JUMP POINT

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GREETINGS, CITIZENS!

Once more, it's all done except this introduction, and once more, I'm on the road as we polish off another issue of **Jump Point**. (This time, it's the Origins Game Fair, one of the two primary board game conventions in the US each year.) To avoid scheduling conflicts, we switched the **JP** pub date from the final Friday of each month to the third Friday a couple years ago, and it seems like the world has decided the third Friday is a splendid time to hold just about every other event under the sun. But I'm not complaining, not me.

Especially since we've got another issue, packed with plenty of *Star Citizen* zest.

We start with a different slant on "Work in Progress." Rather than describing the development of a ship or a location, we take a look at one of the guideline docs that establish parameters for the game — in this case, Technical Designer Jonathan Jacevicius's design doc on where ship thrusters can, and can't, be placed. It's shorter than our usual WIP articles, but still contains plenty of information.

There are other in-house design docs of this sort. Let me know whether you want to read more of them and we'll see what we can do.

This issue's title is "Environmental Sustainability," and that applies in a number of ways. Behind the Scenes, we sit down with the Environmental Art team, the folks who create, and sustain, all the wonderful settings for *SC*

and *S42*. Some of them are beautiful (case in point: our cover art) and some are grungy, some stretch millions of miles and some could give you claustrophobia, but they all work together to create a believable environment in which to play the game. I never get tired of all the various screenshots that are being created throughout the 'verse, and I was glad to have a reason to run a dozen or so in this issue.

Meanwhile, Rayari Inc. (our Portfolio profile) and Garron (in the Galactic Guide) are connected through the environmental disaster on Garron II and the efforts Rayari has made to restore and sustain the native environment on that planet.

We can even make a connection that isn't all that strained with our WIP article on thruster placement — if your thrusters aren't placed correctly, your environment will become unsustainable pretty quickly!

So enjoy the issue, and may your environments always sustain you. Until next time . . .

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

David

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FROM THE COCKPIT

Ship Thruster Placement Guide

There are several types of ship thruster we use that need to be placed and positioned in a very specific way on the ship. If thrusters are not positioned using the methods outlined below, it may cause major flight issues and require rework down the line.

Ship Thruster Types

Ships all use three types of thrusters: mains, retros and maneuvers (mavs).

Mains

Main thrusters provide the thrust needed to move the ship forwards and must always directly face -Y (axis), and have no rotation on any other axis.

In the rare case that these thrusters have VTOL (vertical take-off and landing) functionality, if they animate they must animate to directly face -Z.
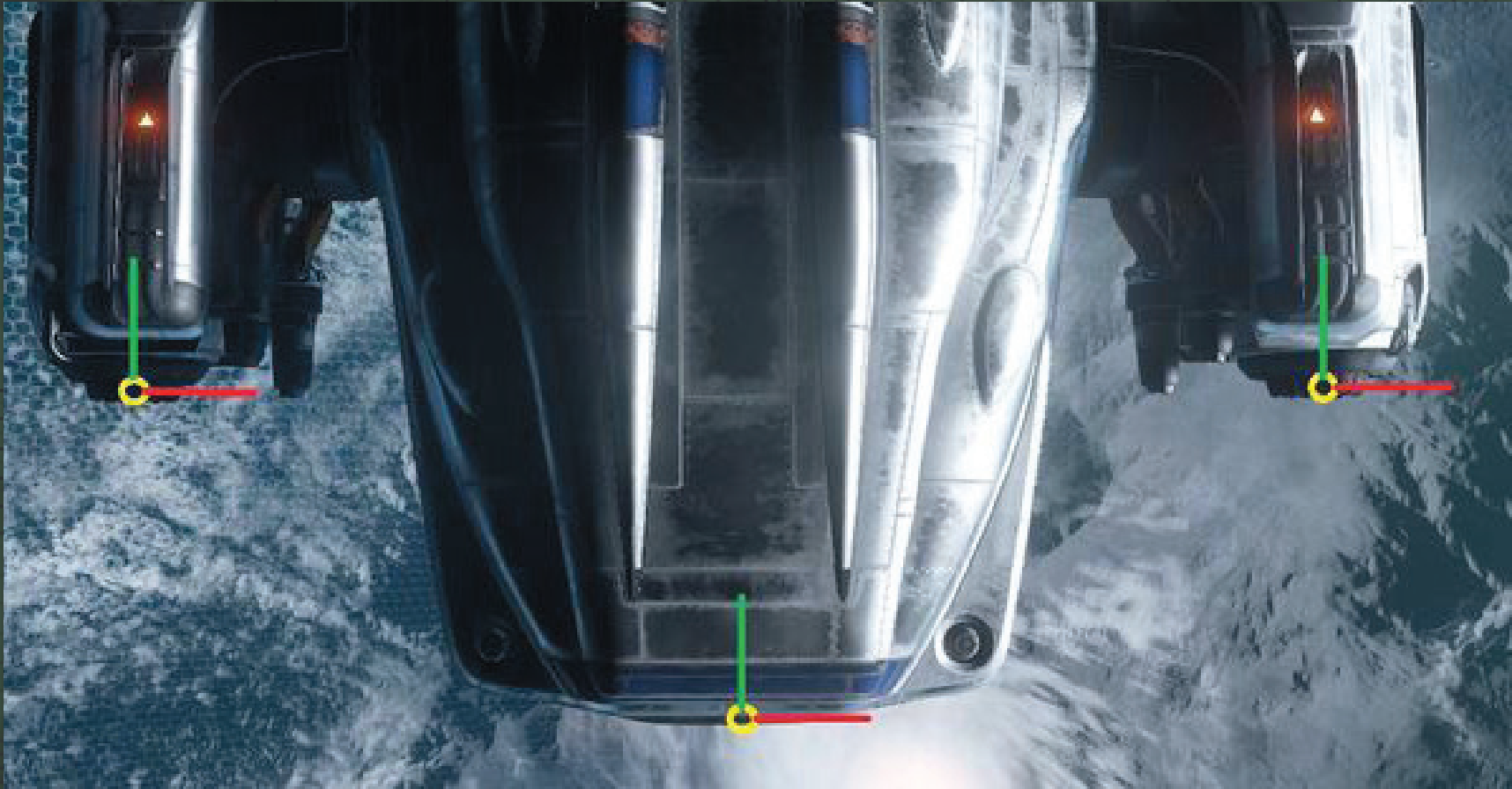
Retros

Retro thrusters provide the thrust needed to slow the ship down and to provide thrust to move backwards.

These must always directly face +Y.
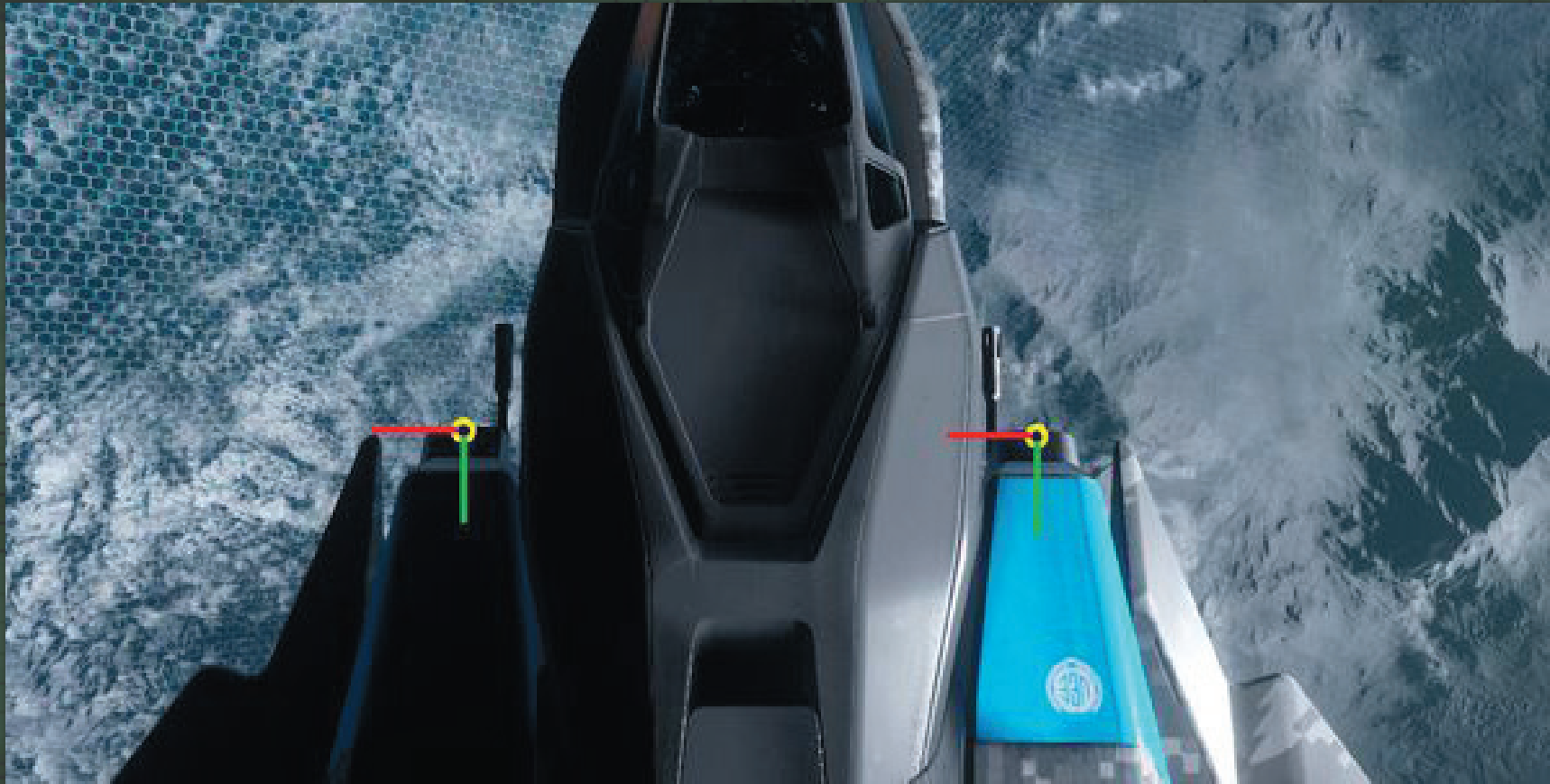
Maneuvers

Maneuver thrusters provide the thrust needed to strafe, pitch, yaw and roll the ship – essentially any movement that isn't moving the ship forwards or backwards.

The rules for these thrusters are a little more detailed as there are a couple of different types, which are outlined below.

Maneuver Thruster Types

There are two types of mav thruster used: fixed and joint.
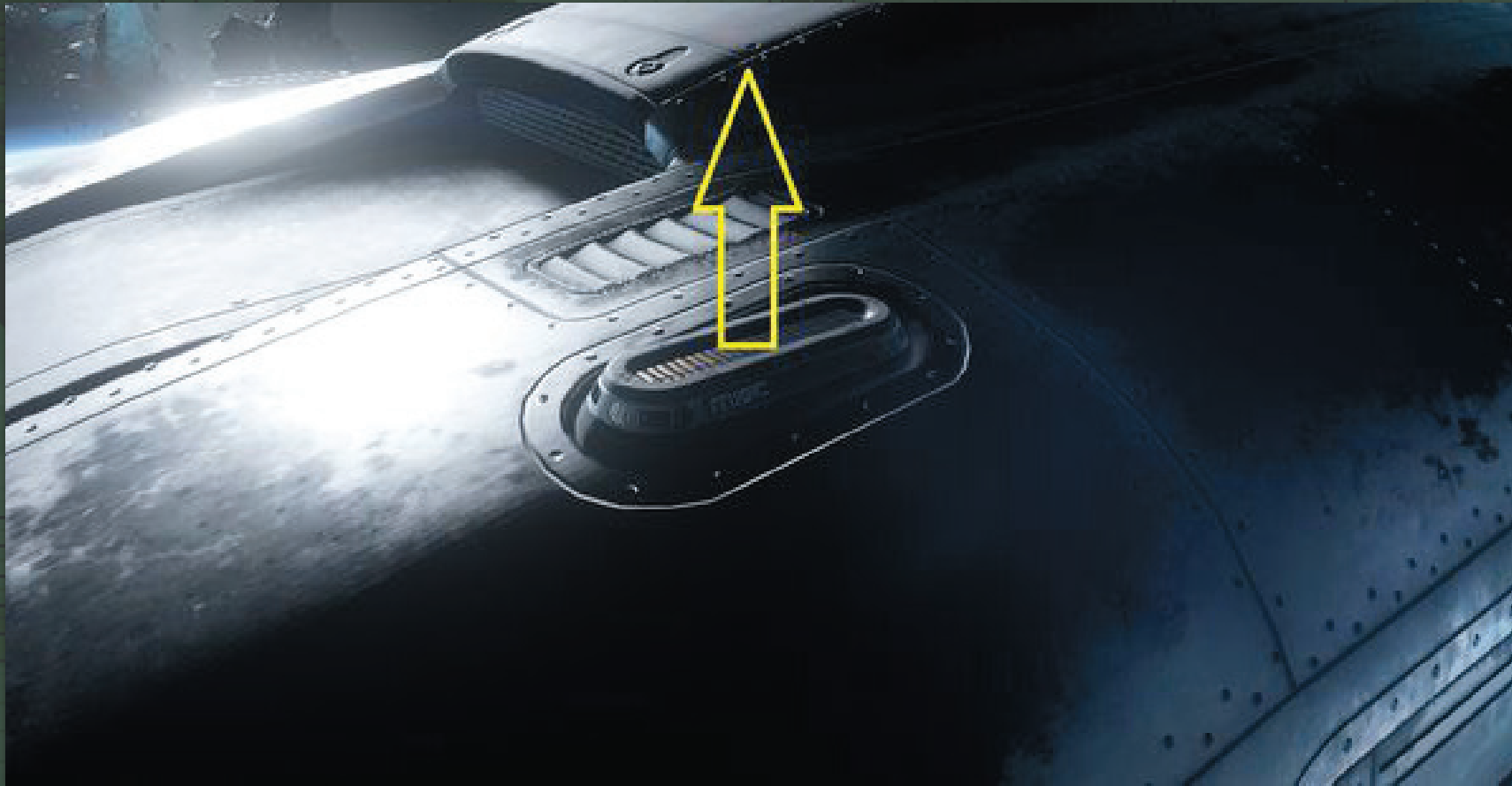
FIXED

Fixed thrusters do exactly what you think — they do not move and are only able to provide thrust in the direction they are facing (up, down, left or right). This means that they must be positioned (like the mains and retros) directly facing the axis they fire on (+X, -X, +Z or -Z) — e.g., a maneuver thruster can have a rotation (90°, 0°, 0°) or (0°, -90°, 0°) but not (90°, -4°, 1°) or (12°, -90°, 0.5°).

JOINT

Joint thrusters are essentially fixed thrusters that are able to rotate between two different points, which enables them to fire in two different directions instead of just one. These thrusters must be able to rotate between the two points, to allow it to directly face each.

NOTE: The thruster should be able to rotate slightly further than 90° (100° is best), as if it only has a 90° angle the system is unable to reach both thrust vectors.
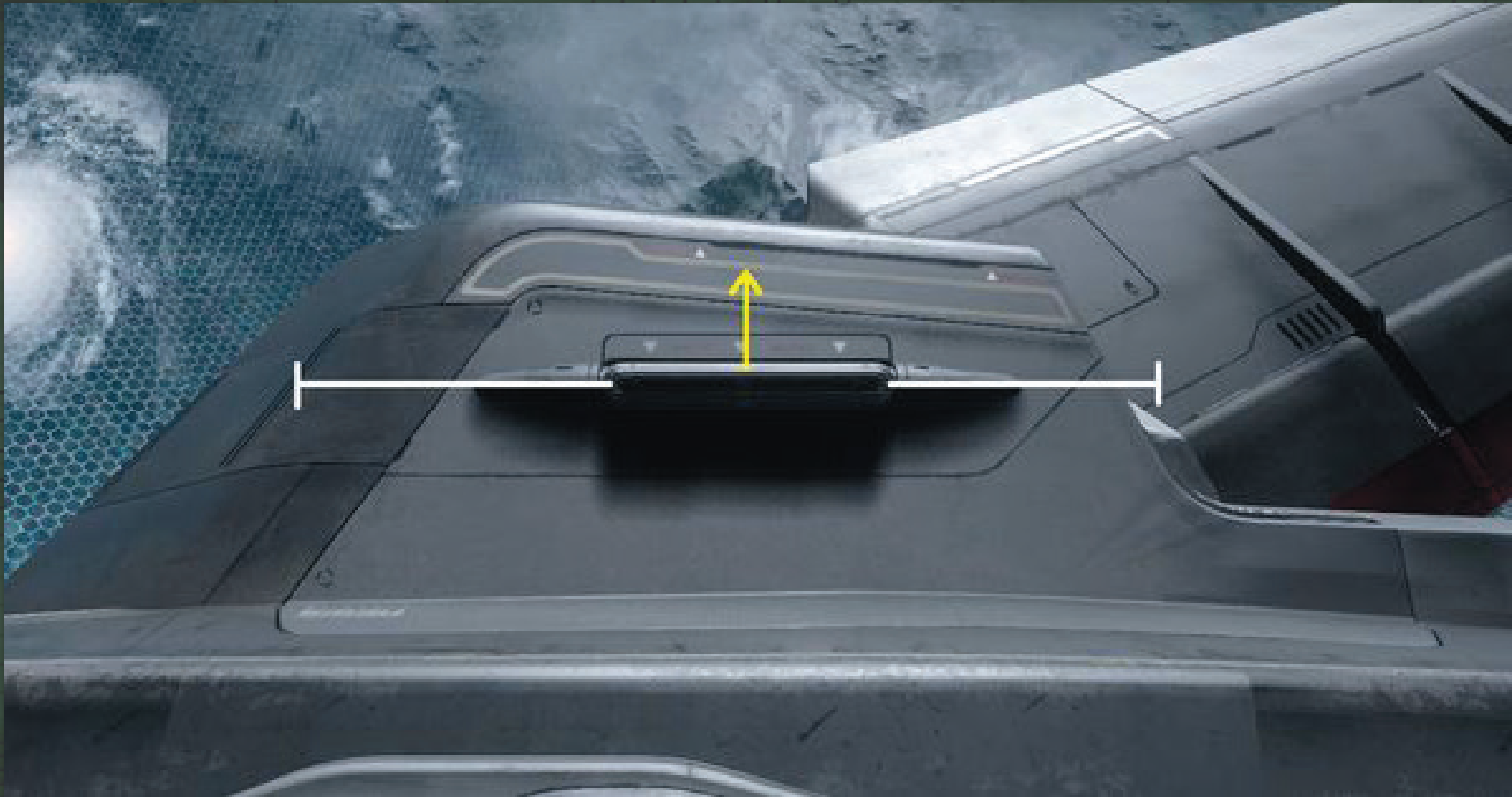
Another variant of joint thrusters are ball thrusters. They work in the exact same way as joint thrusters, but are a bit more forgiving in terms of placement.
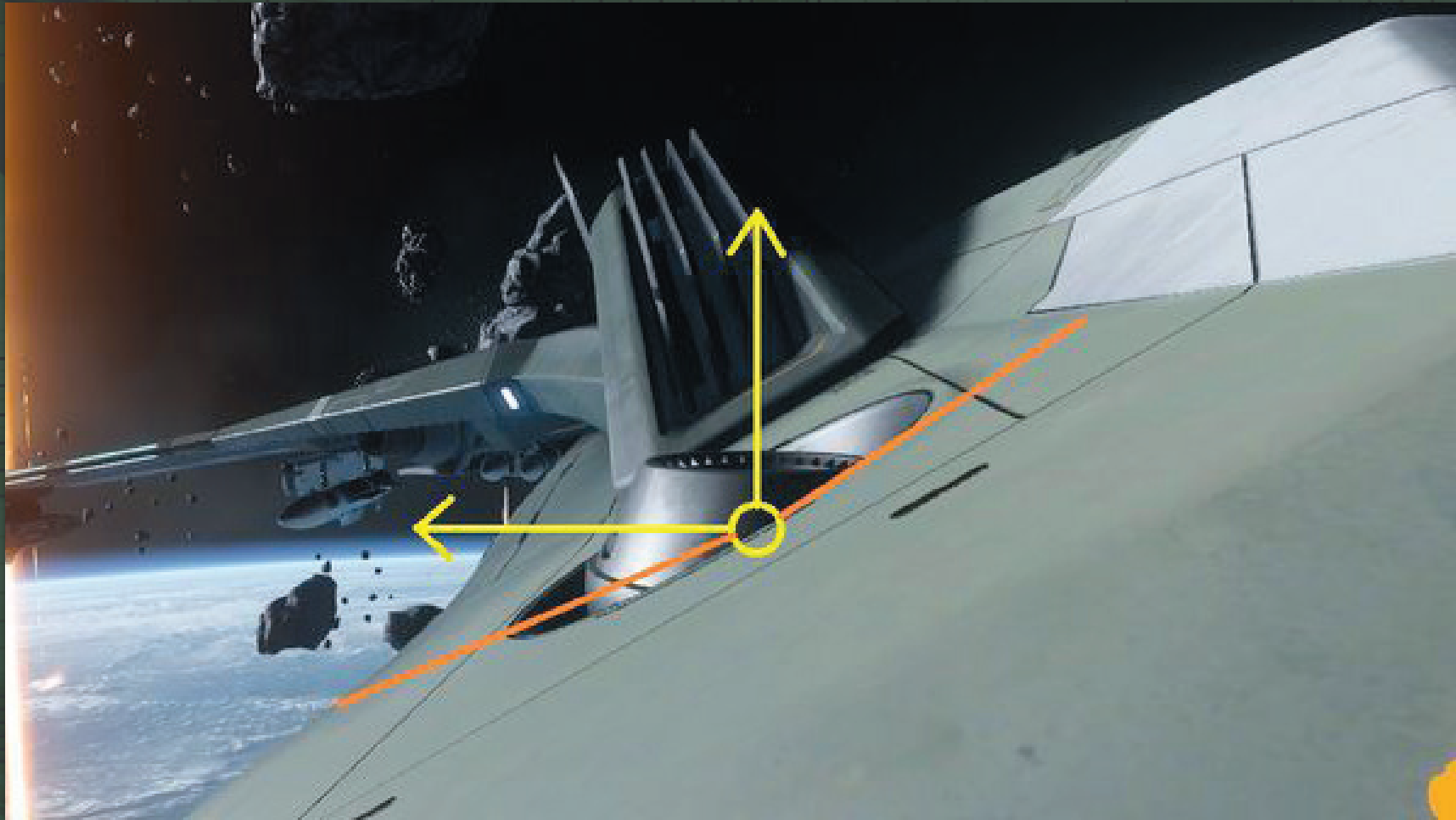
Thruster Setups

There are specific thruster setups that are used to ensure ship flight is balanced.

WORK IN PROGRESS
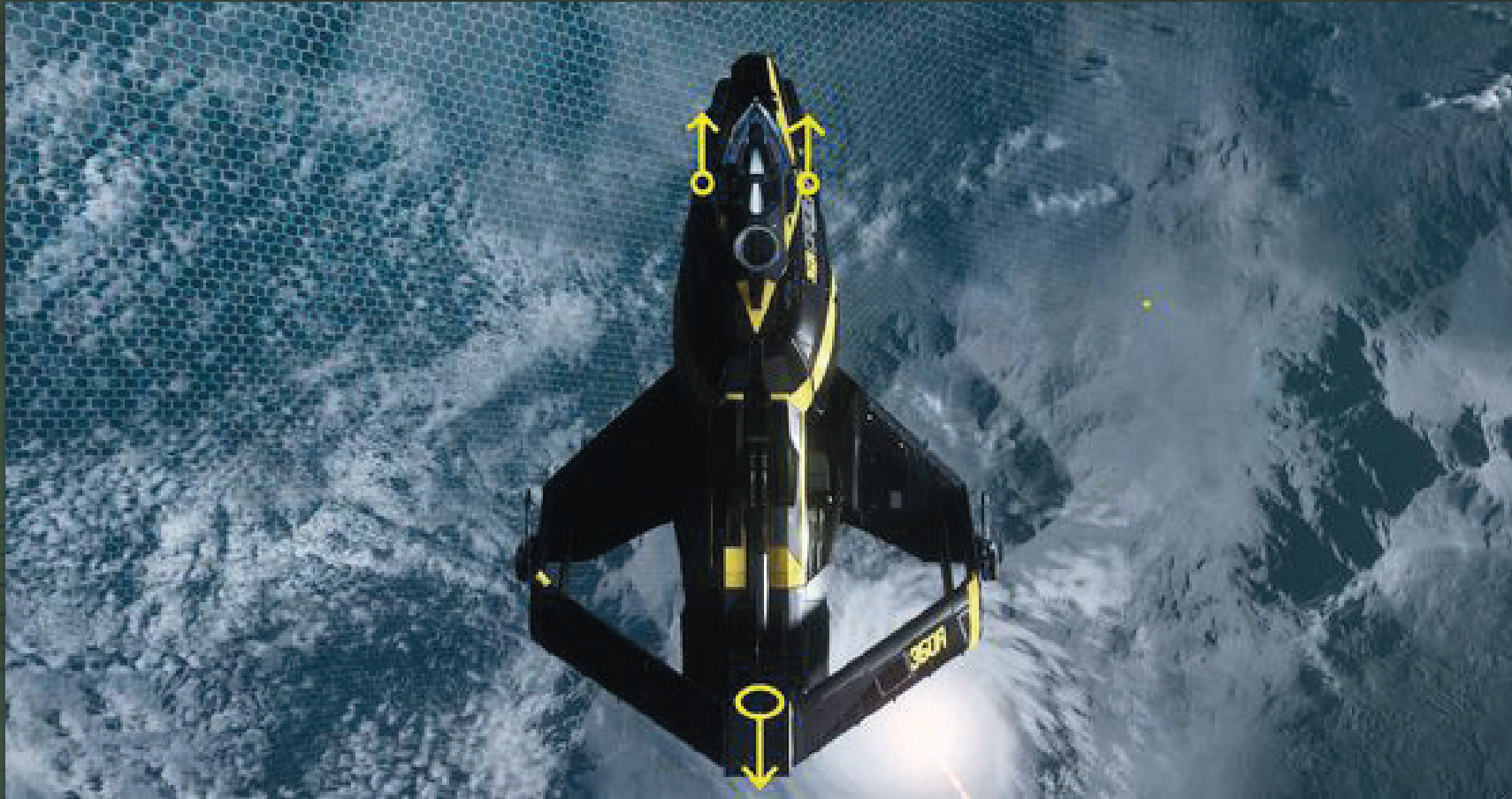
Mains & Retros

The above picture is a good example of one of our current ships with balanced main and retro thrusters. The one main thruster is completely central and there are an equal number of retro thrusters on each side, equidistant to the centre.

This is another example, the Vanguard. It has four main thrusters and two retros, but still provides balanced flight.
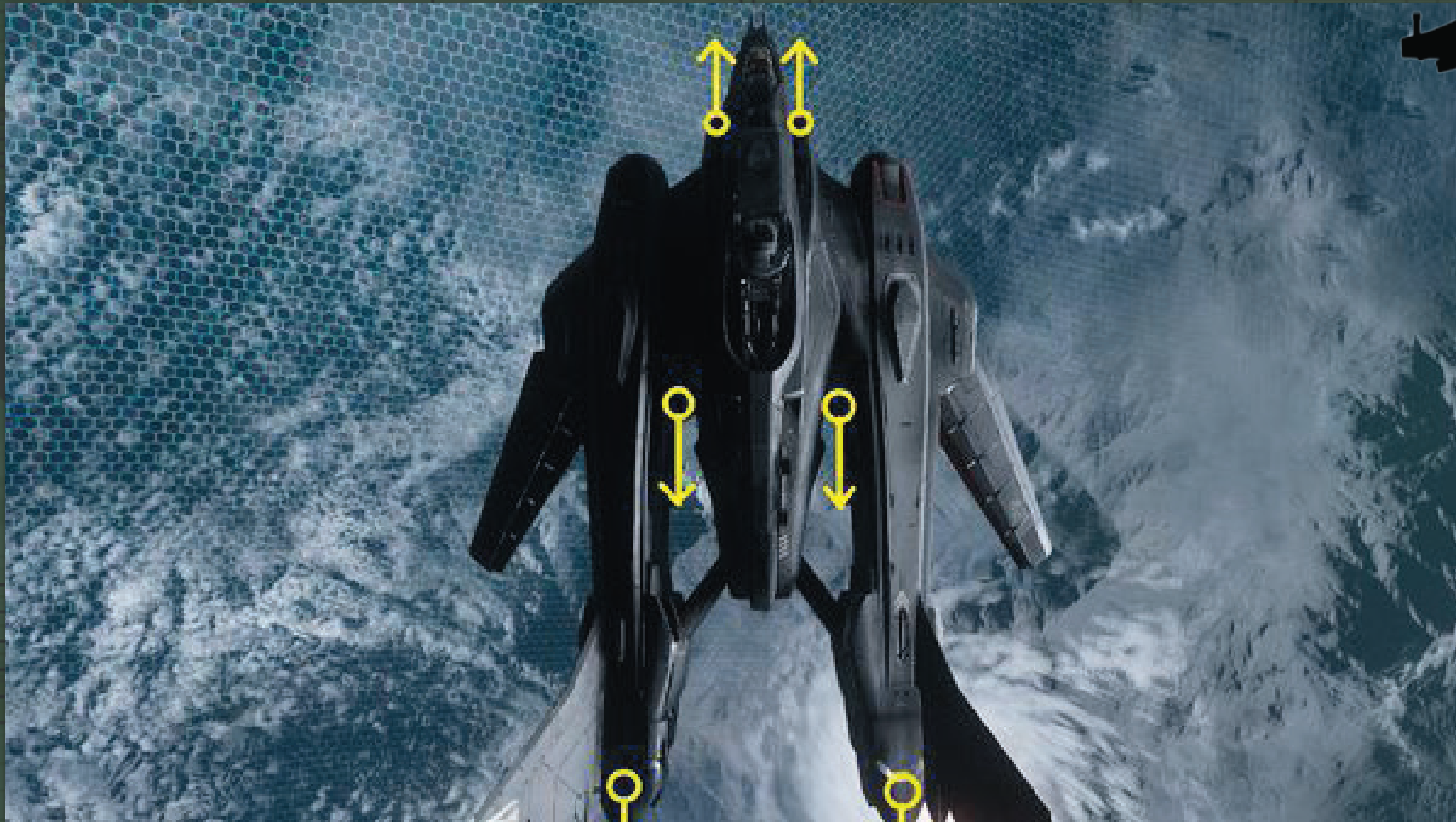
Mains and retros are quite flexible in terms of layout, as long as you keep these two things in mind:

- Ensure that there are an equal amount of thrusters per side.

  If there is an odd number of thrusters, ensure one is in the middle.

- IF there's more than one thruster, ensure that it and its counter-part are equidistant from the centre of the ship.

Maneuver Thrusters

The setup for maneuver thrusters is a little more complex, as it changes depending on whether you're using fixed or joint thrusters.

Fixed Configuration

When only using fixed thrusters for maneuvering, you will need a minimum of 12 thrusters to ensure all directions of thrust are covered.

The above setup of 12 thrusters (6 front, 6 back) would be required on both the front and back of the ship. That means there are:

4 thrusters on the side (2 per side, one front and one back)

4 thrusters on the top (2 per side, one front and one back)

4 thrusters on the bottom (2 per side, one front and one back)

Joint Configuration

When using joint thrusters for maneuvering, you will need a minimum of 8 thrusters to ensure all directions are covered.

The below setup of 8 thrusters (4 front and 4 back) would be required on both the front and back of the ship. This means that there are:

- 4 thrusters on the top (2 per side, one front and one back) that are able to rotate between pointing directly up and directly to the side.

- 4 thrusters on the bottom (2 per side, one front and one back) that are able to rotate between pointing directly down and directly to the side.

REMINDER: The thrusters should be able to rotate slightly further than 90° (100° is best), as if it only has a 90° angle the system is unable to reach both thrust vectors.

Mixed Configuration

It is also possible to use a mixed configuration using the rules set out above.

As long as all axes and directions are covered in terms of thrust, the ship should be able to maneuver correctly.
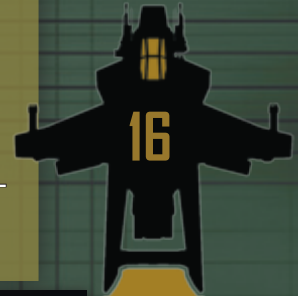
Unbalanced Flight

If the above rules and guidelines aren't followed, you will end up with a ship that flies badly or is very difficult to control. Below are some examples.
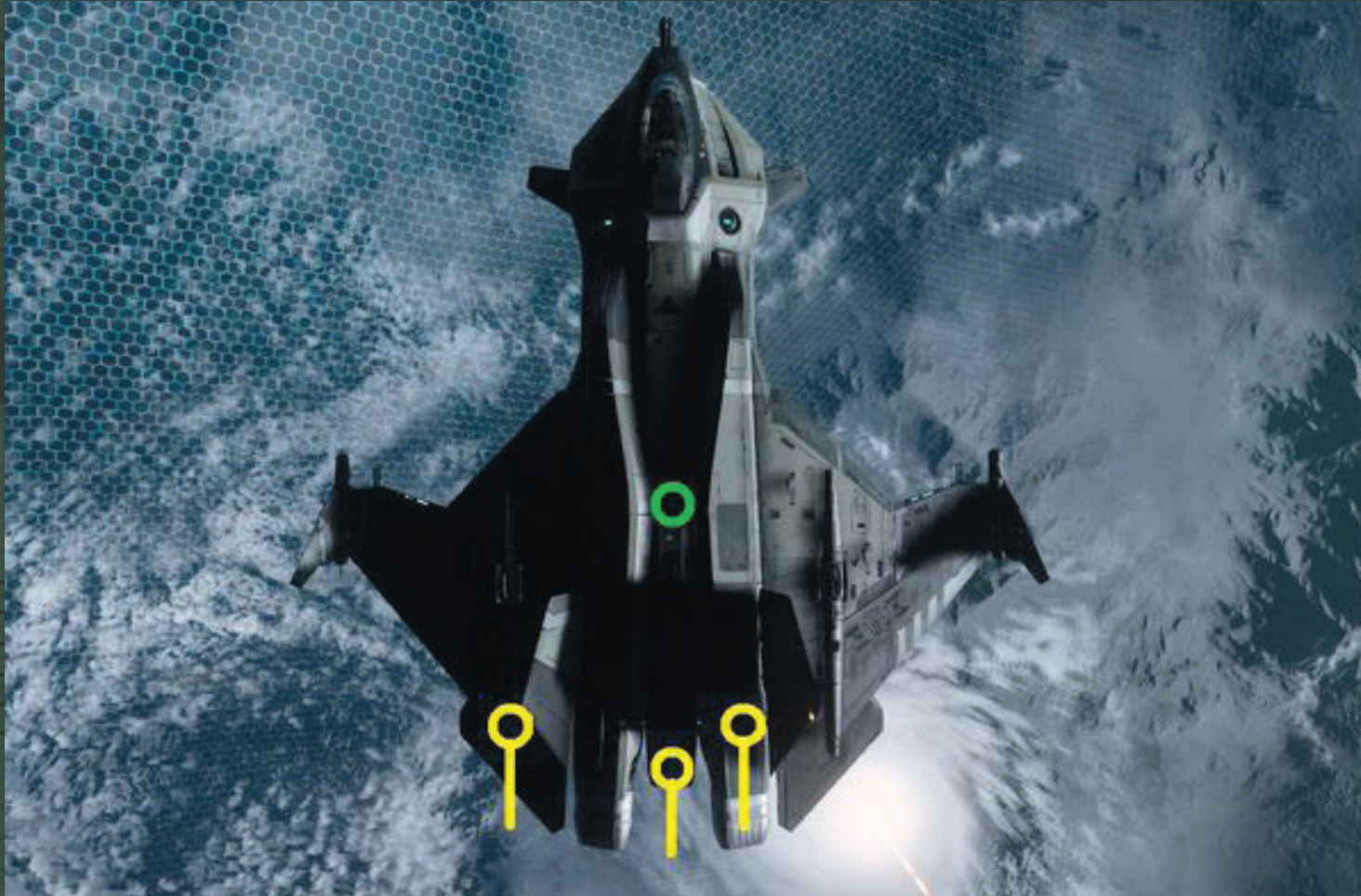
As our flight model simulates realistic physics, all ships have a centre of mass. If a ship had main thrusters set up in the position above, as two counterpart thrusters aren't equidistant from the centre, the one on the left will be providing more rotational thrust than the one on the right. This means that when the pilot tries to fly directly forwards, the ship will be trying to rotate towards the right – which might not even be possible as (another knock-on) the IFCS flight system will be attempting to make the ship fly straight. If it can't accomplish that goal, the ship may not fly at all.
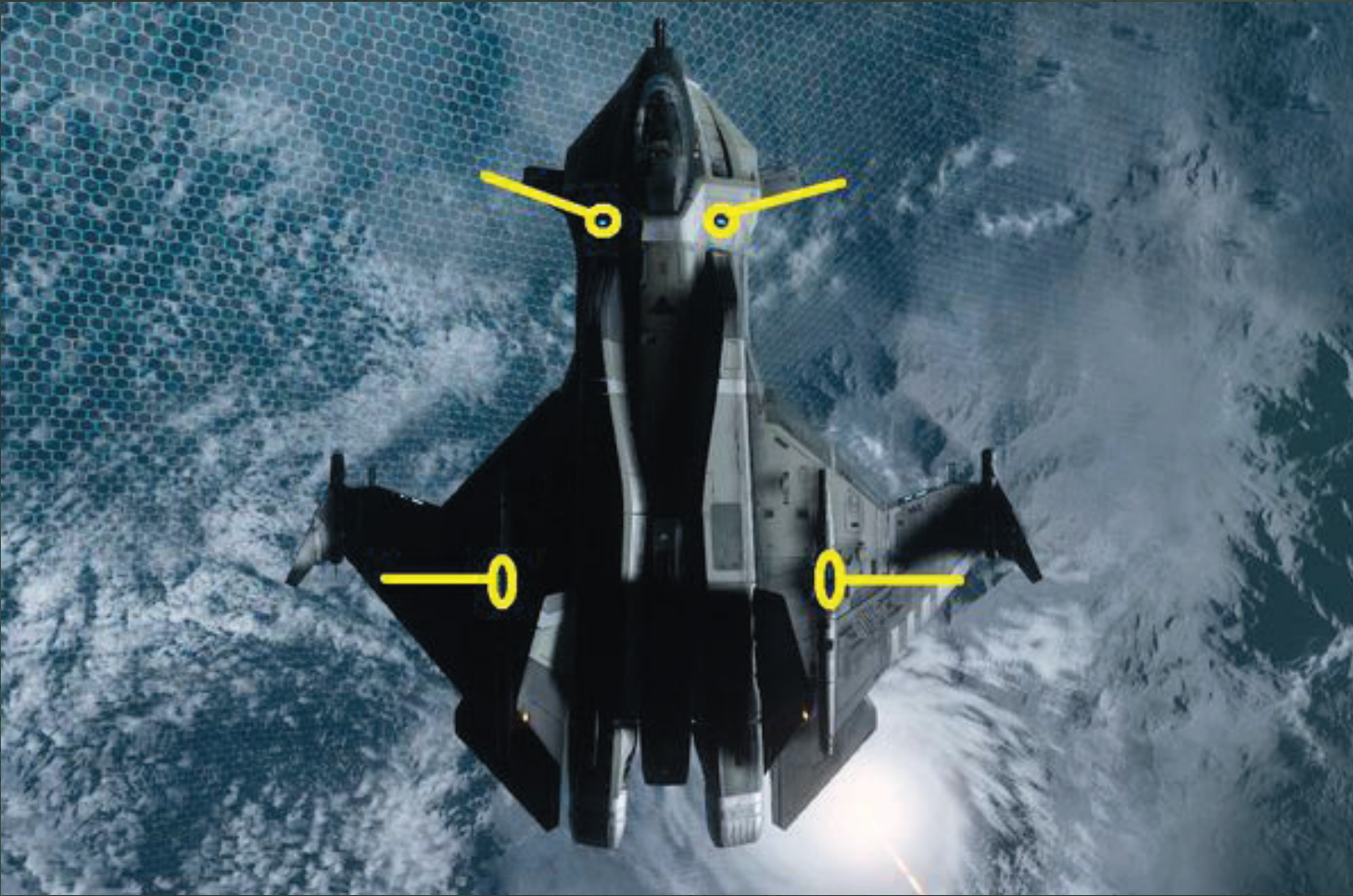
The front maneuver thrusters of the front of the ship haven't been properly aligned to the X axis and are pointing forwards slightly. This means that whenever these thrusters try to fire (if the pilot wanted to strafe, for example), they would be pushing the ship back slightly – causing the main engines to fire to keep it steady, or slowing the ship down if it is already moving forwards. Not only that, but because it provides force in an additional direction, it also loses some force in the direction it is trying to fire in, making the thruster less effective.

Our thrusters are going to be fantastic, but we need to make sure we keep them balanced and appropriately aligned.

RAYAR INC.

Promote growth.

This simple adage has been the mantra of a company that has stayed on the forefront of agricultural technology for almost two hundred years. This mantra has been the motivation behind all the company's pursuits and has driven their cutting-edge research. Although many know Rayari for their multiple initiatives and charities committed to ending hunger, and as the administrators of Reza's Landing arcology on Vosca, not many know the origins of the company itself, particularly that its founders met while working for Imperator Messer XI.

A Dark Origin

The year was 2778. Ulysses Messer X was currently fixated on what he hoped would be his legacy: the Khanos Stadium on Angeli. The Imperator had been steadily implementing an Empire-wide 'renaissance of architecture' that was intended to exalt Humanity and his family line for millennia to come. Something had changed in the public, though. After centuries of oppression, the seeds of rebellion were taking root. With the death of Anthony Tanaka in 2757, the population was beginning to pull against the chains of its imprisonment.

During this time, Ulysses Messer may have been obsessed with his buildings, but he wasn't completely ignorant of the growing dissatisfaction in the public. Though he ultimately believed that the completion of the Khanos Stadium would inspire and unify the populace, he wasn't averse to throwing the people a bone or two to pacify them in the meantime.

The Imperator drafted a challenge throughout the various Imperial departments, looking for public projects entirely intended to act as morale boosters until the stadium could be completed. Selected proposals would receive full funding under the condition that they could be implemented quickly and cheaply. Messer X didn't care where the ideas came from, he just wanted them fast.

Meanwhile, deep in a research lab on Persei, Edward Kesamyn, Clara Douglas and Asif Reader had hit a wall. The three young scientists, all fresh graduates of UPARQ, had been hired by the Agriculture Department and tasked with developing a new fermentation compound that could act as a preservative. Edward's specialty was biochemistry, Clara focused on agricultural biotechnology and Asif's degree was in genetics. They were six months into the project and had little to show for it when the Imperator's proposition arrived.

The three initially disregarded the contest, but found themselves brainstorming ideas while having drinks one night in the neighborhood bar. The conversation became more and more intense as they ordered more rounds; by the end of the night, they had an idea.

Clara had grown up in a very poor family on Hyperion. Her father had always attempted to farm the windswept property outside their modest home in the hopes of producing their own food. And he had always said, "it doesn't need to be anything special, just a basic vegetable we can cook." Unfortunately, if the soil didn't reject the plant outright, the desert's consistent windstorms would finish the job.

The three started discussing the Revenant Tree (*altrucia lacus*) and how that was able to quickly adapt to Hyperion's wind patterns and dry soil. Inspired by the wine they were drinking, Edward recounted the ancient Phylloxera aphid plague that threatened Earth's vineyards. Entomologists figured out that they could graft aphid-resistant rootstock to the bottom of the susceptible vines to avoid the deadly bug. They wondered if a similar solution could be used for her family on Hyperion. In fact, figuring out a way to graft roots of indigenous plants to common crops could open up numerous agricultural opportunities to the entire Empire. They knew that the larger companies could pull off this kind of procedure, but not independent farmers, so they decided to see if they could come up with a simple, affordable way to put this technology in the public's hands.

The bar closed and the three went straight back to the lab. For the next month, they spent every waking moment examining the feasibility of the idea and constructed a pitch to submit to the Imperator's office.

To their surprise, they were one of sixteen projects selected to receive funding. The three happily bid farewell to the fermentation project to which they'd been consigned and set up a new facility and team to realize their idea.

Three years later, however, the Empire took a turn. Linton Messer instigated a coup against his father on the night the Khanos Stadium was set to open, and was empowered as Messer XI. The new Imperator was considerably more vicious and petty than his father, so many in the government simply tried to keep their heads down and go unnoticed. To that end, Edward, Clara and Asif hoped that they would be allowed to quietly continue on their work.

When sentient life was discovered on Garron II, their

project came to a swift end. Asif was selected to join Dr. Michael Shiherlis and the team tasked with studying the planet, thanks to his expertise with xenogenetics. When Edward tried to respectfully protest the dissolution of their agricultural project, the Imperator's office suspended their funding. Edward was sent to a research station on Yar and

Clara was tasked to Bremen where she would ultimately enter the private sector to work for Terra Mills.

The separation wouldn't last long, because in 2792 a revolution finally came.

A New Venture

In the wake of the uprising, Asif decided the time had come for him to leave working for the government. He reached out to his old colleagues to reconnect. Even though they didn't have access to their original UEE project, their experience working together had been a singularly unique one, a dynamic that none of them had experienced in any of their labs since. Clara left her position at Terra Mills to join the team and Edward was all too eager to get off the barren rock he'd been consigned to. They formed Rayari as a private agrochemical thinktank and got back to work. The three scientists quickly found that, having spent so many years apart and developing as independent scientists, they clashed a lot more often than they did in their youth, but their desire to innovate was just as strong. The bright side, however, was that they challenged each other in ways that they hadn't before, which opened up their thinking.

Adopting the motto 'promote growth,' the team wanted to explore everything. No area of science was off-limits if it could lead to innovation that could help Humanity. Although many of the initial employees cited the combative environment between the three founders, none could deny the exciting scientific atmosphere that allowed them to try and fail.

Garron would intervene once again though. The Senate announced its intention to restore Garron II to its original form. Although Dr. Shiherlis' team had kept extremely detailed notes, the planetwide devastation caused by the terraformers was going to be a monumental task to reverse, so they put the word out for scientists to lead the charge.

Asif proposed returning to Garron II. As detailed in his memoirs, even though he was just a researcher on Dr. Shiherlis' team, being even remotely associated with the Massacre of Garron II haunted him. He saw this as an opportunity to undo some of the damage that Humanity had wrought on the planet.

Edward and Clara quickly agreed, as they knew that by signing on, they would be able to regain access to their old project files and potentially apply that research to Garron II. In 2803, Rayari was catapulted into the public consciousness when they unveiled a complete line of indigenous plants, painstakingly reconstructed from the original planet's genetic code, but grafted to heartier flora that could withstand the changes in the soil composition. The experiment was a success and a concerted effort to reseed the planet was launched.

Promoting Growth

After their success in Garron, funding for the company began to pour in to examine other agricultural issues around the Empire. Rayari incorporated to handle the influx of new opportunities. What was fascinating is that although the three founders remained as Board Members, they were all unwilling to walk away from "front line research," so they hired a CEO to run the administrative aspect of the company.

For the next fifty years, the company steadily expanded. Although they built labs around the Empire, their commitment to exploring riskier scientific ventures prevented the company from truly flourishing. Edward, Clara and Asif never saw each other socially and continue to attack each other over their work while in the office. It was always about 'the work.' That was the 'Rayari experience,' as one former employee put it. The company did well enough to slightly grow, but never thrive.

When Clara died in 2863, the last of the original founders had passed away and Michael Vicar, the current CEO, decided it was time to transition the company to focus more on increasing their profit while diminishing their wasteful spending. Provisions in the original corporate charter prevented him from downsizing their research department, but Vicar was a savvy enough businessman to direct more of the funding towards the more commercially viable ventures.

Today, Rayari, Inc. has maintained its place at the forefront of agricultural technology and development. Despite the more commercial direction the company has taken in the past eighty years, Edward, Clara and Asif's original vision remains intact as Rayari labs can be found all around the universe, performing a wide variety of groundbreaking experiments in space and on planets, all in the hopes of finding the next breakthrough that propels Humanity further into the future.

ENVIRONMENTS

Echo 11

This month we talk with one of the largest teams, or groups of teams, working on Star Citizen *and* Squadron 42 – *the environment artists.*

JP: *First, introductions: could each of you please give me your title and a one-sentence summary of what you do?*

Jake Gainey: Lead Environment Artist here in the UK. I'm currently responsible for looking after and improving our space scenes in both the PU and *Squadron 42*.

Peter Royle: Lead Environment Artist on *Squadron 42*, responsible for the environments we'll see in *Squadron 42*.

Eddie Hilditch: I'm the Senior Lead Environment Artist and

I'm responsible for overseeing the entirety of environment production, along with prototyping and development of new tools and pipelines.

Michel Kooper: Lead Environment Artist in Frankfurt, responsible for the procedural planet-related tasks, as well as helping the engineers with further development of our planet tech.

Ian Leyland: Environment Art Director. I am responsible for all environments in *Star Citizen* and *S42*. The teams that I direct are Concept Development, Lighting, and Environment teams in both the UK and DE studios.

Nicholas Etheridge: Lead Environment Artist for PU. I'm responsible for all points of interest within the PU space. This includes things like space stations, outposts and satellites. I need to make sure all the PU artists have the right knowledge, tools and systems to do the job, plus good communication across to the other departments.

JP: *What did each of you do before you joined the* Star Citizen *team?*

Jake G: I was working at TT-Fusion / Travellers Tales on the Lego games.

Nic E: I've worked at a few large studios such as Ubisoft and Playground Games, mainly focusing on driving games, as well as some smaller places, and worked freelance for a bit too.

Michel K: Before joining CIG I worked at Crytek for the last five years. This is also where I met a lot of the people I work with now. Before Crytek, I spent a few years working freelance/remotely and working for a small Dutch games studio doing Nintendo DS games.

Eddie H: I started work on the *PGR* games at Bizarre Creations, then I worked at Free Radical, then Eurocom, then Crytek UK, now here, with about 14 years in the industry!

Ian L: Before working on *Star Citizen*, I was also at Travellers Tales. At the very beginning of the UK studio, it was mostly a small group of TT staff, so it felt like family right

Jake Gainey, Ian Leyland, Nic Etheridge, Pete Royle

from the start. Before that I was working at Rebellion. Before that I had my own creative studio in Liverpool, doing Arch Vis and Design Visualisation, and before that I was working as an Industrial Designer visualising spaces for people like Hilton, etc. Overall, many many years, but to be honest the most important thing about my history is having a solid foundation in Industrial Design. Applying its core principles to the way we're trying to visually develop the environments in our game is very useful in creating beautiful and believable environments.

Pete R: Before working here I was at Rebellion for a long time working on the *Sniper Elite* series, and before that I was at Acclaim . . . some 17 years in total now.

JP: *You're all environment artists of one sort or another. In* Star Citizen*, what is an "environment"? What **isn't** an environment?*

Nic E: Most things that aren't characters, ships and weapons are environments . . . which is a huge part of the game.

Michel Kooper

Eddie H: Everything from a solar system to a toilet cubicle, that you can't fly around or shoot or talk to. :)

Michel K: I guess you could say all of the physical space the player is in, excluding being in a vehicle.

Pete R: Essentially, with the exception of vehicles/ships, if you 'play' through it, then it's environment.

Jake G: Yeah totally, especially when you compare that with more conventional video games where an 'environment' may just be a single room or confined area. For us, it's everything from a planet surface to the interior of a space station. The scope of our environments are on another level!

Ian L: An environment is basically the digital stage we create for our content to exist in. For me, it's the most import part of the frame and obviously what I love the most – we can describe all types of spaces from exotic to alien, we can build mood and drama from adventure to horror, and we can set the stage for our characters to feel believable in.

JP: *I'm getting the impression that cockpits could easily be*

considered part of the environment too, but since this is a ship-combat game, we've decided that cockpits and ships require a dedicated team just for that.

Nic E: A lot of the time it would depend on the game. For a racing game, you would have a dedicated team working on vehicles, but for another game where that isn't the focus, the environment team might take on the odd vehicle. For us, ships are a big part of the game, so they requires a dedicated team.

Pete R: Ships very much have their own pipeline that includes lots of technical set-up. Internally it makes sense for us to split them into their own class and have a separate team working on them.

Nic E: Another example is props. There are lots of props so we have a team for it. Many other games incorporate props as part of environments.

JP: *And what are props? Give us a few examples from each of your areas.*
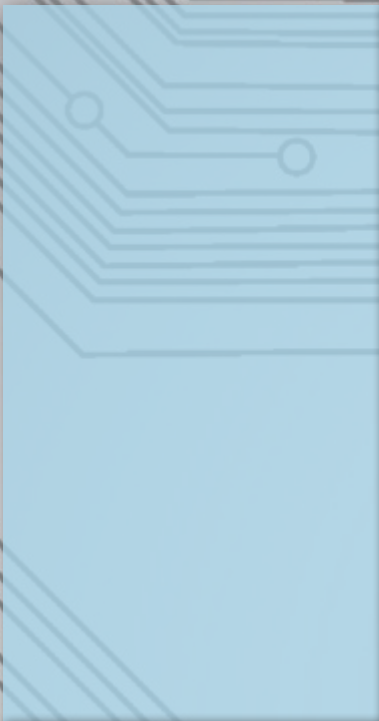
Pete R: Crates and barrels! lol

Michel K: Anything ranging from glasses/ bottles to larger objects like crates, shipping containers, etc. Things we use in our environments to add live and sell the setting, but not physically connected to the environment

Eddie Hilditch

Stanton skybox from space

Stanton skybox from surface
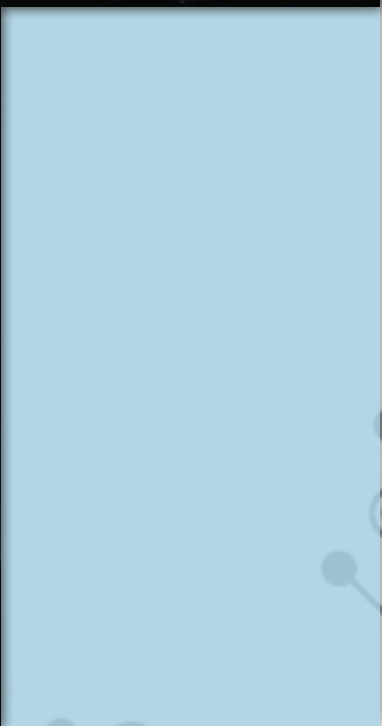
Pete R: Anything that isn't directly part of the surrounding environment, so as I sit here in the office: the office would be the environment, and the chairs, desks computers, etc. would be the props.

JP: *How about a noodle vending machine – prop?*

Pete R: Prop.

Michel K: In smaller teams and projects the props would be part of the environment work.

Stanton landscaping

Nic E: The Big Benny's machine was actually made by an environment artist, but that was when we didn't have a dedicated prop team.

JP: *It looks like most of you are leads or senior artists of various types. Who else is on each of your teams?*

Michel K: The team in Frankfurt currently consists of nine artists including myself, and we are still in the process of growing a bit. Currently we have two senior environment artists: Pascal Muller
Luke Adwick
and six regular environment artists:
Jussi Broxx
Stephan Damrau
Maximilian Keilich
Sebastian Schroeder
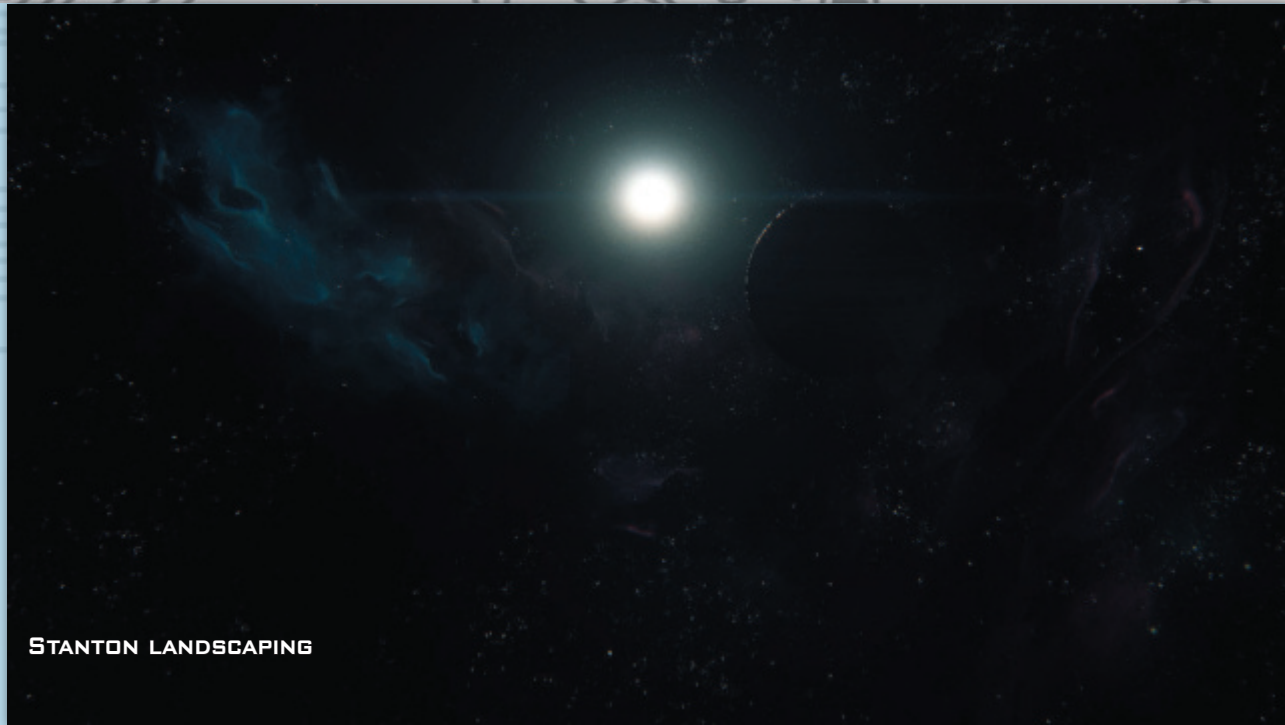
Ozlem Sagbili
Florian Sollaneck

Pete R: Over on *Squadron* we have the following environment artists:
Hayo Koekkoek (principal artist)
Pavel Jelinek (senior)
Jose Fernandez (senior)
Ryan Playle-Howard (senior)
Johnny Renquist (senior)
Jan Harcarik (senior)
Jimmy Pereira (mid)
Andy Baigent (mid)
Carl James (junior)
Chris Reid (junior)
Kieran Burke (junior)
Mantas Karciauskas (junior)

Stanton nebula

Stanton nebula from planet
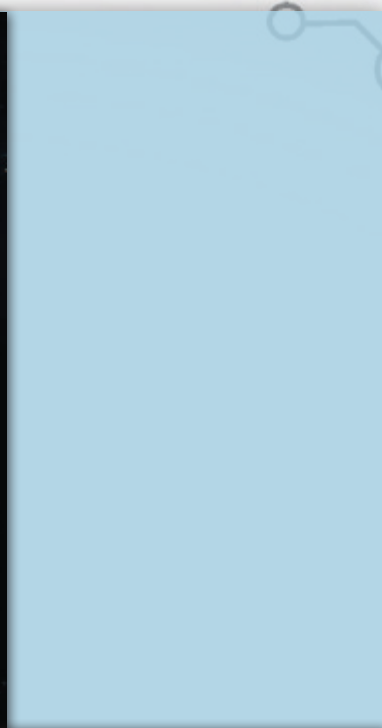
Planet surface

this data to our tech and graphical engineering departments to support development on what we want going forward. A lot of what we create in space requires this technical support and cross-department collaboration.

JP: *Would you say your examples are more focused on look and feel (what a dingy warehouse looks like, or a new space station, or a forested plain), or more on structure (illustrating types of pieces and ways for the pieces to fit together), or something else entirely?*

Jake G: In some ways it can be focused on the look and feel, but the scale of the things I'm looking into are pretty galactic. So a good example might be creating an offline simulation for a nebula in a particular system, which can be pretty abstract! It's hard for our engineers to visualise how this should look in the game and reference can be hard to come by.

JP: *So in a way, you're going where none of our artists have gone before?*

Jake G: In some ways it's ground we haven't covered before, that's for sure! That's why the collaboration between our departments is so crucial here. It's not just environment and the engineers – our VFX, lighting and design

Nic E: My team includes:
    Wai-Hung Wan (senior)
    Daniel Harris (mid)
    Ainsley Langford (mid)
    Adam Sanders (mid)
    Pierre Robin (mid)
    Melodie Delamourd (mid)
    Luan Vetoreti (junior)

Nic E: But sometimes Pete and I share resources.

Eddie H: I just annoy all of the above when I need to. :)

Jake G: I'm currently flying solo, working on RnD and prototyping for a while. :)

JP: *Jake, what does RnD involve in this context?*

Jake G: Partly, it involves creating visual examples and working closely with my art director (Ian) – then providing

departments are also a big part of making a success out of these prototypes.

JP: *Let's talk about the process. Who decides that a new environment is needed? How does an environment get made, starting from the initial request?*

Eddie H: Ultimately, CR. If you want to take it from the very, very beginning, you'd have a kick-off meeting with Ian, the design directors and probably David Haddock and Will Weissbaum (writers) to discuss the general feel and direction, along with high-level design requirements. Then Ian would take this to the Concept team and begin some rough sketches and exploration of the types of forms and shapes we think could work.

Pete R: With *Squadron* being a story-driven campaign, story is central in laying out the environments we need to create – as is design, but that comes after story and in tandem with the art. So once we have the brief we'll start exploring form, scale and composition in the 'whitebox' phase. This is usually supported by concept, which is always a great help in establishing the look of an environment.

Eddie H: We have a few different types of environments that each have a slightly different method of manufacture

Daymar

(nothing is simple). The PU (Persistent Universe) environments are split into three main pillars: Landing Zones, Space POIs and Planetary Bodies. The single-player campaign (*SQ42*) has what I'd call a much more 'traditional' development structure, that is again slightly different from the previously mentioned PU stuff. But it can be generalised down.

Michel K: For the planets, as we can see in the starmap on the website, there is a lot of lore already for the systems/planets and moons. This gives initial lore and the general idea for the location (for example) of a "gas giant," "ice planet," etc. That will be the starting point for art direction, to start shaping the look and feel of each location.

Eddie H: After that it's narrowing down the concept to a final version everyone is happy with. Then we'll take that concept into a 'whitebox' phase as Pete described. But as

CELLIN

They are pretty good at keeping us informed of what's coming up in the near future, or if there have been any changes from the top. Our producer is Luke Davis, btw.

JP: *My next question is how each of you go about creating an environment — what considerations are involved, and so forth?*

Eddie H: There are many things that we have to consider when making an environment, and it can be a very tricky balancing act. Look and feel is very important, but that can be informed by a huge number of things: What's the architectural style? What's the technological level? Who lives there? What's the socio-economic situation? How old is it? What type of planet is it on?

Then you have to make it a believable space. Structurally, things have to work and be laid out in a way that makes sense for humans (or other lifeforms) to inhabit.

The human eye is very good at picking out things that don't look 'right,' even if you don't realise it. You don't have to be a trained architect to feel that a space is awkward and wrong, so creating a structurally believable environment is very important. Exceptions can be made when we begin talking about more technologically advanced and potentially alien technologies informing how spaces and structures can be built.

he says, it's not that the concept artists go "this is finished go make it" — we work together for a significant period of time to nail the forms and spaces we want.

Pete R: Once we have an environment set out in whitebox, it'll get reviewed and iterated on until it's signed off. Design will then become more heavily involved, and the process moves into the 'greybox' phase; here we add more detail and refine how it's actually put together, giving greater consideration to technical constraints. We also have a lot more collaboration with Design making sure it works from a gameplay perspective. Materials/texturing are made and applied here and really help with moving things forward. After that, it's taken up to final, where we light and dress the scene, polish it, then optimise.

Jake G: We'll also get the heads-up from our producer on an incoming 'sprint' or a new environment that's needed.

PLANET SURFACE

The next thing to consider is how we can actually translate a space to work in the game. There are many performance, technological and design requirements to account for. At the end of the day we don't work in isolation; everything we make has to fit with the limitations of the engine and the gameplay requirements.

First and foremost for me is the ability of an environment to tell a story with no words. You should be able to walk through a space and feel its story without having to read or listen to anything.

Nic E: As well as the technical aspects Eddie has outlined, the classic art considerations need to be taken into account: good composition, lighting, colour theory, material definition, shape and silhouette.

Jake G: The player experience is always something I try to think about when creating any environments in the game. How do we want the players to feel in this area? How long will they spend here? There are so many tools we can deploy as artists to help effectively control the player experience in a positive way.

Michel K: I think for planets it is slightly different, in that we don't have a fixed space or layout. The final planet is the result of various components put together with procedural rules.

So we do have a whitebox phase for individual components that will go onto the planet, like the rocks. The general shape of the ecosystems and such for the final result

BEHIND THE SCENES

will continue to change and be tweaked (where traditionally the large shape and layout is defined first).

Nic E: Readability is key, especially for an interactive medium such as a game.

JP: *"Readability"?*

Nic E: How easy it is for a player to read the scene, in terms of what his goals are, what the general layout of the area is. For example, what looks interactive should be interactive.

In contrast to that, players can get confused in a very noisy and detailed scene, and will get frustrated if the layout is hard to read and they can't locate where they want to go.

Eddie H: What Nic says is very relevant – how a player 'flows' through a space is important. Annoying switchbacks or repetitive traversal gets old very quickly if a player is going back and forth multiple times.

Jake G: It's really cool that one of these areas could have all of our teams working on different aspects of it.

JP: *What area(s) do you have in mind? And how exactly would each team be involved?*

Jake G: Well, Pete mentioned that I'd be covering 'space' in this particular example, but then also Michel and his team would be building the planetary aspects of that mission and then we could also be using some outposts or stations being built by Nic and his team.

JP: *That **is** neat.*

Jake G: It's amazing when it all comes together! :)

JP: *What's the smallest environment that each of you has helped create?*

Pete R: Quick answer: nothing is small here. :P

Michel K: I think Delamar is the smallest in diameter. :)

But it's effectively still a planet, and individual components go as small as shrubbery and small rocks on the ground.

Pete R: Probably a space station for me.

Nic E: The comms array is possibly the smallest environment I worked on, and that's still 1km long.

JP: *So for y'all, an "environment" encompasses large, multi-room structures? I was thinking that each room in Delamar or on a space station would be an "environment."*

Nic E: As environment artists, we actually model some nuts and bolts, which is probably the smallest, but they get converted to a texture.

Eddie H: If you break it into an environment 'task,' you are usually talking an interior and an exterior for a team. But then we would take it room by room to do the dressing, lighting, polish, etc., which would be handled by individual artists.

But Jake doesn't do anything less than planet sized. :)

Jake G: Haha, yeah, the smallest environment for me would probably be the Stanton System.

JP: *Yeah, I don't think I'll ask about your largest environments . . . they get pretty big.*

Jake G: It's probably the same answer as my smallest environment!

Nic E: I think I can speak for everyone here, that none of us has worked on anything at these scales before.

Eddie H: That really is the most demanding part of this project. If you were to talk about a 'traditional' game, you would fully expect that the environment team would be creating maybe at most a 10km square environment to

ArcCorp

Jake G: For sure! It's funny because people will still use terminology like 'backgrounds' in meetings.

JP: *Which environment has been the most fun or most interesting to create?*

Jake G: The recent work on the space stuff has been fun, but I always really enjoy the work we do for the live demos like Gamescom or CitizenCon, as everyone comes together to create something awesome.

play in. Anything beyond that would be 'faked' vistas that would only hold up from a distance.

Michel K: Funny anecdote here in the Frankfurt team: we were working on our first moon and decided to measure the square KMs of a crater to understand the scale of things. The crater turned out to be bigger than the entirety of *Skyrim*. It really takes some time to wrap your head around the amount of space we are creating.

Eddie H: In our game you have to be able to wake up in a tiny room, examine a data screen, have it all look visually dense and real, then walk out of your outpost onto the surface of a fully realised and complete planetary surface, with a gas giant hanging in the sky. Then you get in your ship and fly to the other side of the solar system.

And it all has to hold up visually. Once you get close to it, we can't afford to fake anything!

Nic E: Echo11 was fun, as it was a chance to get our hands dirty on a really seedy environment, plus I'm a sucker for team-based multiplayer games.

Like Jake, I also like the demo stuff, as it can sometimes be a bit more fast passed and experimental, but it can also be quick hectic.

Jake G: Yeah, it can be really tough work on the demos.

Michel K: For me, this means picking which of the three moons is my favorite. :)

Yela was the first one that was looking good; in hindsight it was the easiest to achieve. Daymar was actually the most fun to work on because it very much evolved hand in hand with all the planet tech improvements we made. It had the most iterations and drastic changes, but it was a lot of fun working on it and the team is really happy with the result.

Echo 11

Echo 11

YELA

The support and enthusiasm we see from them is what keeps us going. It really means a lot to work on a game that I know people are super excited for, it really drives me to always push for better!

Also to the team, we've had to learn to adapt and survive in a unique and non-traditional development environment, and their talent and hard work have shone through consistently.

Pete R: I don't think I can go into too much detail with what we're working on in *Squadron 42*, but I'm absolutely enjoying being back in the sci-fi genre. One mission I've worked on had a mix of hard surface (a dark, derelict, metallic base) and organic (dusty, rocky, ragged landscapes); working on scenes that mix these different elements is what I enjoy the most. It keeps the work varied, and visually it's more interesting.

JP: *Any last words?*

Nic E: A thanks to all the backers for their support. Without them none of this would be possible.

Jake G: The same as Nic – I can't express how grateful I am to our backers for allowing us to work on this awesome game.

Eddie H: I'd like to for sure give a shoutout to the backers.

Ian L: I would like to echo the shoutout to the community. Getting to meet you guys either at events or when you come by the studio is always really cool. Watching you guys on Twitch play something we've poured our hearts and souls into is always very rewarding. Keep being passionate, and if anyone comes by the studio I will gladly talk to you about interesting subjects like rocks, or shape language, but only if you bring Japanese Whisky!

Pete R: Big thanks to our backers – without them this just wouldn't be possible. Also a shoutout to the entire team, the expertise and commitment here is awesome, and makes for a great working environment.

Michel K: Absolutely a big massive thanks to all our backers. Your support and enthusiasm is what drives all of us to make the best possible game we can make. And a shout-

out to the entire team, I think we have managed to collect a great group of talented and dedicated people and it's an absolute pleasure to get to work with these folks every day!

Nic E: I would also give a shoutout to the whole environment team, the level of talent and calibre of the artists is very high across the board.

JP: *Thanks, guys – it's been lots of fun!*

Demien

Demien

Ian Leyland on the Process

It all starts with the idea of a location. Usually this is established by the lore team. Personally, something as simple as a paragraph from Dave H describing a dusty backwater landing zone is everything I need to get my imagination going. Instantly I start visualising the space, the mood, and most importantly who lives there. To create compelling and believable spaces for a player you need to understand the type of people who would exist in that space.

From the initial idea, I start establishing high-level concepts exploring loose look and feel – nothing too specific, just something to complement the lore and capture the imagination for the other disciplines. We might go through a few rounds of concept, exploring an idea. Depending on how complex the environment is it might take a week, or much longer.

The next stage is whiteboxing or blocking out the scene with simple geometry; at this stage we can make very quick iterations to explore what works and what doesn't. The key is establishing the right proportions of scale in the scene and getting something that works both visually and for design. Near the end of whiteboxing we'll do some concept paintovers based on screenshots of the level. What we are looking for here is finding out what our key visual beats are – for example, this is what the vista looks like, etc.

Following whitebox we move into what we call the 'greybox' phase. This is where we start adding complexity to the environment meshes and modelling in the architectural forms. We also establish a base material library if it's for a new location, or reuse an existing library if there is one available. For example, in our game we have architectural styles, and each style has a shader library, so if we're building on an existing architectural style then we can reuse, etc.

During the greybox phase, the level layout is still pretty fluid. Designers are refining the layout and the environment team are stress testing the building set. Even at this stage we can make fairly big layout changes quickly if an environment isn't working.

Close to the end of the greyboxing phase we start to light the environment. The lighting team can be very creative at this stage, as you can get some very good results from lighting a good scene which has greybox geometry and basic shaders. The lighting team works from lighting key concepts, and if I get time I like to establish a base mood and atmosphere myself and hand that over.

In between whiteboxing and greyboxing, all dynamic elements in the scene are being called out – for example, structures moving, buildings exploding, etc. These are critical to help spaces feel less static; an environment needs to feel like it is living and breathing.

Then the team moves on to the final art phase, where they take each asset up to the final quality, with all teams working together to finalise the scene. The environment team works closely with the lighting team, tech art team and vfx team to achieve the end look.

Once we've met the quality bar for the entire environment, we start moving onto technically validating the scene. This isn't a glamourous task, but it is essential. LOD's are made of assets, environments are profiled to see where it's too expensive, etc., and once again it's a team effort to harden the scene into something that can be shipped.

Taking a scene from initial idea to a shipped environment is a creative and complex process. It involves all disciplines working together to organically grow the level through the production phases. There will sometimes be arguments, there will sometimes be frustration, but this is because everyone is passionate about achieving the same high standard. The end result is always worth it!

GARRON SYSTEM
GARRON II

There are few systems in the Empire that inspire the myriad of emotions that Garron does. Even after two hundred years, the effects of the events on Garron II have barely abated in the public consciousness. To many, the system continues to be a chilling warning about the horrors that unchecked Human greed can unleash on the universe. To others, it is the lightning rod that spurred Humanity to finally rise up and free itself from the shackles of oppression.

Discovered in 2784 by Imperial pathfinders, the Garron system was significant from the start. While performing their initial assessment of the system, scientists and researchers focused on the only planet situated within the narrow green band of the G-type dwarf star. They were thrilled to discover developing life on Garron II. Remarkably, with all the systems that Humanity had discovered to this point, explorers had never before stumbled across a non-space faring sapient species, only ruins of long-past civilizations and 'animals' – so the government had never been faced with the prospect of how to deal with a burgeoning intelligent civilization.

The Imperator, Linton Messer XI, paraded vids of the aliens all across the Empire and boasted about Humanity uplifting the species. "We will be gods," was the cornerstone of his address to the public in 2785. A team of the Empire's greatest scientific minds were assembled under the guidance of famed anthropologist and linguist, Dr. Michael Shiherlis, and assigned to an orbital platform

above Garron II. Their mission was to not only study the species below, but devise a method of contacting them and subsequently uplift them.

Over the next five years, Shiherlis and the team worked tirelessly to observe the creatures below and decrypt their language, all while keeping their presence hidden from the unsuspecting culture. However, their Imperator grew bored with the prospect of uplifting Garron II, particularly when he was presented with the initial planetary assessment that detailed Garron II's considerable natural resources. The prospect of assimilating the species was now overshadowed by the possibility of massive financial gain.

The Imperator immediately began courting terraforming companies and mining concerns to spec out potential bids for processing the planet. Planetary geo-engineers moved into the observation station to perform more thorough surveys of the planet. Shiherlis quickly realized what was happening and implored Messer to reconsider.

He got his answer when Ellis Netemi, Linton Messer's cousin and chief adviser, broke the planetary quarantine to personally lead a tour down to the planet surface. There, in full view of the alien species, he showcased the landscape for company reps in the hopes of sparking a bidding war. Shiherlis, horrified at having to witness this innocent species effectively being invaded, decided to take a stand and let the public know what Messer was up to. Unfortunately, Shiherlis was betrayed by a close associate who was terrified that the Imperator's wrath would extend to the entire team. Michael Shiherlis was deemed an "enemy of the Empire" and quickly remanded to Orville prison on Charon III without trial.

With Shiherlis out of the way and the rest of the scientific team terrified into submission, Netemi sold mining rights to the highest bidder and the terraforming machines moved into place to convert the atmosphere. Whether the Imperator had forgotten about his earlier boasts to

the public about uplifting Garron II or considered the populace to be so completely subjugated that his reversal would go unnoticed is still being debated among historians. However, all of those vids that he showcased depicting the creatures of Garron II firmly implanted the primitive civilization in the public's consciousness, so once the underground activist movement known as the Tide released footage of the devastation caused by terraforming an inhabited planet, the public remembered. What came next, no one could have anticipated.

In the aftermath of the revolution, Humanity was faced with a myriad of uncertainties. The newly installed Imperator Erin Toi was busy introducing legislation that would prevent future despots from seizing power while also ferreting out the remaining forces loyal to the Messers, but the public's attention was firmly on the loss of Garron II.

The Senate enacted the Fair Chance Act and quickly placed the recently discovered Osiris system under its protection, but there was considerably more debate over what to do with Garron II. The Senate decided to build a team to restore Garron II to its original form. They consulted the initial planetary analysis and even managed to bring back some of the original members of Shiherlis' team to assist. The government even attempted to bring Dr. Shiherlis back onto the project after freeing him and the thousands of other political prisoners from the prisons on Charon III, but the doctor refused. Years of abuse during his incarceration prevented him from returning to the project.
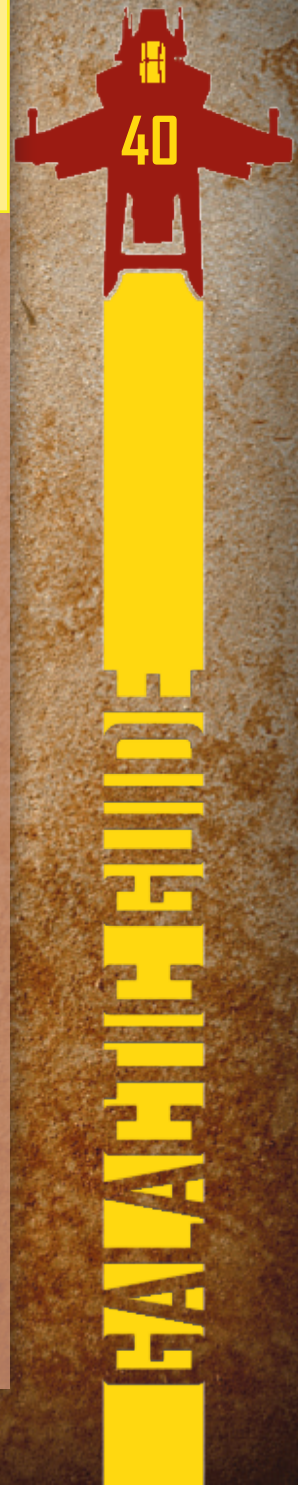
Over the years, advanced research companies like Rayari Inc. volunteered their cutting edge technology to help rebuild Garron II and its biosphere. Imperator Toi ultimately placed Garron II under the Fair Chance Act, guaranteeing that it would be protected from this point onward.

The ramifications of the actions taken in this system reverberated through the decades. It was this incident that Imperator Salehi would cite, almost a hundred years later, as the inspiration for the creation of the Synthworld project. To this day, Garron remains as a nexus for the scientific community. Though it has no settled planets, the system sees a healthy amount of traffic and trade from its connections to Idris and Banshee. Surprisingly, though, Garron generates most of its revenue from the jump point to Bacchus. The system sees millions of travellers every year who are eager to visit the Banu system and conversely, acts as one of the main conduits into the UEE for Banu.

Garron I

Formed very close to the system's star, Garron I's proximity has transformed its surface into a sea of lava.

Garron II

This rocky planet was home to an amazingly diverse biosphere with an equally varied array of lifeforms until the Messers essentially eliminated the indigenous life by replacing the atmosphere. Since then, terraforming companies and scientists have worked to restore the planet to its former self and although they have not been able to recreate any of the creatures, they've made great strides in repopulating much of the botanical life, in large part thanks to the hundreds of detailed scans Shiherlis and his team recorded. Despite not having any inhabitants, this planet has been placed under the Fair Chance Act.

OB Heller

The original observation station constructed for Dr. Shiherlis and his team to design a method to uplift the denizens of Garron II. The station has since served as an operations hub for scientific teams attempting to rebuild Garron II's original atmosphere and as a museum on the history of terraforming and the Fair Chance Act.

Garron III

A large super-Earth that formed on the inner edge of the system's frost line. After exhaustive studies, the planet was deemed devoid of life and cleared for mining to help fund efforts to restore Garron II.

Garron IV

The furthest planet in the system, this large, rocky planet orbits on the outer rim of the system. The UEE constructed a monument on the surface entitled The Sentinel as a sign of their commitment to protect the developing species in this and all other systems.

Heard in the Wind

"I think my second summer house could go right there …"

– Ellis Netemi, Chief Adviser, Messer XI, overheard on prospecting tour, 2791

"Humans of the systems. This is Tide. Pull the veil from your eyes and see. Garron II was a developing world with a vast array of species. We say "was" because they are no more. The Imperator and his Corp minions terraformed the planet, killing everything to feed their insatiable greed. Pull the veil from your eyes and see for yourself."

– Tide, April 12, 2792

SID & CYRUS

by. Adam Wieser

Part 2

A Vucari cavalcade cut across the Platean Plain. Master Kraujas stood in the back of a heavily plated vehicle, specifically converted to accommodate his massive Titan armor. The vehicle also featured a rotating platform, so he could adjust which way he faced — an essential feature considering the tachyon cannon attached to the Titan suit's left arm.

The vehicle barreled over a bump and only Master Kraujas' magnetic boots kept him from being bucked out of the back. He slammed a metallic hand on the cab just above the driver, who immediately slowed. Vucari mechanics joked that this cab panel was the only piece of armor on the whole vehicle that ever needed to be replaced. Protected by his elite Vucari cavalry and that tachyon cannon, not many enemies could get close enough to Master Kraujas' vehicle to even chip its paint.

Master Kraujas turned his attention to the horizon where he could see black, acrid smoke rising from the site of the ambushed convoy. The closer he got to it, the more the anger swelled inside him. How dare they so brazening attack such a large convoy traveling through his territory? The Cadejo were no longer an annoyance, they were a menace that must be eliminated.

It had all started a few months ago. Vucari scouts found the wreckage of a small civilian convoy on the edge of their territory. A few weeks later, another convoy was hit. Then another. At each scene, body armor ripped off the people in the convoy was found in a pile, but never any bodies. That's when the rumors started.

Stories about the Cadejos swiftly moved through his ranks. How was it they always won? How did they always vanish without a trace? They weren't simply slavers, the stories said. Whispers started that maybe the Cadejos' leader, Tomyris, took people to fuel some strange, ancient rituals that gave the crew dark powers.

Master Kraujas knew better than to believe such tripe, but some of his troops still did. Then he started to see fear in his men's eyes when another attack pointed to the Cadejos. That's when Master Kraujas knew they had to be crushed. He could not have his crew fearing anyone; fearful warriors fail.

Vucari spies were dispatched across Lago to dig up information on the Cadejo, but nothing was found. No one seemed to know who they were or where they holed up. The only thing known about the Cadejos was that they were stepping up attacks on civilian convoys crossing Vucari territory.

Now, sitting before Master Kraujas was the largest convoy struck by the Cadejos yet. It was attacked right on the main road between Reis and Behistun, too, a clear challenge to his authority that made him look weak to his troops and other outlaw leaders.

Once at the ambush site, Master Kraujas walked among the still smoldering wreckage, trying to understand how this attack could have happened on such a wide-open region of the plain. There were no good spots to hide an attacking force that could dominate and destroy a convoy of this size. No damage to the ground indicating the use of mines. It didn't make sense.

Master Kraujas stomped around the scene, examining every detail. He estimated that the Cadejo had made off with a hefty haul considering the size of the convoy. How they had even known about it?

According to Dalton, the next major shipment to Behistun was supposed to leave Reis in two days. How had that date been changed without him knowing but the Cadejo finding out? Now he not only appeared incompetent but out of the loop.

He approached the back of the only intact truck. Inside sat a large pile of personal armor, the Cadejo Crew's calling card.

A wave of rage overcame Master Kraujas. His hands grabbed one of the truck's rear door panels, and in one terrifying motion, he ripped it off the hinges and tossed it behind him. The door knocked two Vucari off their feet. One lay motionless. The other writhed in pain until Master Kraujas brought his foot down upon his head.

"Where's Dalton?" demanded Master Kraujas.

When no response came the Vucari glanced among themselves. All eyes looked for the man assigned to oversee this part of their territory.

"Sir . . ."

Master Kraujas turned to an outlaw pointing at the body he just stomped. An intricate Vucari emblem was etched into the chest piece. Dalton had hand-carved it himself.

Master Kraujas glanced at the lanky figure who pointed out Dalton's body. "What's your name?"

"Colby . . . sir."

"Since you're so observant, tell me what the hell happened here."

Colby stalled, unsure of how to answer. Then he remembered something he saw when first surveying the site.

"They forgot to cover their tracks. They're clear as day, heading north."

Master Kraujas smiled, "Show me."

*   *   *

CHRONICLES

Sid and Cyrus had followed the trail from the ambush site. They stopped when the trail entered a small valley, which had a wide entrance, then narrowed. Not wanting to rush into the unknown, Sid and Cyrus found a hiding spot off the trail and examined detailed maps of the area.

The valley led to an old outpost sitting on the edge of a deep open-pit mine. That outpost had to be where the trail ended, and most likely where their daughter was being held hostage.

With its back up against the mine, the rocky valley creating a perfect bottleneck; with ground turrets flanking each side, the outpost would be impossible to approach discreetly from this direction. The only choice the two had was to look for an alternative route.

Then Cyrus noticed there was an old hauling road going down into the mine. It started near the outpost, dipped into the mine and wound its way back up on the far side near a series of spoil banks, which were rows of all the unneeded dirt ripped from the ground. If they could access the hauling road by the spoil banks, then they could travel into the mine and perhaps sneak up on the outpost from behind.

Once close enough, they could assess exactly what they were up against and determine how to breach the building. Plus, there was always the chance that their daughter was being held hostage somewhere in the mine. Maybe Sid and Cyrus could free Immanuelle without even having to deal with Tomyris and the rest of the Cadejos.

Sid and Cyrus redirected course to the far side of the mine. They found a path that took them above the valley. They stopped briefly to survey the outpost and its two ground turrets from above. They didn't linger, worried that the Cadejos might be watching.

Abandoned centuries ago after it was played out, the mine pit had since become a dumping ground for debris and anything else that wasn't supposed to be found again. The stench of rotting trash and industrial waste was apparent even from their spot above the valley. The foul fumes kept even the most dedicated scrappers away and made it a perfect place for a secretive outlaw pack to call home.

Sid piloted the Dragonfly carefully around the edge of the valley towards the far side of the mine. Cyrus glanced down at the spoil banks from above. Cutting through the middle of the rows was the hauling road. Things looked clear until he noticed someone moving. They walked by one of the spoil banks and pulled some camouflage netting off a ground turret, placed perfectly to ambush anyone who flew past.

"Looks like we've got one mark and a turret. That's all I'm seeing so far."

Sid lowered the Dragonfly's signature as much as possible as they approached the hauling road on the other side of the mine. She checked her scans and didn't quite believe them. They agreed with Cyrus. There was only one person and one turret guarding this side of the mine.

Sid stealthily slid the Dragonfly between two rows of the spoil bank. She cut the engine as Cyrus hopped off and unholstered his sniper rifle. He braced the gun on the back of the parked Dragonfly and settled the crosshairs on the mechanic frantically repairing the ground turret.

"That turret gonna give us trouble?" asked Sid.

"Not if we move fast. Looks like it's getting fixed."

"I'm gonna scout ahead."

"Got you covered," replied Cyrus with an eye on the mechanic. "Gonna stay here and monitor Vucari chatter."

Cyrus had hacked into the stolen Dragonfly's comms so they could stay abreast of the Vucari's movements. Sid nodded, checked her suit's scanners and then pushed forward.

She hustled toward a better vantage point, then checked her scans again and still didn't quite believe the results. Why would the Cadejo leave the spoil bank side of the mine so lightly defended?

She watched the mechanic work for a moment. He turned to snag another tool, giving Sid a good look at his face. It was Devin, the kid who'd mistakenly wandered into the Falling Sky and started all of this.

"This is definitely the place," Sid commed. She waited for Cyrus' response, but none came. "Cyrus . . . everything ok —"

"They found the trail. Damn it, we forgot to wipe it."

"What?"

"They're coming, the Vucari. Master Kraujas just sent out a call for anyone in the area to join him on the trail."

On any other mission Sid and Cyrus would've wiped away the trail they had found leaving the ambush site, so no one could follow, but they'd been sloppy. The possibility that their daughter might still be alive exceeded everything else, even their better judgment. This oversight was exactly why Cyrus used to tell young mercs that they should never work something personal.

"How much time do we got?" asked Sid.

"Not enough, considering all the new variables." Cyrus muttered and re-targeted the mechanic. "How's that scan look? Should I take out that mechanic?"

Sid looked back at Devin. Even though she despised him for his part on the attack of that convoy, she knew they needed him.

"Negative. Let's grab him instead. Find out if he knows what they did to Immanuelle. Move to me."

Cyrus carefully advanced forward until he was by her side. Sid checked her scanner once more, then lead them to-ward Devin and the turret. They had to hurry. If Devin got that thing working while they approached, it could chew them up in a heartbeat.

Even though it'd been two decades since their last merc job, the two still moved in sync. When Sid looked one way,

Cyrus swung the other. Sid stopped frequently to check the scans and collect her breath. Cyrus sighted his sniper rifle toward the mechanic, trying to assess the repairs being undertaken.

They advanced to a spoil bank near the turret. Devin was too consumed by his repairs to keep an eye on what was going on around him. He pulled himself to his feet and stretched. All that was left to do was power up the turret and it should be good to go.

He reached for the control panel only for a bullet to strike it first. Devin stumbled back in shock, tripping over his tools and falling to the ground. When he looked up there was a rifle in his face.

"Hands up," Sid loomed over him in her heavy armor. Devin raised his hands. "Now get up nice and slow. I don't want to have to hurt you."

Devin obeyed the order, his eyes glued on her the entire time, though he didn't seem to recognize Sid in her heavy armor. Good; she was going to relish the chance to order this little punk around.

Cyrus advanced toward them with his sniper rifle raised and wasted no time getting to the point. "Where are the prisoners?"

"What prisoners?" Devin replied nervously.

"Don't get him angry, Devin," Sid interjected.

"How do you know my na—?"

"We know a lot of things," Sid pushed on. "Like what you did to that convoy to Behistun."

"You're Vucari, aren't you?"

Cyrus shook his head, "Just consider us the people with your life in our hands."

A soft tremble worked its way down Devin. It was subtle but Sid caught it. Time for the sweet talk.

"Listen, help get us what we want and we'll let you walk away. Understand?"

Devin nodded nervously, "What do you want?"

"I want to know where the hell my daughter is!"

"How would . . . I mean, I don't even know who you are. How am I supposed —"

"She was a part of that convoy to Behistun. Her armor was in the pile you guys left behind."

Devin stared at Sid with a lost look on his face. Cyrus took a step forward.

"Not a good time to play dumb, Devin," said Sid. "Your help is what's going to save your hide."

"But I don't know what you're talking about —"

Cyrus unleashed a tight left hook to the liver. Devin dropped to a knee and sucked air. Sid laid a hand on Cyrus' shoulder.

"Don't bullshit us," Sid said sternly. "We know you played a part in what went down with that convoy."

"Yeah, but I don't know nothing about any prisoners," Devin slowly stood back up.

"Do you have anyone locked up in the mine?"

"No, why would we —"

"Maybe they're in the outpost then?" Sid pushed on.

"I'm telling you. I don't know anything about any prison—"

Cyrus struck Devin again, same spot. The kid fell to all fours. Sid studied him. He was either a glutton for punishment or honestly clueless about their line of questioning.

"Devin, it doesn't need to be like this. Let's make this easy for you, ok? Get up."

Devin nodded, as he slowly rose to his feet. Sid laid a massive hand from her heavy armor on his right shoulder.

Devin winced under the weight, as it strained the side of his body that also held his liver.

"Let's break it down to what we know," Sid began. "You were at the ambush, right? We know that for sure."

Devin nodded his head.

"That's a good start. Now, since you were there, can't you understand why we find it tough to believe you absolutely have no idea what happened to the people in that convoy."

Devin's eyes went wide. "That's because Tomyris sent me off on a mission before they were done."

Cyrus glanced to Sid, who nodded. The kid had shown up at the Falling Sky and mistakenly passed along that message to her. Maybe the kid really didn't know. He sure wasn't acting like he was trying to hide a secret.

"Who would know then, Tomyris?"

Devin nodded.

"Where is she?"

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Devin seemed better at keeping his mouth shut when he was sober. He quickly and quietly walked between the two of them as they descended into the mine, only speaking when asked a direct question. Sid and Cyrus peppered him with inquiries about what to expect at the outpost.

His answers were quick and direct. No pauses indicating that he needed to think through an answer. Devin claimed there were but five inside, including Tomyris. That number seemed low to Sid. There had to be more he wasn't telling them.

Sid led the way, stopping frequently to consult her scans. The deeper they got, the more old mining equipment they saw scatter around them. Some of looked as if it had been pushed down to this depth from above.

At the bottom of the mine, a massive crane sat in the middle of the pit floor. Around it were piles of old mining equipment and vehicles. Sid assessed the operation as they approached. It didn't look like they were repairing or stripping anything, just using the massive crane to organize the debris.

Cyrus kept his eyes peeled for signs of prisoners or strange ritual sites. So far he'd seen no evidence of either. He had no idea whether that was a good or bad sign for the safety of their daughter.

Sid brought them to a stop behind a rusting vehicle about halfway across the pit floor. She pulled up her scanner and studied it. Then she looked up to see a faint Hathor Group logo on the side of the truck before her. Sid had seen it someplace else recently, but couldn't quite place it.

She shook it off and then glanced at their ultimate destination — the small outpost perched atop the other side. She studied a freight elevator built into the side of the mine behind the outpost. Taking it would be faster than footing it, but could attract attention.

Cyrus glanced at the massive crane looming overhead. A giant metal disc dangled from the jib. Intrigued, he asked, "That some kind of magnet?"

"Suckers so strong it pops a truck off the ground like nothing," Devin said proudly.

Sid tapped Cyrus, returning his attention to the issue at hand.

"Give the lift a look."

He raised his sniper rifle and scanned the elevator. The area looked clear. Then he focused on the elevator's console. He nodded to Sid, confident he could hack it so they wouldn't see them coming.

"How much ground is there between the elevator and outpost?" Sid prompted Devin.

"I don't know . . ."

"Guess."

"I'm serious, I'm a terrible judge of distance. Thirty meters, maybe?"

"What about those turrets?"

"What about them?"

"Are they gonna turn on us?"

Devin shook his head. "They're only programmed to care about hostiles in front of them. I can show you the —"

"Just know this," pushed Sid. "You'll be standing right in front of us once we reach the top. If those things spin our way, they hit you first, understand?"

Devin nodded.

"So, let me ask you again. Should we be concerned about those turrets?"

"No, I'm telling you the truth. I'm trying to help."

"I hope so. I really do."

"Have him describe the doors again," Cyrus requested.

"You heard the man. Don't leave him disappointed."

Devin nodded, "When you step off the lift, there's a door straight ahead. That opens up to the main room where they'll all probably be inside. Then there's a second like garage door just to its right that I can open for you."

Cyrus could hack his way in, but using the kid's credentials would be quicker. The faster this plan developed for them the better. Right now, their only advantage was the element of surprise.

"Explain the plan back to me, one last time," Sid requested of Devin.

"We, um, get to the top. Where I stay directly in front of you two as we hustle toward the garage door."

"And . . ." egged on Sid.

"And . . ." Devin reluctantly continued. "If I'm ever more than two steps away of from either you or do anything stupid whatsoever, then you'll probably kill me."

"Definitely kill you," Cyrus emphasized.

Devin gulped.

"Now that we're all on the same page," said Sid. "Let's move out."

The three crossed the pit floor to the lift. Cyrus hacked the console, took control and then killed the security cameras. They all got in and started their ascent.

Sid shook her head, "I don't get it."

"What?" Devin took the bait.

"What you're doing mixed up in all of this? Working with folks that do terrible, terrible things. I don't know, guess it just doesn't seem your style, kid."

"It's not," he shot back quickly. "I came here to repair that crane. I stayed because I believed in the mission."

"What miss —"

Power to the elevator was cut. The car jerked to a stop as the brakes slammed into place. All systems went offline then suddenly rebooted, powering back up.

Sid raised her rifle at Devin.

"I didn't do anything," Devin hands slowly went above his head.

Keeping her gun trained at him, Sid signaled Cyrus, who stepped to the console. He turned back to her and shook his head. They weren't in control of the lift anymore. The tiny red light on the camera in the corner showed that they were being watched.

Suddenly, the lift started moving upwards again.

"Guess they want to meet us," said Sid.

"You best hope your friends like you enough to want to negotiate," said Cyrus.

"They need me, I swear," said Devin. "I'm the only one 'round here that really knows anything about that damn crane."

Positioning Devin in front of the gate, Sid and Cyrus prepared themselves for an ambush. The lift settled into place. The gate lowered before them. Someone was inviting them forward. They instead stayed in place.

A moment later, the main outpost door opened and a figure stepped forward slowly with its hands raised.

"Who's that?"

"Tomyris," replied Devin.

Tomyris slowly stepped from the outpost and approached. Her armor had been through hell on the battlefield: impacts, gunshots, energy burns, the works. Strange symbols had been painted with loud splashes of color. About halfway across the field, the figure stopped and slowly took off her helmet. A lucky bandana held back her long brown hair.

Cyrus lowered his sniper rifle after seeing her face, "I can't believe it . . ."

Cyrus carelessly rushed forward.

Sid started to raise her weapon, but got a better look at the woman. The bandana, that defiant look in her eyes, it could be only one person.

Cyrus reached the figure and scooped her up in an embrace.

Devin looked over at Sid, "What the hell's going on?"

"That's our daughter."

"Tomyris?"

Sid nodded her head, looking at Immanuelle, having trouble believing it herself. "Apparently so."

To be continued