JUMP POINT

IN THIS ISSUE

GREETINGS, CITIZENS!

Once more, I'm finishing **Jump Point** as I sit at a convention – Origins, the national board game convention this time around. As that might suggest, I'm on my own this time around – there are no upcoming *Star Citizen* board games. :)
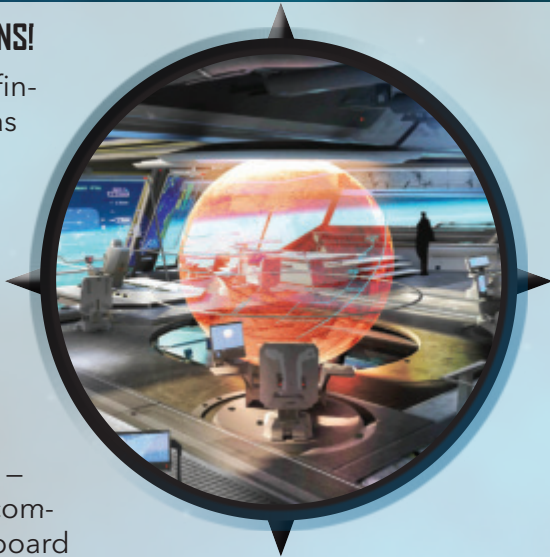
Meanwhile, I want to note that Star Citizen hit Alpha 2.4 this past week. Yes, that's "old news" – it's at least 5 days out of date. But when you look back at **Jump Point** in the years to come, at least some of you will find it interesting to remember that this is when we hit that milestone. I'll try to keep track of other *SC* accomplishments as go forward.

And there will be more milestones – the game keeps growing bigger and stronger, week by week and month by month. Getting true persistence (discussed in this month's Behind the Scenes interview) is an enormous accomplishment all by itself. Being able to reliably keep what you spent hard-earned creds to buy makes this a much more interesting game to me. Space combat is fine – who doesn't enjoy a little pew! pew! from time to time? – but the money game, with all its ramifications and possibilities, is what I'm going to most enjoy. Well, that and seeking out all those places where No One Has Gone Before.

Our Portfolio profile, on Casaba Outlet, lays out how one enterprising family turned a basic delivery service into an empire-spanning financial powerhouse. I don't suggest that this is either easy or likely, but I do suggest that it is going to be possible – and possible is all I can ask for. Give me the chance to do what the Polanco family achieved, and I will be happy. I realize that's not everyone's primary goal, but there are many other goals that will also be possible as *SC* continues to grow deeper and broader.

I just realized that one of those goals – in many ways, the flip side of the Casaba accomplishment –is also illustrated in this month's **JP**. The official designation may be a military-sounding "fighter/interceptor," but the Drake Buccaneer falls squarely into the "pirate ship" category. Check out this new single-seater and its potential for destroying a few of those commercial-empire dreams.

Our Galactic Guide entry covers the star-crossed system of Oberon. When I first saw Stu Jennett's portrayal of Uriel (Oberon II), I actually shivered – that is one cold world. I expect Oberon will play a role as the Vanduul continue their offensive – a role the system would just as soon avoid.

And Adam continues his tale of the Human-Tevarin conflict, which appears to be as star-crossed as Oberon itself. Here's hoping for a better outcome in Caliban.

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

David
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Buccaneer Interceptor/Fighter

Aims

- A small, nimble single-occupant fighter with limited external cargo to serve as a force-multiplier.
- Create a strong companion ship which feels at home when paired with any other Drake Interplanetary ships.

Aesthetic

- The goal is to blend the current Drake style guide with a barebones approach to comfort similar to older Russian military designs.
- Sleek, maneuverable body shape with easy exterior component access panels.

Rough Draft Statistics

Length   ~20 Meters   *Width*   ~16 Meters

Overall a small fighter, roughly the same max bounds of a Sabre, but a slimmer body profile from the top.

Mass   14k (null cargo)

Lighter than a Gladius when unloaded, but heavier than a Sabre with a full cargo load.

Crew   1

Single-cockpit craft with no functional interior.

Engines

Highly responsive engines tuned for acceleration and control over top speed in SCM, while providing a faster base Cruise speed.

Thrusters   24 x Fixed

Fixed thrusters packed together in groups of 3, spaced along the body at the outer-corners to provide 4 fixed thrusters to each main face of the ship.

Power Plants   2 x Small

Dual power plants for a ship of this size to handle the high power draw.

Weapon Hardpoints

2 x S3 Wing Mounts – Out-board mounts on the wings to allow a full 360° range of motion if user installs a gimbal mount.

2 x S2 Underbody Mounts – Underbody mounts similar to the Cutlass, requires 90° turning range of motion; does not need full rotation.

1 x S4 Deployable Underbody Mount – Deployable underbody mount hardpoint. Can fully retract inside of ship with full 360° range of motion if gimbaled.

- The S4 mount serves to offer the Buccaneer the core of its role flexibility for any loadout, with the intended range of options including:
  - o Missile Pylon – Either 2x S2 or 2x S3 Missiles
  - o Fixed/Gimbaled Weapons – Can accept any normal weapons or gimbal mounts which can install to a S4 hardpoint.
  - o Interdiction Devices – DESIGN TBD – Can install specialized equipment built for trapping or disabling targets.

Shield   3 x Small

Capable of shielding on par with the Gladius or Sabre.

Armour   Medium

Built to take some hits; generally will favour mitigation against Physical and Distortion damage, relying on Shields to handle Energy weapons.

Interior Metrics & Templates

No functional interior beyond the Cockpit.

All of the Buccaneer components will be hidden while in-flight. To interact with a component, pilot must EVA out and open a single master panel which will expose all internal components:

- Small Power Plant x 2 – 1m x 1.5m x 1m
- Small Shield Generator x 3 – 0.75m x 0.25m x 0.25m
- Small Avionics – 0.5m x 0.75m x 0.25m
- Small Cooler x 2 – 1.5m x 0.5m x 1m
- Small Gravity Generator – 0.5m x 0.5m x 0.5m
- Small Jump Drive – 0.5m x 0.75m x 0.5m
- Small Life Support – 0.5m x 0.5m x 0.25m
- Small Radar – 0.5m x 0.5m x 0.5m
- Small Ammo/Fuel/Battery Tanks x 12 – 0.5m x 0.5m x 0.5m

Animation Templates

- Fighter-style ship and seat enter/exit.
  - o Use Gladius Enter/Exit/Seat as template.

Requirements: Cockpit

- Needs very good visibility in a 180° arc.
- Very few, but thicker struts framing the cockpit.
- Standard cockpit with functional Ejection seat.

Requirements: Smuggling Compartments

- Excess Ammo/Fuel Tank Components able to be used for smuggling low volumes of contraband.
- Each box provides 0.25 SCU of capacity for small items. Total capacity of 3 SCU if all available space is filled. (12 * 0.25)
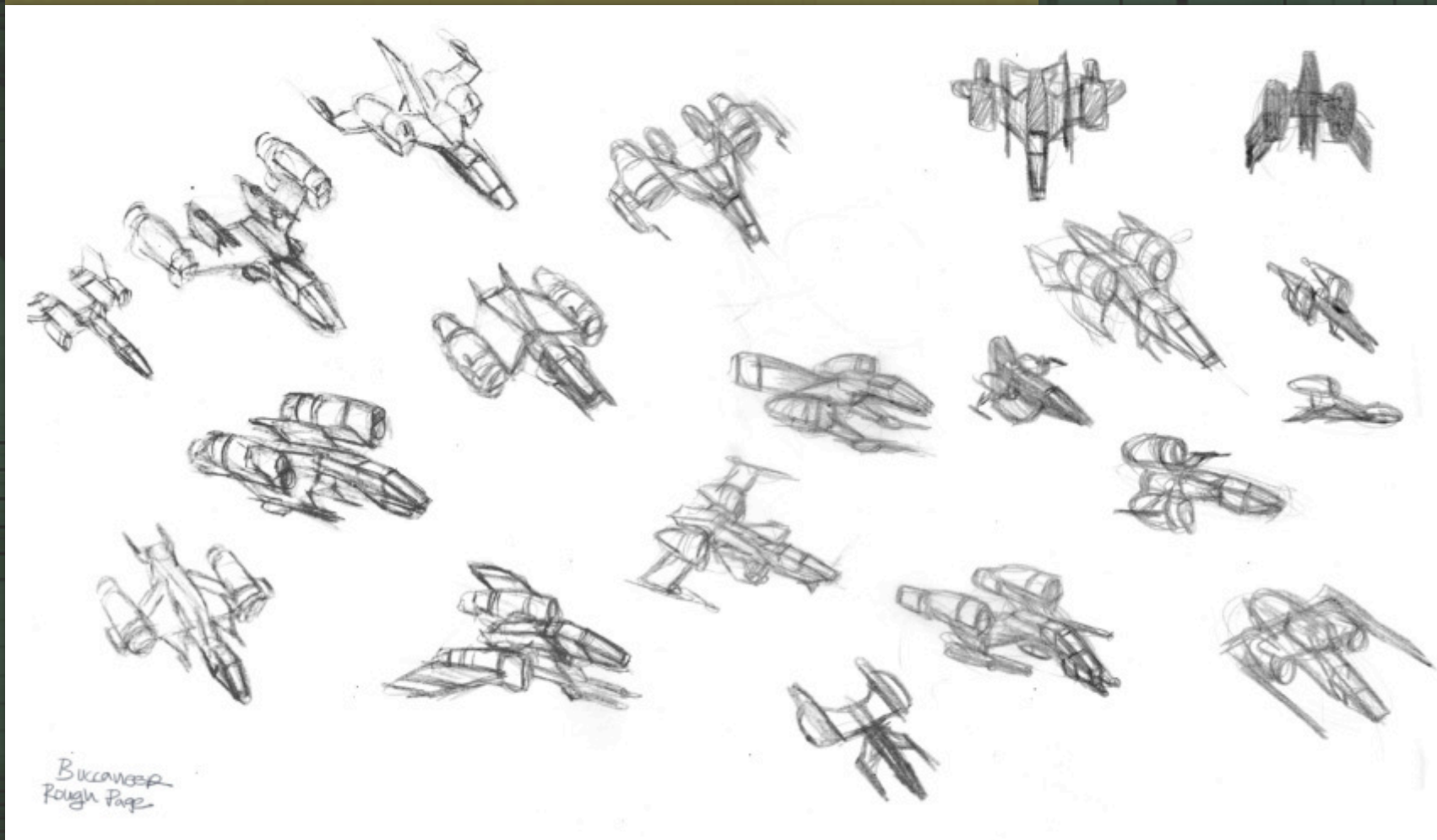

Additional References

- Please reference the included DRAKE style guide for a more general guide to what DRAKE ship features are.
- Engine mounted pontoon style at end of wing
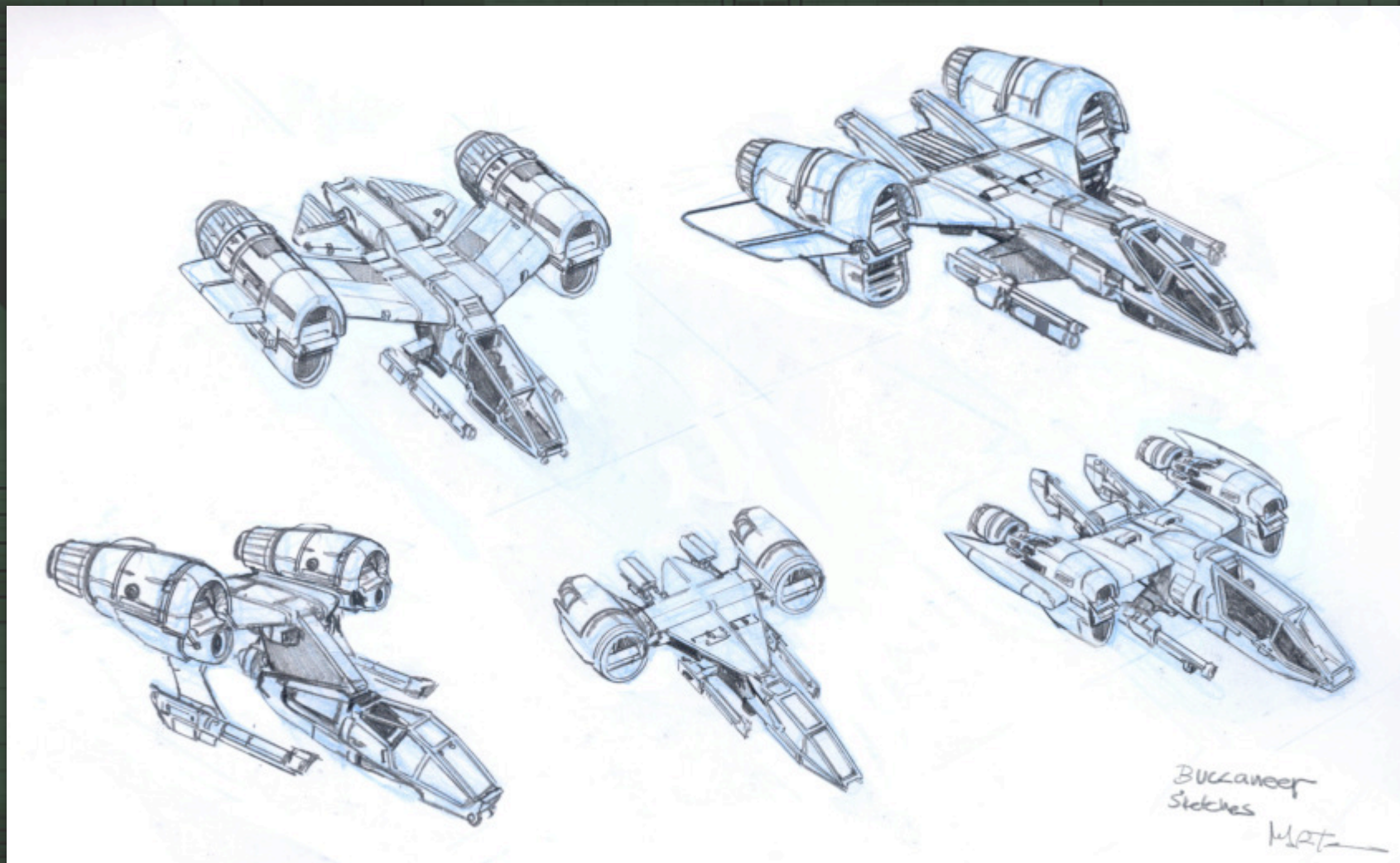- Weapons mounted outside engines
- Thin spine

Jim Martin, Freelance Concept Artist: Initial sketches [this page and next 2 pages]

Buccaneer
Rough Page

Buccaneer
Sketches

VERSION 01

VERSION 02

DRAKE BUCCANEER
ROUGH-IN MARTIN

Chris Roberts: Of the more developed versions, I like #2 the best, but I am not keen on the front of the ship / cockpit on #2 (or really #1, for that matter). I feel it needs to be perhaps a bit more substantial and solid as the engines are huge in comparison. I know this is a Drake signature, but it's almost cartoony in the case of #1 and #2 (probably one of the reasons why I like #2 better is that the engines aren't quite as oversized as #1). I do like the idea of very good visibility that the all-glass cockpit front provides.

BUCCANEER TOP VIEW

WORKINPROGRESS
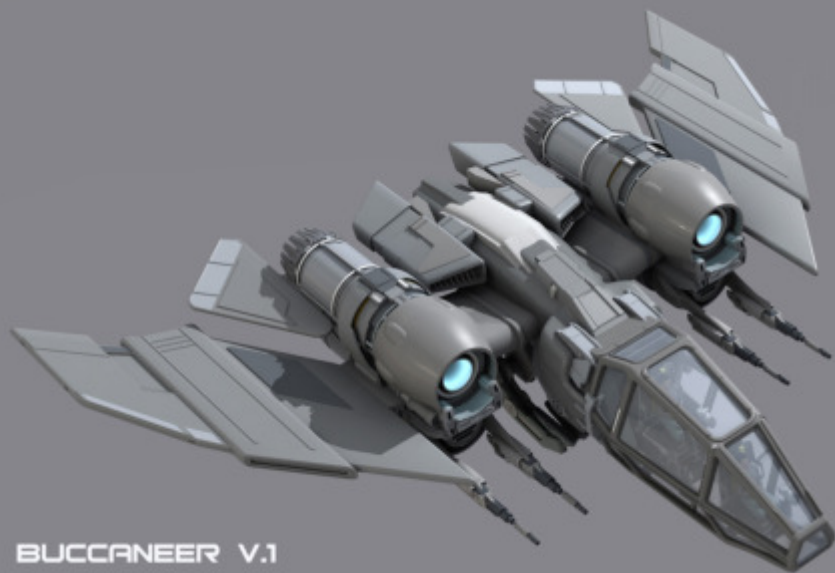
BUCCANEER V.1
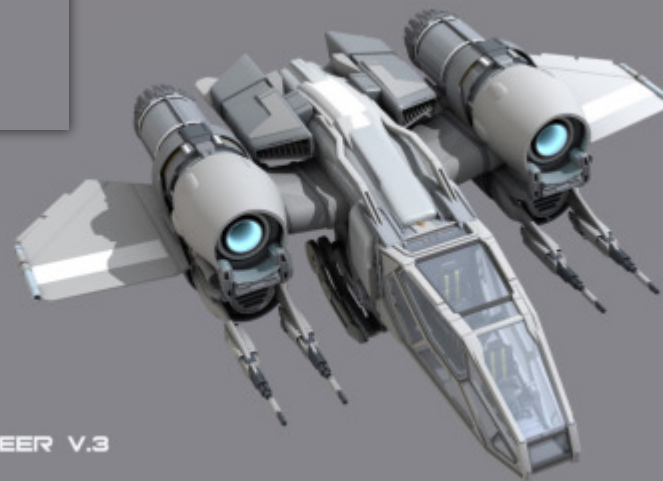
BUCCANEER V.3

BUCCANEER
UNDERWING V.09

WORKINPROGRESS

BUCCANEER V.4

BUCCANEER V.5
BASIC- NOT PAINTED
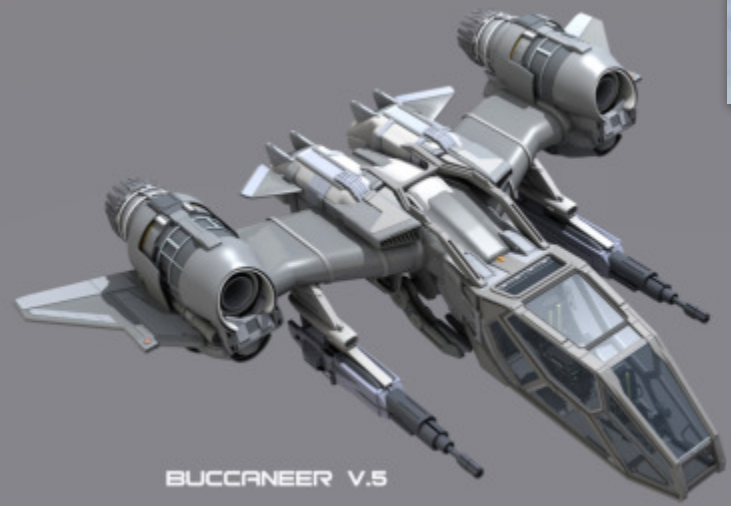
BUCCANEER V.5

BUCCANEER
V.7

Jim M: Here is some new Buccaneer stuff. It's a refine pass on Chris R's first and second pick, with the appropriate canopy used. Also some beauty shots. Let me know what your notes are and we will go from there.

PASS 03 V.01

DRAKE BUCCANEER
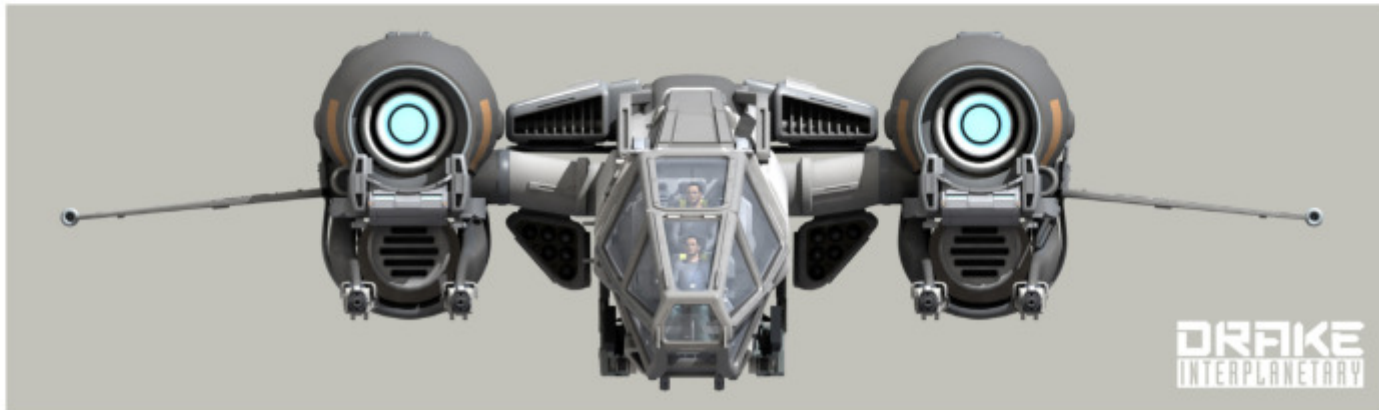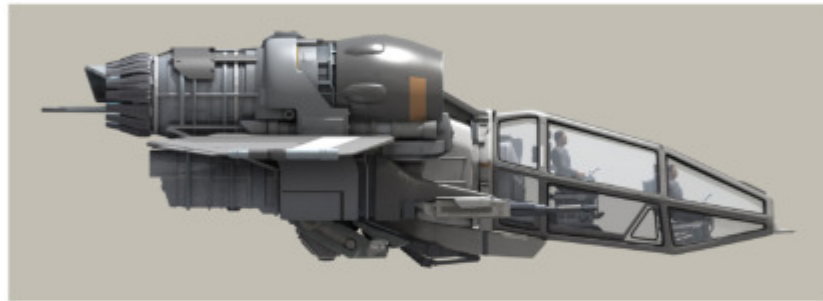
DRAKE INTERPLANETARY

PASS 03 V.01
COMPACT

DRAKE BUCCANEER
3/4 VIEW

12

WORKINPROGRESS

PASS 03 V.02
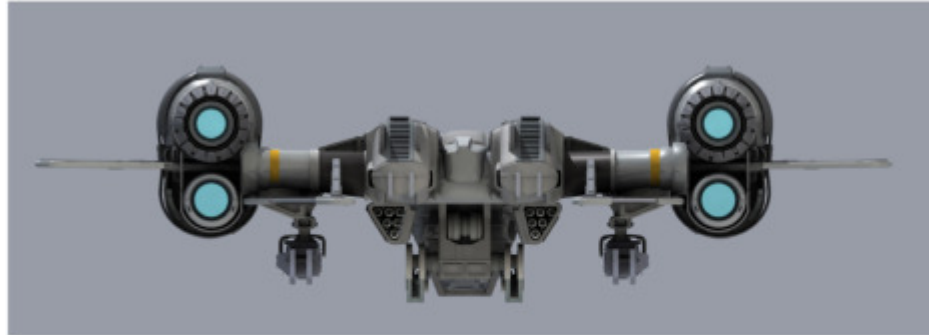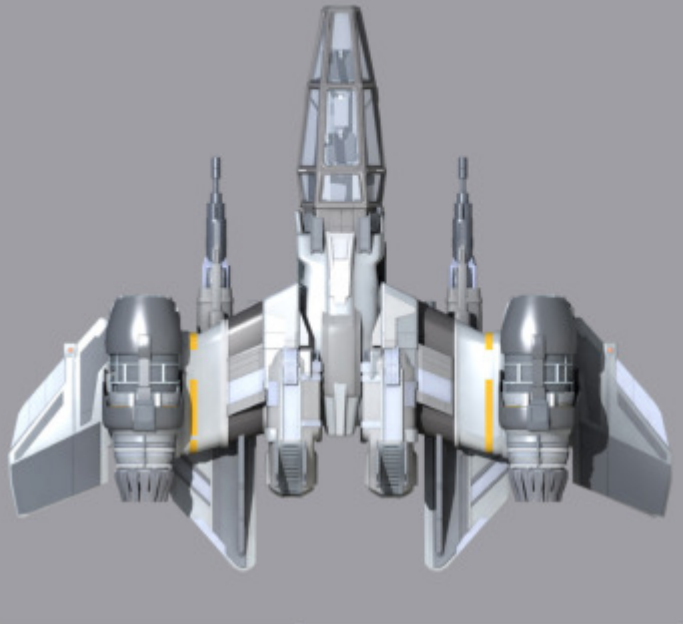
DRAKE
INTERPLANETARY

DRAKE BUCCANEER
HEAVY ARMAMENT WING

PASS 03 V.02
HEAVY WING

DRAKE BUCCANEER
3/4 VIEW

WORK IN PROGRESS

Chris R: I am digging v.01.

Did we spec it as two-person? (I don't mind that at all, BTW – second seat could be optional like on the Super Hornet.)

Feedback from other folks? Does this hit the design criteria? What other areas / components do we need to call out / explore based on the design spec?

Where does the shield generator go? The power plant? Avionics? etc.

John Crewe, Senior Technical Designer: What sort of entry/exit do these have? The original brief had it following the Gladius entry method with side ladder, but this seems to be top entry?

Nick Elms, Creative Director, S42: As it's a fighter, would we want to make the pilot visibility less occluded, by reducing the thick frames maybe?

Phil Meller, Lead Designer, S42: Like the main body, just not feeling it for the cockpit/front end. Looks too big/exposed for me... more appropriate for an Explorer as opposed to a Fighter.
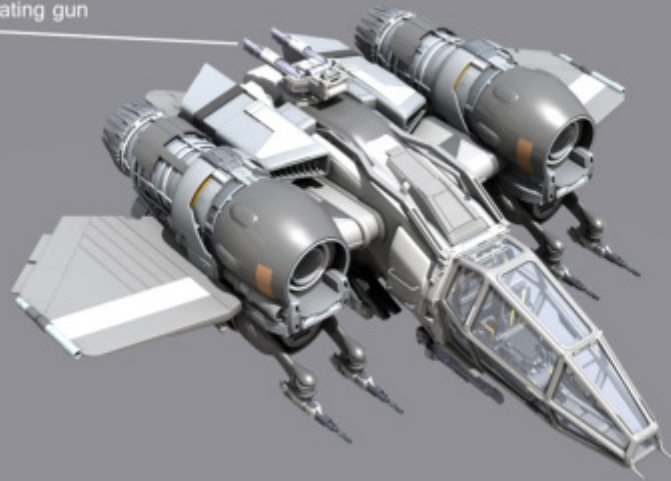
360 rotating gun

Jim M: Rough gun placement.
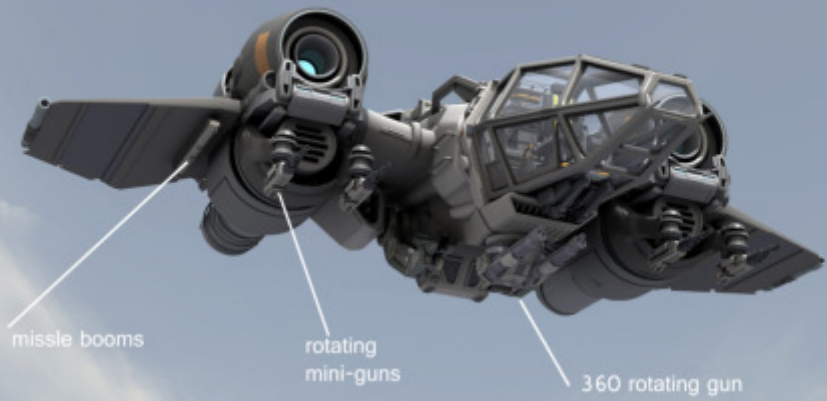
missle booms

rotating
mini-guns

360 rotating gun

15

WORK IN PROGRESS

thinner Cockpit frames

Jim M: Revised cockpit frames.

Chris R: I like the front glass cockpit - feels very Drake. Agree with Nick that the struts could be thinner. Asked design to get the OBJ / FBX file from Jim to check out the cockpit view and general visibility.

Also will explore a single seater entry style (Hornet, Gladius) or a Herald / Aurora / Mustang entrance style...

Jim M: WIP Drake Buccaneer - Hatch Opening and weapon placement.

Here is a reworking of the front end, and a pass on the hatch and "climb-up." I think this stays in the spirit of the earlier silhouette, but gives room to Modelling to fit in the components.

From Matthew Sherman; comments from Chris R.

Matt Sherman, Technical Designer, LA: A few quick things from going over the updated model with Kirk Tome (Lead Technical Designer, LA) [with interleaved responses from Chris R]:

1. Can we get the guns moved off the engines and onto the wings themselves? Additionally,
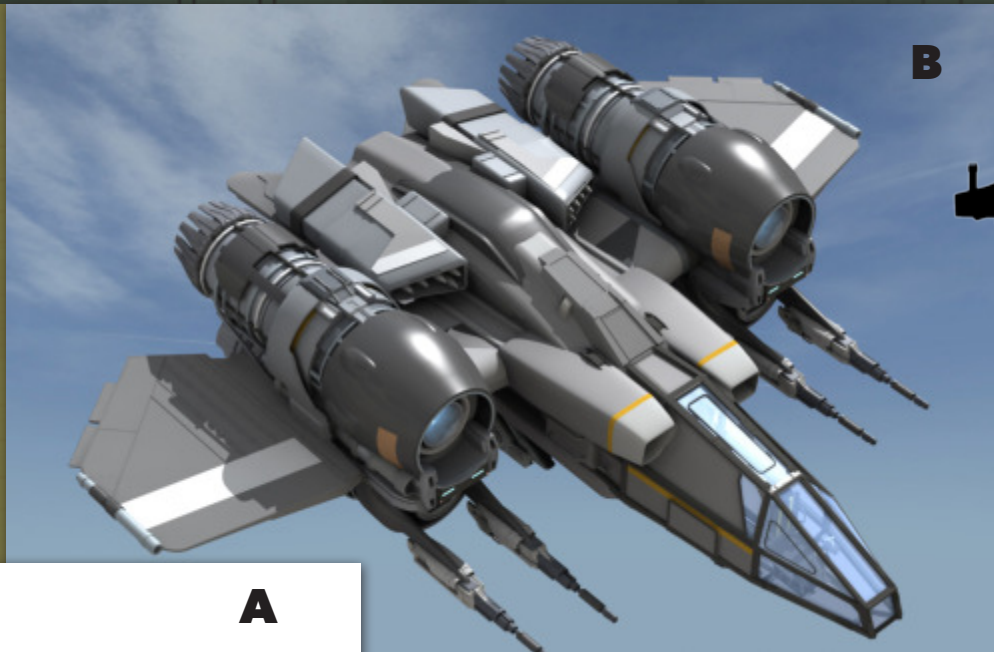
Buccaneer cockpit / weapons revision

A

repurposed space

cockpit

new version

S3
4.125m x 0.875m x 0.875m

DOOR

S2
3m x 0.625m x 0.625m

old version
double seat
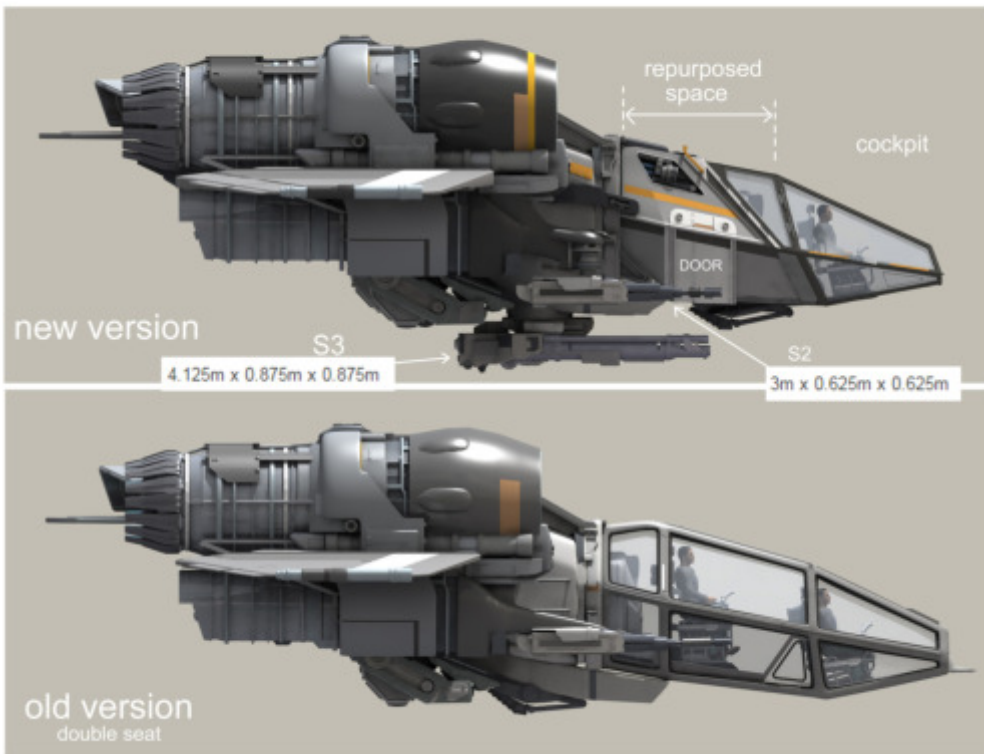
I just want to check the installed size on the concept art. They currently look like Gimballed S2s, when those mounts should be Fixed S2 with Gimbaled S1 as the option.

Chris R: See my above comments, below.

2. The lower gun mount will need a way to completely stow away out of sight, so we'll need something set up to support it fully retracting back into the rear body and some visualization on how that will look. There's definitely the space for it, so just needs something to show that the gun can tuck away, especially when landed.

Chris R: If we raise the front neck / cockpit a bit there may be more room for this. Perhaps we also increase the height of the neck / cockpit – which would also help with the Drake aesthetic.

3. Entrance needs to be pulled forward closer to the cockpit so we can make sure the Enter/Exit animation is a single 'get in/out of seat' setup similar to boarding a Gladius or Hornet. I actively want this animation to be a single action instead of a 2-part of "enter/exit ship" and "enter/exit seat."

Chris R: See my note, below.

4. If possible, reduce the size of the intakes on the top-center of the ship; they seem a little too far forward compared to the rest of the ship, but this isn't an absolute need. (See attached screenshot with orange circled regions.)

Chris R: Not sure about this. I would suggest maybe lowering the main engines so they are closer to being inline with the wing and potentially reducing the size / height of the lower scoops to compensate as they will be more underslung.

5. Can we get direct callouts across a few images to show exactly where the Maneuvering Thrusters are mounted? I see a few across the ship, but panning around the model, I'm not sure there's enough built on currently to support the intended agility/movement of the ship. If these aren't fully mapped on the concept model, I can work on an ideal placement setup with the current FBX file to inform any changes needed so they're properly balanced across the ship.

Chris R: It may be helpful to Jim to show him optimal placement.

Mark Skelton, US Art Director: Jim, talking to the ship team, we agree that the four guns on the bottom look strange. Maybe they would look better mounted on the wings?

C

D

DOOR SLIDES UP
LADDER EXTENDS DOWN
BUCCANEER LANDED OPEN HATCH
E

BUCCANEER REVISION 04

F

19

Chris R: Responding to both Mark's markup of Jim's most recent pass and Matt's points above (inlined).

Not sure what (B) is, as it doesn't match the others with those big side intakes next to the nose / cockpit — which is good as I don't like that one as much as the others.

I also feel in the profile comparison (A) that the front cockpit section rides too low. In (C), (D) and (E) it feels like it is higher up and the of feel the ship is better – probably just a perspective trick but I would like to see what she looks like if brought up a bit higher so the middle section of the front doesn't slope before the canopy.

The fuselage to glass canopy join / blend is a little awkward / cut in.

I would look at perhaps having the top back canopy piece of glass (the one that meets the fuselage in the repurposed space) have closer to a 45-degree angle (so you get a bit more glass) and then have the whole top canopy (not the front bottom glass bit) hinge open (kind of like Chris Smith is hinging the new Hornet cockpit). Then have a ladder extend to allow the pilot to clamber in, up over the side of the cockpit and into the seat – perhaps the seat operates like a lot of other ones where it slides back / forward for enter / exit (which would be consistent with Drake functionality).

I am not keen on the gun mount setup on the wings – firstly I would think they would be attached to the wings on pylons on either side of the engine. I think we want to see an S2 attached to a pylon or an S1 attached to a gimbal. I am also not terribly keen on the look of this in the new version – it looks kind of weird with the gimbal being at the front of a pylon - doesn't seem like it would be great for weight distribution.

BUCCANEER REVISION 04

Chris Smith, Lead Vehicle Artist: Here is a quick paintover I made.

I agree with most of the points already raised in this thread, so I went ahead and integrated most of them.

- I thought the engines looked a little comical because of their size compared to the rest of the ship, but I think the high position is what made them seem even bigger. I believe lowering the engines down already helped a ton with the aesthetic and it also makes it seem more solid overall.

- I understand the ship is supposed to be small and stubby, but I think it is too boxy overall – it seems the ship is as wide as it is long and tall. So what I've done in the paintover is take the cockpit and made it slightly longer and raised it a little as well. I also added a bit more length to the back end and added some complementary rudder fins to the back (not a necessity as it might steer away from the Drake style too much).

This change, included with the lowered engines, gives the ship a nicer overall line, I believe. It's still a short and stubby ship, but it's not as 'tall' anymore, giving the side-view silhouette a bit more of a sleek shape.

- I prefer the guns mounted to the wings; it just makes more sense, IMO. But I changed it around a bit. Since Chris mentioned having a fixed weapon on a pylon and one on a gimbal mount, I moved the fixed mount to the outer edge of the wing, and the gimbal mounted weapon to the middle of the wing. (I just noticed I put the smaller S1 gun on the fixed pylon, but that would be an S2.) I think this gives the weapon arrangement a nice distribution overall.

Chris R: LOVE your paintover! Awesome work … only quibble is I would lose the twin tail fins as it takes it away from Drake. But let's get this (minus fins) over to Jim!

Looks bad ass – If I were an aspiring Pirate I would want this!

Chris S: Cheers, Chris!

And ditto on the tail fins. :)

Make sure to tell Jim he will need to re-address the maneuvering thrusters. This is a pretty crucial part actually, as it can potentially affect the design of the ship.

Are the maneuvering thrusters on this ship going to be fixed or gimballed?
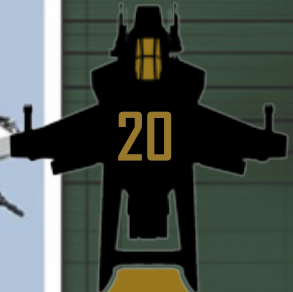
Jim M: Adjustments made off of Chris Smith's and CR's feedback. [this page and next]

Chris R: Looks good to me!

Jay Brushwood, Senior Technical Animator, ATX: Just wanted to make sure that we're following the ship/seat enter/exit metrics on this. This was slated by design to use the Gladius enter/exit, but from the concept the enter is on the opposite side of the ship. Do we need to get Jim some assets to bring this closer to the existing metrics we have?

Chris S: Jim, for the enter animation, it looks like you just need to flip the entrance to the other side and the seat has to be able to slide back to receive the pilot, then slide forward to his controls. There still might be some discrepancies, such as the height off the ship vs. the template, and the places where the pilot grabs onto things. Also, the exit animation will not line up at all, but Jay said he could add a ladder-type exit to this one. It looks to be in the ballpark though, and most of the above issues could also be worked out once we get to the modeling/whitebox phase.

Mark S: All this will be worked out in whitebox. I had passed Jim the animation set early on, so it's close. With a little nudging here and there it will work just fine. It should be close enough for a concept.

Chris S: Looks good! I would like to see a shot of the rear landing gear. I'm also slightly confused on the bottom turret setup — are those two big guns on the bottom connected to the turret? In the front view it looks like there is a turret with smaller guns in the middle.

REVISION

OLD PROFILE

NEW PROFILE

SMALLER ENGINE COWLINGS
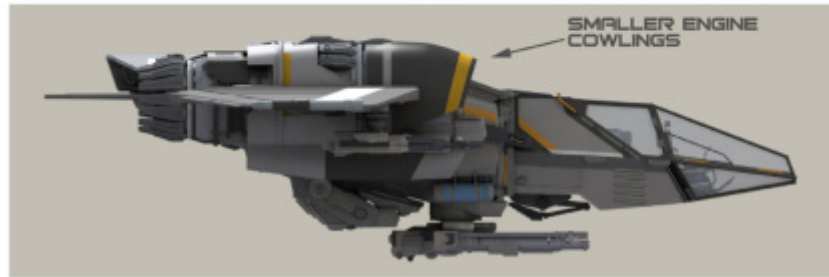
WORK IN PROGRESS

Older version
pass05

New version
Pass06

- lower engine profile
- longer cockpit
- engines sit lower
- cockpit glass revised
- guns re-positioned
- upper intakes flattened
  and lengthened

BUCCANEER

Jim M: Buccaneer landing gear concepts and Marketing shots.

BUCCANEER

OPEN CANOPY

Company History

From Corel to Chronos and almost everywhere in between, Casaba Outlet has become ubiquitous across the UEE. The concept behind the store is far from new. It sells designer-style fashion at affordable prices, yet Casaba succeeded where many had failed thanks mainly to the business savvy and entrepreneurial drive embodied by the company's founding partners, siblings Jean and Joel Polanco.

Freelancer Free Spirits

Jean Polanco claims to have been born in a jump point. At least that's the excuse she gave to justify her restless spirit. Still, her claim can't be disproven. Jean's birth certificate states she was born in an unspecified part of space in 2811, as her parents traveled from Ferron to Idris in search of work. For the next five years, Jean's childhood home was her family's Freelancer, as her parents criss-crossed the universe as independent cargo haulers.

Joel was born in 2816 while the family was in the Goss System. Their mother, Tierney, insisted on Joel's birth happening there, as she believed the cosmic properties of the system's binary star would bless him in life. Joel was described as a shy yet curious child, who constantly questioned why the family was always on the move. So Tierney told him they were searching for a magical city called Casaba: a place of peace and tranquility that was filled with wonders for all.

The family continued to live out of their Freelancer, barely subsisting on odd jobs just long enough to get them to the next system. The extensive traveling excited Jean, who became fascinated with the subtle cultural differences between planets. While the rest of the family visited historical sites or natural wonders, Jean spent her days in dingy alleys, exploring bazaars and garment districts.

One day, Joel joined his sister as she wandered through a New Junction market. A vendor noticed Jean's bracelet and offered her three times what she paid for it. At first she refused — she had picked up the bracelet a few systems prior in Nyx and loved the way the crystal caught the light — but Joel convinced her to sell it for the sake of the family. This transaction made her realize that subtle cultural differences could also be valuable. A cheap trinket from Delamar was a statement piece in Lo, so Jean started buying the most beautiful, exotic or distinct items she could find on one planet with Joel helping her resell it on the next.

Family Affair

For years, the Polanco family traversed the 'verse, and thanks to the extra income from what Jean bought and sold on their journey, they were no longer living hand to mouth … until their father, Atlee, contracted Lezcano Syndrome, a rare disorder that ravaged his nervous system and had no known cure. Tierney insisted the family return to Goss so

the power of the system's binary stars would help him heal. They moved into a dilapidated shack near Lyre, where Tierney spent her day caring for her husband and searching the planet's diverse ecosystem for a natural cure.

Knowing no other way to support their family, Jean and Joel, now in their twenties, set out in the family's ship. They visited both core and frontier systems to acquire a vast and diverse array of items, only to learn their old business model would not generate enough income to support them and their parents. So Joel suggested some changes.

Instead of Jean hand-selecting single items from markets while Joel sold the stock from the back of the ship, the two would deal directly with small- to medium-sized softline manufactures to buy remnant stock in bulk. Rather than just having the one unique item, they would now have dozens available if something proved popular. Aided by Jean's keen eye in selecting the best outdated stock from each manufacturer, their Freelancer soon became known in various landing zones for selling stylish yet affordable clothes. When lines began to form before they could even open the back hatch, Joel knew they were on to something.

During this period, Jean and Joel frequently returned to Lyre to visit their parents. Though Atlee's health had improved, he still wasn't himself. Jean believed Atlee, who had spent his life working, just needed to keep busy, so Joel proposed opening a small store for their parents to manage.

In 2843, the very first Casaba opened its doors in Lyre. Joel called it Casaba after the imaginary city Tierney made up for him as a kid, hoping this would be the magical place his family had always dreamed of finding. It wasn't long before profits soared and they struggled to keep the store's shelves stocked. Though Jean was content handling all the shopping and shipping herself, Joel envisioned bigger things for Casaba.

Expanding Ambition

First, Joel hired haulers to expedite the shipping of items to their store. Jean's vast knowledge of shipping lanes proved vital as she charted very specific routes that cycled through systems and linked up at designated landing zones. At these points, stock from core worlds would be offloaded to ships traveling to the store. These interlocking routes cut shipping costs, and allowed their Lyre location to undercut the prices of similar stores. The optimized supply chain worked so well, within months Casaba expanded to a larger location.

Following this success, Joel began leasing cheap storefronts near the landing zones where their hauler's routes intersected. This introduced Casaba to a wider audience, and further increased profits. Yet, it also brought new found pressures.

Additional stores meant Jean had less time to personally travel to find unique stock and manufacturers. To make up the difference and to further increase their appeal, Joel began to cut deals with mega-clothing manufacturers helping to keep shelves stocked. Jean always believed the appeal of Casaba was that it highlighted brands that were primarily only known in their home system. But, as Joel often reminded her, for Casaba to become a universal brand, it would have to deal with universally known companies or be run out of town.

For nearly two decades, Casaba continued to expand by adding new locations and brands to their shelves. Eventually larger companies took notice. In 2867, the Jayco Group made a bid to buy Casaba and incorporate it into their conglomerate. The offer was appealing, but would have folded their infrastructure and locations into another brand, effectively killing the Casaba name. After much deliberation, Jean and Joel rejected the offer, but now knew the competition considered them a threat.

Feeling emboldened, Casaba bought the floundering Gasper's Garments chain store, giving them prime retail space in core systems. Supposedly, Jean opposed the acquisition, as the job of filling the additional shelves fell on her. Pushed by Joel, Jean cut deals with companies she disliked or didn't trust to consistently deliver quality clothing. The stress drove a wedge between the two and eventually led to her leaving the company.

With little fanfare, in 2875 Jean stepped down from her position to spend her time traveling to the few parts of the universe she had yet to see. Though their professional relationship crumbled, Jean and Joel reportedly remained close, with Jean even continuing to provide helpful advice.
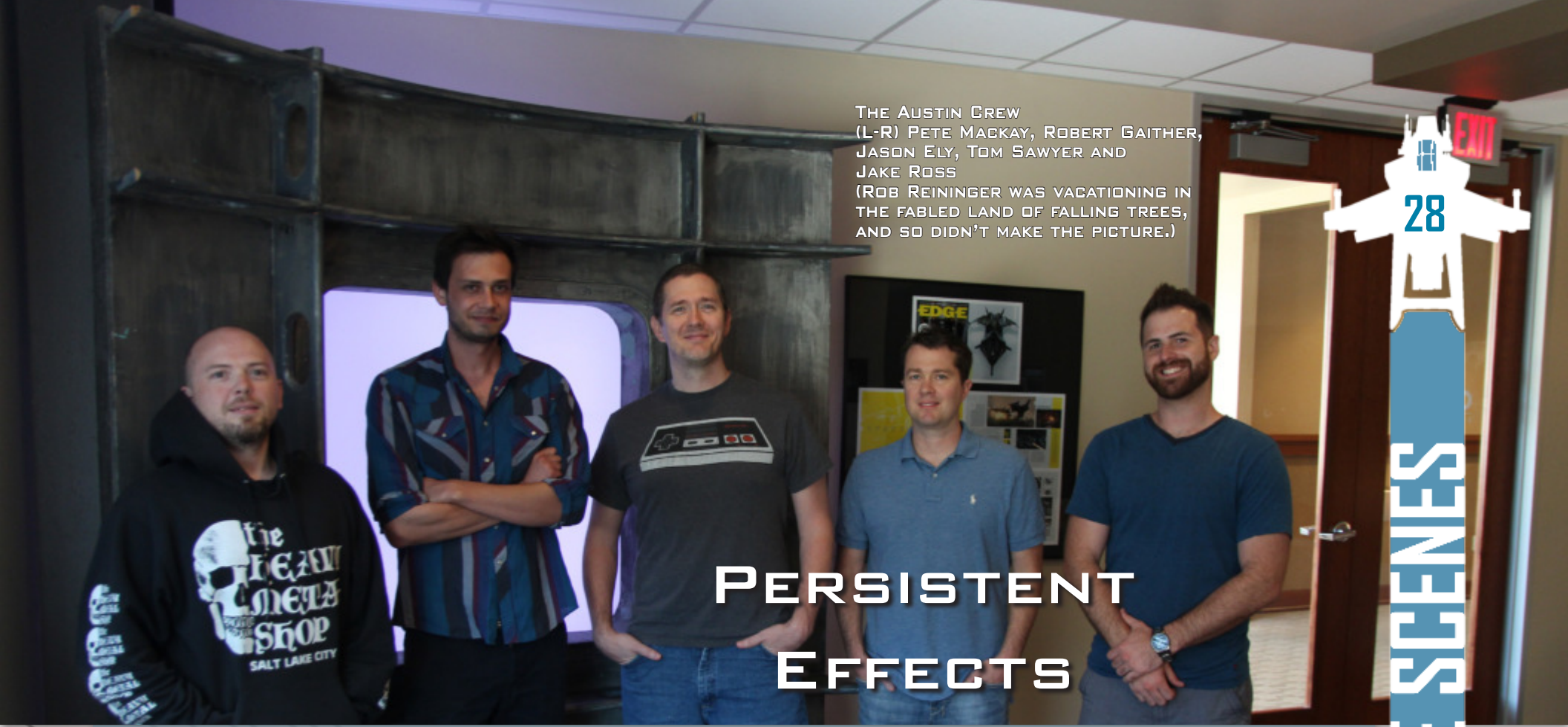
Market Saturation

Joel's careful stewardship of the company and its brand turned Casaba into a store where everyday Citizens and civilian could buy stylish clothes at an affordable price. Eventually, the Jayco Group approached Joel with another offer. This one combined their supply chains while rebranding all of Jayco's clothing stores under the Casaba banner after extensive market research proved it to be the better brand.

Following lengthy negotiations, Joel finally agreed to the terms after Jayco agreed to allow him to stay on. In 2883, the store officially rebranded itself as Casaba Outlet. The merger put a store in nearly every UEE system, a staggering achievement for a company that started out of a small storefront on Lyre. With its success, Joel would eventually rise to the position of CEO once again.

Today, Casaba Outlet remains nothing short of an inspiring success story taught in business schools around the UEE. It provides proof that it only takes a keen eye, a Freelancer and a bit of business savvy to build an incredible empire. While it might not be the city Tierney created in her stories, Casaba ended up becoming something even more magical for the Polanco family.

The Austin Crew
(L-R) Pete Mackay, Robert Gaither, Jason Ely, Tom Sawyer and Jake Ross
(Rob Reininger was vacationing in the fabled land of falling trees, and so didn't make the picture.)

Persistent Effects

With the arrival of 2.40, there's been a lot of talk about persistence in the game, and Jump Point didn't want to be left out. This issue, we sat down with devs from the UK, Austin, Montreal and LA, to talk about what exactly persistence is, and how it is already affecting the rest of the design.

JP: *First, could each of you please give me your title and a very brief description of what you have to do with Persistence and today's other topics.*

Jake Ross, Producer: I scoped the work with help from the Leads and created some semblance of a schedule that was followed to get Persistence, Shopping, and other related features out the door.

Rob Reininger, Lead Technical Designer: From a design side, I was responsible for Shopping and (in part) the Live Works app (co-owner with Karl Jones).

Jake R: I also bought food for Rob. A lot. ;)

Rob R: Ha!

David Bone Gill: I'm Bone, Global Lead UI Engineer and in charge of coding the LiveWorks user interface.

Jason Ely, Lead Server Engineer: I'm in charge of the architecture for back-end Universe Services such as Instance Management, Persistence, Chat, etc.

Martin Poirier, Lead Engineer at BHVR: I oversee shopping client-side code and shopping UI.

Tom Sawyer, Senior Server Engineer: My focus is on the backend server framework.

Robert Gaither, Design Intern: I did whatever Rob needed some extra hands for, mostly setting up the flair ports in each hangar.

Pete Mackay, Designer: Whatever Todd, Tony and Rob tell me to do, which lately is ship and item pricing, commodities tables and gameplay analytics. :)

Martin P: Guillaume Bourque (BHVR) is out to lunch but he's a game designer and assisted Rob on shop tasks.

Zane Bien, Global UI Creative Director: In charge of front-end for shopping UI, among other things.

JP: *Let's start with the backend. What is Persistence, and what does it take to make it happen in Star Citizen?*

Tom S: Wikipedia: In computer science, persistence refers to the characteristic of state that outlives the process that created it. This is achieved in practice by storing the state as data in computer data storage.

JP: *So this is all pretty easy? Just storing data?*

Tom S: For an MMO, itemization is the number one element that needs to be persisted. When you buy a ship, and make modifications to (say) the weapon load or cargo – when you log out and log back in, you would expect to see the ship in the same state that you left it.

Jason E: Persistence in Star Citizen is rather complex, as we are tracking and storing a very large amount of data between multiple services including the game servers and website.

Tom S: Itemization is one of the most challenging aspects of an MMO – you must track all the items that a player owns. Each item may have many children, so if you delete the parent item or trade the item to another player, you need to recursively traverse all items and sub-items to ensure the persistent information is deleted or transferred.

JP: *Can you give me any examples of an item's children?*

Tom S: A ship is a parent item. 4 guns on the ship would be child items to the ship item. An ammo box that feeds ammo to a gun on the ship would be child of the weapon.

JP: *Is the ammo in the box a child of the box?*

Martin P: Ammo boxes have an ammo capacity and quantity, but each bullet is not an individual item. That would be overdoing it a bit :)

Tom S: Secure trade with other players and shop vendors is also a big topic of itemization. This all falls under the persistence technology.

Rob R: Not to mention that CryEngine wasn't an engine that had a large amount of persistence built into it already. Typically things that got stored between levels were variables set by designers in their level scripting. We pretty much had to build it from the ground up.

Jason E: It isn't as simple as just storing an item into a database. In order to support the number of changes to such a large data set we have created multiple layers in the Persistence system. The database is on one end and the game servers/clients are on the other end. In between are a few levels of caching and management of the data.

Tom S: From a persistence point of few, if you trade the weapon of the ship to another player, the gun and the ammo (a child object to the gun) would be transferred to

the other player – and the player could either put it in his own inventory or mount it on a ship.

JP: *So if I sell you one of my guns ... am I also selling you the ammo box? Or is it possible to separate a child from its parent? (That sounds cruel ...)*

Rob R: Not at the moment, but that's ultimately the goal barring technological reasons. The components of a personal weapon might be a better example. Take a sniper scope on a rifle.

This is a component that you might want to keep to place on a different weapon. As the item system expands, you'll be able to swap out components like this to upgrade items as you go.
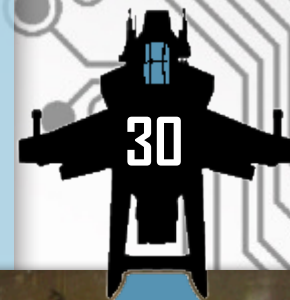
Behaviour staff who worked on persistence or any of the other systems discussed here. Left-to-right: Louis-Philippe Laporte (3d Artist), Miguel Lussier-Gosselin (environment artist), Emanuel Garcia (Art Producer), Simon Pichette (3d artist), Yannick Couture (environment artist), Kate Lane (environment artist), Matthew Csenar (environment artist), Maxime Guindon (environment artist), Jeremie Valerius (concept artist), Fabien Poupineau (engineer), Francois Boucher (technical level designer), Corentin Chevanne (Art director), Philippe Ivanovic (technical artist), Alexandre Cournoyer (environment artist), Romain Grolleau (environment artist), Martin Poirier (Programming Technical Director), Clement Dieu (environment artist), Francois Vidis (environment artist), Guillaume Bourque (game designer), Christophe Halut (environment artist), Jesse Kalb (level designer), Jean-Francois Labbe (environment artist).

JP: *How is damage handled, or color? Are those considered children of the item, or something else?*

Jason E: Damage and Color would be considered states of an item rather than a child.

Tom S: Persistent storage (CloudSQL and NoSQL solutions) are a precious commodity, as we implement the backend framework to scale for 250,000 to 1 million+ concurrent players — there are many design considerations that we take into account to ensure that we will scale gracefully.

JP: *How do multiple layers help address the data problem?*

Jason E: Constantly reading and writing directly to a database is not optimal for performance. We use caching layers to read from the database once and hold the data in a format that is ready to go over the network to a game server without any additional processing. We have a few caching layers, a Persistence Cache and a cache in the game server itself. We also have bandwidth throttling which allows us to control the rate at which data moves through the system and is written to the database.

Our goal is to have this throttling self-adjust and scale based on player concurrency levels.

JP: *So the layers are primarily caching mechanisms, to keep data as ready-to-use as possible?*

Jason E: It keeps it ready to use quickly and also prevents the database and network from being overloaded.

An example would be if we have an item that changes state 50 times a second we do not want to write to the database 50 times a second. So we would track the changes to that item and perform writes over time that makes sense, based on the type of state change and the type of item.

Two of the UK staff: Zane Bien (L) and David Bone Gill (R)

JP: *What sort of item might change state 50 times a second?*

Martin P: Any item that gets shot.

Jason E: If your ship is being pelted by enemies it can change more than 50 times a second. :)

JP: *But shooting at ships ... that doesn't happen much in* Star Citizen, *does it?*

Let's talk about what Persistence makes possible. What's port modification?

Rob R: Port modification is intended to make the world feel much more interactive and is a means for the player to customize their ships and environments (currently limited to the hangar), by simply interacting with the item's location. The holo table is cool, but you're technically interacting with something in a different location (a ship on your landing pad). Ultimately, while it's functional, this doesn't give the player a good sense of world interaction.

LiveWorks AR, the port modification app, is intended to help address this. It's also the first step towards being able to do additional things such as repairing a broken system on a cap/multicrew ship.

zServicePersistenceCache Http Information

A TINY GLIMPSE OF THE BACKEND DATA CACHE

Message History: Size[1000]

Refresh

Index	HistoryId	MessageType	EndpointType	DirectionType	uId	accountId	info	count	Timestamp
1	371725	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[263020001643] items_size[1] bUntrusted[0]	262874	2016-Jun-10 17:32:05.486239
2	371724	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[100000001333] items_size[1] bUntrusted[0]	262873	2016-Jun-10 17:32:05.215976
3	371723	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020000342] items_size[1] bUntrusted[0]	262872	2016-Jun-10 17:32:05.211889
4	371722	2:eOnMsgPushItems	2:eGameServer	1:eInbound	55		playerGEID[100000001755] items_size[1] bUntrusted[0]	262871	2016-Jun-10 17:32:05.198766
5	371721	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[263020001643] items_size[1] bUntrusted[0]	262870	2016-Jun-10 17:32:05.096151
6	371720	2:eOnMsgPushItems	2:eGameServer	1:eInbound	84		playerGEID[100000000222] items_size[1] bUntrusted[0]	262869	2016-Jun-10 17:32:05.039520
7	371719	2:eOnMsgPushItems	2:eGameServer	1:eInbound	42		playerGEID[263020001714] items_size[2] bUntrusted[0]	262868	2016-Jun-10 17:32:04.990589
8	371718	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020001472] items_size[1] bUntrusted[0]	262867	2016-Jun-10 17:32:04.672555
9	371717	2:eOnMsgPushItems	2:eGameServer	1:eInbound	79		playerGEID[263020001349] items_size[1] bUntrusted[0]	262866	2016-Jun-10 17:32:04.647253
10	371716	2:eOnMsgPushItems	2:eGameServer	1:eInbound	64		playerGEID[263020001408] items_size[1] bUntrusted[0]	262865	2016-Jun-10 17:32:04.637224
11	371715	2:eOnMsgPushItems	2:eGameServer	1:eInbound	68		playerGEID[263020001280] items_size[1] bUntrusted[0]	262864	2016-Jun-10 17:32:04.064582
12	371714	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020001581] items_size[1] bUntrusted[0]	262863	2016-Jun-10 17:32:04.011818
13	371713	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020001543] items_size[1] bUntrusted[0]	262862	2016-Jun-10 17:32:04.011800
14	371712	2:eOnMsgPushItems	2:eGameServer	1:eInbound	54		playerGEID[263020001730] items_size[1] bUntrusted[0]	262861	2016-Jun-10 17:32:04.010260
15	371711	4:eOnMsgPushAccounts	2:eGameServer	1:eInbound	68		player[1341875:Dog$myHW] UEC[0] REC[0] aUEC[3950]	6108	2016-Jun-10 17:32:03.985337
16	371710	10:eSendAccountDataResponse	2:eGameServer	2:eOutbound	37		account_id[1338280] items_size[517]	14693	2016-Jun-10 17:32:03.771265
17	371709	5:eOnMsgRequestPlayerData	2:eGameServer	1:eInbound	37	1338280	account_id[1338280]	14694	2016-Jun-10 17:32:03.755525
18	371708	3:eOnMsgPushEntitlements	2:eGameServer	1:eInbound	87		account_id[1338280] items_size[0] entitlements_size[0]	6209	2016-Jun-10 17:32:03.689911
19	371707	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020001543] items_size[1] bUntrusted[0]	262860	2016-Jun-10 17:32:03.682648
20	371706	3:eOnMsgPushEntitlements	2:eGameServer	2:eOutbound	87		result[0] account_id[1338280] player_geid[100000000742] ticket_id[26681802422675] rsi_items_size[21]	6211	2016-Jun-10 17:32:03.630192
21	371705	7:eOnMsgRequestEntitlements	2:eGameServer	1:eInbound	87		account_id[1338280] ticket_id[26681802422675]	6211	2016-Jun-10 17:32:03.630153
22	371704	26:eSendEntitlementProcessRequest	4:eGIM	2:eOutbound			account_id[1338280] ticket_id[26681802422675]	6213	2016-Jun-10 17:32:03.594616
23	371703	21:eSendItemListDelete	3:eDatabase	2:eOutbound			items_geids_size[0]	7017	2016-Jun-10 17:32:03.594577
24	371702	17:ePushItems	3:eDatabase	2:eOutbound			items_size[10] geid-list	16931	2016-Jun-10 17:32:03.594519
25	371701	19:ePushAccounts	3:eDatabase	2:eOutbound			account_id[1340597] player_geid[263020000338]	7669	2016-Jun-10 17:32:03.594437
26	371700	12:eOnMsgPlayerLoginEvent	1:eHubServer	1:eInbound	37	1338280	player[1338280:lord_rsve] items[70] rented[0]	7017	2016-Jun-10 17:32:03.590038
27	371699	2:eOnMsgPushItems	2:eGameServer	1:eInbound	44		playerGEID[263020000639] items_size[1] bUntrusted[0]	262859	2016-Jun-10 17:32:03.583660
28	371698	2:eOnMsgPushItems	2:eGameServer	1:eInbound	44		playerGEID[263020000639] items_size[1] bUntrusted[0]	262858	2016-Jun-10 17:32:03.453700
29	371697	2:eOnMsgPushItems	2:eGameServer	1:eInbound	64		playerGEID[263020001725] items_size[1] bUntrusted[0]	262857	2016-Jun-10 17:32:03.386938
30	371696	2:eOnMsgPushItems	2:eGameServer	1:eInbound	64		playerGEID[181005000159] items_size[1] bUntrusted[0]	262856	2016-Jun-10 17:32:03.386896
31	371695	2:eOnMsgPushItems	2:eGameServer	1:eInbound	44		playerGEID[263020000639] items_size[1] bUntrusted[0]	262855	2016-Jun-10 17:32:03.373389
32	371694	2:eOnMsgPushItems	2:eGameServer	1:eInbound	74		playerGEID[263020001543] items_size[1] bUntrusted[0]	262854	2016-Jun-10 17:32:03.192132
33	371693	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[263020001643] items_size[1] bUntrusted[0]	262853	2016-Jun-10 17:32:03.106694
34	371692	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[100000000862] items_size[1] bUntrusted[0]	262852	2016-Jun-10 17:32:02.866781
35	371691	2:eOnMsgPushItems	2:eGameServer	1:eInbound	55		playerGEID[100000001755] items_size[1] bUntrusted[0]	262851	2016-Jun-10 17:32:02.768390
36	371690	2:eOnMsgPushItems	2:eGameServer	1:eInbound	64		playerGEID[181005000159] items_size[1] bUntrusted[0]	262850	2016-Jun-10 17:32:02.736952
37	371689	2:eOnMsgPushItems	2:eGameServer	1:eInbound	60		playerGEID[263020001543] items_size[1] bUntrusted[0]	262849	2016-Jun-10 17:32:02.735981

JP: *That's its goal ... what can it do so far?*

Jason E: Ports are slots on items that allow you to attach 'child' items. So changing weapons on your ship or adding a new shield generator are forms of port modification.

Martin P: Hangar flair and decorations are also set in ports now and are therefore customizable by users.

JP: *So these are small ports, not ports as in "the port of New York"?*

Martin P: Virtual ports. No need to deal with the NY Port Authority.

Not all ports are virtual, however. On a ship, weapon ports also include item pipes through which weapons draw power and generate heat. But ports in the hangar and on the player (more on that later) are more conceptual ports than physical connections.

JP: *What was involved in making the port modification system? What were the most difficult challenges?*

Bone: LiveWorks is an additional tool to help customise environments such as hangars, but we also found it a useful addition whilst the HoloTable was revamped, to customise small ships, as the player would be able to visually interact with the items whilst they are inspecting it.

Robert G: Here's a shot of the ship ports set up for the XL bay in Revel & York. The green lines indicate ports that are disabled by others when in use (a large ship port might disable two smaller ones in the same area).
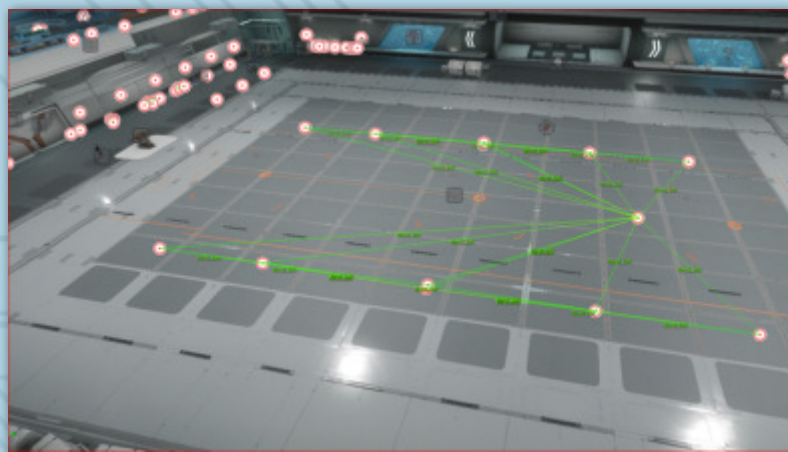
Rob R: Imagine a weapon on your ship. You can now walk up to that point while in the LiveWorks AR app in your mG and, using the inner thought system, "Modify" that port. You can remove an existing item. You can swap one item for another. Or you can place an item in an existing port. There are some range and visibility requirements when using this feature, but you can start to see the ports as you get closer to them.

JP: *Are all the clusters of dots on the walls for flair?*

Martin P: Yes, all the yellow dots (blue, in game) represent a possible flair port. Not all flairs fit in all ports, obviously. We don't want you putting a poster on the floor and the liquor cabinet high on a wall. :)

Zane B: I'll also note that with the introduction of persistence, the LiveWorks AR app was a quick and easy solution that we found useful to implement in place of the holotable, as LiveWorks is also capable of handling port customization beyond just ships. Since we will be completely overhauling the holotable anyway, there was no point in us wasting any more of our time trying to wrangle the old holotable to work with persistence. The holotable will eventually make its way back into the game as a much more robust and user-friendly interface. The LiveWorks AR app will also continue to expand and improve in terms of overall user-experience.

Rob R: Zane brings up a good point — we didn't have persistence when we made things up until now, so we might have to go back and revisit many of our existing features to work with it. The holotable is a good example of this.

Tom S: Persistence also allows us to centralize all the dynamic behaviors in the persistent universe in one centralized data location. The mission control system, where resources are to spawned, behaviors of NPC locations.

Designers can customize these behaviors with backend tools so that the persistent universe has an ever-evolving dynamic experience.

JP: *How does Persistence help Alpha UEC? (This feels like an easy question ...)*

Rob R: It's more the other way around. Alpha UEC helps Persistence. It allows us to test the transaction system without worrying that a bug in the system could potentially cause players to lose all of their real currency.

JP: *So persistence allows you to keep money in your pocket from day to day, and Alpha UEC helps us work out how we do that for you?*

Robert G: Yeah, it's not so much that persistence helps AUEC, more that AUEC couldn't exist at all otherwise. Or at least, money you made would disappear the second you logged out.

JP: *How about clothing – how is that affected by persistence?*

Martin P: Without persistence, anything you buy or equip is lost when you quit the game.

Rob R: You don't want to test your system with players' "real" UEC values. We made Alpha UEC so we could have a currency to test with that didn't potentially put the player's actual cash in jeopardy. There are many factors that need testing. Giving/taking currency, setting up telemetry data for transactions, adding/removing items from databases, etc. ...

JP: *Which brings us to ... Shopping. Talk to me about how Shopping works, and what you can do now that the system has persistence.*

Rob R: Well, persistence is the root of the shopping system. The end goal is to move all of the purchases into the

2 shots of a Super Hornet with debug views showing each port

game and away from the website. This initial release is the beginning of that process. To get this transition rolling, we have chosen personal items as the starting point.

Many features had to come online to make this happen. We have refactored our item system, the character system, the entire shopping system, persistence, alpha currency being the major ones. But there were roughly eight or so major features that needed to come together to make this happen. My opinion is this is arguably our largest release to date, feature-wise.

Martin P: The first thing to mention is that what we're going to see in 2.4 for the shopping interface is in fact barely half of the whole shopping feature. Shopping takes place through two main "modes": AR shopping and catalog shopping. AR Shopping is what we have currently. You move around in a shop, look at items and interact with them (Try, Buy) through the AR (Augmented Reality) interface.

Martin P: Catalog shopping (which will come later) is when you browse a list of available items and buy from that. Think shopping in a brick and mortar store versus shopping on the web.

AR Shopping is good for item types that you can cram a high number in a tight shopping space: shirts, shoes, pants ... Catalog is better for larger items like ship parts. Walking around a huge warehouse full of ship parts to buy would be nice (and it's possible we might still let you do it) but it's easier to scroll down a list.

JP: *And with ship parts, I'm guessing what it looks like isn't as important as it is with (for example) a shirt.*

Martin P: Yeah, not a lot of players would prefer a weapon that looks nicer if it only shoots hugs and kisses. Ok, that might be a bad example. :)

JP: *Do shirts shoot hugs and kisses? Now that would be an interesting item ...*

Rob R: Well, many of the ship components will be visible on or inside the ship. So how it looks will be very important, actually.

Rob R: The two main features for shopping are, as Martin says, AR shopping, which requires you to walk up to items in the shop to interact with things that catch your eye, and phase 2 (coming soon) will be for things that might be a little too large to fit inside of a shop. This will be driven through kiosks that will be found inside the shops. Examples of this would apply to things like ship weapons, ships, and other larger items.

Zane B: Just because the more 'catalogue' based shopping UI is presented on a kiosk doesn't mean you won't get to see what the item looks like. The interface should still be able to display a 3D representation of the item in question. Not only that, but it can also display detailed stats, filters, as well as the ability to perform comparisons with other items in the shop and items equipped to your ships.

Rob R: Yes, item compare! Coming with the kiosk-based purchasing, this is something we look forward to adding. In a game where we have so many items, for so many different things, item compare is essential. (And if I have my way, we'll figure out a good way to add it to the AR mode of purchasing as well.

Martin P: On the tech side of things, shopping works transparently pretty much like you'd expect a web store to work:

- When you buy an item, we open a transaction with the server and populate it with the items you want to buy.

- The game server sends this to the backend services for processing.

- The backend services add the new items to your account (assuming you have enough currency) and sends the result to the server.

- The server forwards this to the client.

- The client then displays the result.

In the current implementation, the client will then ask the server to spawn those items and equip it on you right away, but you'll eventually have the choice of delivering bought items to one of your ships or hangar.

JP: *How do you actually put on clothes that you buy? (Or equip/unequip any bought item.)*

Martin P: Currently that's done automatically. For example, clothes are automatically equipped after you've bought them.

JP: *I automatically am wearing whatever I buy?*

Martin P: Yes. Since we don't have an inventory screen yet, that was the easiest thing to do instead.

Selection options

JP: *And when I want to change back to something else that I own?*

Martin P: if you want to put your old shirt back on, you browse the store for that shirt and the AR will display Try On/Equip, instead of Try On/Buy. Items that you are currently wearing will display when you select Unequip (which means that yes, you can strip down to your undies).

JP: *So at the moment I use the original store's changing rooms to change clothes?*

Casaba Outlet

Rob R: Currently you can interact with items you've already purchased to re-equip them – a temporary solution until we get the inventory management solution in place.

Martin P: Yeah, as Rob mentions, this was a quick workaround for not having an inventory.

Zane B: Indeed, that will be the temporary method of equipping / wearing things until the personal manager app in the mobiGlas comes online.

Robert G: There are also lockers on Port Olisar allowing

you to switch between flightsuits (or armor) and your casual clothes.

Martin P: On the tech side of things, the player, like ships, also has item ports. They correspond to the different pieces of clothing you can have, so when you equip or try on a shirt, it goes through all the player item ports and finds a port where the shirt is allowed.

Rob R: (Inventory management is currently in the design phase but is being worked on right now.)

JP: *I would guess that any Casaba Outlet will let me equip an item I bought at any other Casaba Outlet – it just needs to be in the store's inventory?*

Martin P: Correct, it's based on the item class ("red shirt", "blue shirt", ...). If you have an item of that class on your account, you can equip it. The system actually prevents you from buying a second copy of an item you already have. Again, temporary until inventory management is implemented.

Rob R: As long as the item you've bought is in both locations, yes.

Martin P: We didn't want people to end up with 200 blue pants by accident.

JP: *Which suggests that at the moment, you can't yet trade or sell items between player characters?*

Martin P: Correct.

Rob R: No, but I can tell you that a "trading app" for the mG is currently in the list of systems to be created. No ETA on when, though.

JP: *Were there any unexpected difficulties in putting the Shopping system together?*

Rob R: Oh, let's see ... Persistence, persistence, and more persistence.

Martin P: There was a lot of new tech being developed for this all at the same time: the persistence system, the clothing system, item ports 2.0 on the player, ... so hickups were to be expected.

JP: *I'm sitting here thinking, "What's the problem with creating code that sets a flag when I buy something, to show that I have it?" I'm guessing that's wrong – why?*

Martin P: Sometimes a person codes something expecting a system to eventually work in a specific fashion, and then it doesn't. Or you might use a system for something it wasn't originally designed for. Sometimes it works, sometimes it doesn't.

A lot of the complexity rests on all the data transaction and synchronization that have to take place between the client, game server and backend services (persistence). if one of these is not synced with the others, or if one of them gets ahead of itself while it should be waiting on a reply, then magic happens (the bad kind of magic that ends with dead rabbits in hats).

Rob R: There were roughly four major components that needed to come together. Persistence, the character refactor, the new item system, and the shopping system. If any one of those didn't get done, we wouldn't be able to release any of the whole thing.

JP: *"Character refactor"? What's that?*

Rob R: Well, the character model was originally set up one way, and we took the opportunity to change it to use the new item system (which was no easy task). To put it in perspective, the change was so great, that it broke all of our existing loadouts to make the switch.

JP: *All of the existing ship loadouts?*

Martin P: The player loadouts only, thankfully.

Rob R: Ships were already using the new "item port" system, but the characters were not.

The system was initially developed with/for ships; we just took the opportunity to apply it to characters. Yes it caused some issues, but we would have had to make the switch at some point, so better now than later.

Selecting a gun

Martin P: There were still a lot of loadouts, used by a now defunct system to give players random appearances when they load on Area18 (ArcCorp).

JP: *Martin, a lot of character loadouts?*

Martin P: Now that people can buy and equip clothes and armor they like, they wear what they want everywhere. There were at least eight or ten of them. Not all were used on Area18 (and not counting the ones that existed for *Star Marine*).

JP: *Eight or ten per character?*

Martin P: No, eight or ten total, but it's still plenty of data that needed to be updated.

JP: *Ah, eight or ten character loadouts that were randomly assigned to characters who logged in at Area18?*

Martin P: Yeah, pretty much.

Rob R: Plus all the AI loadouts for *S42*. So not an insignificant total.

JP: *We're about out of time. I have a couple of final questions. First, what Lessons Did You Learn while creating all these systems?*

Rob R: One or two systems at a time!

Martin P: Definitely easier implementing smaller bite-sized features with more precise and upfront tech designs.

Rob R: Yeah, we had a lot of moving parts. Trying to keep features a little more localized in the future will definitely be something I will be fighting for in the future.

Ship Loadout View

Draft of new holotable

Component Selection View
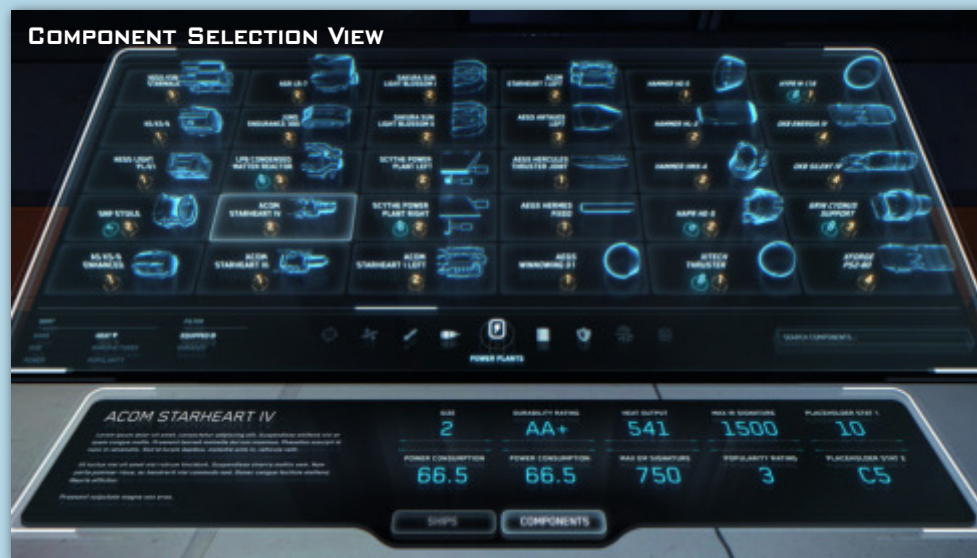
JP: *I can see the advantages to changing only a system or two at a time, but I can also see the advantage of getting the whole thing done at once, rather than incremental changes that require lots of temporary adjustments.*

LiveWorks AR mockup

Martin P: This was the perfect storm of features spreading out both vertically and horizontally — new features through the stack (game client, game server, back end) as well as a lot of spread-out gameplay features (item 2.0, persistence spawning system, item ports on player, ...).

Rob R: From my point of view, persistence was big enough to have been a release on its own. The fact that we did that plus the several other features was amazing.

Robert G: I suppose players wouldn't have had much to look at if it was only backend.

Martin P: They would have the port modification app and persisted vehicles, and configurable hangars.

Rob R: The good part of getting this release out of the way is that it will allow us to compartmentalize features in the future. Adding persistence no longer forces us to develop features that ultimately need to interact with

a system that doesn't exist yet. This was a huge win for us and *Star Citizen*.

Zane B: 2.4 for us was definitely a big push on a lot of functionality within a tight time frame, and I'm sure there was quite a bit of sleep lost over it. Certain things (like LiveWorks app UI) may feel very rough and barebones in their implementation, but it's can doing what it needs to. Without certain accompanying features like shopping or hangar customization, we wouldn't have been be able to test persistence as thoroughly / widespread as we have been able to with them.

JP: *I really appreciate you all taking the time to talk for awhile, especially since we were covering such a wide range of topics. Any final words?*

Martin P: Shoutouts to everyone who gave their all on PTU to help us reach this point. This was a rocky start for a lot of functionality, but it will help us roll out a lot of interesting new features in the coming releases.

Rob R: Now that we have the foundation in place, I really look forward to building things from here. It was definitely a lot of work to get here, but definitely well worth the effort. I hope the players appreciate what this now allows them to do inside the game world and I look forward to giving them more to play with, as well as a variety of items to enjoy.

Martin P: Thanks for having us, David.

OBERON SYSTEM

URIEL

Fools Rush In

From its very first days, Oberon has always been a system that beckoned those seeking wealth and fortune, only to time and again leave them destitute. As the Tarsus quantum drive mod became more readily available at the turn of the 23rd century, new exploration companies were formed, eager to reap the benefits from discovering a system. The "Golden Age of Expansion" was officially underway with hundreds of ships scouring known space, hoping to push the boundaries of Humanity even farther. While the media liked to create the romantic image of the explorer's life, for every success story like NavJumper Antoine Lebec, there were dozens more who lost every-thing, including their lives, hunting for new jump points. The ship that discovered the first jump point to Oberon was one such tragedy despite their success in locating a new system.

The crew of the *Lindy* had been exploring the outreaches of Nul since 2348 and their reserve of funds had nearly run dry, when in 2356 their scanners picked up a faint anomaly that would reveal itself to be a jump point. They successfully traversed through interspace and found on the other side a new system anchored by a neutron star. Small and dense, it turned out to have twice the mass of most G-type main sequence stars despite having a solar radius that is just a fraction of the size. Formerly a bina-ry star system, approximately 1.4 billion years ago the

main star went supernova, gravitationally collapsing and stripping the outer layers of its companion. What was left orbiting in the wake of that chaotic event was the core of the former partner white dwarf star, now known as Oberon I, and six other planets that had formed out of the debris of whatever planets had originally been in the system before. The *Lindy* crew, excited that their payday had finally arrived, completed their initial scans and charted their return trip to Nul.

Unfortunately, while traversing a new jump tunnel was, and still is, dangerous work, the return trip could be equally lethal due to the limited capacity of navigation computer systems of the time. Though the *Lindy* eventually emerged back in Nul, the ship's hull had been horribly damaged en route and sadly the crew had all expired. A salvage vessel found the wreck days later and since no governing body controlled Nul space, the vessel exerted salvaging rights to claim the valuable navdata it found in the shattered ship as its own.

In the decades before the UNE was formed, regulations regarding the discovery of new systems were very much still in their nascent days. When the data were quickly sold at auction, the owner of the salvage operations, Stacia Rholtz, made an unprecedented amount of money for the coordinates of the jump thanks to a bidding war fueled by the recent hype surrounding the effort to terraform Croshaw. It appeared that Humans living outside of Sol were to be the future of the species and businesses were willing to pay heavily to get in on the ground floor. The winning bid for the coordinates was placed by Titania Terraforming and plans immediately began for settlement of the system.

Since so much of their budget had been spent on the acquisition of the system itself, Titania had decided upon a unique way to cut costs on their efforts to terraform Oberon II, by leveraging future profits against their present

expenditures. Workers who signed on to the project would be sold plots of land at heavily reduced prices instead of receiving payment. The promise was that once the terraforming of the world was complete they would be able to settle on the surface with their families. The name of the system, Oberon, was part of the branding used in the marketing campaign to sell labor shares, "The world of your dreams is yours for the making." People signed up by the thousands, selling all their possessions and cashing in their savings, hungry for a chance to leave Sol behind and find a fresh start. It was an interesting business strategy that might have worked if it were not for the fact that Oberon II was far from an ideal terraforming candidate.

With so little light and warmth being provided by the neutron star, one of the first steps in the process was going to have to be raising the planet's core temperature a significant amount. This was a feat that had never before been attempted and one that proved beyond Titania's abilities. After years of toiling, the core manipulations refused to take. The project was declared a failure and Titania dissolved as a corporation overnight. The workers were abandoned on a frozen planet that was only half terraformed with no means to leave. Using the gear abandoned by Titania, the settler's managed to eke out a meager existence in the planet's neverending winter, but their dreams of better days would remain unfulfilled.

Though the system has some wealth in the form of raw minerals and gases, it has never been enough to warrant any further economic investment throughout the centuries. In the late 2600s the UEE briefly looked into acquiring the system, but passed on the opportunity to make
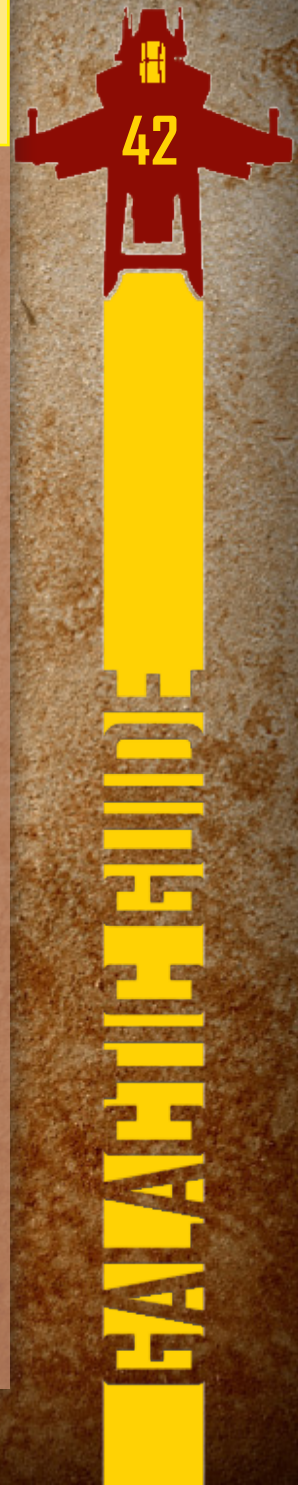
Oberon part of the Empire. Ever since, it has remained unclaimed, with only the descendants of those initial settlers, misguided fortune seekers, and various outcasts and outlaws calling the system home. Ironically, after suffering so much misfortune throughout its history, it has been the system's latest tragedy earlier this year that has allowed the people of Oberon to once again begin to foster hope.

Though the populace suffered heavy losses when a Vanduul clan recently raided the settlements on Uriel, Admiral Bishop and the UEES *Retribution* arrived in time to hold off a second attack and establish a new order in the generally lawless system. For the first time in its history, Oberon now hosts a contingent of Navy capital ships. Though the *Retribution* has moved on, a large fighting force remains in the system charged with protecting it from further Vanduul incursions. The fleet's presence has already begun to have an effect, as outlaw activity has dropped and relief aid has begun to arrive. Though some herald this as a possible second chance for the system, there are plenty who predict that the Navy will pull out soon. If they do, Oberon may never recover.

Heard in the Wind

"The most valuable thing someone can ship in the Oberon system is Urielians. Away from it."

– Urelian Saying

"In the face of such a threat, we cannot afford to draw distinctions between those who are within the Empire and those who are not. There is only us against them. Humanity versus Vanduul."

– Admiral Bishop, Comm to Imperator Costigan, 2946

Oberon I (Gonn)

According to legend, the planet received its name from one of the original settlers who had staked a mining claim – a former Cathcart hauler, who used to chase away rival ships by yelling "Chinewa bedda get Gonn!" A super-Earth carbon planet, Oberon I is the remnants of the system's former binary star. Rich in untapped resources, very few miners are up to the challenge that the extreme environmental and economic conditions pose. The minimal upkeep that the few automated refineries dotting the surface require is too steep a price for most. Even the hardy and rugged mining community that lives here struggles to turn a profit. Many who do find the courage to try their hand come seeking the vast wealth of diamonds that is rumored to exist in the planet's dense carbon core, despite that the fact that so far only a few sparse diamond veins have ever been found.

Oberon II (Uriel)

The settlers who were stranded after the terraforming failure were forced underground by the harsh surface conditions. The temperature being slightly warmer near the core, the families spent decades carving out a meager existence in dark and densely packed caves. The struggle for resources lead to significant in-fighting during those first years and resulted in a society built on strong family ties with dividing lines clearly drawn based on which warren you lived in. One of these warren families, known as the Echo, attributed their strength of faith to their group's survival. The planet's name is said to come from their often repeated saying that, "in the darkness of the tunnels, God is my light."
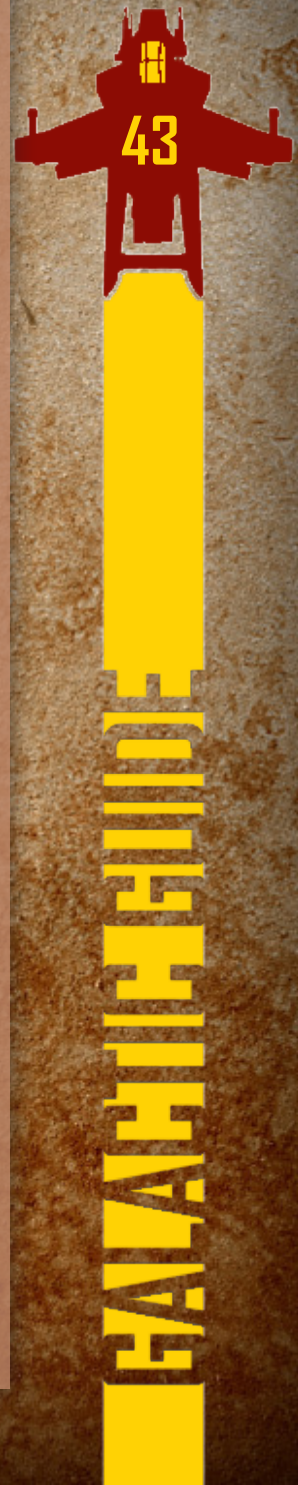
As difficult as life on Uriel has been, it got significantly worse in the 27th century when one of the warrens introduced the chestnut beetle to the world as a farmable food source. It worked well at first, with their seventy year dormant, six months active cycle, and their ability to eat almost anything making them easy to care for. However, that did not last when the inhabitants realized that the insects had found a way to survive on the surface and were spreading to other warrens. What started as a welcome addition to the locals' diet quickly turned into a serious pest, with the beetle population growing into the millions. Now like clockwork, the beetles emerge every seventy years and sweep across the planet, devouring anything they can. Most of the warrens have developed methods to help seal up the tunnels during chestnut season, but the invasive species has seriously hampered any attempts to settle the surface. In recent years several above-ground communities have sprung up, but with the chestnut threat looming they have kept relatively small. Some consider this fortunate, as the casualties from the recent Vanduul attack might have been much worse if it wasn't for the chestnut beetle keeping the population below ground.

Oberon III & IV

These small rocky protoplanets drift well outside of the scant green band that the limited light of the neutron star provides the system.

Oberon V

What little resources there ever were on this atmosphereless mesoplanet have largely been stripped away, leaving it a barren rock that few deem worthy of a visit.

Oberon VI

Even with its rocky core, this gas dwarf does not have much in the way of harvestable commodities.

Oberon VII

Considered to be one of the few calming sights in the whole of Oberon, this Class IV gas giant composed of carbon monoxide has a high presence of alkali metal, giving it a pleasing subdued color.

INSTRUMENT OF SURRENDER
BY ADAM WIESER

Part 2

Crescent's crew rushed to battle stations. Starmen, startled awake by the unexpected announcement of Tevarin enemies, now poured from the crew quarters. Engineers double-checked the ship's power plants and battery bays to ensure every last bit of juice would be on line.

The bridge buzzed around Commander Wallace. Somehow this felt both familiar and completely foreign to her. She'd been in battles before, but never in charge of one. She'd seen firsthand the destruction of Virgil I — the plumes of smoke rising from formerly verdant fields, orbital bombardment craters the only remnants of what was once an emerging metropolis.

Commander Wallace had seen just how far the Tevarin would go to win this war. She couldn't let the same fate befall Crion.

"Commander, a warning has been sent to Crion," XO Coburn stepped to her side, personal data pad in hand.

"Good."

"We've also dispatched a drone to the main fleet, though there's a good chance they won't receive it in time to make a difference."

"That's why we need to do everything we can to slow them down."

XO Coburn nodded then continued, "One final update, sir. Prisoner Lime made it to the brig. Paredes has been assigned first watch."

Prisoner Lime, who called himself Hickory, had slipped to the back of Commander Wallace's mind. What if Lime was right? What if he did have the Instrument of Surrender on his ship,

and this war was finally over? Yesterday's expected comm drone from command never arrived. It might be a coincidence; it might not. Lime was right about the Tevs being in system. There was a chance he was telling the truth about this too.

"Have we located his ship yet?"

XO Coburn scowled, "No, sir."

"Let me know the moment they do."

"Of course, Commander."

Still, it wasn't something she would risk the lives of millions on. People like Lime are always playing an angle; why else would he, a wanted criminal, flag down their ship for a ride?

"Sir, our scouts just reported that the Tevarin fleet has entered the asteroid belt."

Commander Wallace crossed to a terminal and overlaid the system's extensive network of early warning sensors on the hologlobe. Entering the asteroid belt meant they didn't want to be detected. The moved aligned with the many after-action reviews she had read about other Tevarin attacks.

When the Tevs struck civilians targets, they did so with little to no warning. They preferred to move in quietly, strike hard and fast, then retreat before support appeared. When executed correctly, the results were devastating. Commander Wallace knew from Virgil there's no feeling more helpless than responding to an attack that's over before you arrive.

The Tevarin war machine fed on chaos and the flames of fear. Corath'Thal had even recorded a series of vids that often forced their way onto the spectrum through pirate broadcasts. The vids justified his guerilla tactics and excoriated Messer for taking their homeworld away. Corath'Thal claimed that no Human world was safe until Jalan was under Tevarin control once again.

"XO Coburn, the Tevarin are sacrificing speed for stealth. That gives us a chance to quantum travel ahead and set up a defense of Crion."

"It does, sir . . . " His words had stopped, but it was obvious he had more to say.

"Now's not the time to hold back."

Coburn glanced at his feet, then proceeded, "Even if we rush to Crion, we'll never be able to set up a viable defense. We don't stand a chance battling them in open space. Their force is too big and their capital ship's phalanx shield too strong."

Her body temperature spiked as nervousness poured out of every pore. She was certain everyone on the bridge could feel the tension coming from her. This was not the calming presence the commander of a ship should project.

So Commander Wallace closed her eyes while her thumb and forefinger squeezed the bridge of her nose. There had to be another way, she thought, but what options were left?

Commander Wallace finally opened her eyes and looked at the hologlobe. Her eyes settled on the asteroid belt. She zoomed the hologlobe in on the belt, and watched the Tevarin fleet slowly making their way through it.

A thick silence settled over the bridge. No one dared to speak as everyone anxiously awaited orders.

* * *

Deeper in *Crescent*, Hickory lay on the brig's bunk, counting. The kid guarding him had been pacing since the cell slammed shut. He moved up and down the hall with such annoying precision that it was hard not to count along. Every bleedin' 25 seconds, he'd pass the cell window with that stern look on his face that Hickory attributed to overcompensation.

The kid had to know he had been saddled with a crap assignment. Every other soldier on the ship was gearing up to roast and ghost Tevs and here he was stuck guarding some Human. The young starman would never become a hero stuck watching the brig, or at least, that's what Hickory needed to convince him. Anything to get himself more than 25 seconds of alone time. Hickory needed time to work.

Hickory glanced at the cell door. He had worked a few electromagnetic locks in his day. He'd first opened a cell door, a lot like this, on Olympus. In fact, many of these halls felt vaguely familiar. If his hunch was right and this was the same type of UEE ship that crashed into Ashana, it meant Hickory knew how to find the hangar.

Of course, he'd have to get out of this cell first. Then he could worry about how to get to the hangar discreetly as the ship prepared for battle.

Hickory swung his feet to the floor and sat up straight. Behind his back, his fingers dug inside his spacesuit's right sleeve, and found the secret zipper hidden near a seam. Carefully, he opened the hidden pocket and withdrew a miniature multitool.

Wait, he had focused so hard on extracting the tool that he'd lost count. Suddenly, the kid appeared before of his cell.

"Well, look who's finally up."

Startled, Hickory's fingers fumbled with the multitool almost letting it fall from his sleeve. "Wanna be ready when the Tevarin arrive," said Hickory as he arced his back and secured a grip on his multitool.

"Don't you worry. They won't be getting this far. Not with me and my mates in the way."

"Seen a lot of action against the Warriors of Rijora, have you?"

The Marine nervously shifted his weight from one foot to the other.

"That's what I thought."

"Yeah, well, what do you know about 'em?"

"Can't admit to fighting any T-vars myself, but they've never given me cause to."

"You should be ashamed to call yourself a Human."

"Don't you worry, I'm far from sympathetic. I just don't fight folks with everything on the line. They're too desperate, unpredictable. You never know what they'll do to survive."

He paused for dramatic effect.

"So I'd grab more ammo if I were you. Cause if a few warbirds come barreling through the door at you, it's not like I can help."

The kid considered his position, then pivoted and paced with precision back down the hall. Hickory cursed under his breath. So much for talking him into leaving. Guess he'd have to go at the lock slow and steady.

Once again, the kid appeared, then stepped off down the hall. Hickory started counting as he silently crossed the cell floor to kneel by the door. His right fingers flipped out a small drill bit from his multitool. His left hand felt the sterile grey metal encasing the door's large magnet. Its width was slightly smaller than his hand.

Hickory switched the multitool to his left hand, then pressed the drill bit into the middle of the metal casing. His internal clock hit 20. No need to test the limits first time out.

Hickory quick stepped to the bunk and sat with his hands behind his back just at 25. The kid arrived as planned. Hickory couldn't help but smile as the kid's nervous eyes glanced in his direction.

Then he was gone again. The multitool sliced into his spacesuit just under his left cuff line, exposing a small port that tapped the suit's power.

Hickory plugged the multitool into the port then shuffled his hands behind his back. The kid came and went, but Hickory stayed seated, drawing a deep breath. Letting the multitool charge before continuing his escape.

* * *

Commander Wallace stared at the Tevarin fleet on the hologlobe. Their icon hadn't moved for a while. Neither had the marker for their scout stalking the fleet.

"Starman Darsha, is our feed still live?"

"Yes, sir."

"Contact the recon ships, see if they know why the Tevarin fleet is stationary."

"Yes, Commander."

While waiting for a response, Commander Wallace slowly advanced then reversed time on the hologlobe, watching the asteroid belt's composition slightly change. New asteroid-free areas suddenly appeared or vanished as objects closer to the star orbited slightly faster than those near the outer edge. Then she saw something strange.

At first she thought it was a glitch. She reversed time on the hologlobe then played it forward. There it was again. Positioned too close to the waiting Tevarin fleet to be a coincidence.

A relatively straight gap through the belt.

Commander Wallace checked the time stamp. According to this, the belt would fall into this alignment in 45 minutes before vanishing again 15 minutes later.

"Starman Odorizzi, how accurate are these scans?"

"Uhhh . . . estimates show they are operating at 93%

accuracy, sir."

Commander Wallace's gears began to spin.

"Commander?" Starman Darsha called from the comms station. "Our scout's reporting that there's no indication why the Tevarin fleet has come to a stop."

Commander Wallace's eyes returned to their icon.

A plan took form in her head. She finally saw a chance to engage the Tevarin on favorable terms.

"Starman Odorizzi, see this point here? In 44 minutes a gap will be opening there. Pull its precise coordinates."

"Yes, sir," Odorizzi responded.

"Helmsman Ayers, once Odorizzi's done, get the *Crescent* lined up to quantum travel directly into that gap."

Helmsman Ayers shared a nervous look with XO Coburn, then spoke cautiously, "Excuse me, Commander?"

XO Coburn quickly stepped to her side, "Sir, it might help to talk us through your intentions."

Commander Wallace locked eyes with Coburn. They didn't have much time to get her plan in motion. She almost reminded him who gave the orders aboard *Crescent*, but held back. She looked around the bridge. The rest of the crew avoided her gaze. She needed Coburn's support now more than ever.

"In precisely 43 minutes, the varying orbits of the asteroids in this belt will align in such a way that a large gap will appear completely through the belt. Currently, the Tevarin forces are holding position near that area. We can only assume they're waiting for this gap. Once it appears, they'll maneuver into the gap then quantum jump onto Crion's doorstep."

A murmur spread among the bridge's crew. Commander Wallace let the voices settle then continued, "We can't let

that happen. So here's what we're going to do. XO Coburn, order all of our scouts to rally near this gap immediately."

"All scouts, Commander?"

Commander Wallace paused, then nodded. Hickory's story was a long shot, and this Tevarin threat was real. The scout searching for his ship would be better utilized here.

"All of them. I want proximity interdiction mines placed on both sides of where the gap will appear, about halfway down. As the Tevarin approach, the mines will detonate, creating a wall of debris that will bring their ship to a stop. That's our chance. The moment those charges blow, Helmsman Ayers, you quantum travel us into the back end of this gap. While the Tevs are occupied with what's in front of them, we'll sneak in behind and attack their stern."

Commander Wallace scanned her crew. Helmsman Ayers locked eyes with Starman Odorizzi, who urged him on, "Commander, are you sure? The timing needed to execute a QT into a moving belt, not to mention the risk of stray asteroids, is problematic to say the least, if not dangerous."

"Commander Wallace was not looking for opinions or excuses, Helmsman Ayers," XO Coburn bellowed.

Helmsman Ayers' stiffened. "No, sir."

"Good. Now let's get to work. We've got some Tevs to surprise."

As the bridge came to life, XO Coburn stepped to her side. She met his gaze and felt the confidence and experience radiate off of him. It was exactly what she needed.

Coburn leaned in close and spoke in a voice only she could hear, "This better bloody work."

* * *

Drahk and Tajhbind sat in their Jackal, running dark except for their scanner. They, along with the rest of the Tevarin scouts, were posted like sentries around the main Tevarin ship. All patiently waiting for the gap to appear so they could strike Crion.

Drahk quietly recited Rijorian verses while watching the scans. Tajhbind stared out of the cockpit, seemingly at peace. Drahk always wondered where Tajhbind's mind went in quiet moments like this.

Everything was back to normal between them after Tajhbind convinced Drahk not to volunteer for the first strike force. Once settled into the Jackal, Drahk realized Tajhbind was right. His decision to volunteer for an assignment unsuitable for him was impulsive and clouded by emotions. He hoped he would be more thoughtful and patient in action.

As Drahk returned his attention to the scans, he saw a strange blip moving across the screen. Drahk increased the range of his scans and watched the blip weave around asteroids. It was certainly a ship and definitely not one of theirs. Those wretched Humans had finally shown themselves.

"Tajh, there's something moving ahead. Let's see what it is."

Tajhbind cautiously piloted the Jackal in that direction. As they drew near, the blip slowly spun towards them. Drahk looked up to see a small Human ship circle from behind a large asteroid.

Tajhbind fired a salvo from the Jackal. The Human ship ducked away as the asteroid beside it was ripped to shreds.

"Come on," called Drahk, almost instinctually. "Don't let them get away!"

Tajhbind put the Jackal's engines on full burn and careened around an asteroid after the ship. With each new twist and turn, Drahk adjusted the shields so they would be protected if the Human ship looped back to surprise them with a head on attack.

Ahead of the them, the Human ship skillfully wove its path. Yet the longer they pursued it, the more Drahk wondered about the ship's intentions. It hadn't initiated another attack or even attempted evasive maneuvers to shake them. Instead, it seemed content to stay just out of effective weapons range while leading them away from the rest of their forces.

Tajhbind spun the Jackal around an asteroid to see the Human ship pitch up. Drahk's eyes followed it, then returned to the scans to see two new blips before them.

"We've entered a trap," Drahk called. He immediately pushed all shield power forward to withstand the blasts from the new attackers. The shield held, but would need time before regaining full strength.

Tajhbind sliced down, then pitched up and around an asteroid. The quick, efficient maneuver was enough put the Jackal on the tail of one of the ambushers. Without wasting a second, Tajhbind fired a missile and destroyed it. One ship down.

As Tajhbind spun them through a tight inside loop, Drahk saw one the remaining Human ships fall in behind them. He bolstered the stern shield then searched the scan for the other ship, not wanting to be ambushed again.

The Jackal's cockpit beeped loudly. The Human pursuer had achieved missile lock. Drahk looked at their shield's charge. It still wasn't fully regenerated.

"Tajh, evade!"

The Jackal accelerated, then suddenly pitched up. Its wings rolled right until achieving a vertical alignment. Then barely passed between two asteroids. As Tajhbind slipped the ship between these two giant chunks of rocks and minerals, he dropped some chaff. The trailing missile exploded into the asteroids, saturating the area with a debris field that the Human ship could not avoid.

Drahk glanced at the scans to see the pursuing blip disappear, done in by damage from the debris. That left only one ship, but Drahk couldn't find it on his scans.

"Where is it, Drahk?" an energized Tajhbind implored.

"I do not know."

Tajhbind slowed the ship until it stopped. Drahk's scans remained empty of enemies. Maybe the coward had run away, fully aware of its danger?

Drahk checked the shield strength and gave an update, "Shield is fully powered."

Suddenly a signal sparked.

"Stern side attack," warned Drahk as he redirected the shields to that sector.

The Human ship bore down on them from behind, both of its barrels blazing.

Tajhbind reacted instantly, pitching the ship's bow up until it was flipped 180 degrees. They were now upside down from where they started. The two had done the maneuver so often that Drahk knew exactly when to shift the shields from front to back.

The moment the bow was flipped, Tajhbind unleashed hellfire. The two ships tore into one another's shields. The Jackal withstood the onslaught while the Human ship's shield was quickly ripped to shreds. By the time the Human ship realized it was in a losing battle, it was too late. It exploded seconds later.

Drahk and Tajhbind sat there silently for a moment. They had done it. They had survived.

"Time to return and report our encounter," said Tajhbind.

Yet something wasn't sitting right with Drahk. He checked his scans to see they had worked their way deep into the belt, but were still near where the gap would appear. Why

would so many Human ships converge around here when the rest of the Tevarin forces were so far away? His time as a youth on Olympus had taught Drahk that it was always best to suspect treachery from Humans.

"No. We can't go back," Drahk said resolutely. "Not if we want the attack on Crion to succeed."

* * *

All activity on the bridge stopped and every eye found Commander Wallace. After Starman Darsha reported that their three scouts were under attack, everyone had turned to the hologlobe. Together they had watched as those three blips disappeared, one by one. The entire bridge crew knew their fate, but none dared to say it out loud.

XO Coburn stepped forward, "Commander, how do you wish to proceed?"

"Have the proximity mines been set?"

"Yes, sir."

"Then we have only one choice. We go forward as planned."

"But, sir . . . " Coburn hesitated then continued. "We won't have our scouts to confirm the Tevarin forces are in the gap."

"It's not ideal, but we'll know they're there once the gap opens and the charges detonate. Prep for quantum."

Coburn didn't move. None of the bridge crew did. Wallace looked around.

"I gave an order."

Still nothing.

"I don't need to tell you what those Tevs will do if they get to Crion. You've probably heard about it. Some of us have been unfortunate enough to see it in person," she paused to scan the faces of her crew. "We find ourselves

out of position and against superior numbers, so I'm not going to stand here and lie to you or promise you victory. We might die today, but it won't keep me from fighting to save the millions of innocent people on Crion. Will it stop you?"

"No, sir!" Echoed in unison.

Across the bridge, her crew snapped into action. After a brief respite, Commander Wallace continued, "Now, in exactly three minutes, this gap will open, and the Tevarin will begin their march to destroy Crion. No matter what, those mines will still explode and the Tevarin will be slowed down. But the only thing that can truly stop them is *Crescent*. So . . . who's ready to trap some Tev?"

A roar went up around the bridge.

* * *

Drahk and Tajhbind watched the gap slowly form before them. It was an elaborate celestial arrangement so peculiar it was hard not to watch in wonder. Yet Drahk wouldn't allow himself to stare. Instead, he focused on his scans to see if more UEE forces were lying in wait.

Tajhbind had contacted the leaders to update them on the situation. Their superior had even congratulated them for their destruction of the scouts, and Drahk's foresight to continue searching the gap.

Still, the lack of a further UEE threat puzzled Drahk. He almost suggested expanding the search deeper into the belt, but he held back on that suggestion. Instead he just wondered, what could three scout ships have hoped to do to stop an entire Tevarin force?

Suddenly, asteroids on both sides of the gap exploded. Shrapnel hurled into the Jackal on all sides, overwhelming their shields and striking their hull. The impacts sent the ship spinning wildly. Drahk held on for his life, hoping Tajhbind could regain control before they both blacked out.

Tajhbind cycled through thrusters until the spinning slowed and Drahk's sickness abated. He checked the status of the ship's systems now that he could focus. They had taken significant damage and were in desperate need of help.

Drahk accessed the emergency channel and broadcast a distress signal. Suddenly, a massive object filled the scanner's screen. Drahk's eyes grew wide. It could only be one thing.

He looked up to see a Human capital coming down the gap towards them. Still in disbelief, Drahk announced the Humans' arrival across the emergency channel. Then desperately said, "Tajh, we must abandon ship!"

Drahk grabbed his personal propulsion device and unstrapped himself from his seat. With the shields down, it would just be a matter of jumping out the open back of the ship and then EVAing into the asteroids until help could be sent.

Suddenly, turret fire from the Human ship blanketed the space before them. Instinctively, Tajhbind turned the Jackal away from it, but the previous damage to the left wing was too much. It ripped off the hull and sent the ship into a tailspin toward the massive ship, flinging Drahk towards the back of the Jackal and eventually into space.

Once Drahk realized what had happened to him, he activated the thrusters on the personal propulsion device until he was under control. He searched the space around him, but there was no sign of Tajhbind. Just the sight of the wounded Jackal tumbling towards an impact with the massive Human ship, its damaged engines hurling it wildly out of control.

* * *

Hickory was one step away from escaping his cell. He had drilled a small hole in the metal case housing the door's electromagnet, then carefully removed the power port in his left sleeve to expose the wires connecting it to the rest of his suit. All while the kid continued to pace the hallway none the wiser.

Hickory began the countdown in his head as he crossed to the cell door for hopefully the final time. He needed to reverse the polarity of the electromagnet so it would repel the door away from the armature plate built into the jamb. But he wouldn't know which wire would do so until he tried.

The orchestration of this last part was essential. Hickory assumed opening the door would set off some kind of alarm. So doing it too soon would give the kid the chance to react. Yet, if he waited too long or chose the wrong wire, the kid could catch him in the act.

As his internal clock hit ten, Hickory had no more time to debate. He picked a wire and guided its exposed end into the drilled hole, then held it in place with his left hand.

The countdown hit five . . . four . . .

Hickory's right hand activated as many of his suit's systems as possible. Electricity buzzed through the wire and into the electromagnet. The kid appeared before the cell just as the door popped open and beeped loudly. The kid jumped back, surprised.

Hickory grabbed the door and pushed it open. The last thing he wanted was for the electromagnet to re-engage with the armature. Suddenly, a shockingly loud alarm blasted through the brig, this time startling both Hickory and the kid.

Moments later, an explosion rocked the ship. Only Hickory's hold on the door kept him from flying across his cell. The Marine was not so fortunate. He was flung down the hall, landing with a loud thud.

Once *Crescent* stabilized, Hickory glanced out of the cell to see the kid writhing in pain. Hickory hurried down the hall towards him. Seeing him coming, the kid struggled to raise his gun. Hickory kicked it out of his hand.

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The Marine screamed in pain. Hickory couldn't have him making any more noise, so he cocked his arm and knocked the kid out cold.

* * *

"Tajhbind!" Drahk helplessly called into his comms. Still holding the personal propulsion device, he fired its thrusters until coming to a stop.

Still and silent, Drahk stared at a debris field drifting away from the UEE capital ship. It was all that was left of the Jackal.

Even though Tajhbind's fate seemed clear, Drahk was not ready to accept it, as doing so meant grappling with his own.

Drahk knew a rescue wouldn't be possible from this position. He'd have to EVA into the asteroid belt and soon. The UEE capital ship grew closer every second.

Drahk felt himself drifting towards the ship, having entered its gravitational field. Slowly floating forward, he stared at the ship. It reminded him of home on Olympus. Sitting on the dunes as a kid, staring at its hulking hull half-embedded in sand, he'd always imagined what one would look like in space. And here it was.

In a way, he had come back home in the end after all. A sense of peace settled over him and a Rijorian verse filled his mind. Then he had an epiphany: he had been brought here for a reason.

Thrusters sparked on his personal propulsion device, shooting Drahk forward. He'd be building up a good deal of speed on approach. If Drahk had any chance of surviving this, from here on in, his thrusters should only be used to slow him down.

That is, of course, if the ship didn't pick up speed and ram into him. Drahk doubted that would end well for him.

* * *

Commander Wallace gripped the railing before her. The charges had detonated but, besides the one ship that crashed into them, the Tevarin forces weren't here. At least the damage from the impact appeared to be minimal.

"Find me that Tevarin capital ship immediately," cried XO Coburn. "We need to know how much time we have before they're on us."

Coburn's eyes cut across to Commander Wallace. She had never seen him so worried before.

Wait . . . if they quantum jumped in then they could just as easily quantum jump out. It would just be a matter of steering the bow in the other direction.

"Commander . . ." cried Starman Odorizzi.

Wallace looked at the hologlobe. Her heart sunk into her stomach. It was too late.

The Tevarin had entered the gap behind them. *Crescent* was snared in its own trap, boxed in by a debris field on one side and the Tevarin capital ship on the other. Before Commander Wallace could say anything, the Tevarin's phalanx shield flared to life, ready for a fight.

To be continued

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