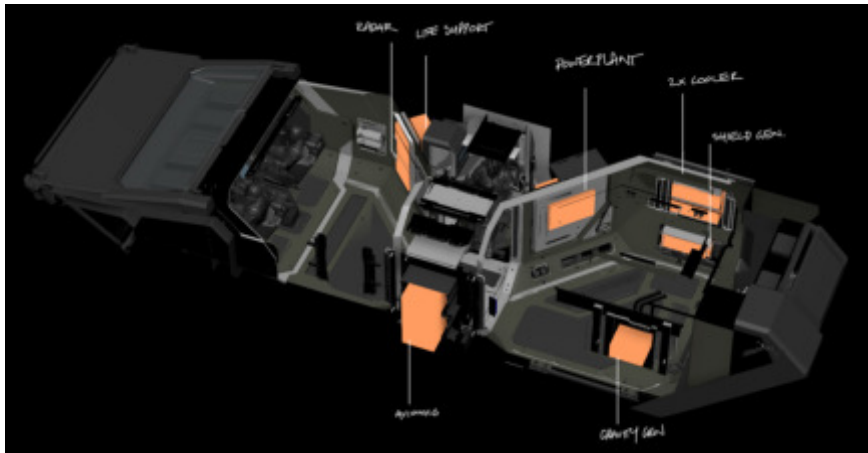
ALTERNATIVE LIVERIES

A TANK IN THE 'VERSE

A great vehicle needs a great story, and the lore team was more than up to the task! Following on the fiction created for the Tumbril Cyclone buggy, Star Citizen's writers crafted a backstory establishing the Nova's place in history. The immediate desire was to make sure the Nova was woven deeply into Star Citizen's rich tapestry; rather than introduce it as a new vehicle. It was decided to be the sort of design that everyone in the year 2947 knows by heart. Just as an M1 Abrams or a T-14 might be the first thing that comes to mind as a tank today, so too should the Nova represent the core tank concept to the people of the UEE. Since the Cyclone had established that the current iteration of Tumbril is a new corporation based on old ideas, the team developed a story about Tumbril's decision to upgrade a classic tank design:

'Built for the Second Tevarin War, Tumbril's Nova heavy battle tank has enjoyed a long distinguished career of military service even after the company initially folded. A staple of the UEE Army and represented in over five hundred combat operations, Tumbril Land Systems is proud to announce that the Nova is back. Drawing extensively from the original blueprints, Tumbril engineers have kept all the features that made the Nova such a memorable battlefield equalizer while capitalizing on all the technological advances of the past fifty years. The result? The same resilient and devastating battle tank that redefined ground warfare, brought to the modern age.'

The art team got into the spirit by painting the Nova in a dozen different liveries, including regular UEE army, arctic and desert camo, specialized colors worn by corporate mercenaries and even an orange model they intended as the version of a United Nations peacekeeper vehicle. The tank's artist was encouraged to try different options to find what would work, resulting in a colorful array of potential tanks! While only three of these liveries were completed for the Nova promotion, the complete set offer great insight into longer term plans for the tank's role and for how players may someday customize their own tanks.

The team also developed a fictional 'show in a show' to reinforce the Nova's heritage within the Star Citizen world and showcase the design in a lighthearted fashion, presenting a G.I. Joe-styled "toy" version of the Nova that children of the 30th century might be familiar with. Complete with retro packaging, these model tanks helped anchor the Nova's reveal and help diversify the previous Takuetsu-centric collection of ship models. As the Nova reveal happened alongside the 2017 holiday livestream, in-game flare objects of the toy Nova were awarded to backers as a special holiday treat!

SUPER NOVA

DEPLOYING THE NOVA

FINISHING TOUCHES

One big question remained: in a world full of amazing space fighters and massive frigates, would there really be a strong interest in Star Citizen's take on a main battle tank? The entire team's spirits were buoyed midway through the process when a backer touring the Foundry 42 offices happened to see the tank in development. They reported to Reddit that while they weren't able to say what they saw, they had learned what the promised 2017 'game changer' vehicle was and that it was, indeed extremely true. While the actual game changing ship was the Pioneer colonization spacecraft, the idea that our modest tank would be considered a sea change by the backers making the game possible excited everyone.

With the shape, functionality and background of the tank now determined, the final challenge for the art team was to put the tank into our world with a series of concept images that would reveal the design to the public. The team turned to history, looking at a range of historical photos of tanks in action to choose six 'key shots' that would show the tank as it was intended to be used in its environment. These included everything from giant tank battles to serene scenes of tank drivers going about their daily lives in cramped, armored vehicles. Artists also put together several pages of blueprints and a series of internal renders to show the tight quarters inside the Nova.

The Nova tank made its official debut during the 2017 Star Citizen Holiday Livestream alongside a major demonstration of Squadron 42. Backers were excited to see further vehicle development and are reportedly eager to start duking it out planetside when the Nova comes online. The Nova may be Star Citizen's first, role-specific ground vehicle for procedural planets,, but it represents only the beginning of work being done. Like space, planets are very, very big... with room for plenty of different kinds of vehicles.

NOVA RESOURCES:

Want to learn more? The following resources will provide additional information about the Tumbril Nova tank.

TUMBRIL NOVA SHIP PAGE
This page contains the most current specifications and other data on the Nova tank arranged in the same fashion as Star Citizen's more familiar spacecraft. Read the nuts and bolts or enjoy exploring the 3D holoviewer model!
https://robertsspaceindustries.com/pledge/ships/nova-tank/Tumbril-Nova-Tank

LEGENDARY BATTLE TANK REBORN
The original presentation that revealed the Tumbril to the Star Citizen community. Includes all of the final artwork created for the tank, the model toy and the backstory established by the lore team.
https://robertsspaceindustries.com/comm-link/transmission/16341-Legendary-Battle-Tank-Reborn

TUMBRIL NOVA BROCHURE
Straight from the Tumbril corporation circa 2947, this brochure will familiarize you with the relaunched tank, complete with detailed blueprints.
https://robertsspaceindustries.com/media/5i88gwg499gdwr/source/Nova_Brochure_FINAL.pdf

TUMBRIL NOVA Q&A
As part of the Nova's rollout, these questions were asked of the design team by community managers based on anticipated reaction from Star Citizen backers. Can you operate the tank yourself? How fast is it? Does it have any weak spots? All this, and more!
https://robertsspaceindustries.com/comm-link/engineering/16344-Q-A-Tumbril-Nova

TUMBRIL NOVA Q&A - PART II
Star Citizen's backers voted on these questions which largely focus on the anti-aircraft functionality and various military scenarios. Can the Nova sustain an EMP blast? How far does the turret rotate? How do you see out of it, anyway?
https://robertsspaceindustries.com/comm-link/engineering/16358-Q-A-Tumbril-Nova-Part-2

AT REST
THE RESOLUTE CREW OF A NOVA TANK TAKE A MOMENT TO RELAX AFTER A HARD DAY'S BATTLE WHILE A SUN SETS IN THE DISTANCE.

CONVOY
URBAN WARFARE, TUMBRIL STYLE! A NIMBLE CYCLONE BUGGY COVERS THE FLANK APPROACHES AS A TEAM OF NOVA TANKS HEADS FOR ACTION.
https://robertsspaceindustries.com/media/ul5zp2zllebm2r/source/TMBL_HeavyTank_ShotG_PJ03-Squashed.jpg

GALACTAPEDIA

XIPHOPOD

The Xiphopod is a soft-shelled invertebrate omnivore native to Leir I. Xiphopods, known colloquially as "Blind Oni Crabs," are typically found on worlds with hot grassland environments, but have also been found to be highly adaptable to extreme conditions. They are considered an invasive species in the UEE. Their ability to float and propel themselves through the air has made them a favorite subject of xenobiologists.

Discovered during the initial planetary survey of Leir I, several specimens were captured and delivered to the University of Rhetor for study and classification. The scientists named the new species Xiphopod in honor of its resemblance to animals in the phylum Arthropoda and genus Xiphosura. The surveyors who discovered the animal, inspired by the "face" and "nose" that can be discerned in the animal's front carapace, were responsible for the more common name "Blind Oni Crab."

BEHAVIOR AND ECOLOGY

Xiphopods are found naturally on Leir I, in hot to warm grassy climates at or near sea level. In their native environments, they spend their time hunting, scavenging for food, and resting. Xiphopods spend part of their year in groups, then split off and travel hundreds of kilometers to join other groups during mating season. Biologists theorize that this behavior developed in order to ensure genetic diversity among the species.

Their unique flight pattern occurs via biological process. The Xiphopod converts surrounding air into a hydrogen-helium mix and circulates it within a large, hollow cavity. This allows it to float. It then propels itself through the air by expelling gas from its body, which is incredibly light compared to its size. The most lightweight adult Xiphopod ever found weighed only 10.58 oz (300 g).

INVASIVE SPECIES

The Xiphopod is a common invasive species, thanks in large part to its opportunistic omnivorous diet, and its ability to adapt to a variety of conditions. Its reproductive habits also play a part: Xiphopods lay up to a thousand eggs at a time. Typically, the unattended eggs hatch in 13-17 Standard Earth Days. The UEE prohibits the trading of Xiphopods in order to discourage their spread throughout habitable space.

The hot, dry environment of Hurston (Stanton I) has proven particularly hospitable to Xiphopods. Although it feeds on a variety of food types, it thrives off the biological waste generated from the settlements on Hurston, and has been able to breed in great numbers thanks to the lack of natural predators. While Xiphopod hunting is encouraged by the local government, for the poorest inhabitants of Hurston, the Xiphopod can be a food source. When roasted, the flesh of the Xiphopod becomes white and firm, and the meat has a musty, sweet flavor.