

JUMP POINT

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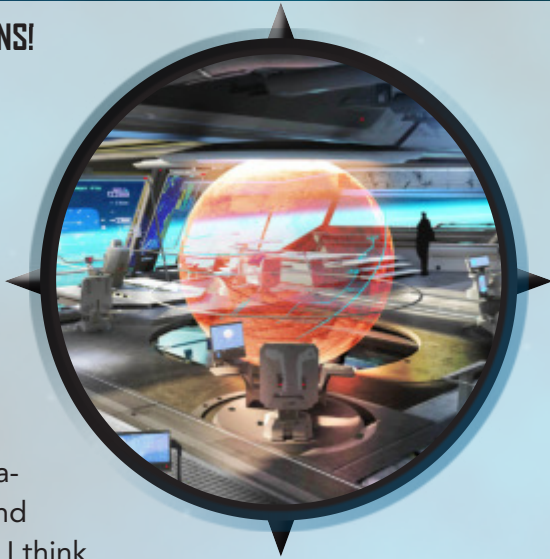


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GREETINGS, CITIZENS!

As the cover might have suggested to you, we're exploring people, not ships, in this month's Work In Progress. Specifically, the male UEE Marine, and his brand new assault rifle. I think the most interesting bit is the degree of detail that goes into creating accessories and even the uniform's stitching.



Meanwhile, we travel to Kilian, the "military system," and investigate the Marines' history and structure, courtesy of Ben. We've also got a discussion of how the game economy is developing, illustrated with a table and three colorful charts (!), and the first episode of a new trilogy, from a new author, Robert Waters. *The Cup*, besides being a good read, gives you our best current estimate of how the actual Murray Cup race will be held. That being said, there are almost certainly parts that will change drastically before the first in-game racer leaves the starting line, so take it as interesting, but not gospel.

I appreciate the various suggestions and other comments in the **JUMP POINT** feedback thread. I'll try to keep the typos and other grammatical errors to a minimum, and we're gonna try to give you more information on various in-game systems and mechanics as they develop — case in point being this issue's discussion of how the economy is

being evolved. One problem is that most of these systems are still in very early development — anything we tell you at this point would be tentative and very much subject to change. That's fine for some of you, but others want to take whatever we publish and refine it into in-depth game strategies . . . which we'll probably render inoperable with the next version of the system. People tend to get cranky, the third or fourth time we do that to them, and we try to avoid cranky. :)

And related case in point: we have no stats this issue, because we don't yet have any working stats for people or personal weapons. We will, but not today.

People are also asking for monthly development updates. That's an entirely reasonable request, and we're trying to get it implemented . . . but for everyone, not just JP subscribers. More on this as I know more. (We've got to make sure we're giving you useful information, not just meebles.)

I survived the Livestream, as did everyone else, although I think my flight jacket was more popular than I was. Nevertheless, an interesting experience.

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

David

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COVER: MARK SKELTON & CHRIS OLIVIA
PAGE 25: MARINE LOGO, CLINT SCHULTZ
PAGES 28-32: PHOTO BY MICHAEL MORLAN; CHARTS BY PETE MACKAY
PAGE 33: KILIAN, ELIJAH MCNEAL
PAGE 36: ELIJAH MCNEAL



FROM THE HICKORY

UEE Marine

This month's Work In Progress highlights the development of the UEE's basic Marine, along with his Behring P4SC assault rifle.

Rob McKinnon created the concept art for both Marine and rifle. Mark Skelton (**MS**) and our friends at CGBot (**CGB**) converted Rob's Marine model into a finished in-game figure, while Chris Smith (**CS**) did the honors on the P4SC.

In this first section, the normal text is conversation between Mark and CGBot; the *italic boxes* are additional notes from Mark, afterwards.



Rob McKinnon's original concept art.

MS: Here's the first outfit you'll be working on, the UEE Marine. Please be wary of things like the tubes that attach the chest to the shoulder. Make sure those parts aren't sewn into the geometry so the animators can attach them separately. Thanks!



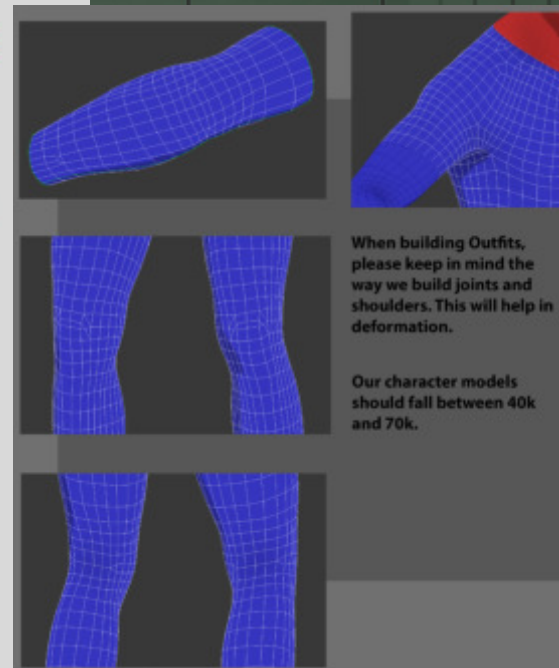
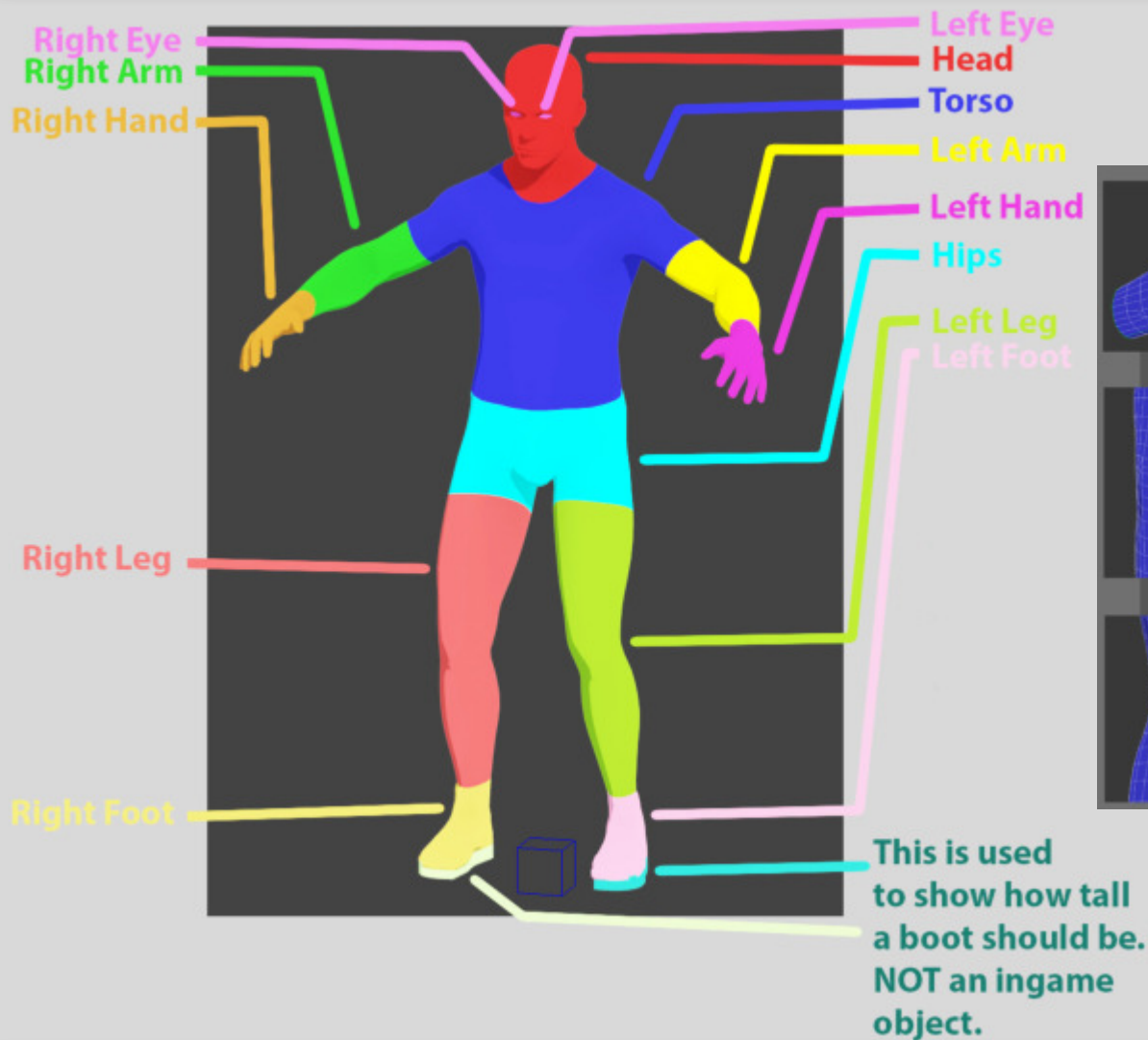
**UEE MARINE 002
LINEUP**



WORK IN PROGRESS

MS: The first thing I do when dealing with an outsourcing company is to bring them up to speed on how our character customization currently works. There are currently 10 body swaps for each playable suit we use in the game.

The way the different parts fit together is very important. I stress to them how the seams need to be tucked away or hidden. These are things to think about when building the blockout.

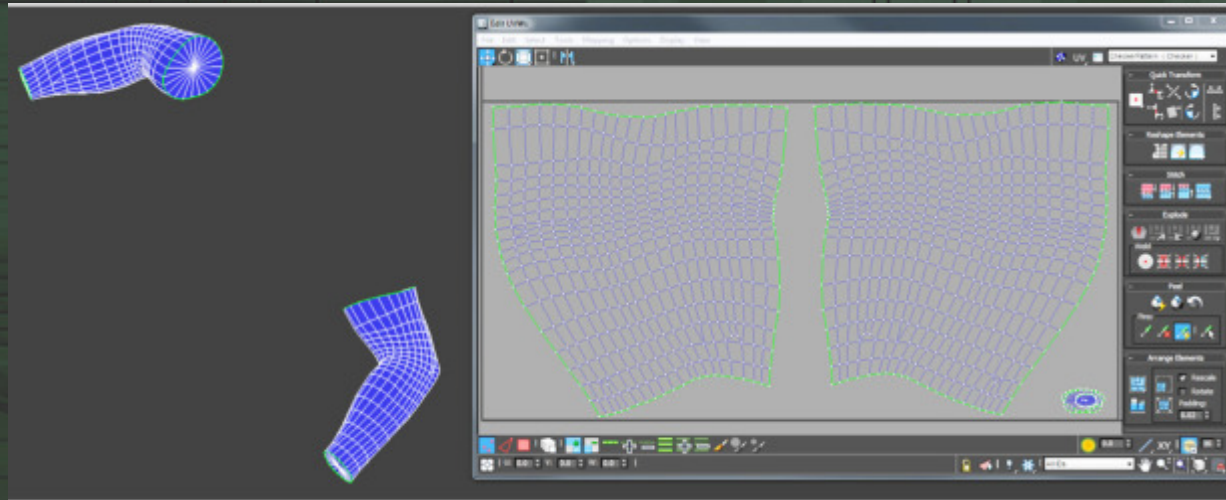


WORK IN PROGRESS

The body is divided into 10 separate parts:

- UEE_Marine_RightArm
- UEE_Marine_LeftHand
- UEE_Marine_RightHand
- UEE_Marine_Torso
- UEE_Marine_LeftArm
- UEE_Marine_Hips
- UEE_Marine_LeftLeg
- UEE_Marine_RightLeg
- UEE_Marine_LeftFoot
- UEE_Marine_RightFoot

Not shown: eyelashes, teeth, tongue, hair

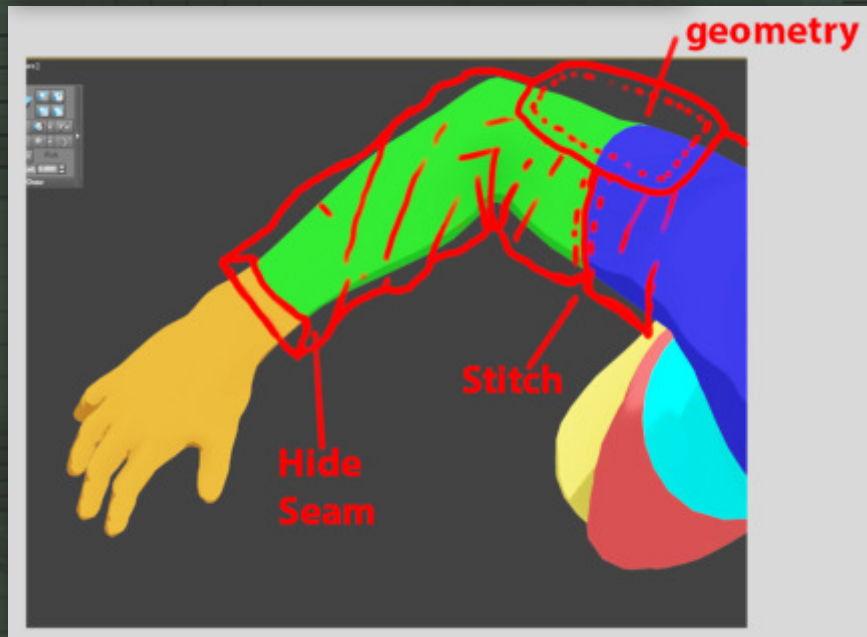


MS: Each object, or pair of objects, has its own texture map associated with it.

MS: All of the hanging straps and belts should be modelled independently (not sewn in) so we can modify or remove them.

MS: When making suits, please hide the seams where they connect, either by:

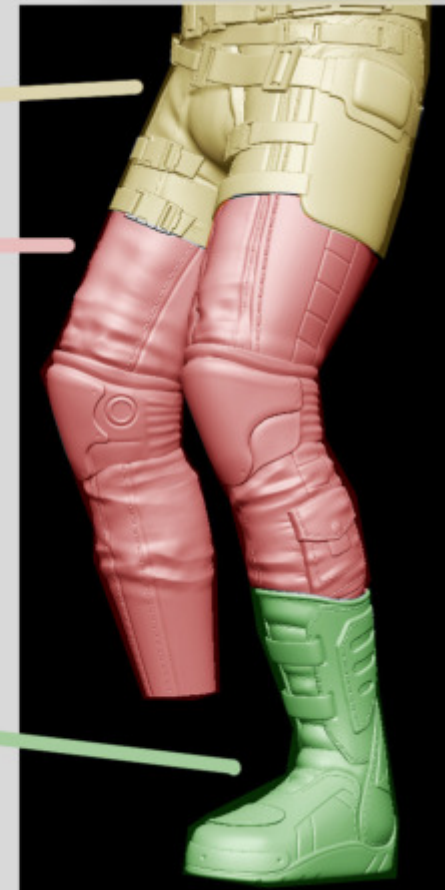
- Making a logical stitch
- Tucking it up under the geometry
- Putting a piece of geometry over the top of it



All on Hips Sheet

All on Legs Sheet

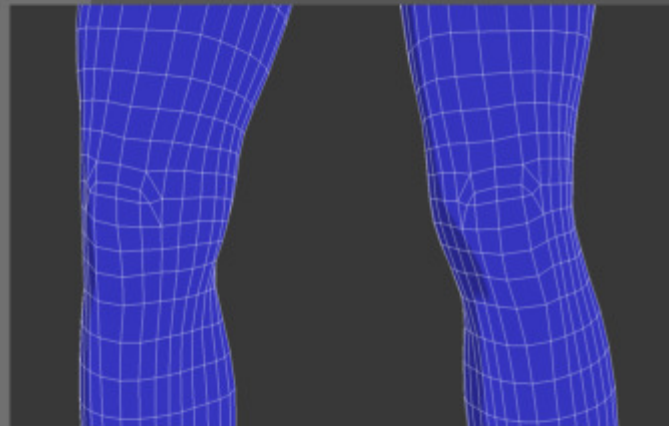
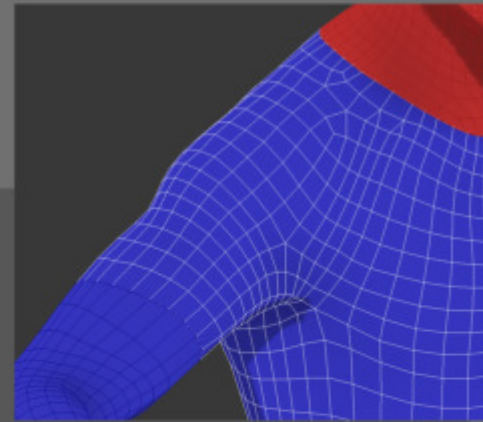
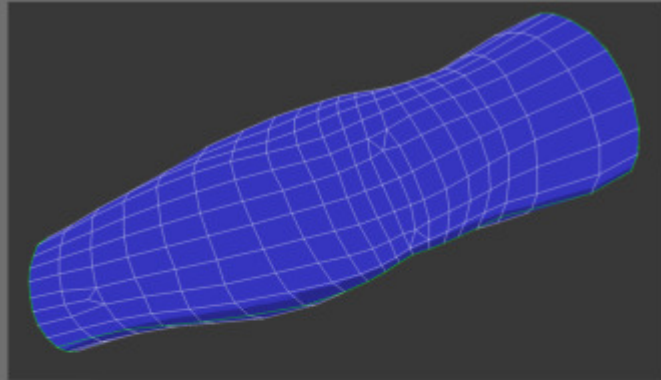
All on Feet Sheet



WORK IN PROGRESS

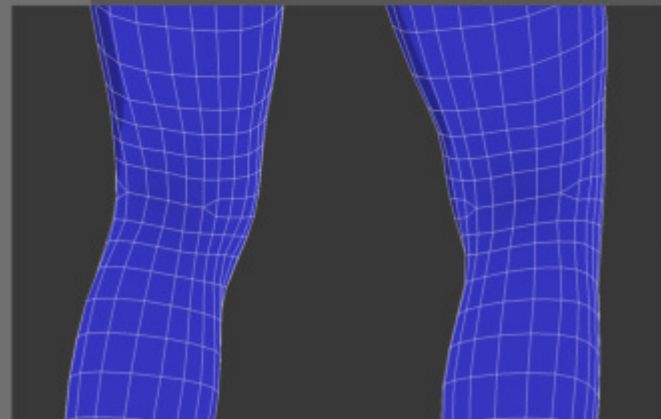
MS: I also stress to them the importance of edge flow and joint construction. This is essential for deformation when skinning a character. Next, I send them the base male 3D file that I made for size and construction reference and the concept artwork.

From this, CGBot has all they need to make a base blockout or a 3D "sketch."

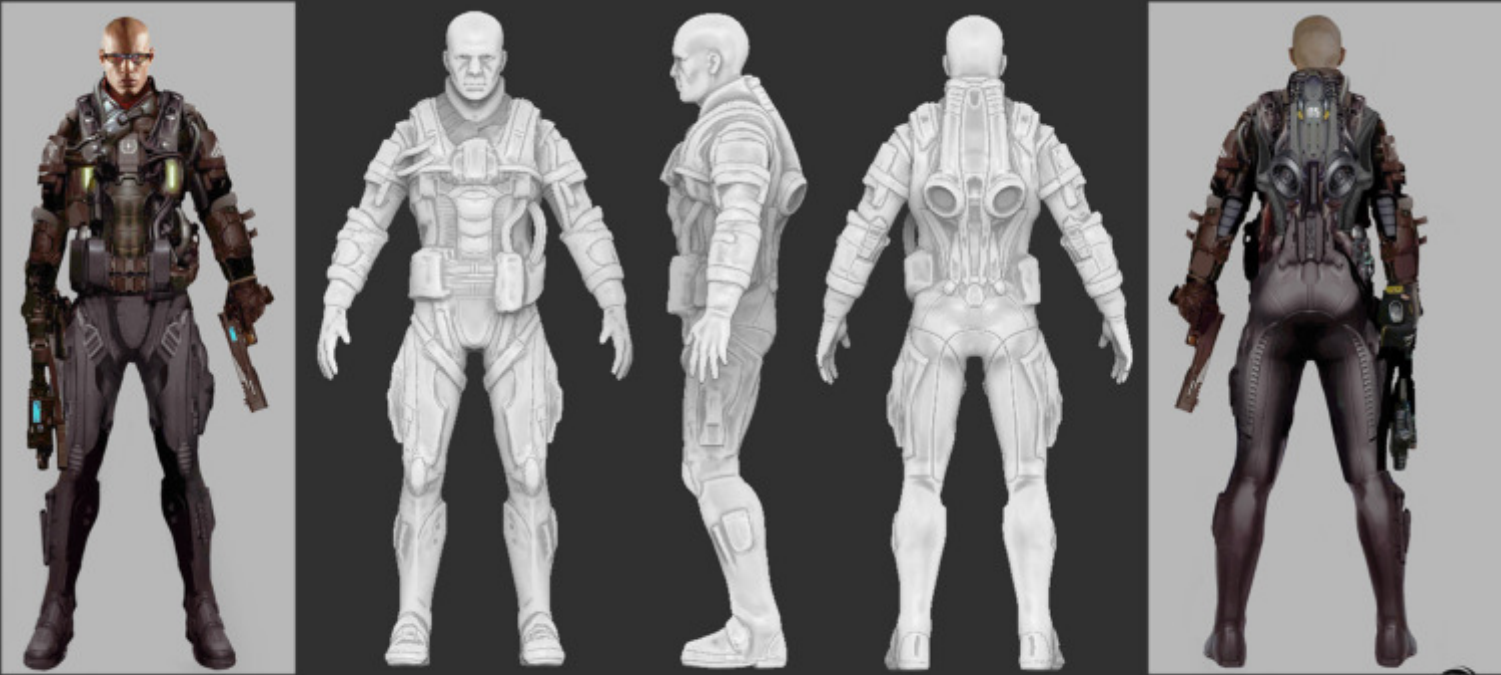


When building Outfits, please keep in mind the way we build joints and shoulders. This will help in deformation.

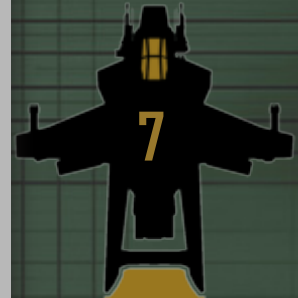
Our character models should fall between 40k and 70k.



WORK IN PROGRESS



Characters | Outfit 01 | HP 3D Sketch | CGBOT



WORK IN PROGRESS

MS: Typically a 3D sketch takes around a week to finish. The main things that a sketch will inform you of is the overall silhouette, the construction decisions that were made, and possible skinning problems with the way it's constructed.

CGB: We posed the character to have a better match with the concept; you can turn off this pose on the layers. This temporary pose won't create any distortion in the polish pass.

MS: Looks cool, man! Chris Roberts and I were talking about the pants and we agreed that we don't want straight up wet suit/ neoprene (skin tight) material. The pants should be just a LITTLE bit looser, like in this concept.



MS: I noticed a few potential problems from the block-out. First off, the tubes in the concept that go from the chest to the arm were (in my opinion) more trouble than they were worth. Skinning them would have been problematic since they would have to stretch and contract constantly, and would never look quite right. With a slight redesign, we could still have tubes on the chest, they just wouldn't have to stretch all the way to the arm. The tubes on the waist had the same problem. After talking with Bryan Brewer, our animation lead, we also chose to lower the straps around the hips so they wouldn't interfere with deformation around the legs and hips area.

These tubes should terminate into the vest, not the arm.

The upper vest is one piece; it slides over the bottom piece.

Soft and flexible.

Let's get rid of these tubes.

Continue belt around

Basically, just keep in mind how the pieces will interact with each other when it comes to rigging and animating the character.

Keep the holster separate. It will be an accessory.

Move the straps lower so they won't interfere with the leg deformation.



CGB: I think we've got the idea, but looking at the Marine concept, there are some parts that seem to be armor plates with stuff attached. Is there any chance we can get a paint-over from you that shows what areas should be loose pants and (if possible) some extra reference of what you have in mind so we can reduce the feedback loops on this phase?

MS: I did a little paint-over write-up on the Marine suit. There are a few parts on it that don't make sense, but that always happens with concepts. You just have to think it through and decide the best way it would work in reality. Feel free to redesign a little as you go, to make things work — just run it by me.



UEE MARINE 002
LINEUP

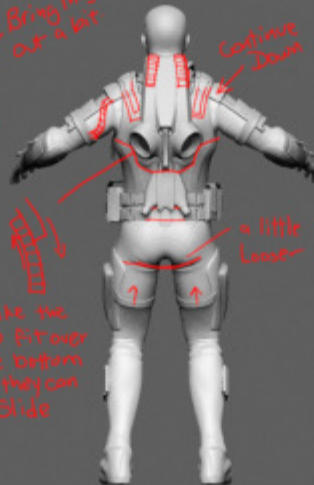
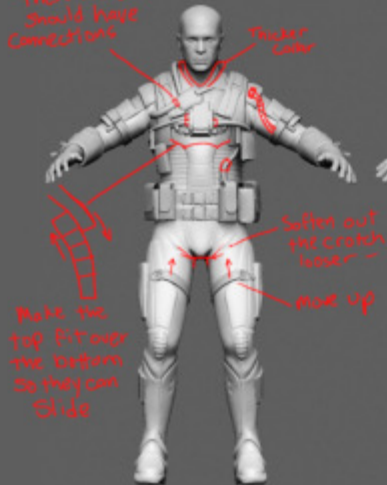


WORK IN PROGRESS

MS: Typically, a “high resolution” suit takes anywhere from one to two weeks, depending on the complexity. The Marine suit took about ten days. The things you look for in a high rez model are medium to small details. I like to include reference pictures, if I can find good ones, in the feedback for clarity. At this point, we’re almost ready to “bake” the details from the “high resolution model” down to the “low resolution model.”



All of these tubes should have connections



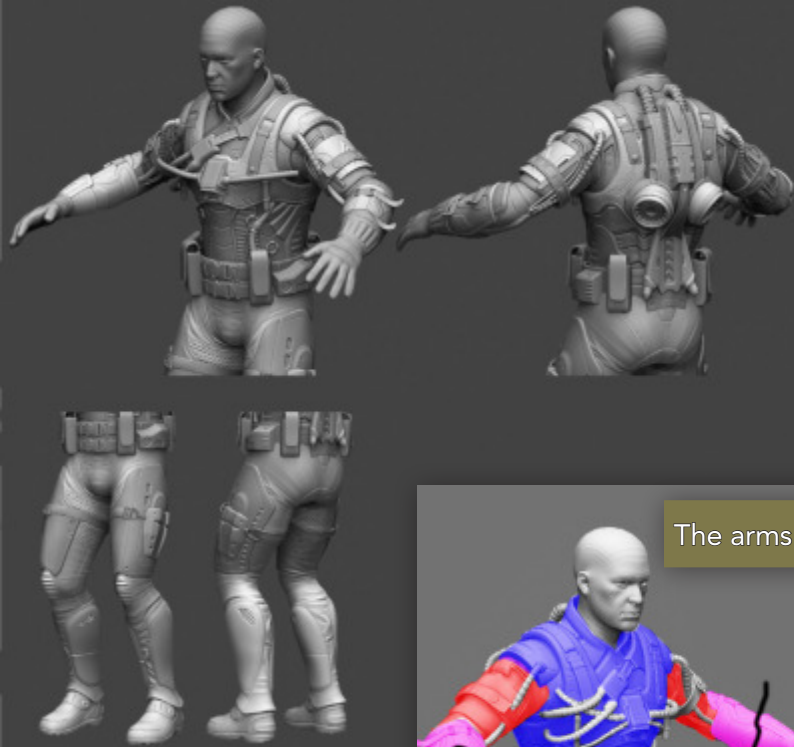
noren

CGB: Regarding the backpack: initially, we made its silhouette more interesting, but then we checked Chris Roberts’ feedback on the UEE Pilot (last year). For that character he asked us to give it less volume because he was going to be seated when he flew the ship — so we made it smaller on this character too. Should we make it as specified in your feedback?

MS: Yeah, pull it out. If it turns out to be a problem, I’ll just pull it back in the low rez version.



WORK IN PROGRESS



CGB: We are still working on some tweaks and fixes for the low poly, including:

- Add more detail to back hoses
- Put in the leg straps
- Put the leg panel within the same mesh as the lower leg to avoid skinning and baking issues
- Improve the silhouette on the shoe strap
- Attach the hand to the wrist
- Even the shoulder pad and strap geo density
- Fuse some arm panels into the arm mesh
- Improve the fit between low and high poly models

MS: Looks good! Everything you list is valid.



WORKING ON THE LOW POLY

CGB: Here's a paint-over. We're planning to separate pieces to make each one as "single" meshes on the low poly. Should we separate more pieces into sub-elements?

MS: Cool! here's some feedback.

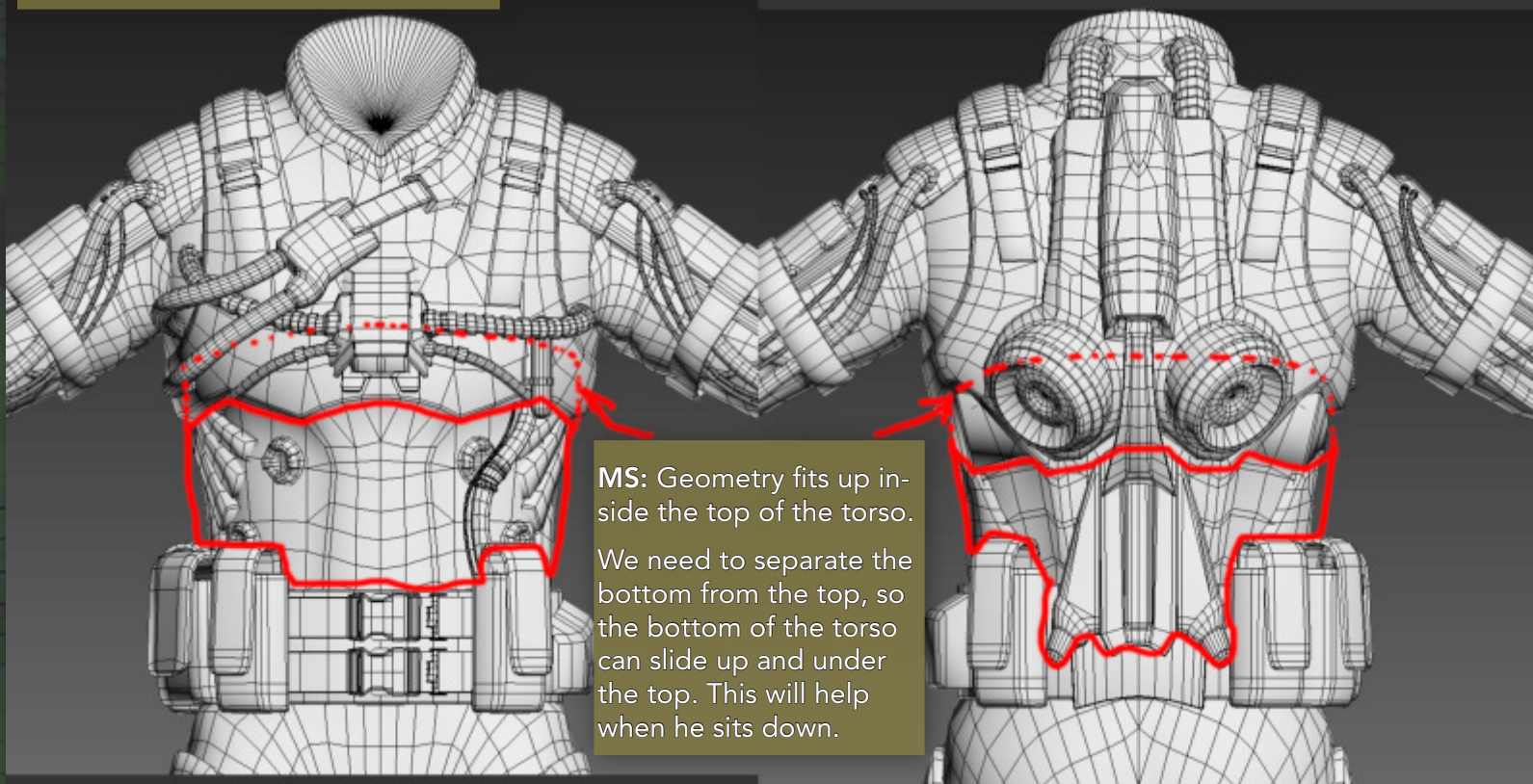
The arms should end lower.

■	Left and right Arms
■	Left and right Hands
■	Torso
■	Left and Right Legs
■	Hips
■	Left and Right Foot
■	Separate Pieces

Ideally, if you remove an arm or leg, we'd like geometry underneath all the way to the cut-off point. For example, if you removed the green lower leg, there would be yellow geometry from the hip area all the way to the cut line.

CGB: I've just uploaded an updated low poly Max file. These are just unwrapped UVs; we're still working on those.

MS: I've talked to our Animator, and this is the feedback he had:



MS: Geometry fits up inside the top of the torso.

We need to separate the bottom from the top, so the bottom of the torso can slide up and under the top. This will help when he sits down.

MS: To make the low rez model, we use a procedure called "retopo" which is short for retopologizing. Basically, it's the process of snapping polygons to the surface of a high-resolution mesh. Since you can see the high rez mesh while you're snapping, you can build

up the edge flow and density as you go. What you're left with is a lower rez mesh that's used in the game, that perfectly fits over the higher rez mesh. This saves memory and improves deformation and performance.

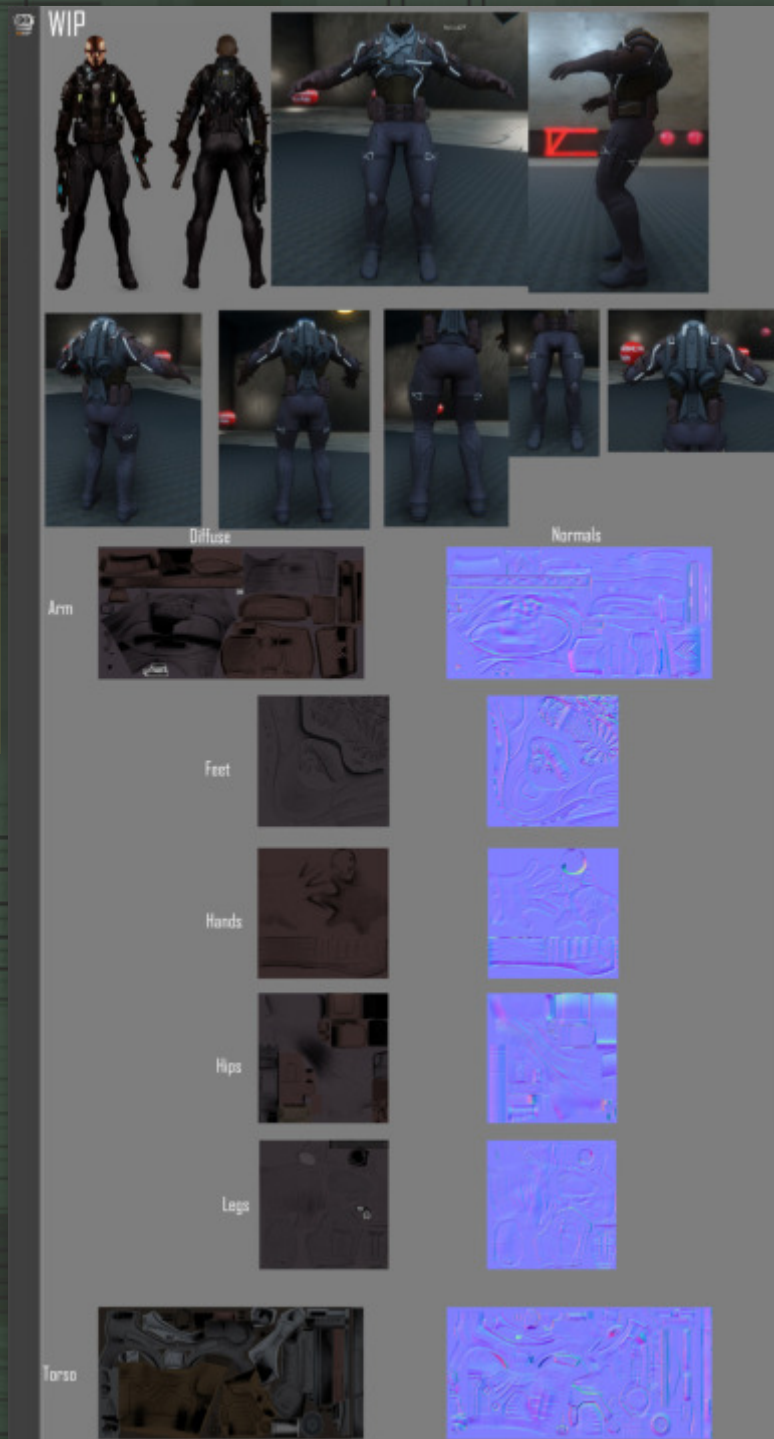


WORK IN PROGRESS

CGB: Here is a rough color blockout. The hue here may look altered because of the color of lighting in the Cry-Engine scene, but we will work with a neutral one from now on.

We also added some highlights and volumes through blending modes.

MS: Can you take out the saturation in the colors, please? We need to make the suit a little darker and more grey / black.

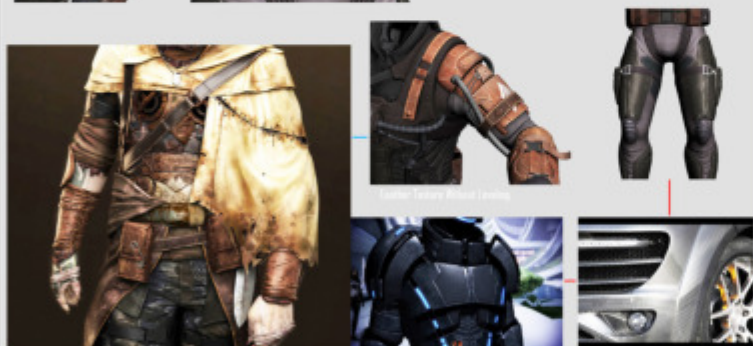


MS: After they “bake” all the information from the high rez down to the low, you’re left with a significantly lower rez model that essentially looks the same as the high. At this point, they begin blocking in the colors for the suit.



WIP

Concept



Leather Ref

Carbon Fiber

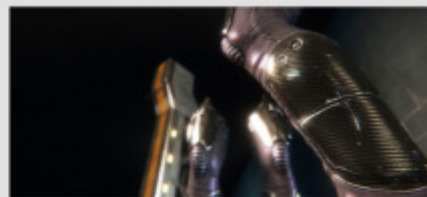


Heads

Legs



In Engine material tests



CGB: Here's a WIP for the outfit's textures. We're making some material tests; as part of the tests, we decided to make the panels on the legs carbon fiber, to add texture detail and variations for a high rez look. This carbon fiber needs two specular layers (as in cars), one for the base painting or details and one glossy glass-like layer on top of it.

We duplicated the geometry of the carbon fiber areas and gave it a little push out. We applied a second material ID to it and applied a glass shader to it in the engine. The advantage is that you can separately control the spec, gloss and opacity levels. There is no visible z-fighting in the tests we did (textures are target size on the tests).

There are two disadvantages to duplicating this geometry:

1. Skinning may be harder to control (but the skin wrap modifier may do the work if the original leg is skinned first). It may also work by duplicating the carbon fiber geo after the leg is skinned.

(continued on next page)



WORK IN PROGRESS



CGB: here is the proposal for glowing bits on the outfit.

(continued from previous page)

2. We did some tests with tessellation and displacement in engine, which really improves silhouettes on the base mesh, but, since glass shader doesn't have a displacement option when the base geometry is tessellated and displaced, which starts crashing the glass layer in some parts.

MS: Looks cool. let's pull the brown leather to black, and make the legs dark grey/black.

As far as the doubled up geometry goes, it looks fantastic, but I think we should pursue doing it in the shader. I'll talk to our material programmer and see what he thinks.

MS: After a few rounds of feedback/art direction, CGBot began to flesh out the "materials" for the parts of the suit. This is where you begin to define the looks of the various textures. They refine the metal areas to take on the characteristics of metals, like scratches and chips and shininess. Similarly, leather areas are refined to look more like leather, with cracks and bumps.



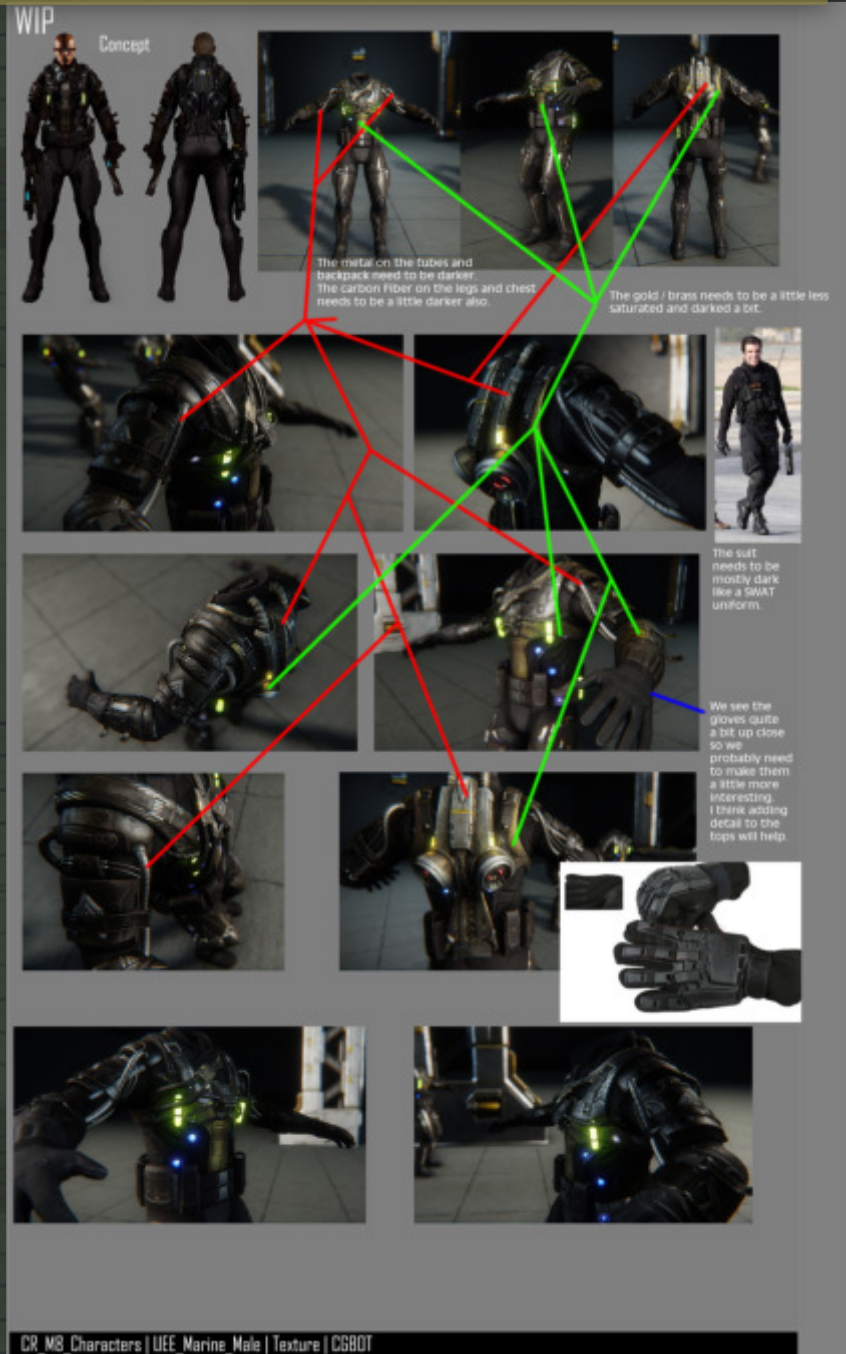
CGB: I've done some light tests and it looks like the suit still reads well even with the new darker colors.



WORKING IN PROGRESS

CGB: I've just uploaded two versions of the mesh, one with the duplicated geometry for the carbon fiber parts, and one without it.

MS: Looks great! love the leather and details! Here are a few adjustments ...



WORKING PRIORITIES



Concept



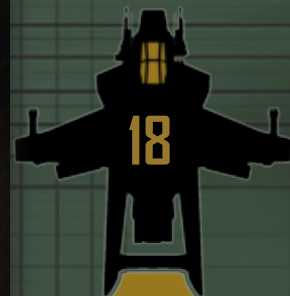
AFTER



MS: I sat down with Bryan, our animation director, and went over the model. Looks great, man! Everything on the construction side is good to go. Turned out very nice!

CGB: I've just uploaded an update, with changes on the textures and gloves.





WORKING IN THE SHADOWS

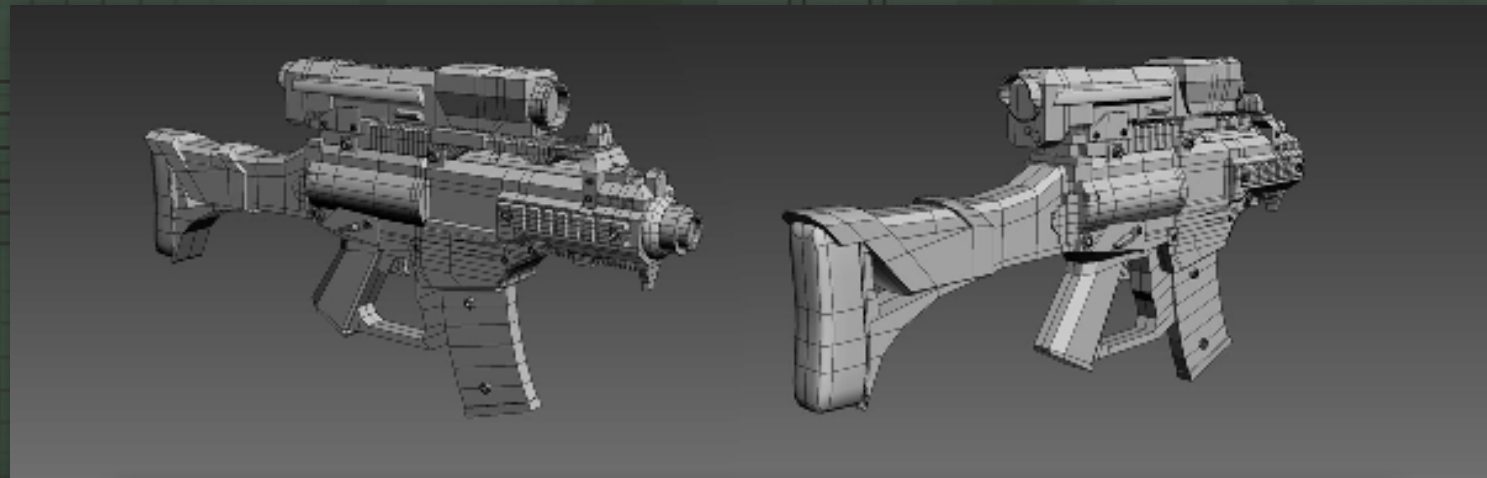
MS: When all that's done, they send the model for approval. I look at it in-engine to make sure everything looks correct, then send it over to Bryan for one last look. After everything is approved and signed off, we be-

gin the skinning process and get it ready for animation.

This whole process usually takes a month or so depending on complexity, but the end result turned out great, so it was all worth it!

Behring P4SC Assault Rifle

CS: The Behring P4SC Rifle started as a concept drawing from Rob McKinnon.



CS: From there, I took the concept drawing and started blocking out the general shape of the weapon to match the concept as closely as possible.

After the block-out I did a quick test fit with our character, to make sure the dimensions are not too far off, so that later tweaks can be dealt with easily.

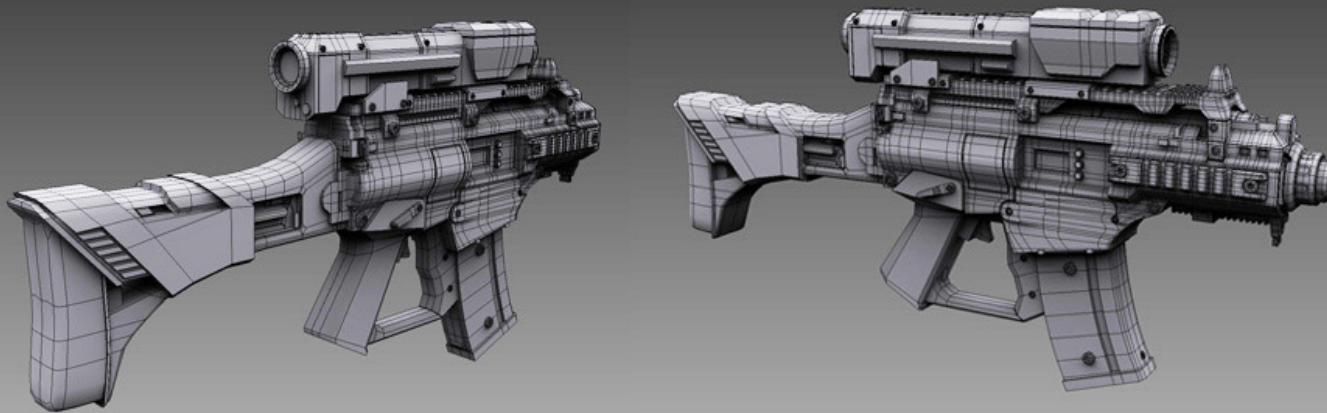


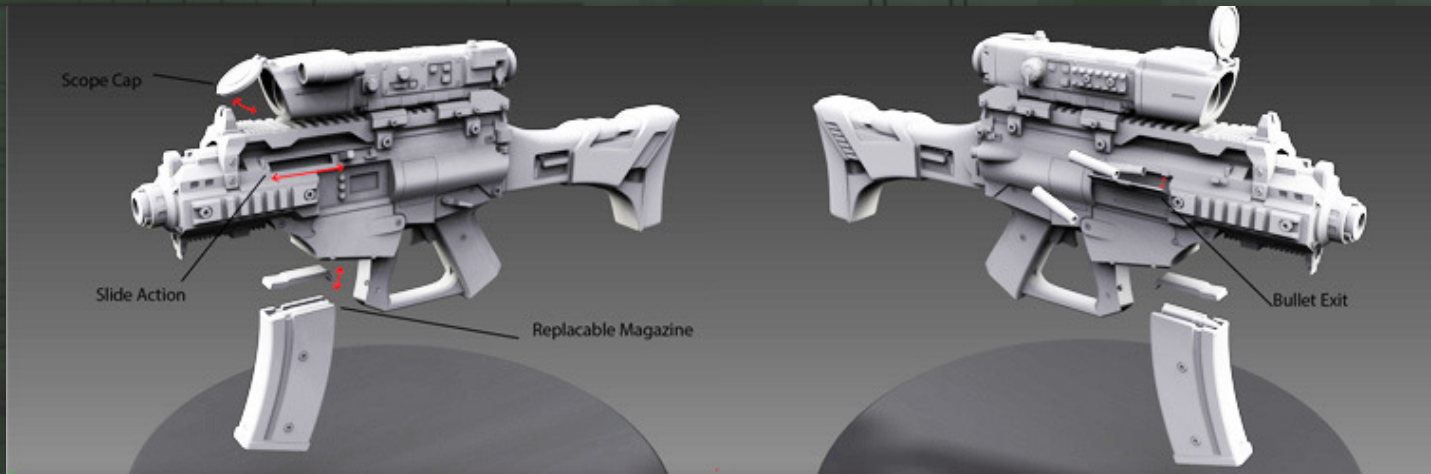
WORK IN PROGRESS

CS: At this stage I also start collecting and looking at real-world rifle and gun references, because I want to make sure that it retains a good level of plausibility and real-life parts that people can better relate to, even though it's a sci-fi gun. In this case, the rifle style is very close to current technology already, so looking at real-life rifles was an important step here.



CS: Now I start fleshing out the model a bit more, and add a rough detail pass. Also, at this point, I go ahead and make a copy of the roughed out model so I can use it later as a starting point for the low-poly model.



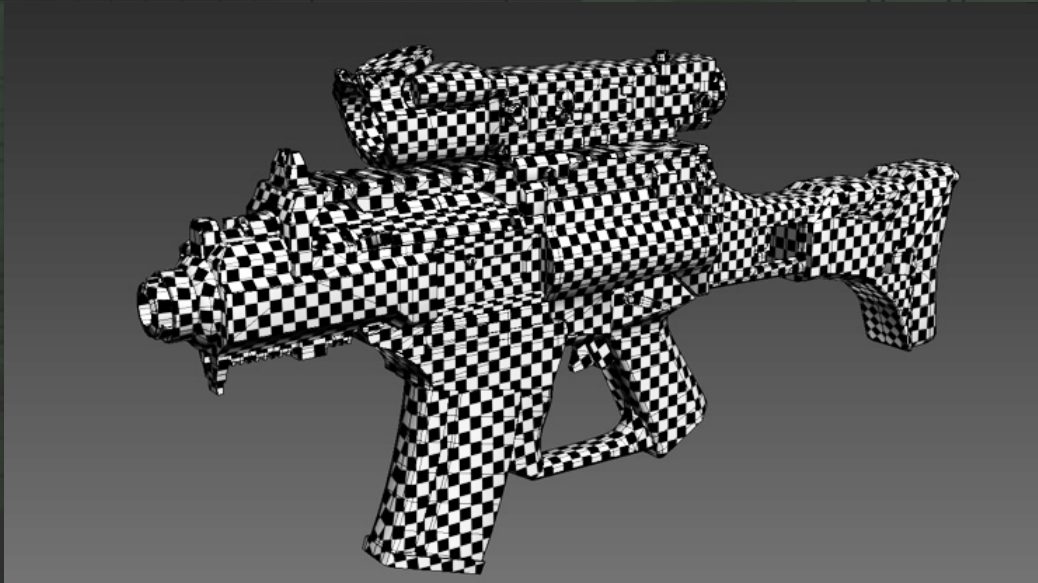


CS: I also get together with our animator and we discuss any animations that will be needed for this gun, because I'll have to model them out correctly so it works as intended. At this point I also present a lot of WIP pictures for Chris Roberts to look over so he can voice any concerns or compliments. ;)

CS: Then I really get into the high poly modeling and start detailing out every little bit, based on the concept and real-life reference. Once the high poly model is done, I can move on to the low poly model that will eventually be used in the game. I use the low poly proxy I duplicated out earlier and do a detail pass on it so it matches up better with the high poly I created.



WORKING IN PROGRESS

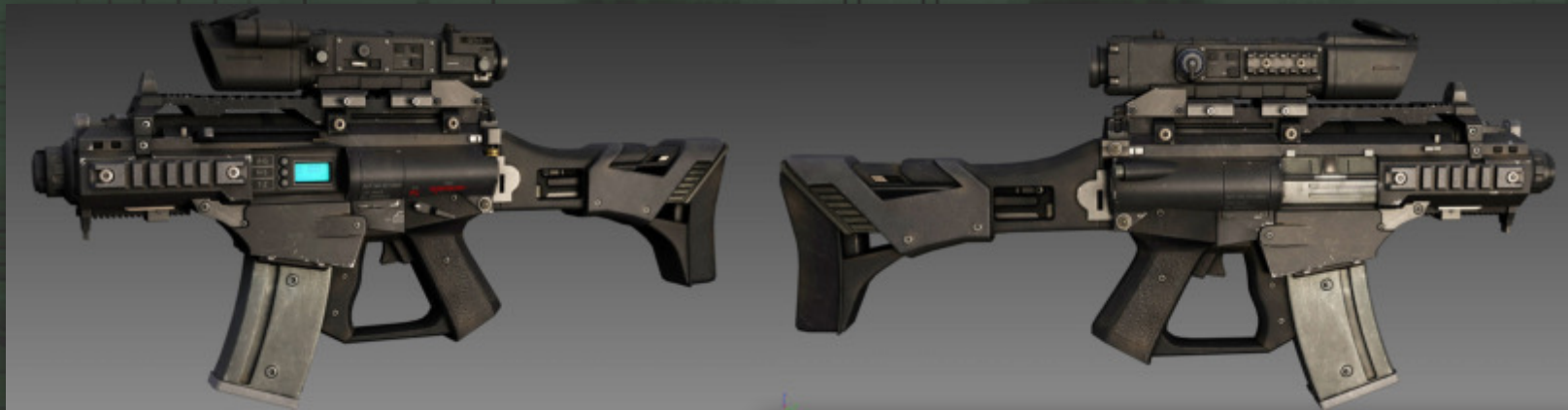


CS: After I'm done with the low poly modeling, I start the UV process to get it ready for the normal map creation.

CS: I then take the high poly and the low poly model and bake out the normal and Ambient Occlusion maps.



WORK IN PROGRESS



CS: Now the rifle is ready for some color. I take the baked maps and start the texturing process, again using a lot of real-life references so I get the 'feel' of the materials correctly (rough vs. smooth, shiny vs. dull, etc.).



CS: With the rifle model ready and textured, I hand it over to our animator and he gets it ready and finalized for game implementation.

This process takes about two to three weeks from start to finish, depending on the complexity of the model and the animations.



WORK IN PROGRESS



WORKING ON THE
SHEPHERD
PROGRAM



UEE Marines

Old spacers have a saying: you can outrun the police, you can outgun the Navy . . . but you can't escape the Marines. Marine operations are a rare sight in civilized space and a strong indication to anyone in the region that a location is to be avoided at all costs. The Emperor calls on his Marines for only the most essential missions and never for routine operations. While their advanced technology and training gives them the option of extreme precision in their combat maneuvers, their charter allows them an extreme amount of leeway in projecting force. In dealing with an assassination mission, for instance, it is just as possible that a Marine aviator bomber squadron could glass an entire city as it is that a sniper unit could be deployed for a silent kill.

The UEE Marines are literally the best of the best: Marine candidates are chosen from the top recruits undergoing Army and Navy training. The selection criteria are never published and remain intentionally vague. No one applies to be a Marine, and candidates who make it known that they are seeking to serve with the organization are often passed over regardless of merit. Many theorize that the process is intentionally vague (and may be altered regularly) so that hopeful candidates cannot follow a precise model of Marine qualification. Although the vast majority of Marine trainees are selected from exceptional recruits during the boot camp process, it is not unheard of for outstanding soldiers and spacemen to be inducted into the corps after distinguishing themselves in action. In addition to initial Army or Navy boot camp, Marine candidates must undergo six "hell months" at Marine Base Corin prior to being considered for induction.

IMPERIAL

History

The Marines began life as the Advanced Special Operations (ASO) unit of the UPE Army, an elite corps charged with undertaking particularly difficult or unorthodox missions. ASO teams comprised the Army's top soldiers, and were provided millions of credits of advanced training with a focus in spatial combat (including zero and high gravity fighting). ASO units racked up a string of celebrated victories during mankind's expansion into the stars. During wartime, however, this changed. With the onslaught of the Tevarin, the division-strength ASO found itself playing a support role more often than not. Used by Army field commanders as a source of reinforcements in ordinary operations, rather than as a special operations group, the organization's training went to waste. A noteworthy 2558

Current Status

UEE Marine Operations Headquarters is located on Corin, a dwarf planet in the militarized Kilian System. The site was chosen as much for its desolation as its proximity to a major naval base: the planet's harsh environment is the ideal training environment for Marines. Located outside the system's Green Zone, Kilian boasts massive tundra plains, jagged rock caverns and little else. The majority of the command base is located underground, with boot camp and wargames taking place on icy vistas and within natural ice trenches. The planet is protected by at least one Marine-crewed Bengal carrier at all times, and landing there is absolutely forbidden. The orbital guard forces have a standing weapons-free order allowing them to engage and destroy anyone approaching Corin airspace.

Unlike other UEE forces, Marines do not deploy indiscriminately. A Marine is either stationed on Kilian for training

Quantum Obelisk Computer analysis of infantry actions during the conflict resulted in a flurry of changes to organization and tactics, chief among them the need to disassociate the ASO from the Army's command hierarchy.

The ASO was reorganized into the core of a third spatial service. From this point on, the Marines would act fully independently of the Army. A number of smaller Navy organizations, including the Space Combat Team and the Naval Future Weapons Office, were rolled into the newly-christened UPE Marines. With the advent of the Second Tevarin War in 2603, the wisdom of this policy was proven time and again: Marine units bested Corath'Thal's forces every single time they were present for an engagement. The Army and Navy could claim nothing approaching that, with their leaders starting the still-running claim that Marine 'brain drain' was lessening the effectiveness of their forces.

or he is actively engaged in a combat operation. Marines do not protect convoys, interdict pirates or garrison jump points: they invade planets, strike back at the Vanduul and personally protect the Imperator. The most famed specialty of the Marines is space-to-surface landing operations. Marine shock troopers can drop from the sky in specially constructed individual rocket pods, known as "Nails." Featuring the same internal dampeners as a Hornet, a Nail can deliver a trooper from the drop ship to a specifically targeted location on a planet's surface within 90 seconds.

In addition to their landing forces, the Marines operate an elite aviation arm. Marine air units typically feature more rugged variants of existing spacecraft that can be flown from rough terrain or aboard fast-responding escort carriers. Marine forces do not fly off of Navy capital ships. Instead, they operate and crew their own warships. Per their charter, the force does not operate its own full scale dry-docks or repair facilities: Marine spacecraft receive priority treatment at all military yards.



26

UPE MARINES

Although all Marines consider themselves “The Emperor’s Own,” one detachment in particular has special claim to this title. The 1st Marine Combat Battalion is the best-of-the-best unit charged with guarding the Emperor. Only the top Marine troopers are ever considered for assignment to the First, and very few of those considered are even selected for a one-year term. Fewer still earn permanent assignment to the ranks. Members of the First wear purple-highlighted space armor when on display and are expected to protect the Emperor at all costs.

Every Marine trooper is an efficient killing machine and has been trained in a variety of special warfare styles. The force encourages the development of both jack-of-all-trades fighters and extremely specialized experts. The average Marine is likely an expert marksman, a world class athlete, a tactical genius and more. Uniform bands colored outside the visible spectrum (but easily identifiable by the advanced HUDs used in Marine combat armor) denote further specialties, ranging from anti-matter munitions operator to exolinguistics support.

Rank Chart

- H.C. Legatus Marinuum
- General
- Lieutenant General
- Colonel
- Lieutenant Colonel
- Major
- Captain
- Lieutenant
- Second Lieutenant
- Marine Gunner
- Sergeant Major
- Gunnery Sergeant
- Corporal
- Lance Corporal
- Trooper



THE MARINE



THE ECONOMY

AN INTERVIEW

WITH

PETE MACKAY

&

ROB IRVING

28

BEHIND THE SCENES

This month we go behind the scenes to talk with Lead Designer Rob Irving and Designer Pete Mackay about how economics will work in Star Citizen.

JP: Chris Roberts games like *Privateer* and *Freelancer* have featured buying and selling commodities before. How does *Star Citizen* differ?

PM: The economies in those games were great, for their time. A player could make a living figuring out lucrative trade routes, but the economy didn't actually work. Stations didn't care if they were being fed, they just might pay out a bit more money for generic foodstuffs than that agriplanet at the other end of the sector.

The primary goal for the economy design was to take something that players of those games would immediately recognize, then put systems into place that reacted to player interaction in the simulation.

RI: It's no longer a matter of just moving widgets from point A to point B because it gets you the best price. The price reflects that location's need, and what becomes available for players to purchase is based on fulfilling those needs.

JP: Has a full economy been planned for *Star Citizen* all along, or is it something that has evolved with the development of the campaign?

PM: Chris knew he wanted an economy in the game from the beginning, but the design has evolved considerably since the initial description of the system.

JP: What is your inspiration for this feature? How does it compare to games like *World of Warcraft*?

PM: The foremost inspiration for the economy comes from *Privateer*, and then *Freelancer* a close second, but *Pirates! Gold*, *Transport Tycoon* and *TradeWars 2002* are other

games in the cargo hauling genre that are fondly remembered by the team.

The economy in *Star Citizen* isn't really comparable to *World of Warcraft* because they are vastly different games. The economy in *SC* is a huge net of supply chains, trade routes, manufacturers, producers and consumers.

JP: How do you create a future economy from the ground up? What do you reference?

PM: The primary references are *Privateer* and *Freelancer*, but we've been doing a lot of research into our supply chains to make sure that they at least pay lip service to reality, and Wikipedia has been a great fount of information on that front. And while it has somewhat limited application to what we're doing, our design reference library includes many classic and modern pen and paper RPGs and board games like *Traveller*, *Rogue Trader*, *Transhuman Space*, *Alternity* and *Merchants and Marauders*.

NODE TYPES

Node Type	Needs	Produces	Examples
Population	Food, water, construction materials, medical supplies	Workers	Cities, space stations, small scientific outposts: anywhere people live or work
Training	Workers, ships and parts, construction materials	Pilots, Marines, soldiers	Boot camp on MacArthur or Corin
Entertainment	Money, contraband, luxuries	Morale for workers	Casino (legal or illegal), jeweler
Repair	Workers, machinery, money, fuel, repair parts, ammo, missiles, ship upgrades	Restores ship to flight-readiness	Landing pads or hangars on planets, carrier bay on a Bengal
Raw Materials	Workers, machinery	Raw Resources (timber, stone, grain, water, etc.)	Iron ore mine, logging camp, water planet
Refining	Workers, machinery, raw resources	Refined resources	Steel mill, water purification plant, sawmill
Manufacturing	Workers, machinery, refined and/or raw resources	Manufactured goods (tier 1)	Factories for simple machined parts (hull plates, cockpit polymers, ship fuel, etc.)
Advanced Manufacturing	Workers, machinery, any level of resources or manufactured goods	Manufactured goods (tier 2)	Electronic components, ammunition, processors
Component Manufacturing	Workers, machinery, any level of resources or manufactured goods	Manufactured goods (tier 3)	Laser cores, industrial electronics, warheads, thrusters
Assembly Line	Workers, machinery, any level of resources or manufactured goods	Ships, weapons, missiles, etc.	Assembly line for ships, weapons, missiles, etc.
Reseller	Money, manufactured goods, resources	Bi-directional	Ship dealer, supply store, scrap yard
Transport	Money, manufactured goods, resources	Bi-directional	Warehouses and shippers that pass goods from one location/client to another
Communications	Packets of information	Bi-directional	Communication satellites and pigeon jump drones



BEHIND THE SCENES

As for building an economy from the ground up, we've found that the best way is to start with the smallest pieces, figure out how we attach them to each other, then take those larger pieces and do it again, pausing to work through how each new attachment impacts other aspects of the game, rather than just its immediate neighbors.

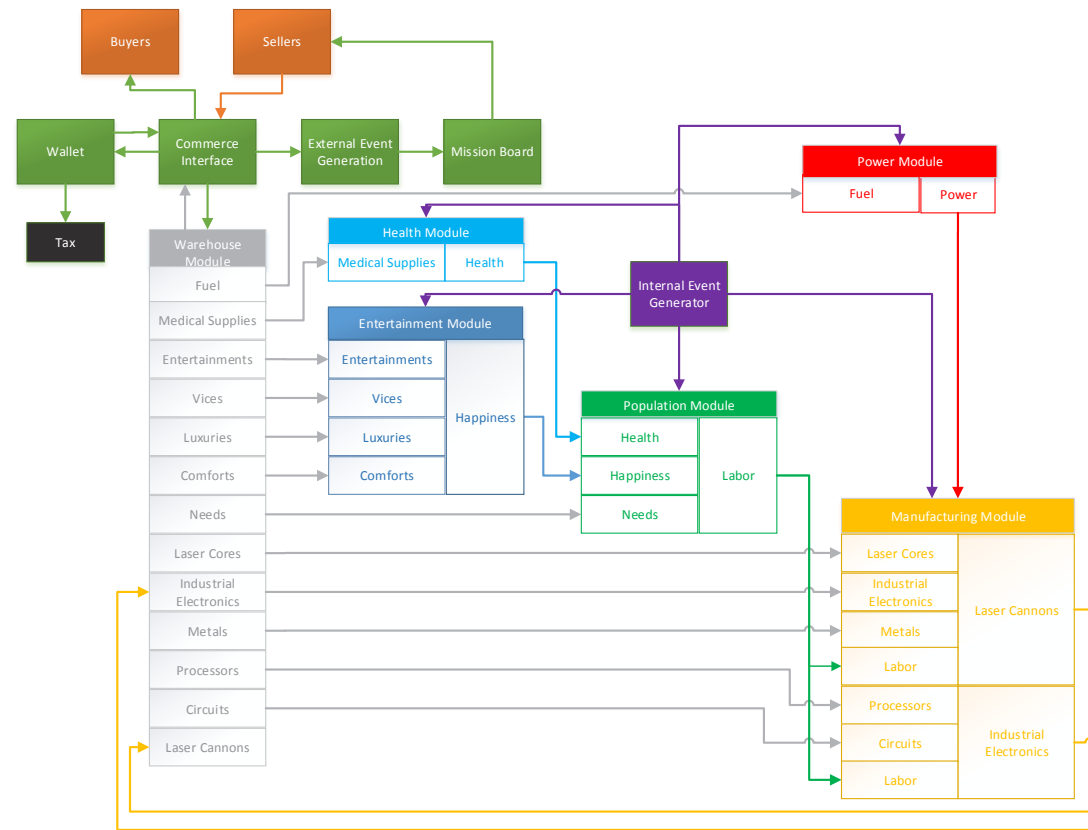
JP: *Who is building the economy? Do you have any outside help?*

PM: The economy has been a concerted effort between Rob and me, with Chris holding the reins. Behavior is building our economy sandbox tools that we'll use to test out the system and verify the design. I just returned from Montreal, where I sat down with our team there to get the development of the economy sandbox underway.

JP: *Designing a system on paper is one thing; how will you test the economy to make sure it works with hundreds of thousands of players?*

RI: Great question! It's difficult to foresee how any system will hold up when hundreds of thousands of agents begin interacting with it. The key is to build prototypes early and to start generating data so that we can figure out where the system works and where it fails. Only after a lot of iterations in prototype will we actually start rolling out final game code. (We can imagine sitting around playing the SC economy board game late nights while we figure out the moving parts.)

ANATOMY OF A NODE



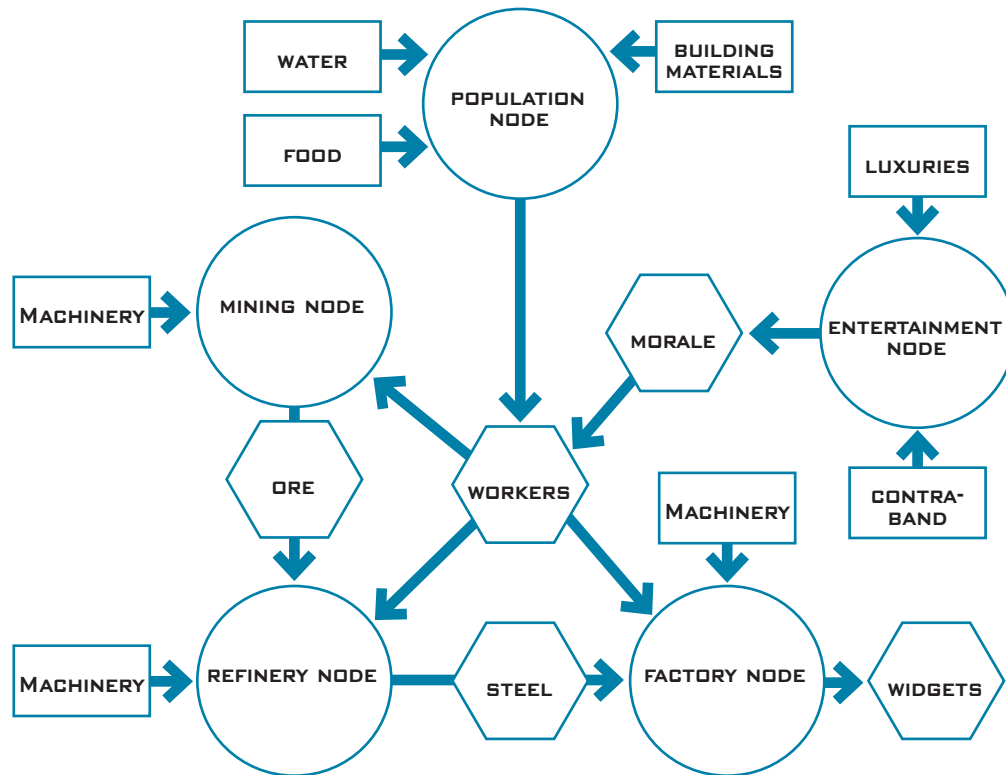
PM: Slowly rolling new players into the economy will be necessary, and we'll likely need to wipe the economy slate clean a few times during testing in order to properly evaluate the effect our changes are having. We also have economists on deck to provide analysis of our data.

But of primary importance is that we are learning and responding to the ways players interact with the economy. While you guys are figuring out how to play the game, we need to figure out the ways that you're playing it that we didn't expect, so we can support you where you're having fun, and address the places that aren't working as intended.



BEHIND THE SCENES

SAMPLE ECONOMY MODEL FOR WIDGET PRODUCTION



JP: How much control will players have over the economy? How will CIG moderate this?

PM: This is an area we are still working out, particularly in regards to player ownership of factories or space stations. At the most basic level players will be able to influence market prices and directly participate in the growth of cities, towns and outposts, by supplying goods in demand. Other players may wish to instigate blockades to cut off vital supply lines. Even without direct control of a factory or station, players will have many opportunities to impact the system.

RI: The important thing is to not allow the players to have *too much* power. This is the reason for the vast simulation that includes NPC agents as part of the system. Players will never own *all* of the nodes or handle *all* of the trade.

JP: Will external prices be impacted by changes in the economy? Could the dollar value of ships and add-ons go up and down?

PM: Once the economic simulation goes live, we will no longer be selling items outside of the game itself, apart from the base package and ship to start the game. All purchases must be made in star credits at that point, and it's up to a player to decide whether to pay for them with credits he's earned through game play, or credits purchased with real world currency.

RI: It's really not ideal to think of ships in terms of dollar value. What we've done so far is open up the ships to backers at reduced (dollar-to-credit) prices and enabled folks to back the game by buying them early. Once the game goes live, there's not really a "dollar" value to compare. So the prices of ships may fluctuate in-game, but they will no longer be tied to an out-of-game cost. (We don't expect them to drop to any cost that equates to the prices you're seeing now, however.)

JP: What does the economy system mean for the player? You mentioned owning factories. What does that entail?

PM: This is something that we want to include, but is still under heavy design. Player ownership of economic nodes is one of the most complex parts of the design and we're still working out what players can own, and how much control they have over their holdings. Owing to the size of the *Star Citizen* sandbox, owning a factory at a node will be a very rare achievement. Owning an entire node (even a small space station) will be legendary.



JP: Do players need to interact with the economy? What about those who just want to dogfight?

PM: If a player buys parts for his ship, he's interacting with the economy! All of the parts for sale come through the manufacturing pipeline and the money goes back into the system. On top of that, dogfight-focused players can also interact with the economy by providing escort for the shipping lanes. Some parts are pretty rare, so it's probably a good idea to make sure that their supply lines aren't getting raided by pirates!

JP: What happens if the economy collapses? How will the team handle that kind of situation, however unlikely?

PM: Some imbalance in the economy is a good thing, but

we'll have tools to correct severe issues that threaten to catastrophically destabilize the system.

JP: Where do you go from here — what kind of emergent gameplay do you think the economy will create, and how could it be expanded in future iterations of Star Citizen?

PM: That's the thing about emergent gameplay, it's really tough to predict! We don't want to get ourselves into trouble speculating about features that might be coming out years from now (or might never happen), but I could see a more robust gameplay experience for business ownership evolving out of the initial release of the game. We'll just have to see what features players want once the game is live!

RI: The amazing thing is that the designers have already

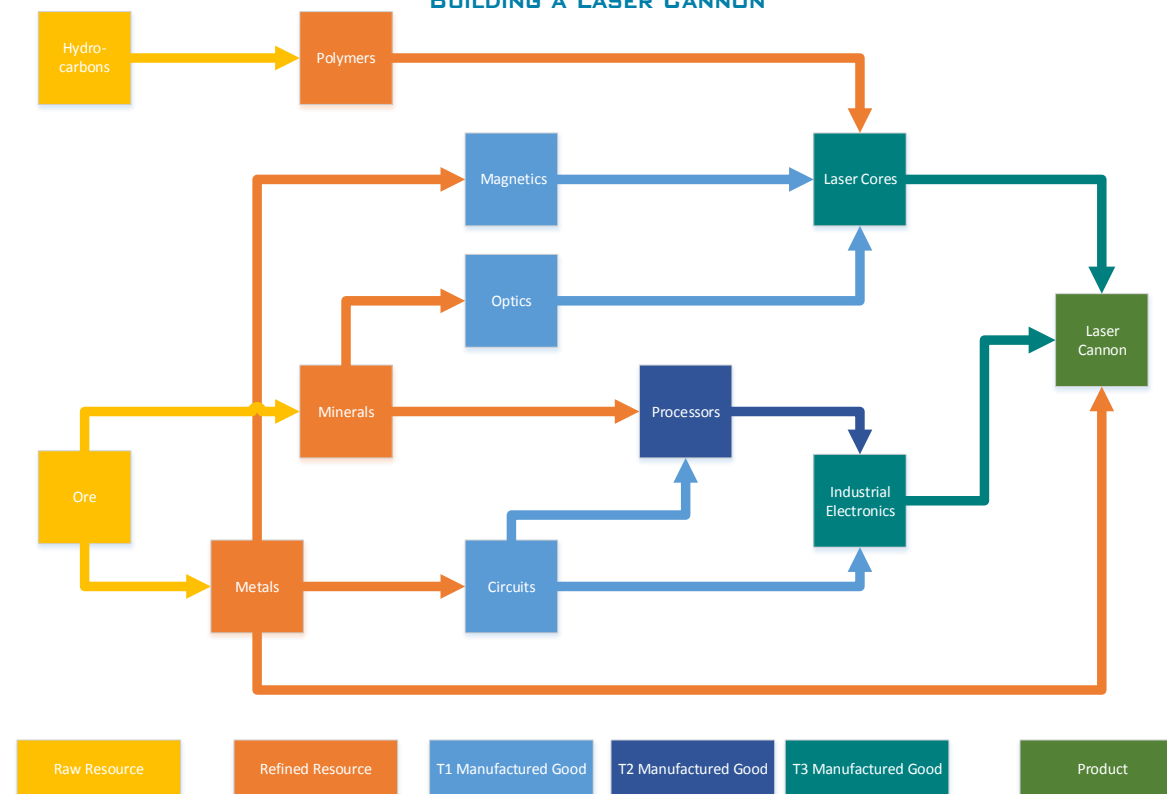
wandered into some extended conversations about the economy that seem to just grow out of themselves. I suppose that you could call it emergent design? We get excited just envisioning these connections and extensions of the system that we're designing, so we foresee plenty of opportunities for players to make it grow in ways we didn't anticipate.

JP: On a scale of one to ten, how tempted have you been to reply to dev thread questions on the subject with "it's the economy, stupid"?

RI: That's an internal answer only. :)

PM: [REDACTED]

BUILDING A LASER CANNON



BEHIND THE SCENES

KILIAN SYSTEM



Kilian is where young soldiers go to learn the art of warfare and where old soldiers return to fade away. For them and most other Humans, it is the shining symbol of UEE military might. Located at the heart of the Empire, a single jump line away from Terra, and home to hundreds of military barracks, training facilities, shipyards and support facilities. Kilian's economy is based entirely on the massive military presence, with weapons manufacturers and ship designers flocking to the system to offer their wares. Between the shipyards at Naval Station MacArthur to the Marine headquarters on Corin, Kilian may be the safest place in the galaxy . . . if you're on the right side of the law.

Kilian itself is a white A-type main sequence star orbited by fourteen planets. The discovery of Kilian occurred early in man's expansion into the galaxy. Terraforming of green-band planets began very early, as did the garrisoning of military forces here. While there was no specific plan to build out the system specifically as a military base, it naturally evolved from a forward base in the early days of exploration to the most important headquarters in the galaxy, as power shifted towards the region of

space surrounding Terra. Only the UEE Army continues to maintain their formal headquarters on Earth; the Navy and Marine top commanders now direct troop and ship movements from armored city-bases on planets in the Kilian System. As a collateral development, Kilian has generated a large civilian population and is fully represented in the UEE Senate.

THE THREE SISTERS

The first three planets in Kilian are dwarf worlds known informally as the Three Sisters. The sisters travel close to the star and are essentially uninhabitable rocks. Limited metallurgical resources are mined on the smallest of the sisters, Kilian III. For the most part, the worldlets are an outlet for UEE weapons testing exercises: their surfaces bear the scars of hundreds of years of antimatter blasts and railgun impacts.

EMPEROR PALPATINE

MAGMA

Kilian IV is the system's primary mining outpost. As the name — chosen by a particularly uninventive explorer — indicates, Kilian is covered in superheated metals and features heavy volcanic activity. No land area on Magma is stable, so miners operate flying carryalls capable of jetting entire massive refinery complexes from place to place.

MACARTHUR

Home of UEE Navy headquarters and birthplace of the Bengal-class strike carrier! MacArthur (named after a famed army general of the previous millenium, in what naval personnel choose to find amusing irony) is home to the largest Human naval base in the galaxy. It's where tens of thousands of naval aviators train every year and where all major naval exercises are planned and coordinated. The planet is orbited by countless rings of spatial moorings and drydock facilities. The largest ships in the known universe, including the Bengal, are constructed in the space around MacArthur.

As a result, MacArthur is a place where merchants can make a killing. On the legal side, merchants can bring in processed ores, weapons components, shield generators and a myriad of other elements needed for constructing large warships. Those affiliated with the black market can also get rich on MacArthur, as the planet's population of lonely ship crews has a variety of appetites. The latter category should be warned, though, that there are more

MARKET DEALS — MACARTHUR

BUY: WEAPONS	+2
BUY: SHIELDS	+2
BUY: THRUSTERS	+1
SELL: ENTERTAINMENT (BLACK MARKET)	+4
SELL: IRON	+2

standing military patrols in the Kilian system than there are anywhere this side of the Vanduul line.

OSHA

Osha is a small terraformed world, home to many of the families and support personnel for the system's military population. It's a temperate world that has been highly constructed: arcologies now dot the surface, providing homes for hundreds of thousands of husbands, wives and children of military personnel who are either assigned elsewhere in the system or deployed to distant stars. There is some profit to be made shipping to Osha, whose population generally seeks luxuries from the rest of Human-settled space.

KEENE

Slightly larger than Osha, Keene is another civilian world. Unlike Osha, Keene is the domain of military-aligned corporations and businesses. If a manufacturer has a military contract, you can bet it has a home office located somewhere on Keene. Manufacturers compete for factory slots on the world because an in-system factory allows one to be a much more efficient supplier. This means that regardless of resources, everything from toilet paper to starship bulkheads is manufactured here. Roberts Space Industries and Anvil Aerospace both maintain formal showrooms on Keene which may be visited by civilians.

KILIAN VIII

Kilian VIII is an ocean world with an open secret: it is highly toxic to the point of total inhospitability. What appears from orbit to be a tropical paradise is in fact an orb of high-density fluid consisting of water, ammonia and more volatile liquids. No current space suit technology is capable of protecting a Human on VIII's surface and even most starship hulls will dissolve with minimal contact.



ELLIHWHIHWVH

CORIN

Home of the UEE Marines, Corin is a deadly ice world that is used for Marine command, housing and training. Dotted with icy tundras and craggy rock caves, Corin is technically outside the system's green band. The Marines maintain a massive underground base, but also require that all trainees survive a six-month boot camp on the planet's surface. Marine units not in the field are engaged in constant wargames here. Corin is one of the best-protected worlds in the galaxy, with a Marine carrier preventing unauthorized access at all times. The best advice: do not approach.

TRAVEL WARNING All pilots are warned not to attempt any approach vector to Corin. The UEE Marines garrisoned there have a standing shoot-to-kill order for all spacecraft entering their airspace. Insurance does not cover hull replacement for craft destroyed attempting to break past the cordon around Corin.

OUTER PLANETS

Kilian X through Kilian XIV are uninhabitable. X has a thin atmosphere and a dense mineral-rich surface. Metal rights to the planet are currently locked in an ongoing court battle, so only claim hoppers need apply . . . and the massive military in the region makes that an unappealing prospect for all but the boldest miners. Kilian XI is a gas giant which is used primarily for in-system fuel supply. Automated harvester platforms surround the planet, gathering resources for UEE shipyards. Kilian XII, XIII and XIV are small, essentially dead worlds of little interest. Kilian XIII, sometimes called a "haunted planet," does feature an impressive smoky-quartz surface that looks like nothing else in the galaxy.



FRONTIER





The Cup

by Robert Waters



PART One

Hello everyone, and welcome once again to GSN Spectrum Broadcasting's continuing coverage of the Murray Cup Race. The MCR, or The Cup as it is more commonly known, is one of the finest sporting events in the UEE. Nearly 100 racers compete in the Hare Division's grueling 10 -stage run, which winds its way through Ellis System's many wondrous planets and dual asteroid belts. Racers compete to determine who's the fastest and strongest, as they struggle to maintain the integrity of their racecraft amid some of the deadliest conditions in the galaxy. This year's competition promises to be one of the toughest, as the top 25 share in a meet-and-greet with media and sponsors in GSN's sports atrium in orbit above Green. Though many come to race, only a few are considered real contenders, and those contenders are now awaiting their chance for glory and honor.

This year's darling is Ykonde Remisk, a Human who surprised everyone by winning both the Goss Invitational and the Cassini 500. He comes into the MCR with a real chance to be the first racer to win the Triple Crown in twelve years. Then there is Shoo-ur Motak, the finest Xi'An racer in the history of the sport. If he prevails, he will be the first to ever win three MCRs in a row. Zogat Guul, the old Tevarin warhorse, can't be counted out, either. This legend has won the MCR more than anyone else in its history, but fate and bad luck have prevented him from winning a major event in over five years. His second place finish at the Cassini 500, however, has brought his name back to prominence. Can he win it once more before he fades away? And finally, newcomer Hypatia Darring has surprised everyone by taking the pole position away from Remisk. She has never won a major racing event in her short career, but her consistent top ten showings for the last two years indicate that her pole position is no fluke.

CHRONICLES

Can this youngster handle the enormous pressure placed upon her? Only time will tell . . .

Let's throw it back to GSN reporter Mike Crenshaw, who is making his way through the reception as we speak. Who do you have for us now, Mike?

Hypatia Darring didn't even notice the reporter's question as she stared across the busy reception floor. The Tevarin looked to her like a lean, elegant gray post amid a gaggle of reporters who crowded around his thin body like pecking birds. She felt sorry for him. How silly was that feeling? To feel sorry for Zogat Guul. Ridiculous! *I should feel the need to whip his ass, to blow past him on the final stage, to force his ship into an asteroid.* That would be the feelings of a great racer, a great competitor, one focused and ready to win. But no. Try as she might, she could not feel that way toward this legend who stood only a few feet away. Much to her sorrow, she hadn't had a chance to speak with him when their paths could have crossed at Cassini. Now, she had to find the time. She fought the urge to walk across the room, push past the media hounds, invite him to dinner, and ask him to sign the worn, faded, dog-eared poster of him in his youth — standing proudly next to his silver M50 — still hanging on her apartment wall.

She shook her head and blinked. "I'm sorry. Say again?"

Mike Crenshaw cleared his throat. "Do you think Admiral Darring is proud of his daughter?"

Darring clenched her teeth and forced a smile. "Of course he is. Why wouldn't he be?"

"He has stated publicly more than once that he believes you are wasting your talents as a racer. That you should drop all this 'nonsense' — his word — and pursue a more fitting career in the UEE Navy."

"My father has never been one to restrain his opinions,"

she said, taking tentative steps toward Guul. "But if you really want to know the answer to that question, you should ask him yourself."

Another reporter fought her way in. "Ms. Darring . . . taking the pole position from Ykonde Remisk was a marvelous achievement. How did you do it?"

Her smile was genuine. "Luck."

"Oh, come now, Hypatia," Crenshaw said, regaining the floor. "Achieving a time one point five seconds off the record is hardly luck. How'd you do it?"

She chuckled. "Patience, dedication, focus and an acute attention to detail. That, plus the fastest damned M50 on the circuit. All things I'm sure my father would appreciate."

The reporters laughed and scribbled notes. Darring made a few more steps toward Guul.

"Ms. Darring," another reporter interceded, "how do you intend on maintaining your 'luck,' as you put it, through the entire race? Ten stages, all timed, many with narrow, dangerous channels, especially through the asteroid belts. You'll be racing neck-and-neck with some of the finest racers in history. Being a relative newcomer, how do you intend on handling the pressure, maintaining your good start, and ultimately winning the cup?"

"She's a natural!"

All turned, including Darring, and found Shoo-ur Motak, the Xi'An, dressed in a bright purple jumpsuit, standing among a pool of sycophants who followed him to every event. Some of them were ex-GSN reporters, now under full employment by the Motak family, captured by his fame, notoriety and wealth.

Darring controlled her scowl as the tall Xi'An stopped a few feet from her. "She's a natural," Motak repeated, to make sure the reporters could record his reply, letting



CHRONICLES

the last word bounce across the short, sharp beak of his turtle-like face. He was taller than Darring by an inch or two – unusual for his race – but his cool, amber eyes enconced beneath a prominent, boney ridge scanned her face as if they were searching for food. His thin, leathery pink-black tongue slipped through his razor mouth, slicing the air like a knife. His powerful jaw muscles pulled back in a tight approximation of a smile. “She’ll win it by being the best racer on the circuit.”

“Do you really believe that?” Crenshaw asked. “She’s the best?”

Motak nodded slowly, diplomatically, his eyes affixed on Darring. “I wouldn’t have said it if I didn’t.” He blinked. “How are you, my dear? Rested from your trials at Cassini?”

“Rested enough,” she replied, beneath her breath. The reporters leaned in to hear. “But you should know all about that.”

Motak waved her off as if she were his lesser. “The dangers of the trade, my dear. I did what I had to do to gain advantage.”

Darring nodded. “But you didn’t win, did you? Cutting me off in a move that, *technically*, was illegal, only gave you third place.”

“Still, a better finish than you.” Motak chuckled. His devotees did the same. “The Cassini is not all that important to me, my dear. The MCR is the crown jewel. You’ll understand that in time . . . if you last long enough.”

“Can we get a picture of the two of you side-by-side?” a reporter piped up. The rest confirmed that desire with exaggerated nodding.

Motak turned to the crowd, preening his proud, slim form for all to see. “Of course you may have a picture,” he said, offering his hand to Darring in goodwill. “I’m honored to be

a part of this great tradition. The MCR is dear to my heart, and with such brilliant competition, like Hypatia Darring here, this year’s race will be one to remember.”

Hypatia took his hand cautiously. She wrapped her fingers around his broad palm. She was surprised how warm and comfortable it was. She relaxed and turned herself toward the reporters to let them take their pictures and ask their questions.

But then Motak began to squeeze, and squeeze, and squeeze until she felt the small delicate bones in her hand giving beneath the pressure. She squeezed back against it, but that didn’t provide much relief as Motak continued to grip. *Don’t cringe*, she said to herself. *Don’t cry. Don’t give him the satisfaction.* But the pain began to leach up her arm, into her shoulder, through her neck. *God, he’s trying to break my hand. He’s . . .*

He released, and the pain subsided. She sighed and wiped a bead of sweat from her forehead. She used her other hand.

Crenshaw was about to ask another question, but then someone spotted Ykonde Remisk, and they all scurried away like a flock of sparrows.

At her side, Motak chuckled. “We are only as important to them as our last quote.” The Xi’An turned to her again. This time he didn’t offer his hand. He winked. “*Athlé-korr* to you, my dear. Safe travel. I’ll see you down the line.”

Motak disappeared into the dotting arms of his fans. As he walked away, Darring caught the eye of a lean, surly-looking fellow who maintained a watchful position behind his employer. He nodded at her. She ignored him and imagined driving a knife into Motak’s back.

“Don’t let him get to you.”

The voice was soft and amiable. Darring turned to greet it.



CHRONICLES

There he stood, even taller than Motak. In his shadow, she felt truly small, both in stature and in status. But Zogat Gul's waxy, pale grey face, small coal-black eyes and tiny puckered mouth radiated a kindness and a quiet experience that steadied her rage. She offered her sore hand humbly. He took it without complaint and massaged it with smooth fingers stained in red tattoos.

"Don't let that pompous twig get under your skin. He's infamous for his mind games." With a quick grin, he snapped into formal posture, as if he were greeting an officer, thrusting his chest out though it was wrapped comfortably in a black-and-gold half-coat. "My name is Zogat —"

"I know who you are," Darring interrupted, embarrassed immediately by her rudeness. "It's an honor to meet you. It's a dream I've had since I was a kid."

"And I have been following your career with great interest." He took her by the arm and began to lead her toward a table filled with three large punch bowls and an assortment of fish appetizers. They walked slowly. "You are rising steadily on the circuit. Your name is on the lips of many. Your fifth place showing at Cassini was quite impressive, especially for someone so young."

"Thank you. It would have been even more impressive had I won, if Motak hadn't forced me back."

"You let him get too close," he said, with no malice or indictment in his tone. "You had the inside lane, but you slowed down to spar with him."

"He pissed me off!"

Gul stopped, turned Darring toward him, and held her shoulders with tight, fatherly hands. "Such behavior may be tolerated in the smaller, roundabout races like Cassini. But not here. Here, such raw emotion will get you expelled or killed. True, there are stages along the way where the racing will be tight, where you will have to maneuver for

position. But speed matters the most here . . . speed and time. Remember, Hypatia Darring, the one most important fact about the Murray Cup: *Speed is life.*" He smiled. "Speed is life . . . or death, if you are going in the wrong direction."

She laughed at that, letting the seriousness of his words trickle away. "We will speak no more of these things now," he said, resuming their course toward the food table.

"We will have further opportunities to talk later, when the wolves are not so thick and hungry." He ignored the wave of a reporter nearby. "Every word we speak here is interpreted and reinterpreted until, in the end, they will make us lovers in the eyes of the public."

Darring forced a wry smile. "Sorry . . . you're not my type."

Gul let out a hearty laugh. He shook his head. "Story of my life." He quickened his pace toward the food. "Now come, and treat me to a glass of the greatest gift Humans have bestowed upon the galaxy."

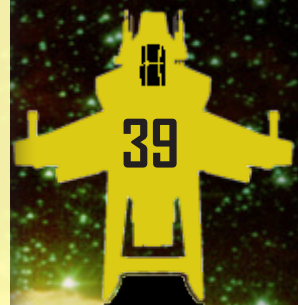
"What's that?" Darring asked.

Gul smacked his lips. "Lemonade."

* * *

Shoo-ur Motak crushed the thin shell of the jumbo shrimp with his beak. He did not bother shucking it as a feeble Human might do. Blast this Human food anyway! What he wouldn't give to be back at the family complex in the Kayfa System, gorging to contentment on huge handfuls of crunchy needle fish. Their bladders had a dye that was as sweet — no, *sweeter* — than anything a Human might concoct. Nothing on the table before him was actually enjoyable in his superior opinion, but he tolerated it as best he could, smiling humbly as he picked at this dish or that for the benefit of the media. Motak nodded at a Human reporter as she walked by.

Humans had their uses.



CHRONICLES

And so did the one that stood now in the center of the media frenzy. Short, stocky, dark-skinned, considered the favorite of the circuit, although the true favorite was Motak. Why wasn't the media surrounding him, asking him questions, begging *him* to divulge his secrets for winning the race, just as they had asked Darring. These damned Humans and their racist ways! But Motak was the best Xi'An racer that had ever climbed into the cockpit, and his perfectly modified 350r, with its purple hull and reinforced golden-stripped wings would do what no other racer had ever done: win the MCR three consecutive times. Neither Remisk, nor Guul, nor Darring could claim such a feat. So, why weren't the GSN goons surrounding him?

But perhaps that was best, he reconsidered, popping another shrimp in his mouth and sipping on a warm, frothless beer. Let Ykonde Remisk have his moment in the spotlight. Let the media have their favorites. For when they fall, when they fail to live up to the hype, Motak's victory will seem that much sweeter. *Yes, let them bask . . . then let them fall. And I will see that they fall hard.*

"Is everything in place?" he whispered to an underling at his side.

"Yes, sir. Your maintenance crews are dispersed through the Ellis system per your specifications and per the MCR guidelines."

Motak scratched his neck in frustration. "That's not what I meant."

The underling gulped and wiggled his head. "Yes, that matter we spoke of has been taken care of as well. But I would recommend against it, sir. The risk is too great, and besides, Shoo-ur Motak does not need to rely on such things. He is the best racer on the circuit."

"I do not pay you to give me such advice or praise. I pay you to do what you're told. Now go, and make sure everything is ready as I have instructed." He put his beer down. "And I will

go and remind the 'favorite' of his obligation to me."

The underling nodded and ran off to do his duty. Motak sighed deeply, put on his happy face, and walked confidently toward the madness surrounding Ykonde Remisk.

* * *

She loved her Origin M50 Turbo more than life. Banged up, scratched, red and white paint slopped on to cover a hull that needed an integrity sweep, but there had been no time for any of that after Cassini. Nor would her father condescend to send her enough money for such repairs. But what of it? The plant was sound, the thrusters new and top notch. In a pinch, she doubted that any racer, anywhere, could match it. Certainly, none of the other twenty-four challengers behind her – including Guul – could beat her in a straightaway. But the MCR had few straight-aways. Hull integrity mattered.

As her crew chief rattled off the final systems check in her ear, Darring pulled up on her navcomp the schematic for the first stage. It appeared with a bright blink to display row after row of rings winding their way through low orbit above Ellis III. Darring studied the rings carefully, reminding herself which ones were large, which were small, where the cameras and timer buoys were located. All racers were required to stay within the "invisible" lane running through the rings; if a racer strayed outside, he or she would lose time. This first stage was both timed and awarded extra credits to first, second and third place. Having the pole position, then, gave her an advantage. *But for how long?* Darring leaned over in her seat and studied the course carefully.

It was not unlike one stretch of the Goss Invitational, so she had ample experience with this kind of run. Her M50 was built for strenuous zigs and zags through tight spots. But how well would she fare later on, when the courses got more deadly, more strenuous?



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From Ellis III, the racers were mini-jumped to Ellis IV where the so-called Seahorse Shuffle took place. Then on to Ellis V and the “Noble Endeavour.” After that through the first of two asteroid belts, a course called The Sorrow Sea, where hulls of previous racers floated as obstacles. Then around the gas giant Wall-Eye, where ships could be easily ripped apart by one foolish move. A longer stage followed, across the outer asteroid belt (formerly Ellis XI) and finally to Ellis XII. Then the race turned back in-system to finish at Ellis VIII. She had run this race before, but never as a true contender, and thus she had taken her time, flown each stage slow and steady, like a marathon runner, to learn all the ins and outs. This time, though, the pressure was on. She held the pole position, the top spot. Everything was different now.

The MCR starter’s voice crackled over the comm link. “Racers, prepare for launch.”

Darring turned off her navcomp, affirmed the standard agreement to MCR rules and regulations in unison with the other racers, strapped herself in, and gave a small prayer. She was not religious by any stretch, but figured it wouldn’t hurt. The prayer calmed her nerves as the bay doors of the starting carrier opened to space.

She could see Ellis III through the door. It was beautiful, green, its orbit peppered with corvettes and pleasure craft of the well-to-do who had come out to view the race firsthand. There would be plenty of spectators along the way, a lot of media, and Darring had to just put them all out of her mind. She focused on Zogat Gwul’s words – *Speed is life* – and looked back through one of her cockpit panels to try to get a glimpse of the Tevarin’s upgraded Hornet. But he was too far back. All she could see was Ykonde Remisk’s M50, with its garish gold and blue trim. She noticed that he was too close to her; by rule, there was a specified distance that racers had to maintain prior to launch: the privilege of the pole position.

She gnashed her teeth and cursed beneath her breath. Someone was already violating rules.

“Hypatia Darring . . . you may launch.”

She didn’t even wait for the spokesman to finish. Darring burst out the carrier bay door at top legal speed.

Through a narrow channel flanked by media and spectators, Darring flew the ceremonial lap. The rest of the racers followed behind, releasing one after another, but maintaining their specified positions within the line. Ahead of her, the pace craft sparkled with a flashing red light. Nervous energy spotted her brow with sweat. Her crew chief gave his final comment and instructions. She signed him off and focused on the course ahead of her.

In her ear, the MCR starter counted down – *ten, nine, eight* . . . Darring thrust to the left, trying to keep directly behind the pace craft. Ykonde Remisk was right on her six, the nose of his racer dangerously close. *Back off!* Darring mouthed silently, wanting to flip on her comm link and tune to his frequency. It wasn’t strictly against MCR rules to speak to other racers, but officials discouraged it, fearing that frequent conversation during the race could produce distractions that would lead to crashes and injuries. Besides, there was enough chatter going on between racers and their crews. Still, Darring wanted to open a channel and scream into Remisk’s ear, *Get off my back!*

Five . . . four . . . three . . .

Now, all the racers tightened as the pacer made the last turn to set them up toward the first rings. Darring gunned it a little herself, closing in on the pacer. She put herself now just a little to the right of it, to keep Remisk from rushing past her at the last minute. Darring’s heart raced, her hands shook on her joystick. She tried concentrating on the small object that grew and grew in her viewport: The first ring, its rotating lights swirling around its virtual frame, signaling the beginning . . .



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Two . . . one . . .

The red lights on the pacer flashed green, and it fell to the left quickly, breaking formation.

Darring pressed herself into her seat, gunned her thrusters, and blew through the first ring.

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The flashing lights of the rings caused her eyes to ache. They flew by her quickly and she was concentrating on them too much, too worried about her time, her position in the line. She had fallen to third place by count of the last timing ring. It had been her fault, too, worrying so much about conserving thrusting fuel, letting some pilot with a beat up Avenger take the inside lane. Her crew chief yelled at her for it; she ignored him. The little shit was right, of course, but he was an old academy friend of her father's, and she was in no mood to listen to a man yell at her. Besides, she could overtake an Avenger at any time. The real focus of her recovery had to be Ykonde Remisk.

The smarmy son of a bitch had forced her against the left wall of the tunnel they were speeding through. Her wing had actually broken the virtual plane, and the voice of the MCR caller came over her comm . . . "Ten seconds added to your time." *Damn!* Remisk's press was not strictly against the rules since his ship had not touched hers, but it was certainly dirty pool and against the spirit of the competition. She had no way out of the pick-and-roll either; it was as if he and the Avenger pilot were in cahoots. That wouldn't surprise her in the least.

She refocused and thrust her M50 forward, dipping beneath the Avenger and slipping past it on the low. It tried muscling her back, pointing its right wing down to mask her view, but Darring anticipated the move, shifted in kind, and kept her position and composure. Meanwhile, the Avenger pilot had lost his focus on the lane ahead of him, and failed to notice the ring closing fast and to the left. Darring hit

her thrusters hard and shifted left, at the last minute moving out of the Avenger's path. Darring took the turn and ring perfectly; the Avenger saw it too late, tried to adjust, and clipped the ring with its left wing. It broke the invisible plane of the tunnel and then overcompensated into a spin through the void.

Eat that!

She hoped that somewhere behind her, Gul was cheering. She could almost hear his martial voice singing her praises. She liked the thought, but the most pressing concern now was right in front of her.

Remisk had been pushing his craft at full speed the entire course. *How was that possible?* she wondered. Sure, he had customized his M50 like all the rest, removing hard-points for extra fuel and cooling equipment, but he must be running on fumes by now. There was no other explanation. He would have to burn out soon, and the sooner the better.

She ignored the three other racers pressing hard at her six. She took the next ring and the next, letting the strong inertia pull and propel her craft forward. That was the best way to conserve fuel, she had learned racing around Saturn. Release thrust on the turns, and let your craft drift at top speed into the vector. Then you had enough thrust to pick up the few seconds you might have lost on drift. This racing gig was a game of milliseconds, and each one counted.

She moved up behind Remisk, taking advantage of the last straightaway before the final turns through the ultimate three rings. There was not much time left, and she had to make her move now.

She tried shifting up and over his craft. He moved to block her. She shifted down; he moved again, in perfect unison, their ships equal size. She shifted left, right, and each time Remisk moved to counter. *How is he doing this?*



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He was a great racer. There was no doubt of that. He was strong, athletic and cool-headed. Remisk had not gotten where he was on the circuit without being smart and precise. But his moves, his instincts were almost supernatural, as if his senses were enhanced. But that was impossible. Every racer went through a rigorous medical exam to ensure that no drugs had been introduced before the race, and further testing would be conducted along the way to ensure none had been taken after the first stage. Remisk was just that good.

Then I have to be better.

She pushed her plant to its limit, exceeding safe levels, much to the ire of her crew chief who implored her to back off, take second or third place, don't risk blowing your plant so soon for so little reward. *Little reward, my ass!* She had taken the pole position, and she was going to let everyone know that it was not some fluke, that Hypatia Darring was here to stay. She wouldn't give her *fath*— the media — grist for their mill.

She barrel rolled, letting the rotation of her M50 spiral her forward like a screw. Remisk, fearing that he would be clipped himself, shifted ever so slightly to his left, and Darring pounced. She pulled alongside him, letting her craft settle. She punched her thrusters again, feeling them wail their discontent through her arms and hands. Her stick was shaking, her heat warnings blaring. She could feel it all through her body, and there was, in all the galaxy, no feeling like it. It was something her father had forgotten. He was a good fighter pilot himself, or at least he was in his youth. But he had spent too much of his life in the warm, safe comfort of destroyers, cruisers and battleships. He had forgotten what it was like to feel flesh tingle as strong G forces threatened to rip your skin from its bones. Ghul understood it. Remisk most certainly did. And even that sorry son of a bitch Motak understood the ecstatic feeling of sheer speed.

She pulled ahead. She took the next ring flawlessly, shifting against inertia and rolling through the next ring, which appeared immediately after the last. The final ring loomed large in the distance. Her crew chief, his attitude suddenly changed, barked “Go! Go!” into her ear. She smiled. She'd made the right decision. She most definitely deserved to be here racing among the greats.

Remisk pulled up above her, obviously giving her first place. She kept her course forward and strong, letting her plant holler. She giggled like a little girl, accepting praise from her chief. The flashing lights of the last ring did not make her weak or sick this time. She welcomed them happily.

Then a shadow came up over her, darkening her cockpit. It was Remisk, his M50 finding new life and overtaking her ship. In her joy, Darring had not realized that her thumb had lightened its pressure on her throttle, and she had slowed just slightly. Slowed enough for Remisk to swing his craft up and over her hull and plant itself, with its exhaust nozzle, right in front of her cockpit. Darring tried keeping her speed and course, but Remisk kicked his thrusters and threw a gout of yellow fire across her cockpit windows.

Darring screamed and rolled left. It was a serious mistake. She tried regaining her position, pressed her thumb deeply into the throttle, but it was too late. Ykonde Remisk passed through the final ring in first place. The Avenger and one other racer took second and third, while Darring, her ship rolling uncontrollably through the last ring, barely finished fourth.

To be continued . . .



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