

JUMP POINT

A ROBERTS SPACE INDUSTRIES PUBLICATION ISSUE 03



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GREETINGS, CITIZENS!

Exciting times – \$100 million in backing funds, a really slick Apha 2.0, and more and more play options. It's a good time to have *Star Citizen* loaded on your system. There's still plenty to get done, but seeing concrete steps like 2.0 definitely gives everyone's confidence level a significant spike.



I'm also excited that we're taking a shot at printing **Jump Point** Volume 2 (that's 2014, not this current year). Keep those orders coming in, especially since Subscribers get a significantly lower price as a thank you for all the support you've given us over the years. If we receive enough pre-orders, we'll be able to print them up and get them into your hands (and mine – I like the accessibility of PDF docs, but there's nothing like having a five-pound tome to hold and read). And you don't want to wait to order; we'll print enough to fulfill the orders we get, but not many more than that.

Our Behind the Scenes interview this month is with the team (spread across three companies) that put together the Starmap. I'd like to thank all the Subscribers who gave us questions for the interview – so many that we didn't have time to answer them all – including Dazc, Perry_Hope, Kieren_Akari, Schrike, BaconofWar, fireblade1, steve-2001, Solis_Obscuri, Azmodeth, WildVolusPrime, AragornBH, Tjourney, Eschatos and KronosPRIME.

Metal. Our new term of the issue comes from a comment by Martin Lizée in our Behind the Scenes article. He re-

ferred to a wiki created by Cunningham & Cunningham, Inc. to get this definition for *metal*: "Slang that means 'close to the hardware' or deep guts of the system."

Meanwhile, another December means another twelve issues in the . . .

normally I'd say the vault, but the Vault is something specific that isn't where **Jump Points** live. And the thesaurus isn't much help . . . the basement? The dungeon? How about the crib? Either way, that marks three years down, and plenty more to go for SC.

The lamp puts it so well: Happy Lampidays, and thank you! (If you don't recognize the lamp, ask someone who's been around since the beginning.)

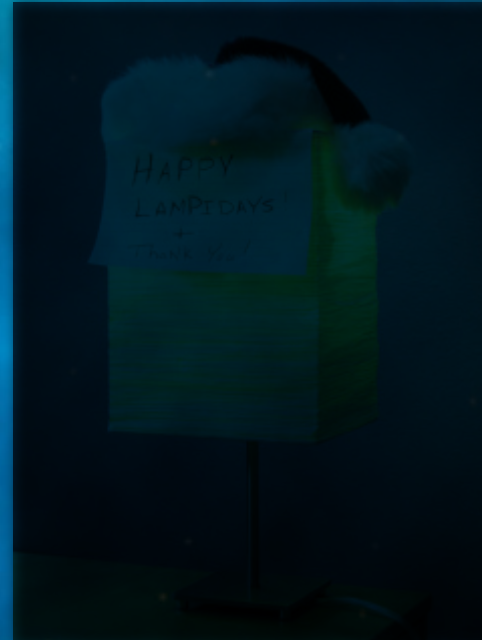
Hold on, it's gonna be a wild ride!

David

David.Ladyman@cloudimperiumgames.com

EDITOR: DAVID LADYMAN, INCAN MONKEY GOD STUDIOS
ROVING CORRESPONDENT: BEN LESNICK
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PAGE 48:	EDERN TALHOQUET
PAGE 66:	RYAN ARCHER & KEN FAIRCLOUGH
PAGE 69:	RYAN ARCHER



FROM THE HICKET!



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Crucible



WORKING IN PROGRESS

Design Brief

Manufacturer Anvil

Keyword Repair

DESCRIPTION. A so-called “flying toolbox,” the Crucible is Anvil Aerospace’s first dedicated repair ship. Featuring a rotating control bridge and a detachable pressurized workspace, the Crucible is a versatile mobile garage equipped

with repair arms, a drone operation center and all the equipment needed to overhaul a damaged craft back into fighting shape.

Variants

- Repair Ship (base)
- Refit and Resupply Ship
- Tug Boat

DESIGN BRIEF (cont.)

REPAIR SHIP. Repair is the main function, using the garage to host numerous tools and equipment to get ships fixed up and back out in space. This will have the largest garage and will focus on space to fit ships within the garage, as well as storing material to repair larger ships.

REFIT AND RESUPPLY SHIP. Making sure a ship is topped off with various resources is the primary goal of the Refit/Resupply variant. The garage is much smaller than the Repair variant to host more efficient storage space and pumps. This will help supply ships with coolant, fuel, power and any other commodity (ammo, etc.).

TUG BOAT. This ship boast the smallest of garages and focuses on the additional hardpoints to house tractor beams to help guide ships in space. This also has an expanded avionics and radar system to sync easier with other Crucibles when tugging larger ships.

Details

BRIDGE. The bridge is the hub of operations and houses 3 stations. It rotates and locks in place with the side airlocks, so crew members can EVA directly from the bridge on to the outer platform.

PILOTING THE SHIP. Due to the bridge rotating, the controls need to change based on the orientation of the bridge. This will be a state change for the control scheme used.

The change in controls will help players have a better control and view of the ship repair target.

CREW LIVING. The crew living space has been broken up into 2 unique sections: Common area and sleeping quarters.

Common Area. The common area will be where the crew share living space and commodities like dining, restroom, shower, and lounge.

Living Space (starboard, port). Each living space will have a bed, couch, and backup (redundant battery, life support)

components in case of catastrophic failure or decompression. Each bed will double as an escape pod. Limited personal storage is provided for crew members to access inventory within their personal space.

ENGINEERING. The engineering space houses a majority of the components and spreads throughout the entire ship's third level from port to starboard. This is also the place where the engine arrays will line up during maintenance.

The repair station will be within the main engineering area that will allow players to maintain the resources needed to accomplish repairs and house the repair task manager.

Components

- ABBF
- Coolers
- Shields
- Power
- Gravity
- Life Support

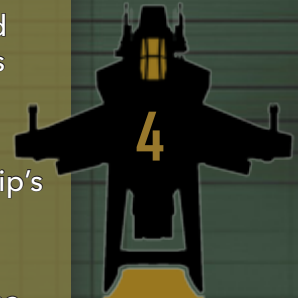
The repair task manager will allow players to access Damage Assessments of the target, Ship Diagnostics, Material Panel, Material Stock inventory, and the amounts of each left within the manifest.

LOADING / STORAGE. The Loading / Storage area will have space for storing parts, sub-components, tools and equipment. The main entry houses the freight elevator, personnel entry elevator, main bay airlock, and side personnel airlocks.

GARAGE. The Garage will dock against the ship here at this level. Seals along the side will need to line up with the area surrounding the main bay and personnel airlocks.

TRAVERSAL. The Crucible is designed for long hauls, getting to and from repair jobs, as well as setting up shop allowing repair jobs to make it to them. The Crucible's main engines allows the ship to travel with an empty or full garage and maintain similar speeds, but the acceleration and deceleration would differ based on mass. Positioning of the engines would affect where the thrust would come from as well as how the ship would handle.

Each engine will be able to rotate in 360 degrees.



WORKING PROGRESS

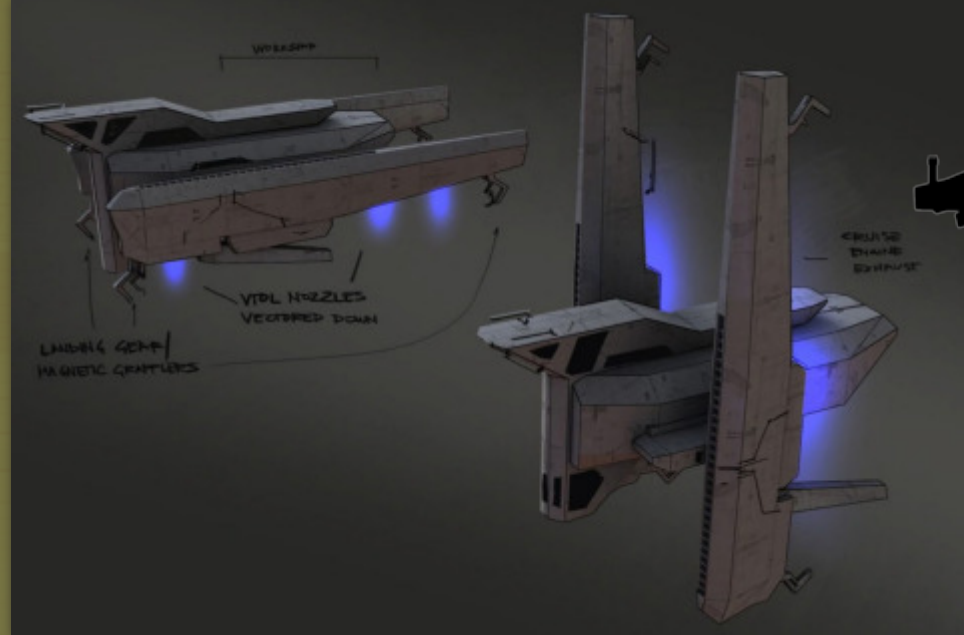
Ryan Church, the fantastic freelance designer who has created the concepts for several CIG ships already, is the primary author of the *Crucible*. He narrates the first part of the *Crucible* story here, before being joined by **Chris Smith** (Lead Vehicle Artist) and others.

Ryan Church, freelance ship designer: I've been thinking of configurations for the Anvil Crucible and roughly sketched some out. What I've been trying for in this first quick pass is to get a cool shape that looks pretty utilitarian and tough rather than fast and sleek, as implied in the brief.

Reading over the brief and adding my own thoughts, these rough designs all:

Have a large 'workshop' module at the 'bottom' of the ship where it can be positioned as close as possible to a ship's hull for doing work and accessible from the ground when landed in atmosphere.

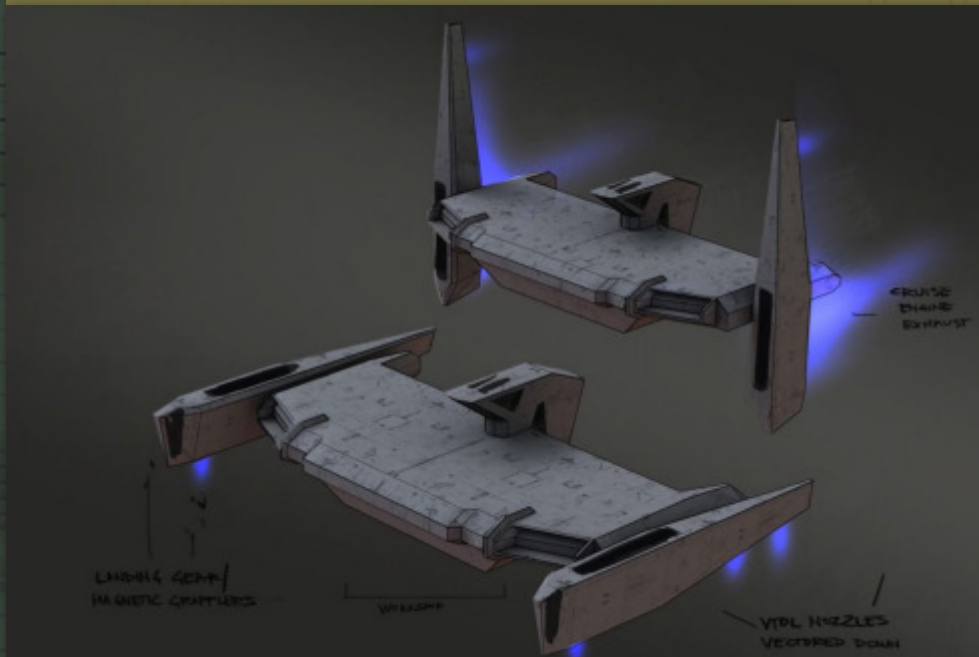
Have a cockpit with large windows for good visibility, but we could add low tech door shields to protect the windows. Also



it might be cool to have some braces around the windows for more protection, kind of like a crane cab or something.

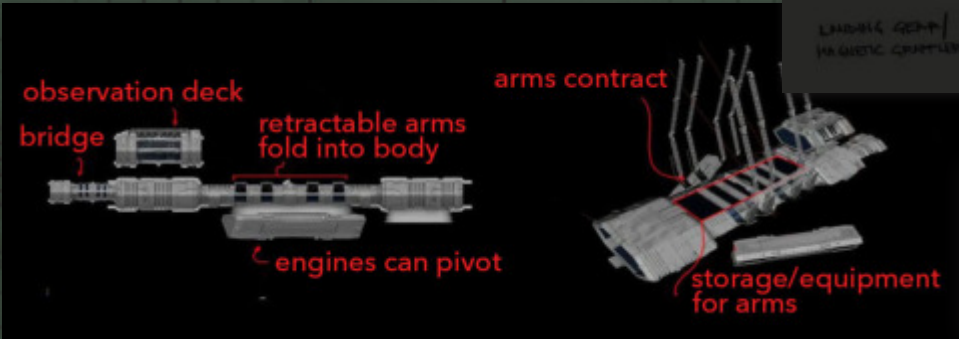
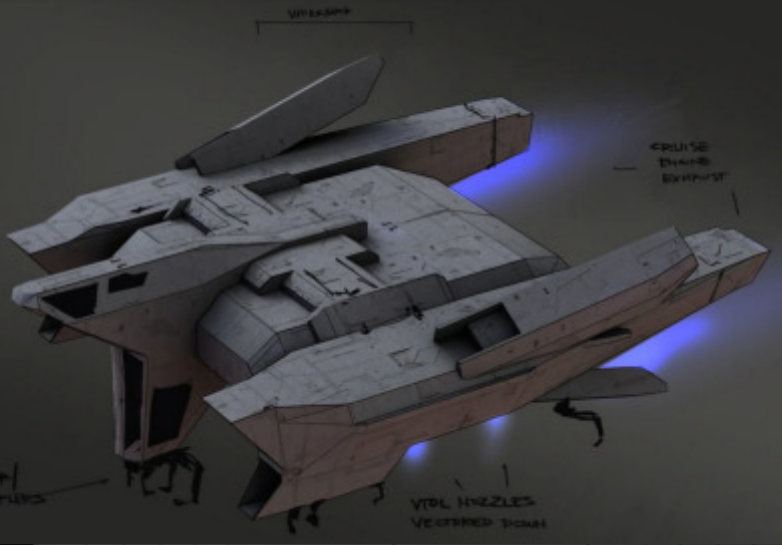
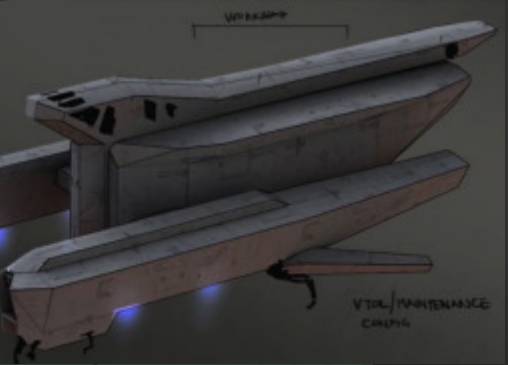
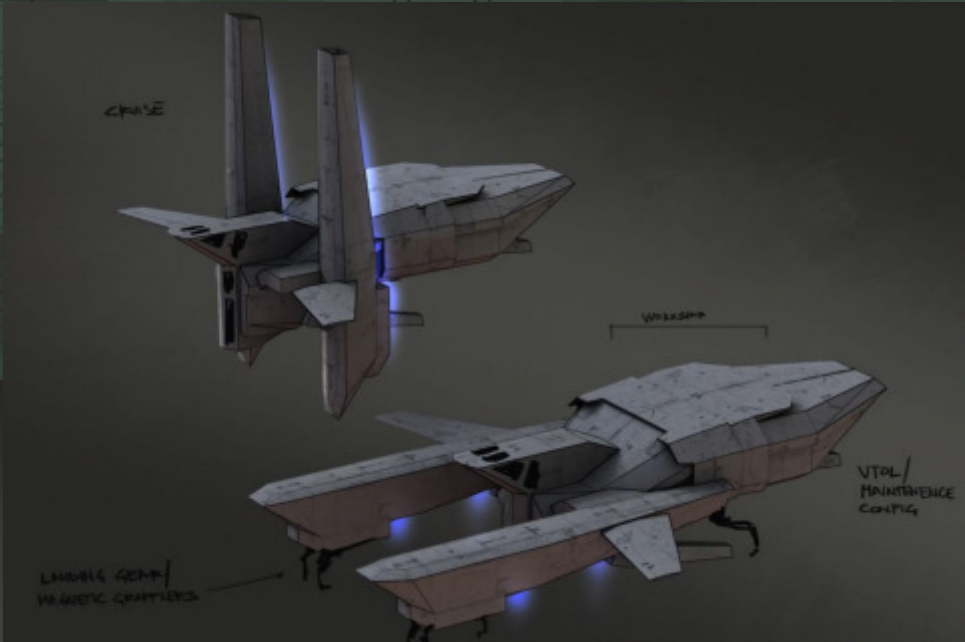
One other thing most of these designs have are big, separate engine modules away from the centerline. You can see in most of the designs I am going for a pivoting engine shape that looks very different in cruise configuration from landed/docked configuration.

I think it's a cool look to have the engine exhaust spread out along the long aft end of the module; I haven't seen that kind of a look before. It allows for a cool, aggressive shape when viewed in cruise configuration (i.e., with vertical engines) from the front or back and for a very stable landing/docking footprint when the long engines are pointed down and the exhaust is spread out along the long edge of the nacelle (horizontal engines). On the nacelle would also be the landing gear and cool grappling arms that could strap you to a ship you're repairing as it positions the 'workshop' over the working area.



WORKING IN PROGRESS

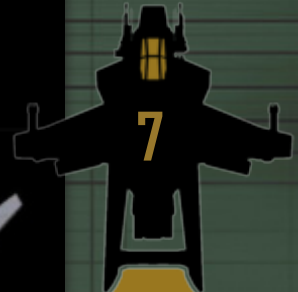
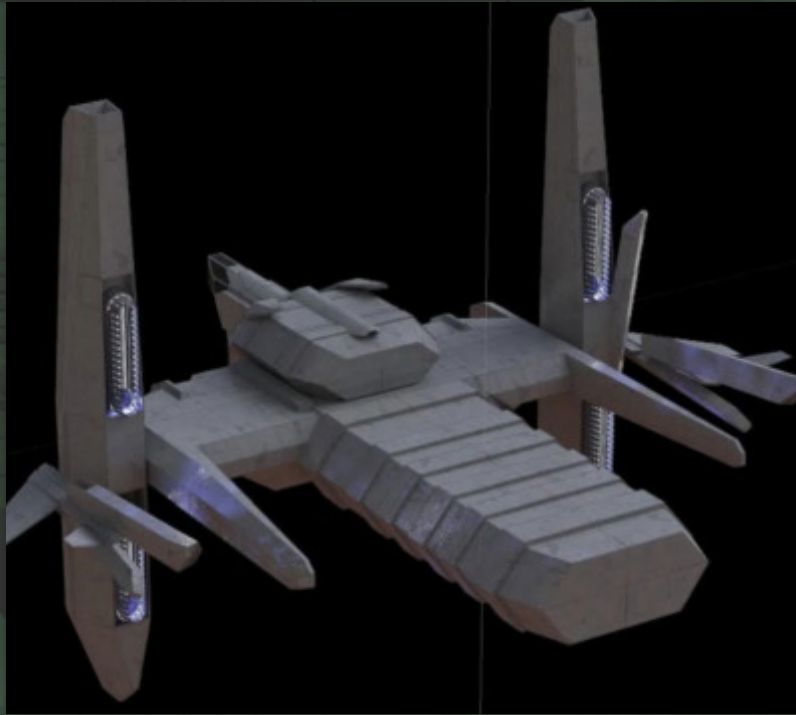
Remember these are super rough stick figure versions of the ships, any of which can be detailed out and look really cool with a utilitarian, rugged aesthetic.



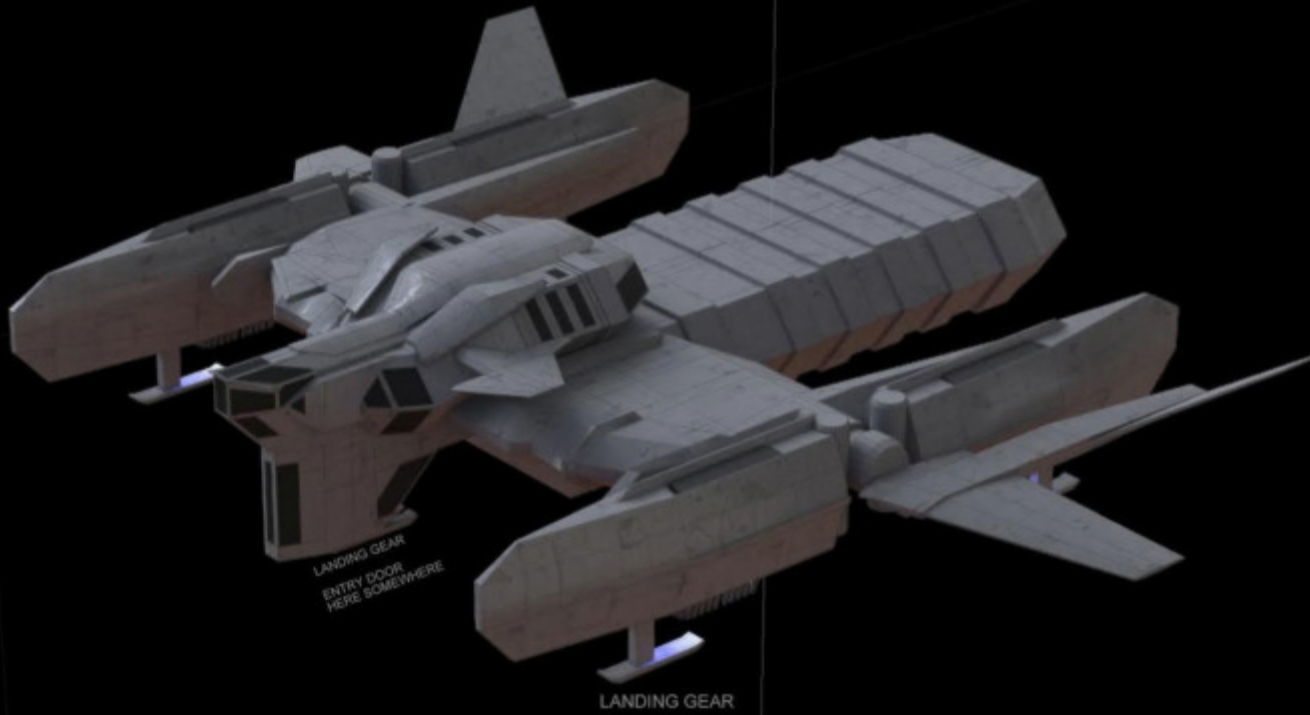
Ryan C: This shows the requested configuration. The main takeaway here is that the ship arms are to come out of the workshop and grab 'up' – so that to latch onto a ship you would be under it.



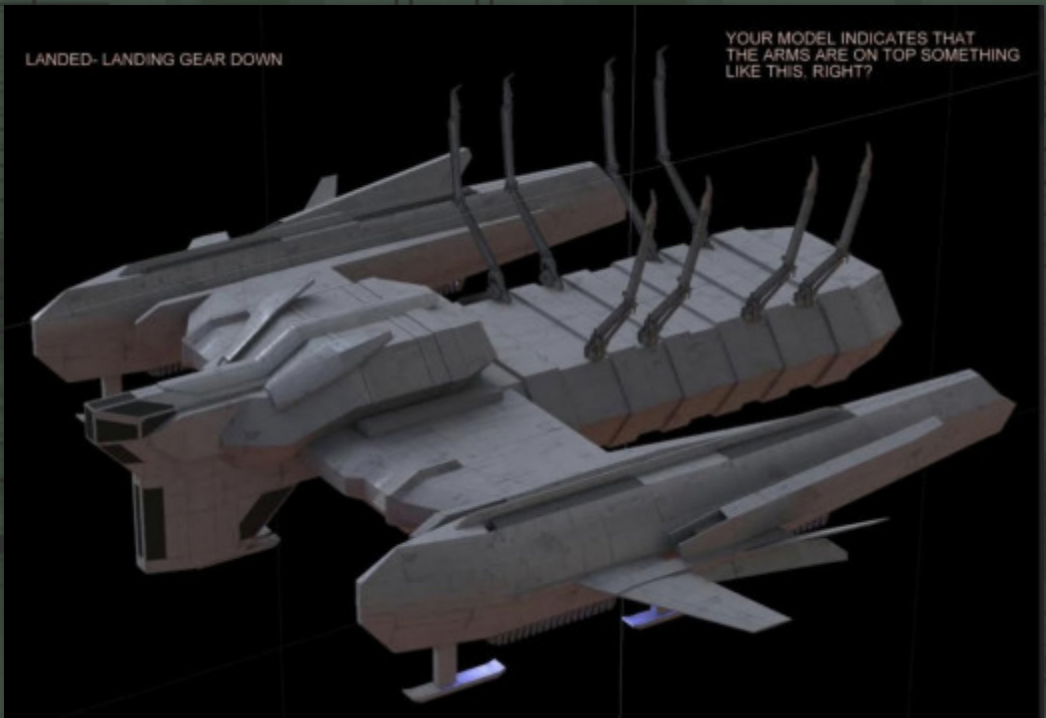
WORKING DRAFT



Ryan C: Here are my idea based off of those notes. Also looking for an engine configuration that would do cruise and VTOL as outlined in the Design Brief. My other thoughts regarding the engines at this point are that the pivoting and movement of the nacelles would allow for a high degree of fine maneuvering for docking, all visible from a pilot's chair that could be swiveled 180 degrees to face aft for control during those maneuvers. At this point I have some aerodynamic control surfaces also.



WORK IN PROGRESS

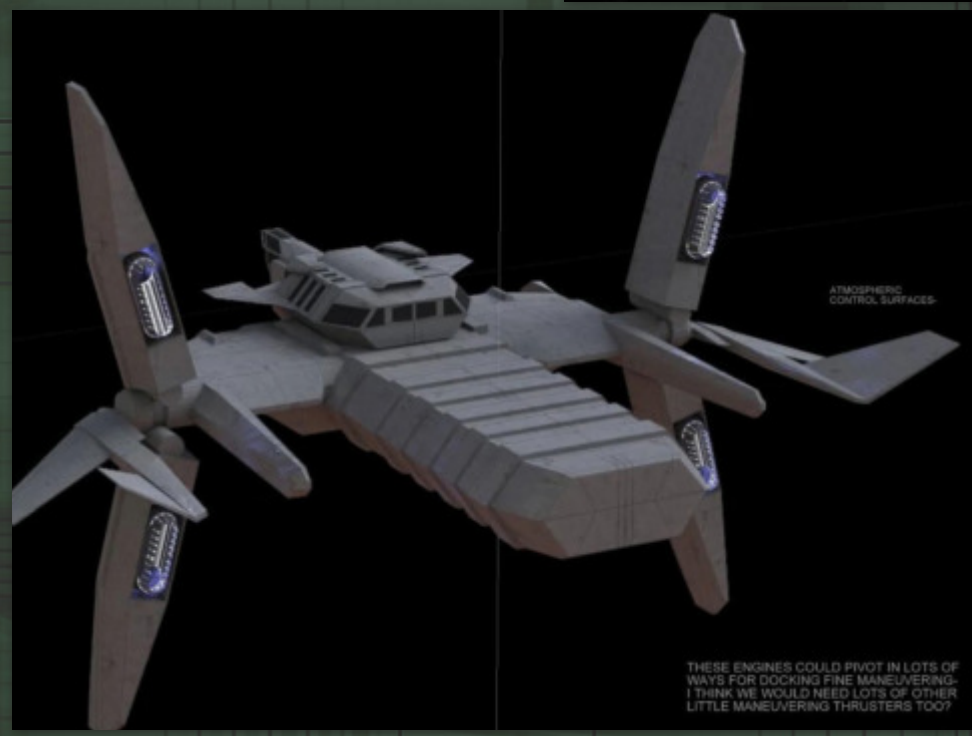


LANDED- LANDING GEAR DOWN

YOUR MODEL INDICATES THAT THE ARMS ARE ON TOP SOMETHING LIKE THIS, RIGHT?



WORK IN PROGRESS



ATMOSPHERIC CONTROL SURFACES

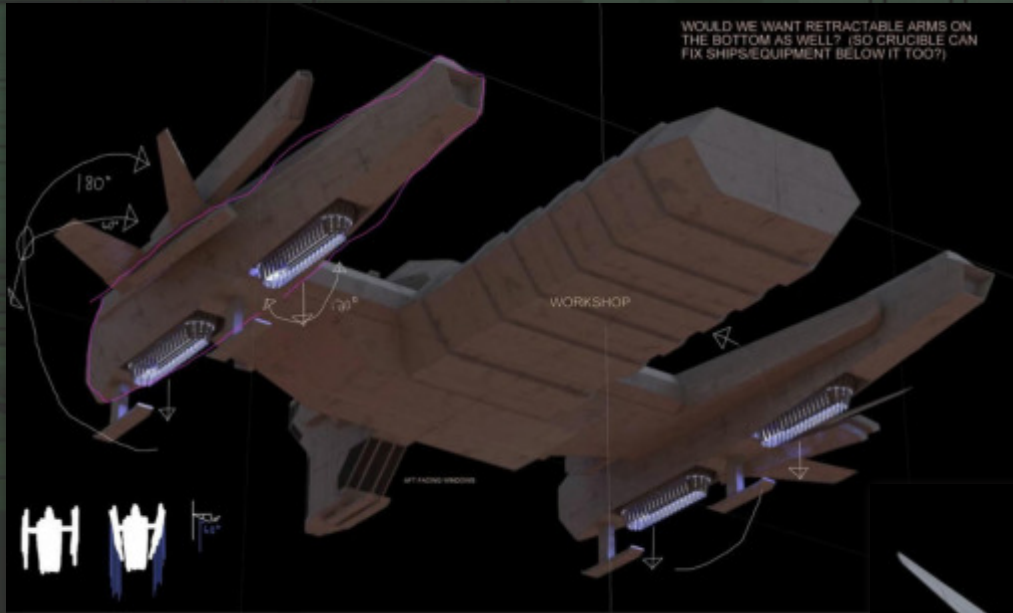
THESE ENGINES COULD PIVOT IN LOTS OF WAYS FOR DOCKING FINE MANEUVERING. I THINK WE WOULD NEED LOTS OF OTHER LITTLE MANEUVERING THRUSTERS TOO?



CRUISE CONFIGURATION

MODEL IS ROUGH- FOR ROUGH PROPORTIONS ONLY. ALL SHAPES WILL LOOK MUCH COOLER!

BRIDGE

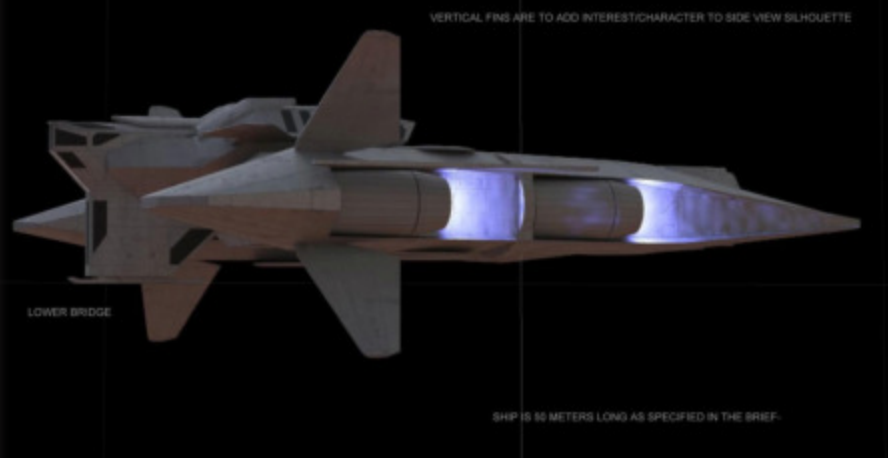


Ryan C: This is a note for how CIG wants the nacelles to be configured, a neat idea to allow for VTOL and cruise flight.

Ryan C: These are my take on this configuration, losing some aerodynamic control surfaces in the process but refining overall.
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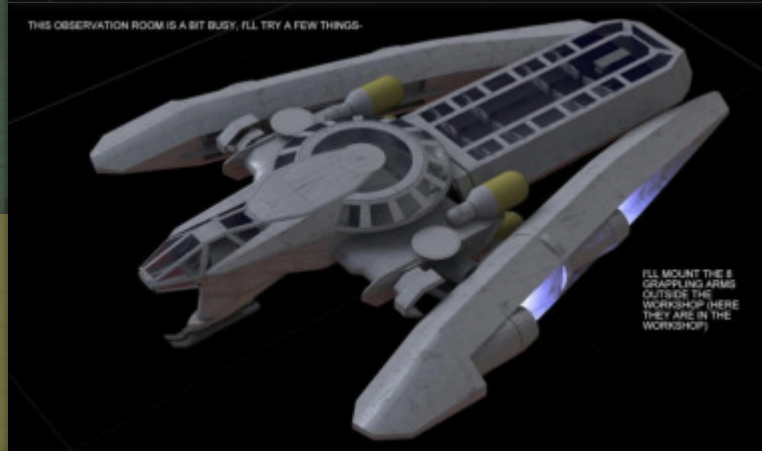
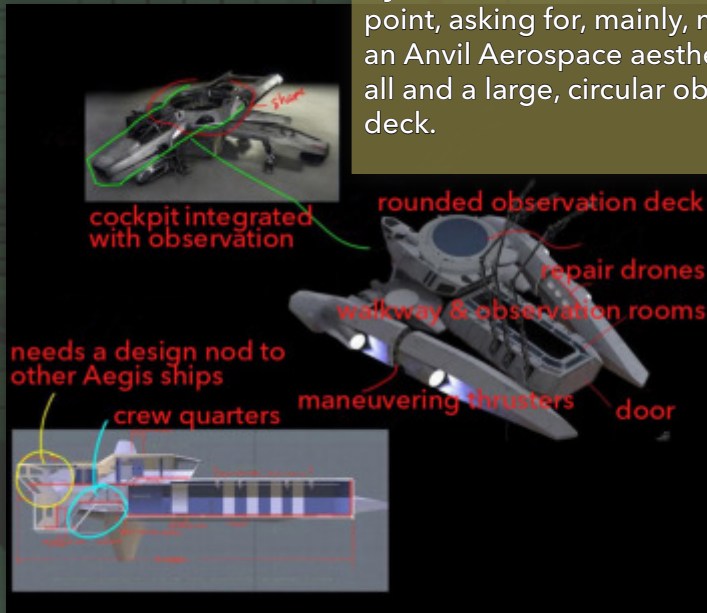


WORKING IN PROGRESS



WORK IN PROGRESS

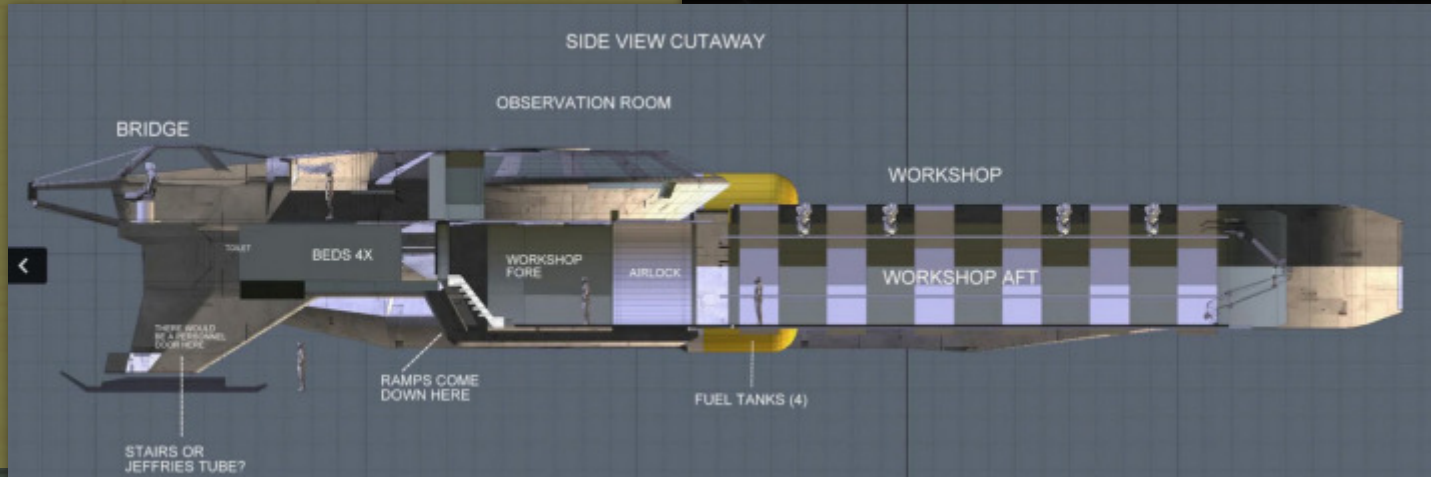
Ryan C: This is CIG's note at this point, asking for, mainly, more of an Anvil Aerospace aesthetic overall and a large, circular observation deck.

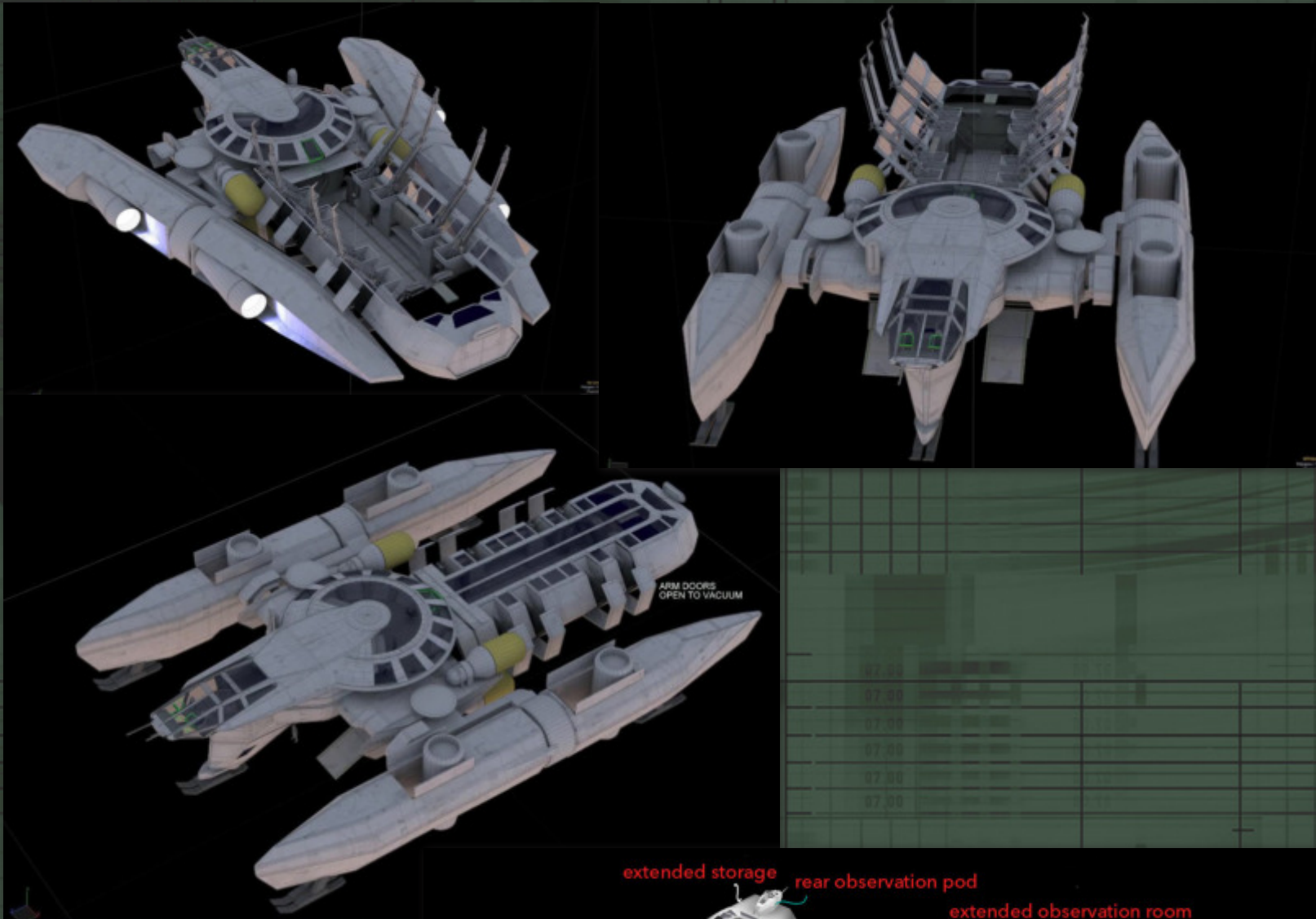


Ryan C: These are my design evolution based on those notes. You'll note also that I've placed the 4 yellow fuel tanks that are called out in the Design Brief astride the observation deck above and below. This has further detailing and functional evolution of the engines, cockpit, etc., along with a lot of interior design work. The large nose landing gear strut also serves as

an elevator to quickly get you from the ground up to the main level and the cockpit level.

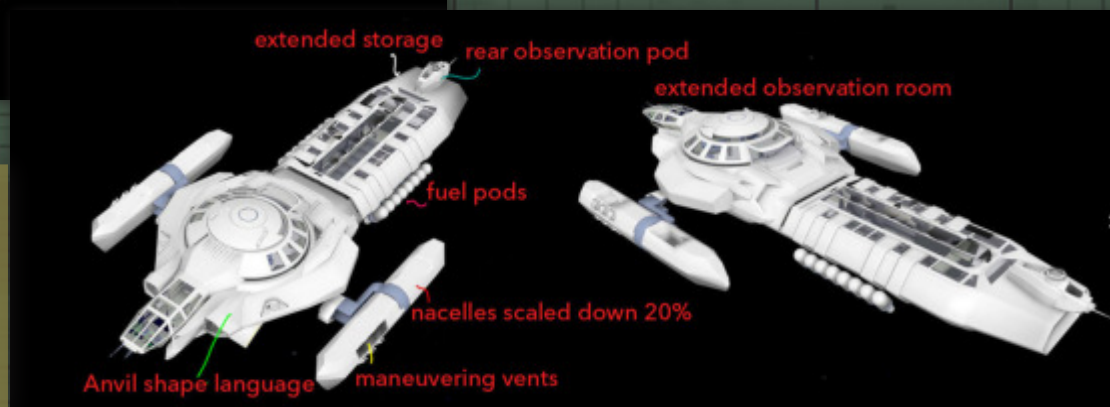
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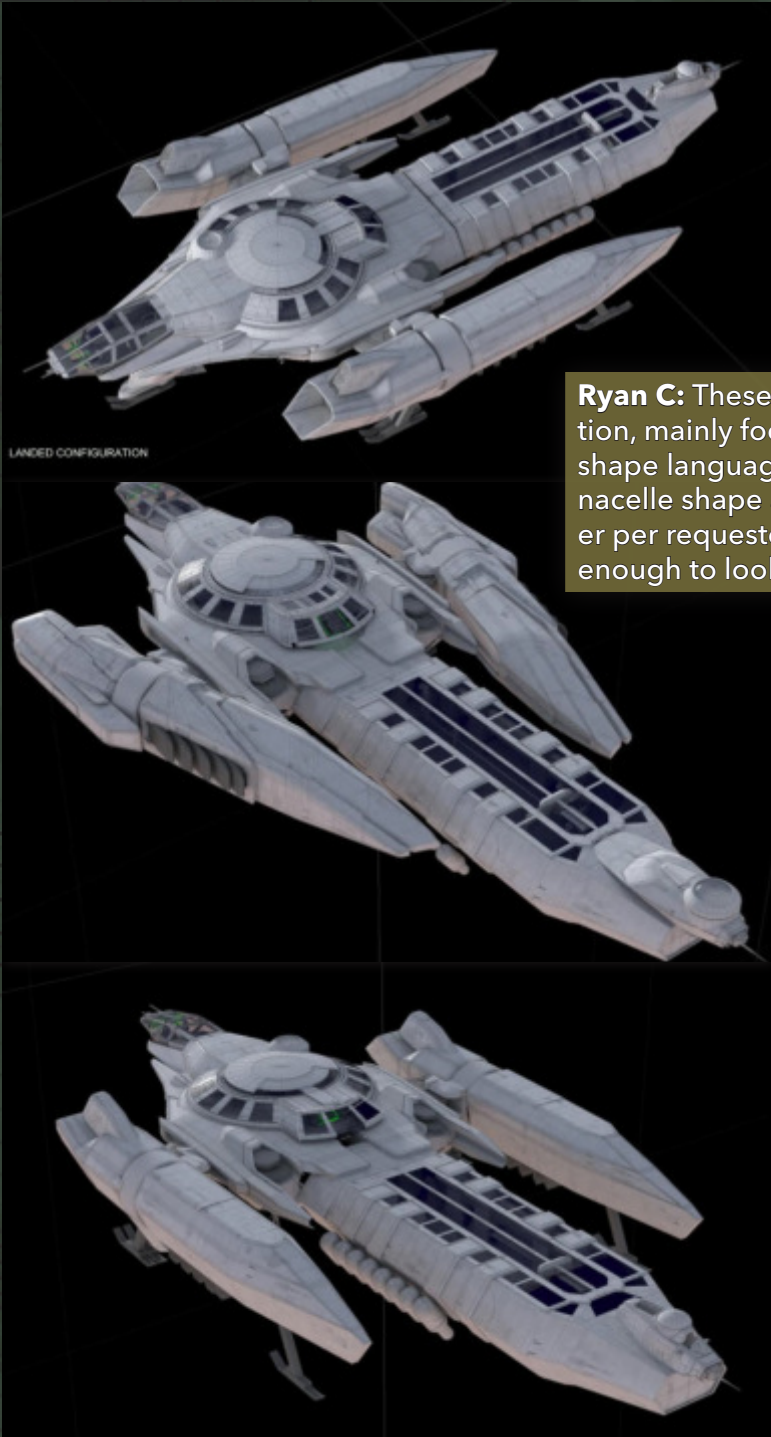




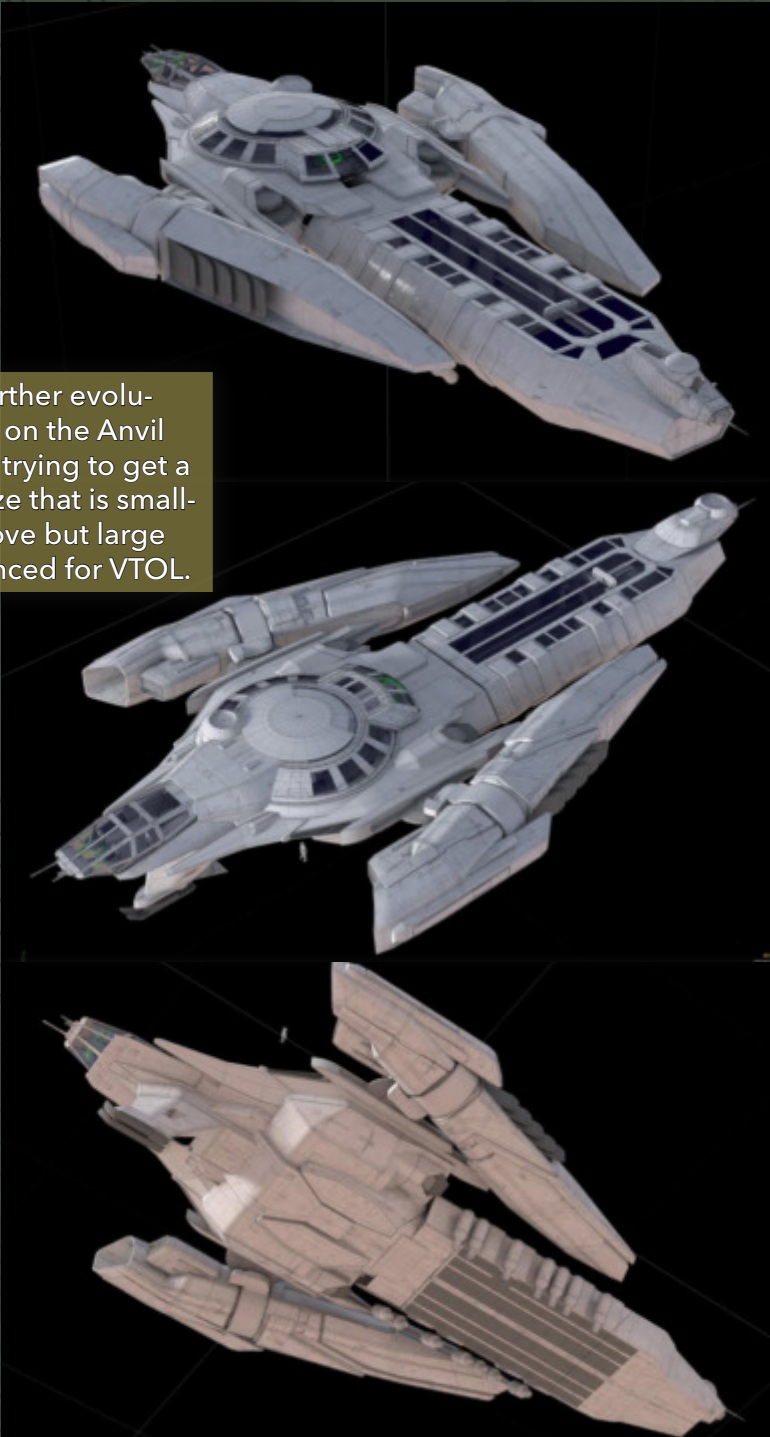
WORK IN PROGRESS

Ryan C: This is CIG's next feedback, making the nacelles smaller, putting the fuel pods along the side of the rear fuselage (workshop) and increasing with the Anvil shape language.





Ryan C: These are further evolution, mainly focusing on the Anvil shape language and trying to get a nacelle shape and size that is smaller per requested above but large enough to look balanced for VTOL.



WORKING PRIORITIES

Chris Smith, Lead Vehicle Artist: Very cool so far!

A couple of comments:

I think the mid-section area of this ship is really strong and looks well put together. I like how a lot of the Anvil shape language is transferred to this ship, especially the front and midsection. I'm digging the pivot side thrusters so far.

I also like the transition to the cockpit area on the top, but aesthetic-wise I'm not sure about the bottom dorsal fin, which seems to be doubling as a landing skid and entrance to the ship. I would like to see a profile shot to see how that feature flows with the rest of the ship. To me, the rear section of this ship does not feel as strong as the rest. I'm not too crazy about all the window and trellis work on the top side. Perhaps reducing the amount of the smaller windows and extending them to the sides might help with this. Also, the rear turret area feels a little too tacked on to me. (Dat Hornet front end tho ;))

Ryan C: Chris, thanks for the notes, good feedback. Let me go down this list, plus a few points I'm thinking about too.

The front cockpit to me looks a bit weak, but this is a side effect of having good rear visibility – how it tapers to the rear to allow you to see back there, which was a note I was given: that the chairs swivel so you can look back and up at a ship you're grappling onto. I think this functionality is worth the cockpit not looking as great as possible, but you can see how I've tried to give the front a strong silhouette with the triangular strakes that extend back from the cockpit.

The 'bottom dorsal fin' is my attempt to give the ship more character and a more distinctive silhouette, to put a bit more distance, silhouettewise, from, say, the Prometheus or Nostromo or any of a number of ships it's in the neighborhood of. It doesn't flow at all to the rear and is meant to stand out a bit while providing the functionality of having an elevator from the ground right up to the lower levels and up to the cockpit – very quick cockpit

access. It also contains the front landing gear, as you can see. We can totally remove it no prob but those are my reasons for putting it there. I thought it was kind of cool also to be able to just walk up to the front of the ship, go up an elevator and be in the cockpit really quickly.

The rear section of the ship is a bit of an aesthetic hold-over from early sketches showing the layout. It's also meant to look really utilitarian and functional with zero aesthetic. The workshop is kind of a big work dumpster hooked onto the back with these grabber arms that come out and doors on the ceiling that open. I can totally make it a more integrated shape that flows more into the front and looks like a more unified ship, no problem – let me know if that's where you want to go.

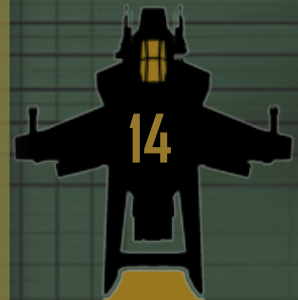
All the windows are meant to give a good view up, which is where the arms are grabbing- any ship being repaired would be seen out of those top windows (or doors if they are open).

The rear turret is WIP. I've been following the brief in general, especially where major packaging issues are coming up. I haven't given a lot of thought to the small stuff though – exactly where the sensors or countermeasures go for instance. I can start to block stuff in where I'm thinking of putting it and we can go from there.

To recap, I would say that my understanding from reading the brief was that the ship has a very utilitarian, purposeful, 'jeeplike' character. That's where a lot of my more simplified forms came from early on. I've been steered towards a sleeker, more distinctly 'Anvil Aerospace' design look which I think has definitely made for a better-looking ship as it comes along, and one that really instantly reads as an Anvil ship.

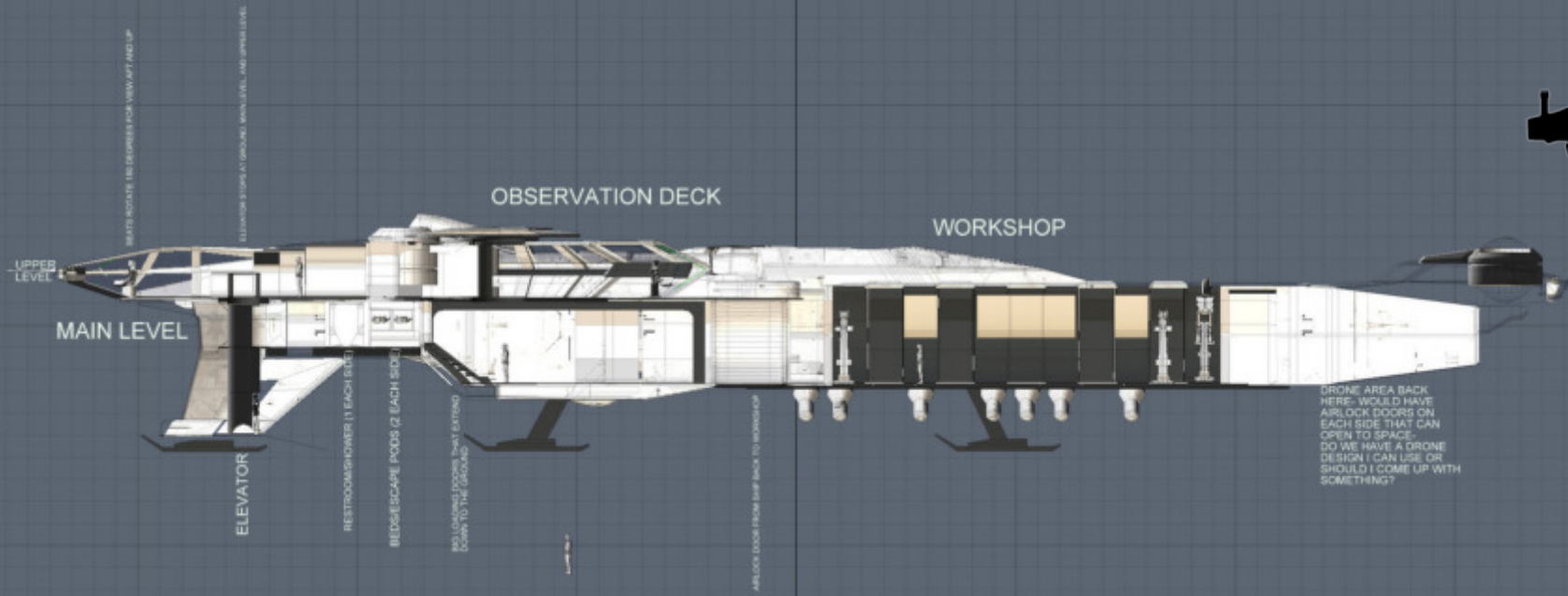
Here are some more renders that are labeled with the design brief in mind; we can go from there. All sounds good though, thanks!

[next two pages]



WORK IN PROGRESS

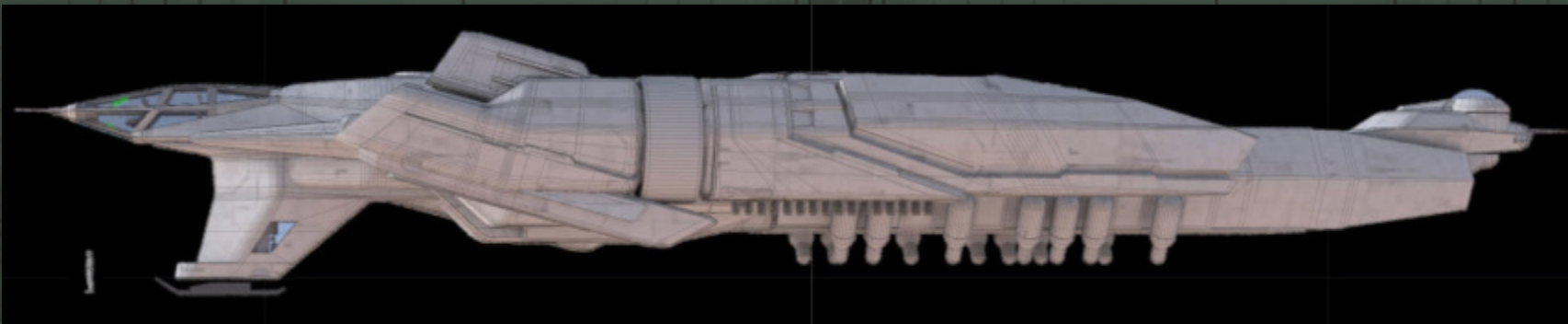
INTERIOR CUTAWAY



CURRENTLY IN THE FRONT OBSERVATION DECK ROOM I HAVE A SMALL KITCHEN ON ONE SIDE AND A SMALL RECREATION AREA ON THE OTHER. THERE IS AN OBSERVER'S SEAT IN THE REAR OF THE OBSERVATION DECK, WHAT ELSE NEEDS TO BE IN THERE?

CURRENTLY IN THE WORKSHOP (VERY ROUGHLY BLOCKED IN) ARE STORAGE LOCKERS FOR EQUIPMENT AND TOOLS, PLUS SEVERAL ROBOTIC MAINTENANCE ARMS. WHAT I'M THINKING WILL GO IN THERE ARE WORK TABLES, BUCKS, ROBOT ARMS, CONSOLES, FABRICATION STATIONS, THAT TYPE OF THING. ANYTHING ELSE SPECIFIC NEED TO GO IN THERE?

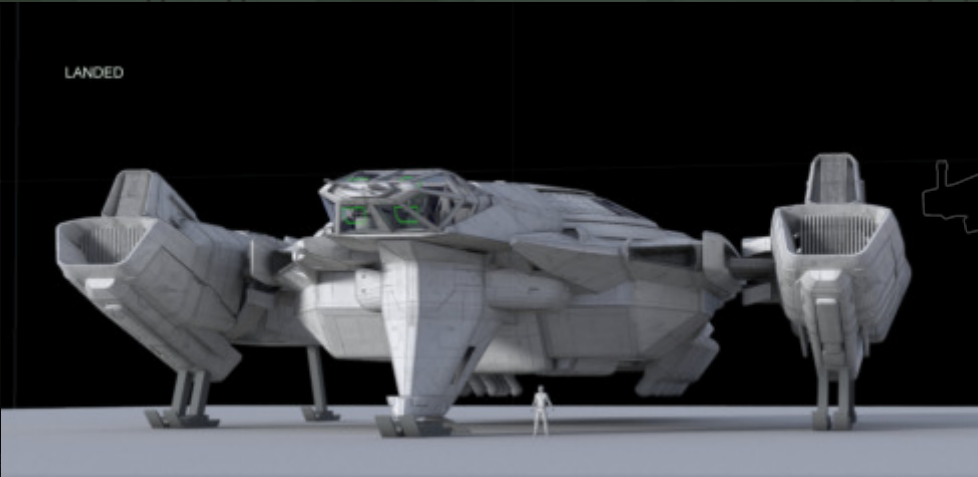
THE GRAPPLING ARMS WHICH ATTACH THE CRUCIBLE TO WHATEVER SHIP IT'S WORKING ON ARE ALL HOUSED OUTSIDE THE WORKSHOP, IN INDIVIDUAL POCKETS, EACH WITH A DOOR- VISIBLE IN ONE OF THE EXTERIOR VIEWS



WORKING IN PROGRESS



GRAPPLING ARMS DEPLOYED. CEILING DOORS STILL CLOSED & AIRLOCKED



LANDED



CEILING DOORS OPEN TO VACUUM- TO SERVICE SHIP ABOVE IT



GIVING IT A TRY WITHOUT THE NOSE PIECE, STILL LOOKS PRETTY GOOD



ALL CLOSED, ENGINES IN LANDING POSITION

HERE IVE CALLED OUT THE EXTERIOR SKIN THAT I USED IN THE DESIGN BECAUSE ALL SMALL DETAILS, MOST OF WHICH I HAD TO DO BUT WERE GREAT THANKS TO MY COLLEGS



RAMPS DEPLOYED



16

WORKING IN PROGRESS

Chris S: Awesome, thanks for the explanations and extra screen shots! Here are my responses (*with your words in italic*):

"The front cockpit to me looks a bit weak, but this is a side effect of having good rear visibility – how it tapers to the rear to allow you to see back there, which was a note I was given: that the chairs swivel so you can look back and up at a ship you're grappling onto."

I think the front cockpit area is quite all right actually, and the taper doesn't bother me. Overall it has a solid 'Aegis' look in that regard.

"The 'bottom dorsal fin' is my attempt to give the ship more character and a more distinctive silhouette"

Yeah, the fin does look kinda cool when landed from that angle (sweet shot, btw), but I do like it without as well, especially from the side view. Based on the other Aegis ships, which have quite a bit of a sleek and modern style built into them (especially the newest designs), the fin design just seems to go against that philosophy a bit.

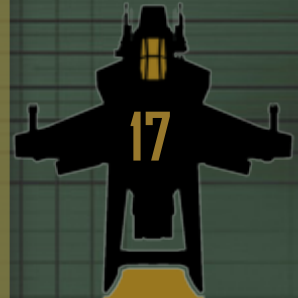
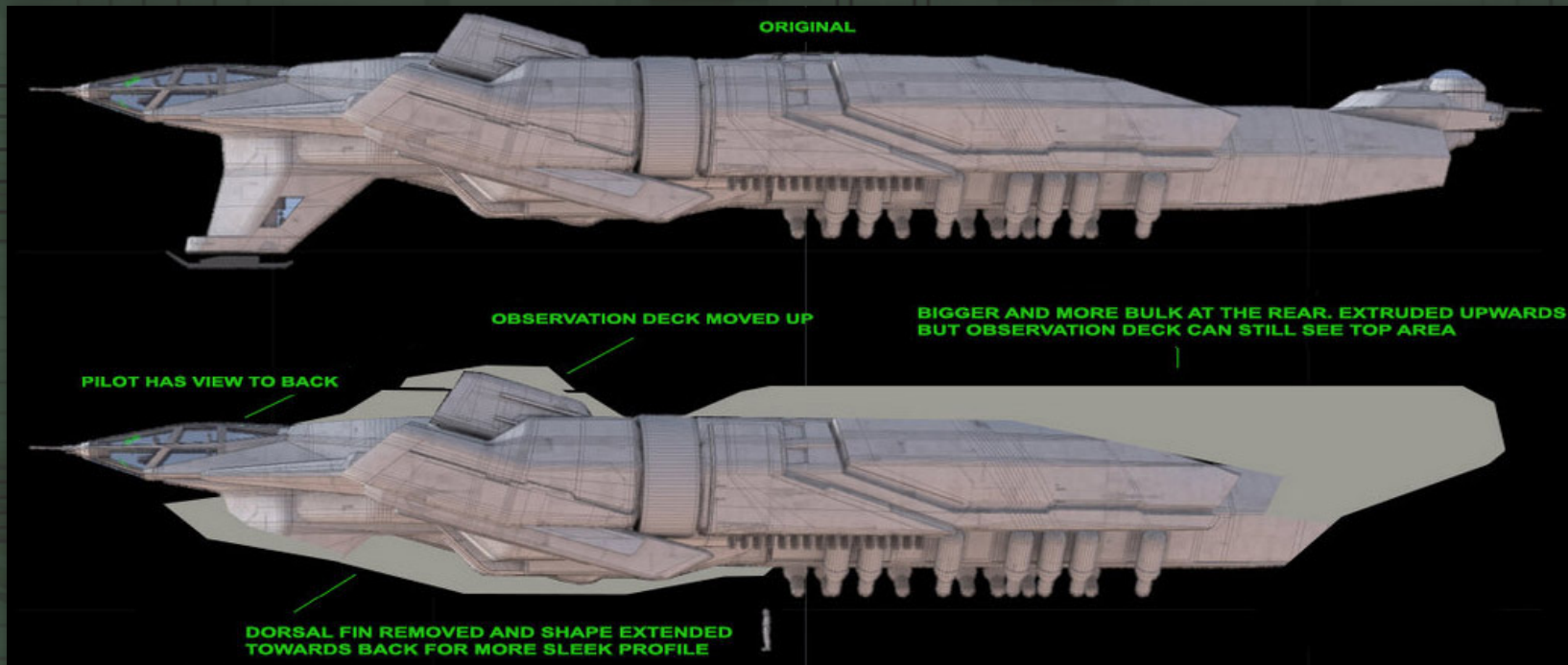
I would like to hear CR's opinion of this, as removing it would definitely impact some interior design choices, especially the entrance.

"The rear section of the ship is a bit of an aesthetic hold-over from early sketches showing the layout. It's also meant to look really utilitarian and functional with zero aesthetic."

Totally cool. I think the main issue with the rear section is that it looks a little weaker than the rest of the ship. Perhaps the rear section could be bulkier and more built out? The mechanical arms also feel a little fragile, especially if they're supposed to hold a ship for repairs.

Looking at a towing rig, for example, the rear section is like the main highlight of the vehicle, it's built out and looks very tough, including the control arms. The drive cabin is almost a secondary feature.

I've attached a screenshot with some profile modifications; let me know what you think.



WORK IN PROGRESS

Ryan C: Chris, thanks for these notes, they're great and they really help! I'll try to address your concerns and otherwise keep going and have something for you in the next batch. Helps to hear your thinking and it's easy to implement the calls you're making, get it all to fit into the big picture.

One issue I can foresee (I think) is that if we raise the observation area it will further block the pilot's rear view when he is swiveled aft; the aft view is already not fantastic.

All else sounds good (removing chin piece, making the grappling arms much bigger, etc., etc.).

Ryan C: Chris, wanted to run these by you, in-progress and very rough undetailed blockings, but showing some progress along the lines of the notes.

Matched your profile modifications by enlarging the workshop upwards and adding a raised area to the rear of the Observation Deck. This would be accessed via a few stairs.

The inside of the workshop is very tall and skinny now.

We could go even larger with the workshop but note that the overall length is now 66 meters (the design brief calls for 50 meters) and the width is 35 meters (the design brief calls for 20 meters). It's a big ship!

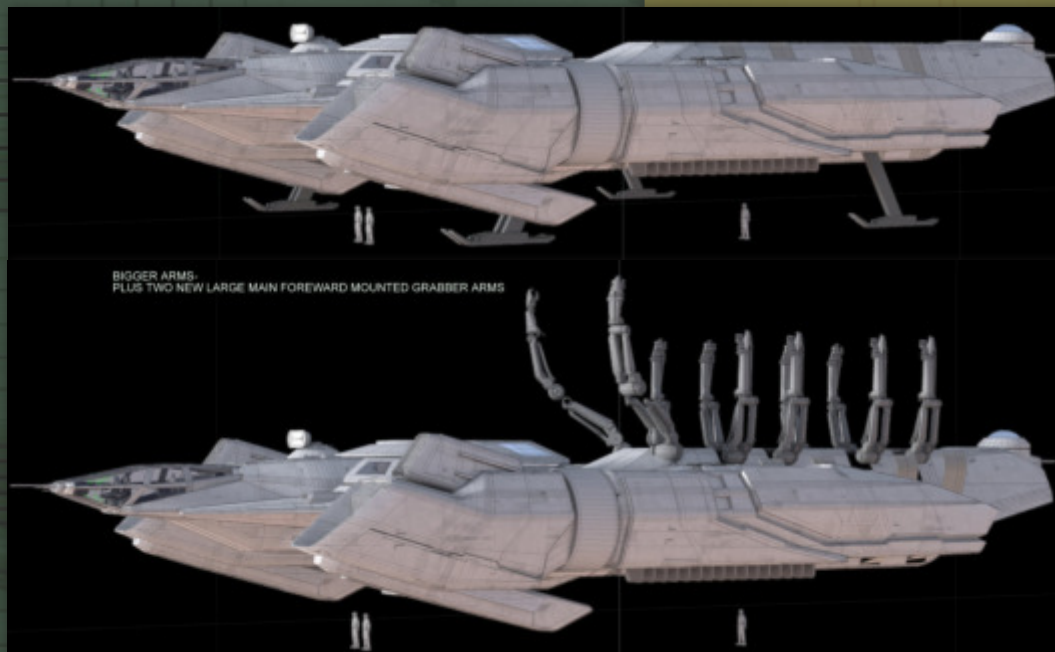
You can see the enclosed views of the cockpit showing the aft view; is the aft view good enough now? We could further improve it by raising the cockpit by a few stairs.

Enlarged the grappling arms and added two large forward arms.

Removed the under-nose fin and reworked that area.

You can see the images of the interior – there is living space under the cockpit that has 4 bed/escapepods, a shower and a restroom. There is a view of that and showing the view aft into the workshop.

Anyways, all work in progress but wanted to run it by you for any comments, thanks!
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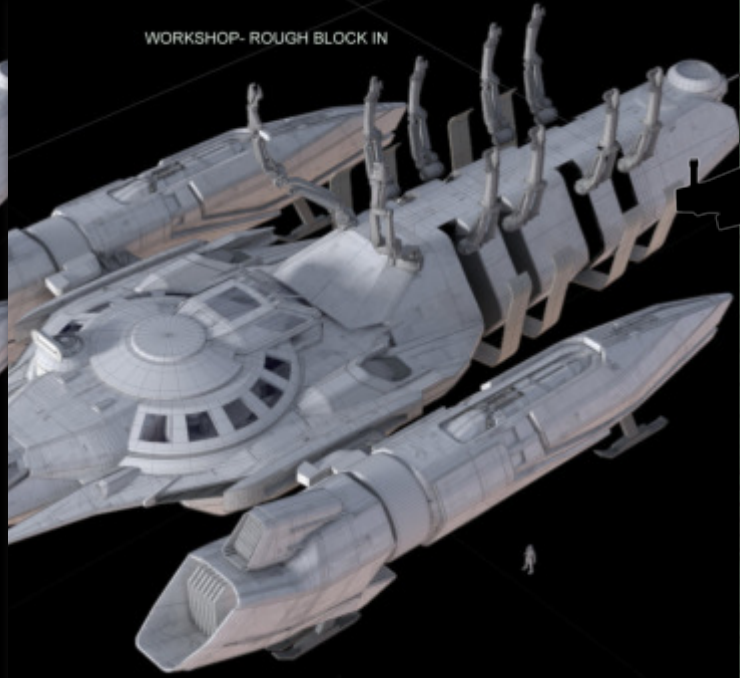
WORK IN PROGRESS

REFINEMENTS PER NOTES-
TALLER WORKSHOP WITH LARGER ARMS
THE WORKSHOP IS VERY TALL INSIDE NOW!

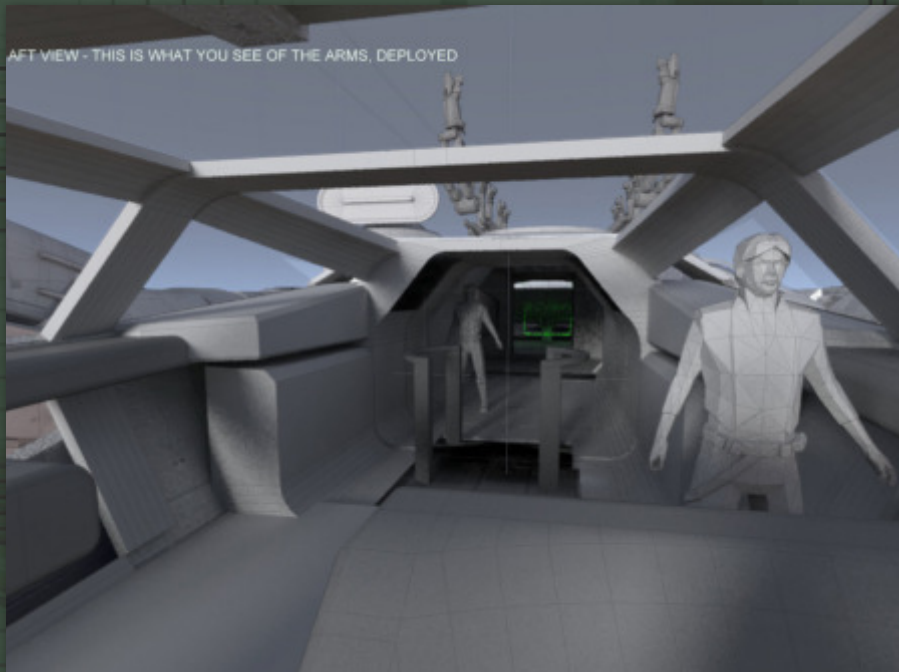
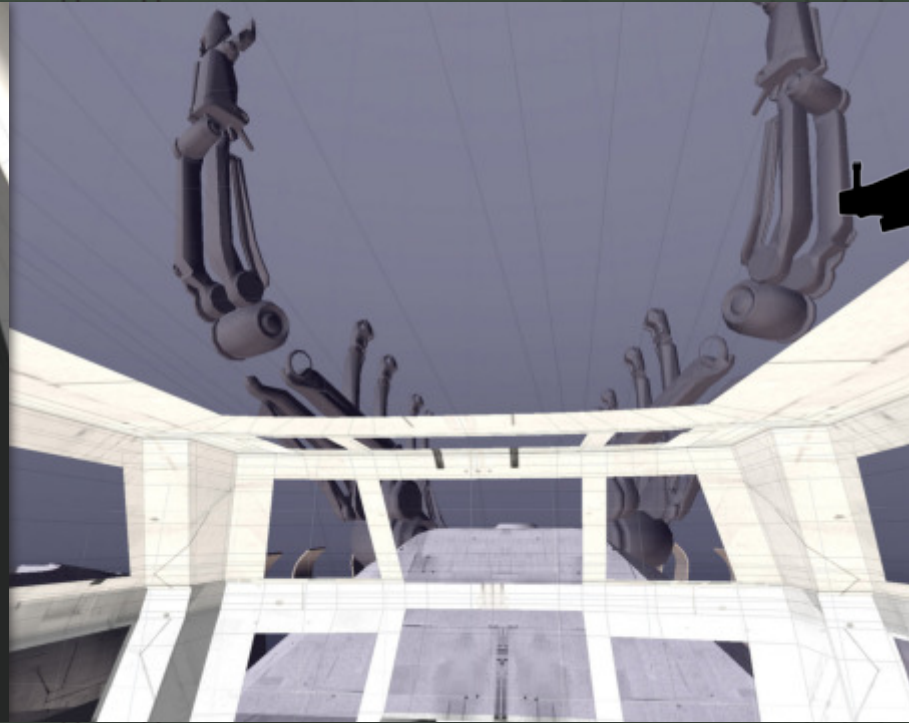
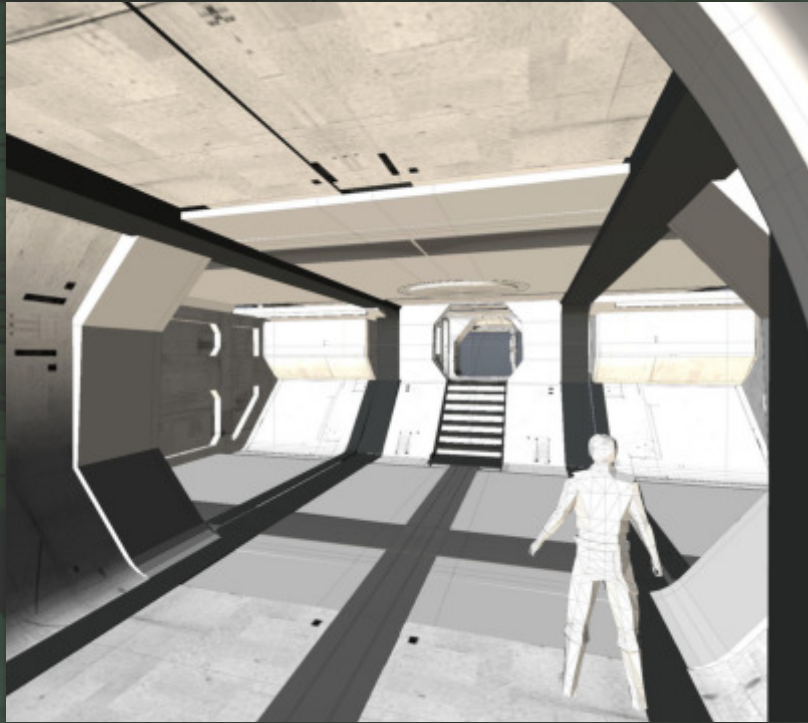
HIGHER MOUNTED OBSERVATION DECK-
ONE WOULD NEED TO WALK UP A FEW STAIRS TO GET THERE NOW



WORKSHOP- ROUGH BLOCK IN



WORKING IN PROGRESS



WORK IN PROGRESS

Chris Roberts: I'm not entirely sold on the shape of the ship – feels kind of "insecty" to me (with the big abdomen and pods on it not helping).

Ryan C: The early stuff is really blocky as I thought the Design Brief was calling for something very utilitarian and chunky looking. You can see how it's gotten more 'Anvil' in the look as it comes along.

Chris S: Awesome, Ryan! I still think the front is looking pretty good at this point, but the skinny rear still looks odd to me. The multiple mechanical arms in the back push it even more into the 'insect' territory for me.

Hannes Appell, Director of Cinematics: Really like that early configuration that is reminiscent of the "Imperial Shuttle," where the engine nacelles can go straight up and the ship is more vertical than it is horizontal. We don't have any ships that fit that category yet, do we? (where the ship is taller than it is wide/long)

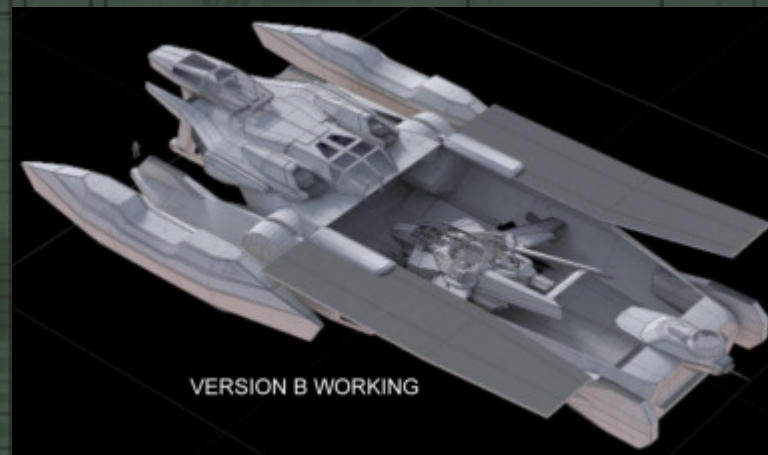
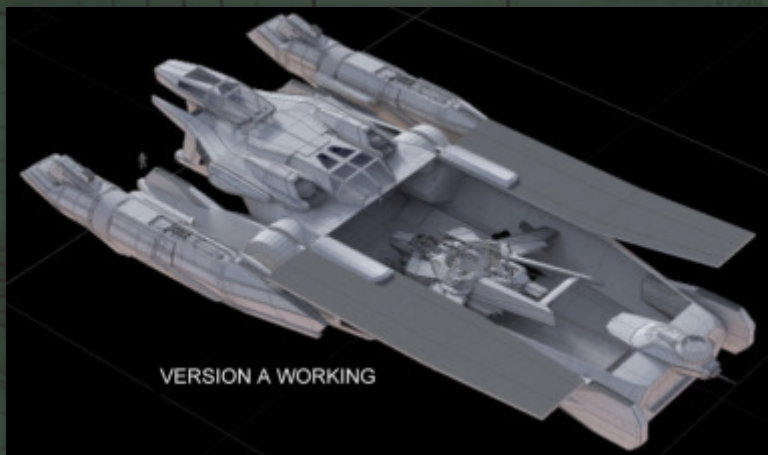
Ryan C: First pass options of new configuration per discussion and notes. Two basic versions; in both versions the engines, in work mode, retract back along the sides and the cockpit rotates aft to look at the workshop bay. Version A has the cruise engines slide aft and pivot 15 degrees to provide the forward thrust. Version B has the engines side aft and pivot 90 degrees to provide the forward thrust. Both versions have a vertical structure from

Chris R: The initial idea of the ship was to have a space-shuttle style bay that could open up and a broken / damaged ship could dock in it and be repaired. That concept seems to have been lost along the way, and even if we went with the arms coming out of the abdomen, it feels like it would only be working on a pretty smallish ship – a Hornet is wider than the current area that it appears could be covered by the arms.

I do think that Chris Smith's notes improve the look – the abdomen looks better in the most recent revision and the way the arms come out is cool. I'm just not sure it is set up for the functionality that we need. Bear with us while I make sure we collect functional and aesthetic feedback. I will make sure there is one direction and set of notes. :)

the bottom of the cockpit that allows for quick entry to the cockpit via elevator; the structure also would have a landing gear at the bottom. That structure strengthens the front end visually and keeps the ship from looking a little bit like the *Serenity* or *Prometheus* – we could remove it though, no problem. All of this is very rough, lacking much of the cool details.

[this page and next two pages]





VERSION A LANDING



VERSION B LANDING



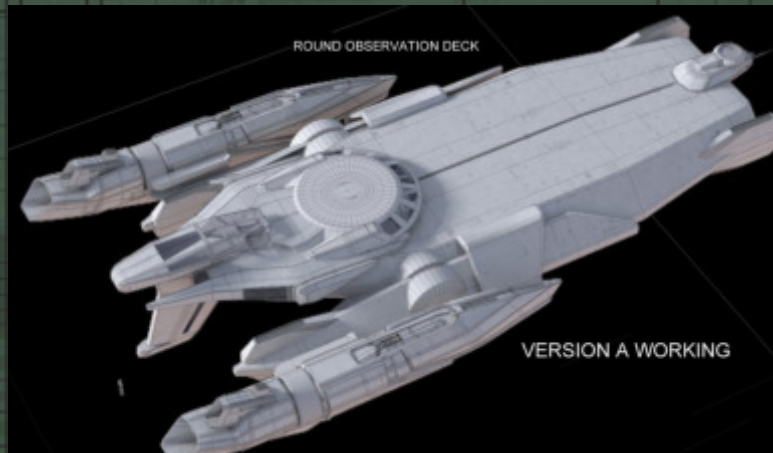
VERSION A WORKING



VERSION B WORKING



VERSION A WORKING



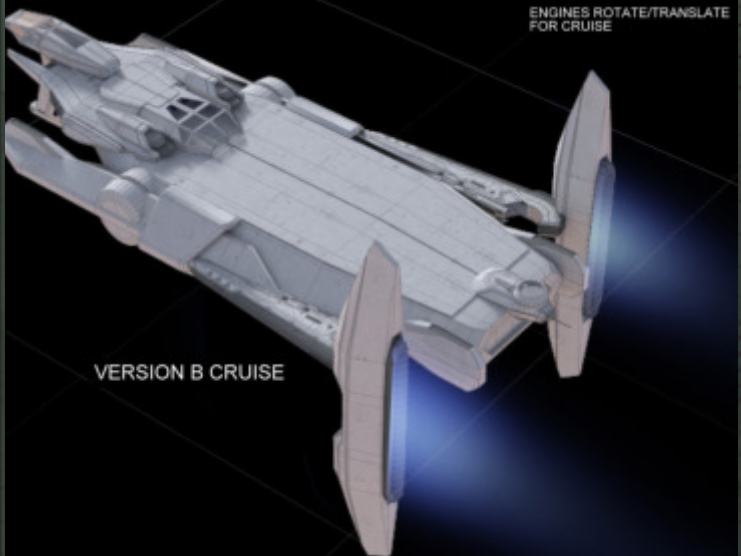
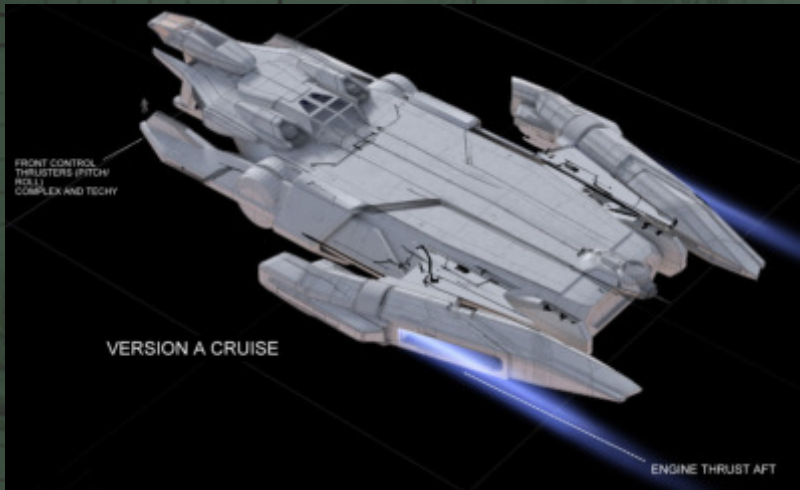
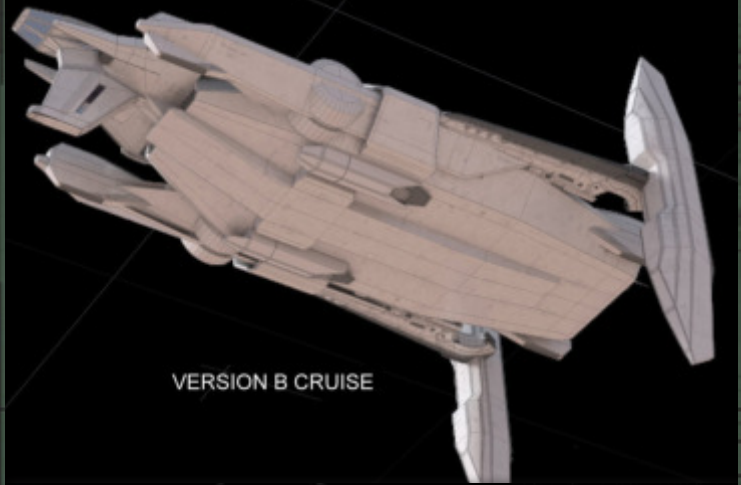
ROUND OBSERVATION DECK

VERSION A WORKING



22

WORKING IN PROGRESS



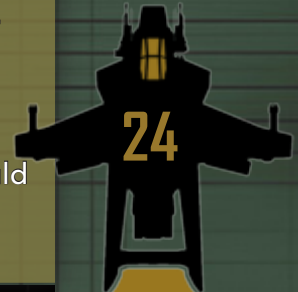
WORKING IN PROGRESS

Ryan C: Anvil Crucible ideation: 3 versions (A, B and C). All are functionally identical, differ in look only. All have a rotating cockpit / observation deck that can, with the engines, face one way when cruising and the opposite way when working or docking. All have a removable aft workshop section with doors that open exposing the top. All land by rotating engines so the exhaust rotates pointing down.

John Crewe, Senior Technical Designer, F42: Is a fully

extended Hornet supposed to fit, in here or is it for smaller ships generally? It feels like it's got millimeters of room to spare between the edges of the wings and the inner hull.

Michael Barclay, Senior Level Designer, F42: Looks like it's a bit restrictive. Wouldn't this be required to repair multiple ships? I'd have thought a ribcage style dock would be flexible enough to repair multiple ship sizes.
[continued, next page]



WORKING IN PROGRESS

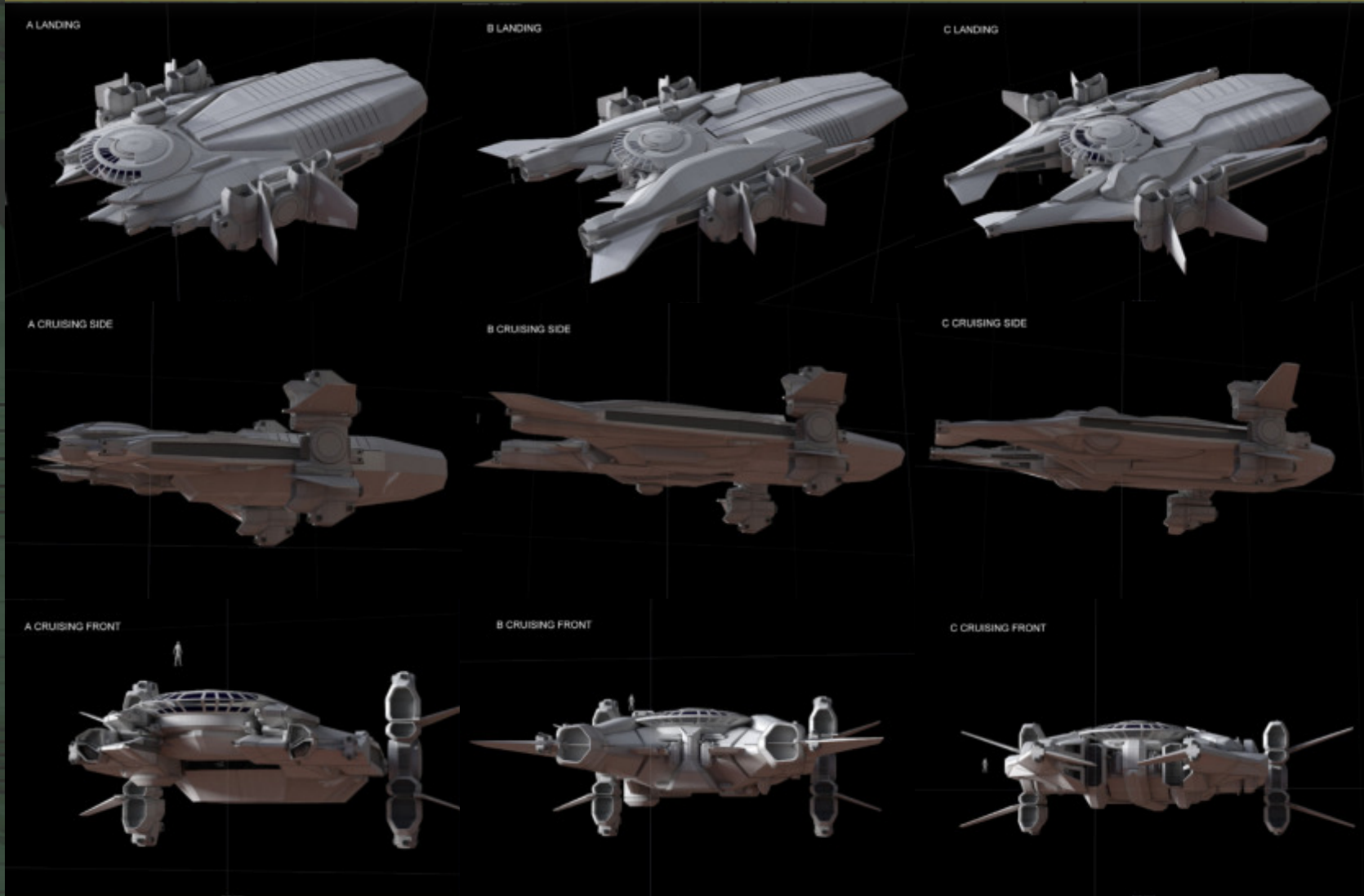
Phil Meller, Lead Designer, S42: Is this ship limited to repairing just light or medium ships? Can't see a Vanguard squeezing into that hold.

Ryan C: Chris' idea was that the Crucible would be able to fully enclose a Gladiator or Aurora-sized craft. For any bigger ship repair, the Crucible has tractor beam grapples to hold it in close formation with the ship being repaired and external arms that would extend and do the work. The

'workshop' can be closed and pressurized, or most of it can open to vacuum for working on those big ships.

The Hornet is shown with wings spread as a worst case; they would normally be swept in to fit better.

Phil M: Ok, so the bay houses a number of repair arms to the sides.



WORKING IN PROGRESS



Ryan C: A few more Crucible images. I'm not sure how often we would see it without the workshop attached, but I wanted to show this in case we do.

Phil M: Really like those front forks that have been added. Just think those inside fins will obscure the view. How about cutting them back?



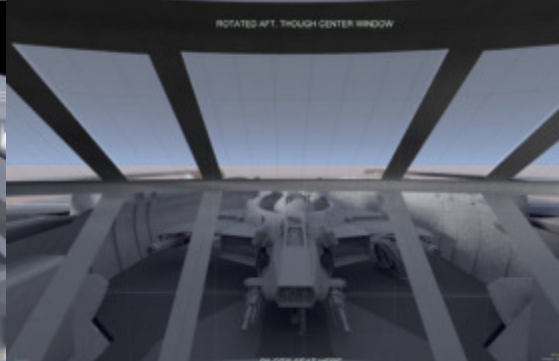
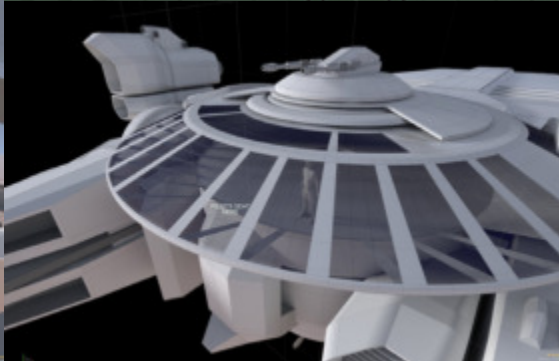
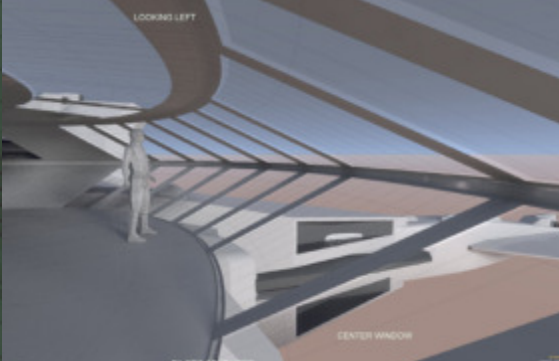
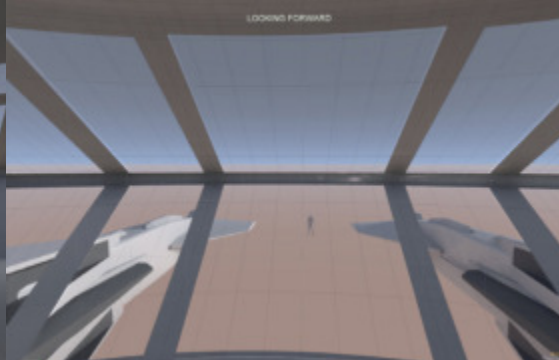
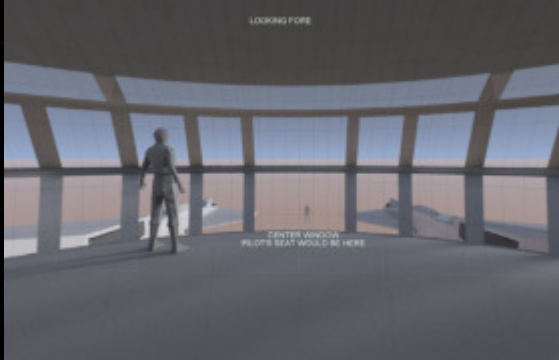
WORKING PRIORITIES

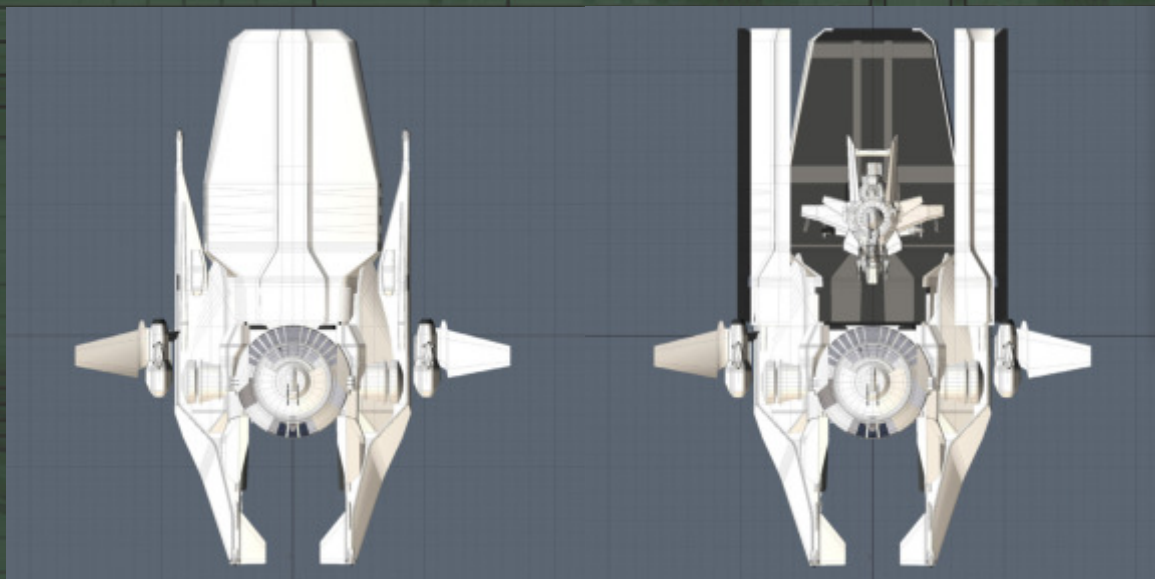
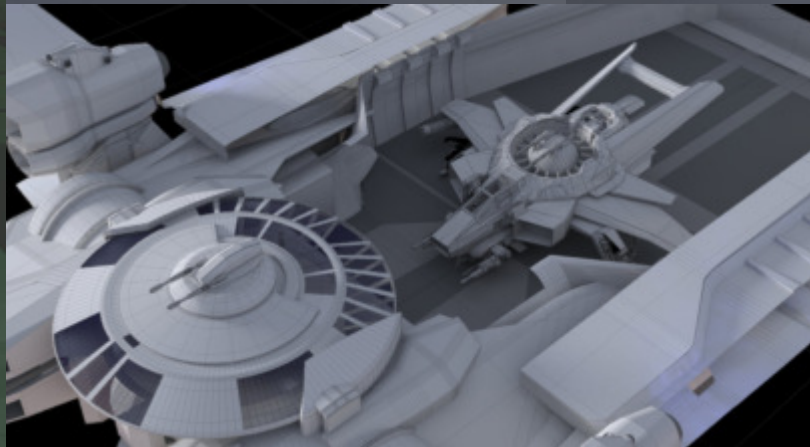
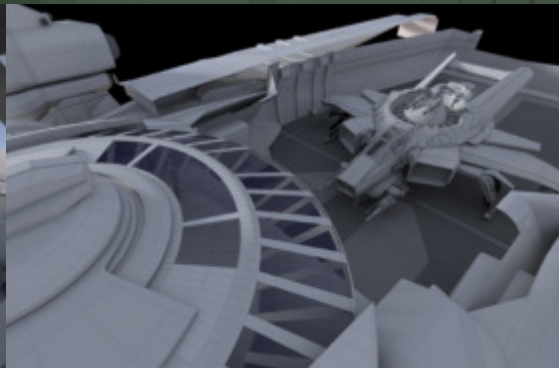
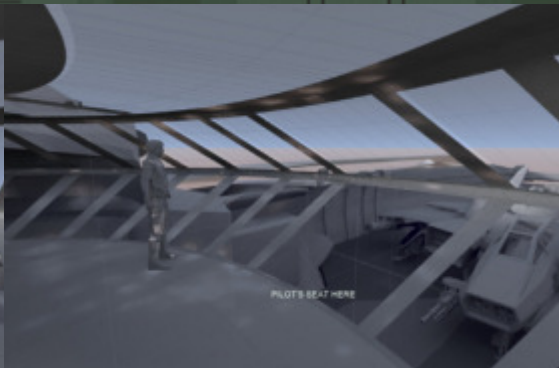
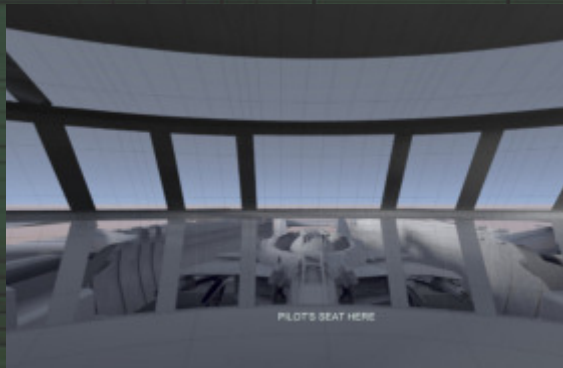
Ryan C: Quick revisions to the Anvil Crucible addressing last feedback and illustrating the visibility out of the cockpit in forward and aft facing modes. Workshop is wider around the Gladiator/Hornet. Added guns above and below cockpit. [this page and next page]

Chris R: The front part of the workshop should open as well. I would make this be part of the two leaves that open, so think of each leaf being an L bracket with the short part of the bracket being the front part and the long part being the top.



WORKING IN PROGRESS

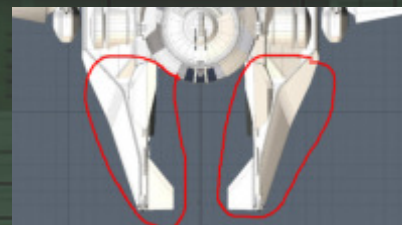




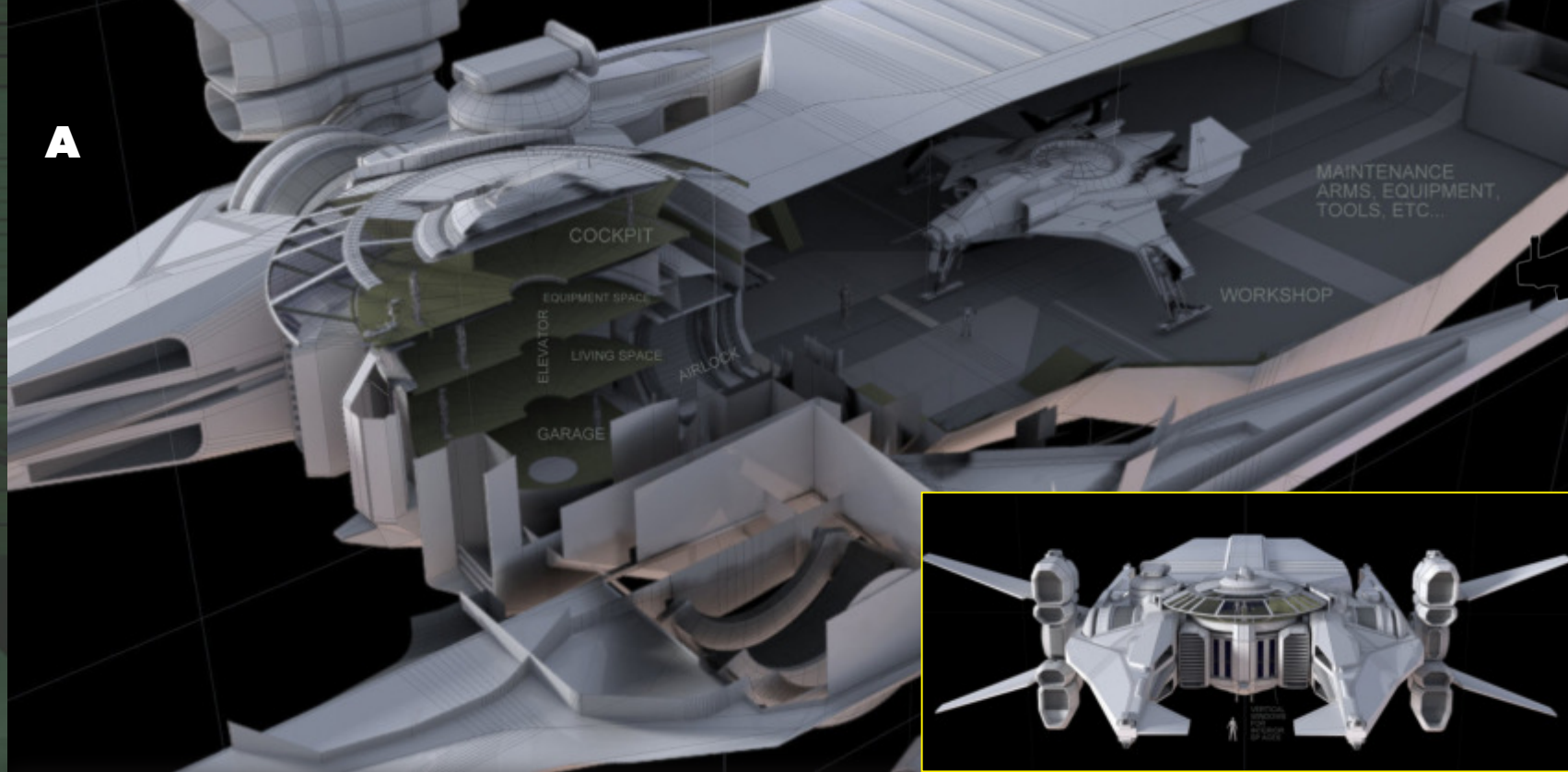
Paul Jones, Art Director, S42: Do these areas have any function? They look like they should, as they are so prominent. I like them; was just wondering.

Mark Skelton, Lead Artist, ATX: It was just a weighting aesthetic to balance out that large workshop area. I don't think they have a real purpose besides stabilization.

Ryan C: They serve all of the functions of a traditional fuselage (control surfaces, landing gear, RCS placement (longer moment for better control), shield generator/sensor placement, aerodynamics, weight and visual balance, equipment and maybe fuel, etc.) ... except they are split in order to give good front/downward visibility from the cockpit.



WORKING PROGRESS

A

Ryan C: Slight explanation of these images: Cutaway showing possible interior spaces. All in a cylinder under the round cockpit, each floor with an elevator running through the center. You can imagine the challenges in creating interior spaces in round rooms, but it might be pretty cool looking, very techy. You can see the vertical windows in the cylinder shown in the outside view. The bottom rear of the cylinder would have an airlock door to the workshop. Also shown is an idea for a possible ramp door on the bottom of the ship; think about if that is a good way to enter the ship or if we need an additional or different entry way.

A) Chris R: I wonder if stairs / ladder would be more appropriate than an elevator. I kind of see the Crucible being a rugged industrial ship; elevator feels very swishy and *Star Trek*. I think the airlock would be more rectangular.

I like the extra rooms for maintenance, tools, etc. in the hangar / workshop area, but they would probably be more towards the airlock as the front needs to open (see previous note).

What would go in the garage?

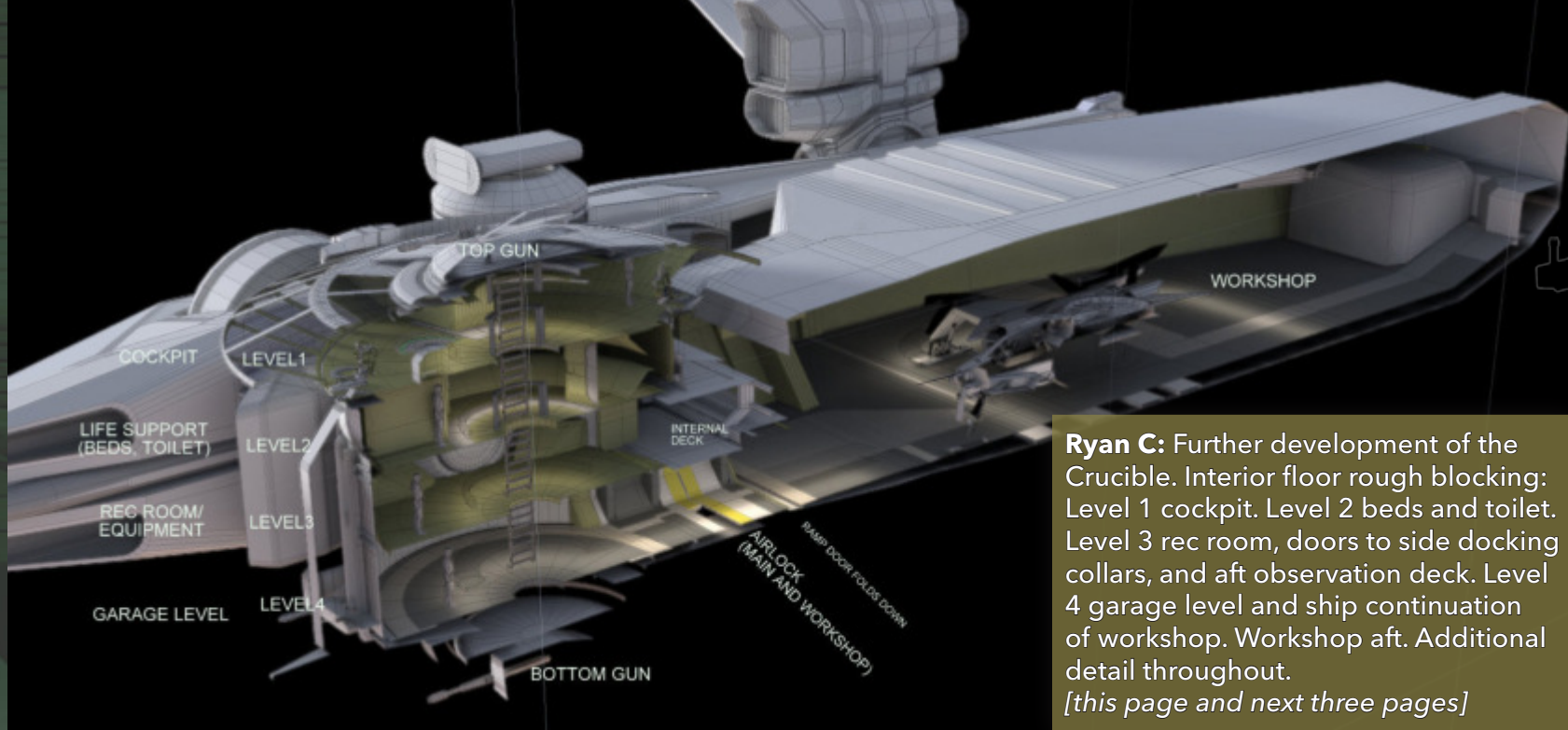
B

B) Chris R: Ramp seems like a good idea (if you have a vehicle in the garage).

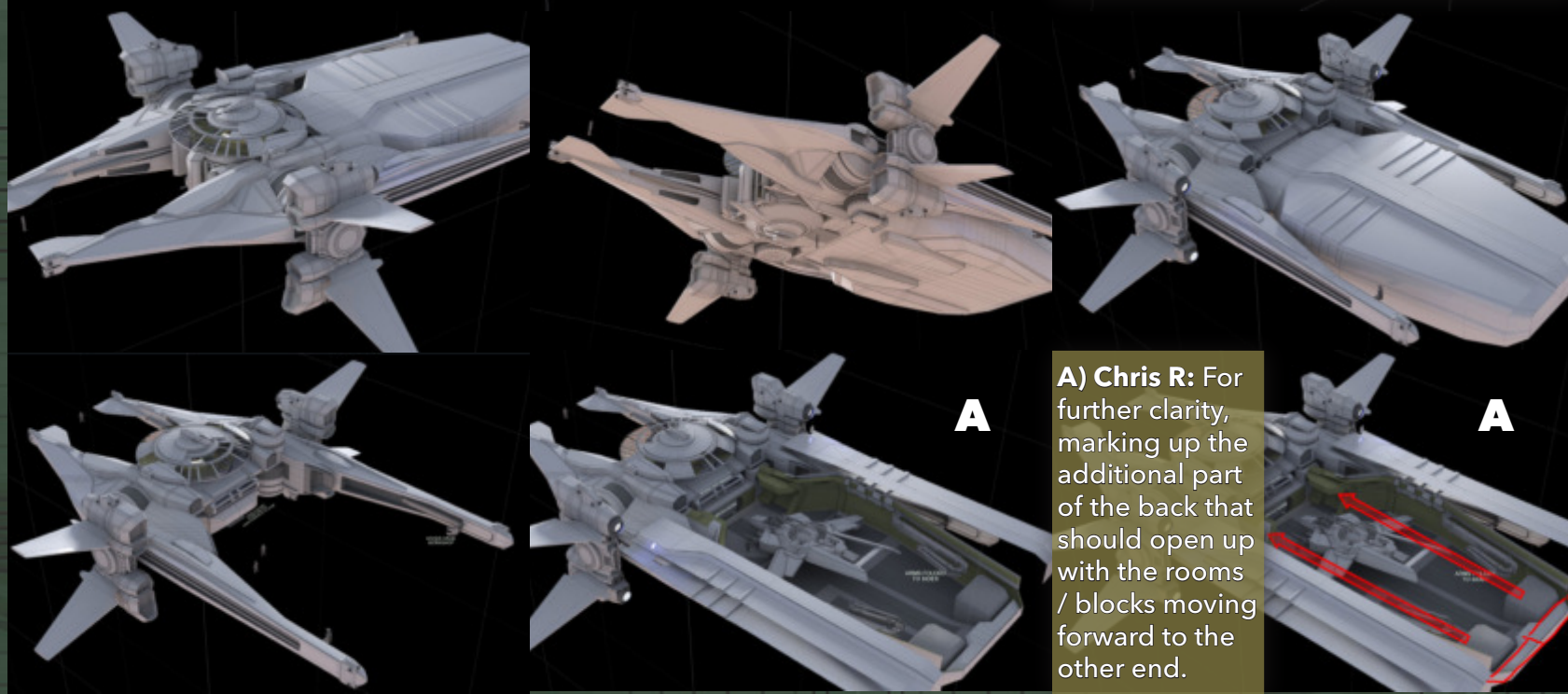
We would also want to be able to leave the workshop on a planet surface or ditched in space / tethered to an asteroid – so perhaps it needs some of its own life support stuff, plus its own skids? Perhaps it can be lowered to the ground?



WORKING IN PROGRESS



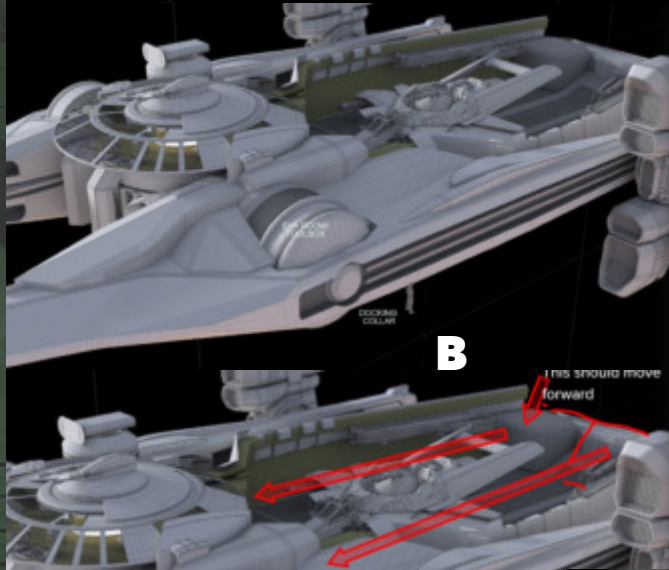
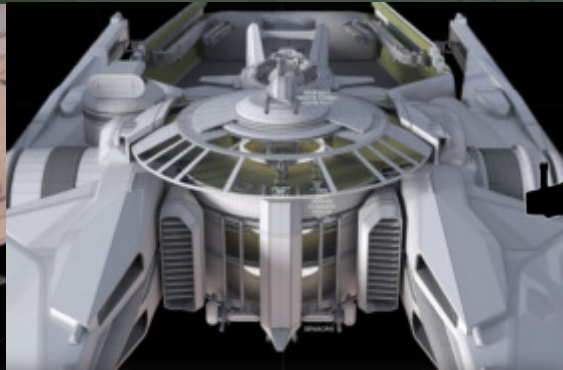
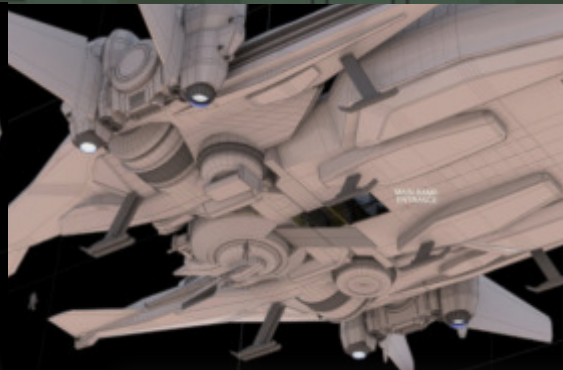
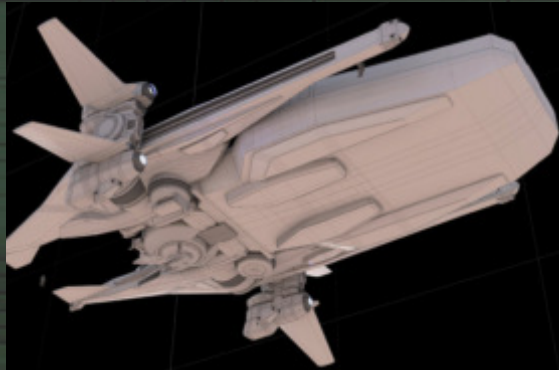
Ryan C: Further development of the Crucible. Interior floor rough blocking: Level 1 cockpit. Level 2 beds and toilet. Level 3 rec room, doors to side docking collars, and aft observation deck. Level 4 garage level and ship continuation of workshop. Workshop aft. Additional detail throughout.
[this page and next three pages]



A) Chris R: For further clarity, marking up the additional part of the back that should open up with the rooms / blocks moving forward to the other end.



WORKING IN PROGRESS

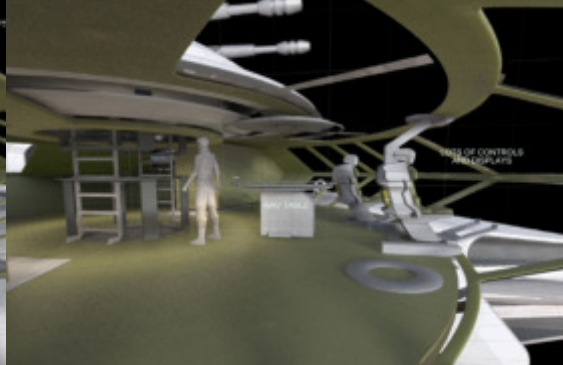
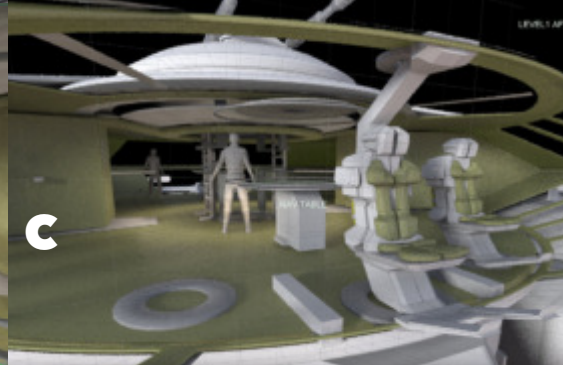
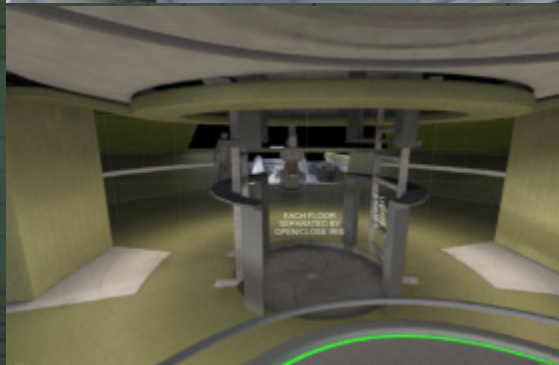


B) Chris R: I've marked up the image. Rooms at back of repair bay should move to the front so the back wall opens up so a ship can fly in. I've made notes on how it should open on another image.

One other note – we had discussed having the arms perhaps not be inside the repair bay, as what happens if you've ditched the bay but are performing work on a bigger ship?

We would need the arms and material storage (perhaps in tank form) for the goo applied by the arms to fix up a ship (think of it as a future version of 3D printing and you need to store certain mixtures of alloys to rebuild / repair ships) outside of the work bay. So arms perhaps come from the side sections (that also have the engines on them).

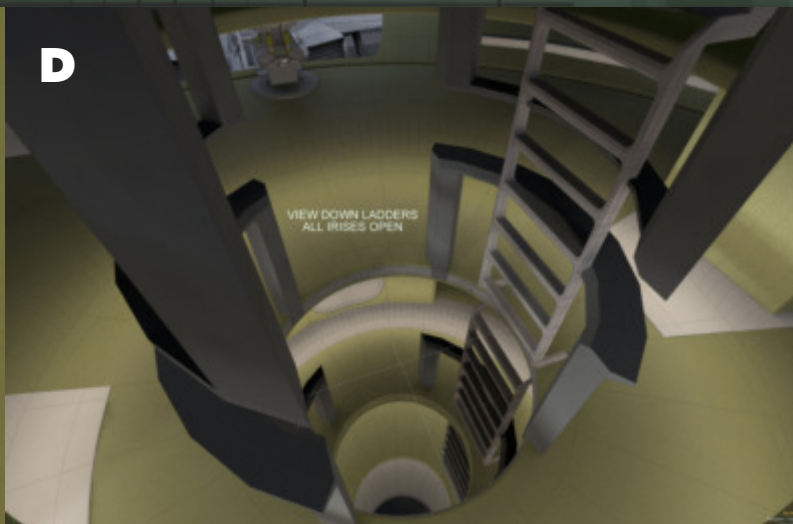
A repair ship will have to be stocked with the appropriate raw materials to fix certain things. A simple hull may require a different material / alloy mix than armor, for instance.



C) Chris R: Looks good to me. I would figure out an Anvil command chair; these feel pretty similar to the Idris ones, which are Aegis.



WORKING PROGRESS



D

D) Paul J: Animation team: will this be a workable solution, having a hole at the bottom of a ladder?

Michael B: This would need its own bespoke mantle/dismount animation, as we don't currently have any other

geometry in the game that looks like this as far as I am aware.

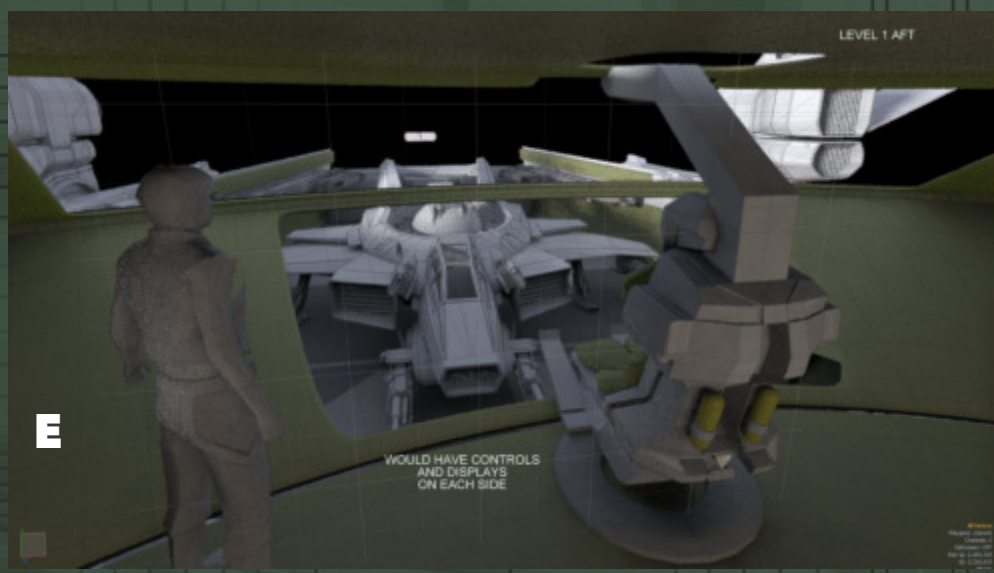
It would also need some special prompts to instruct players when they are level with a floor so as to step off.

Not sure who is in charge of the interior designs of these ships, but from an environment standpoint my gut says avoid these unique layouts and do something more standard.

Ryan C: I originally had an elevator there. Chris requested ladders; he felt they better suited the design of the ship (simple and utilitarian rather than swooshy and star trekky).

Chris R: It may be simpler to go back to an elevator.

We also talked about whether there would need to be the equivalent of a freight / platform elevator for the first level as I think the 1st floor (with the workshop level being ground) had storage for parts and equipment.

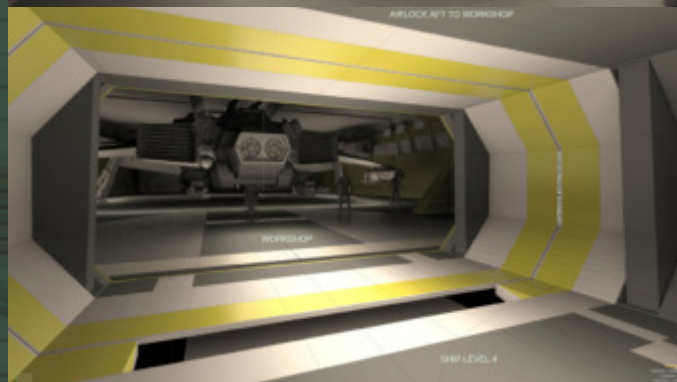
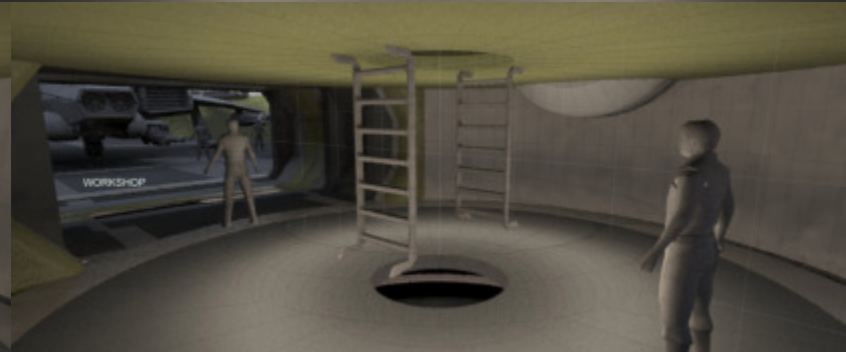


E



E

E) Chris R: Marked up back of workshop (is this aft or fore :-)) that is meant to open so a ship can fly in. My suggestion would be to split the wall in half and have the left side be part of the left roof section (that is open in this render) and the right side go with the right roof section. Kind of like how the top Constellation turret covering works.



F) Chris R: I think we want a little more height in the repair bay.

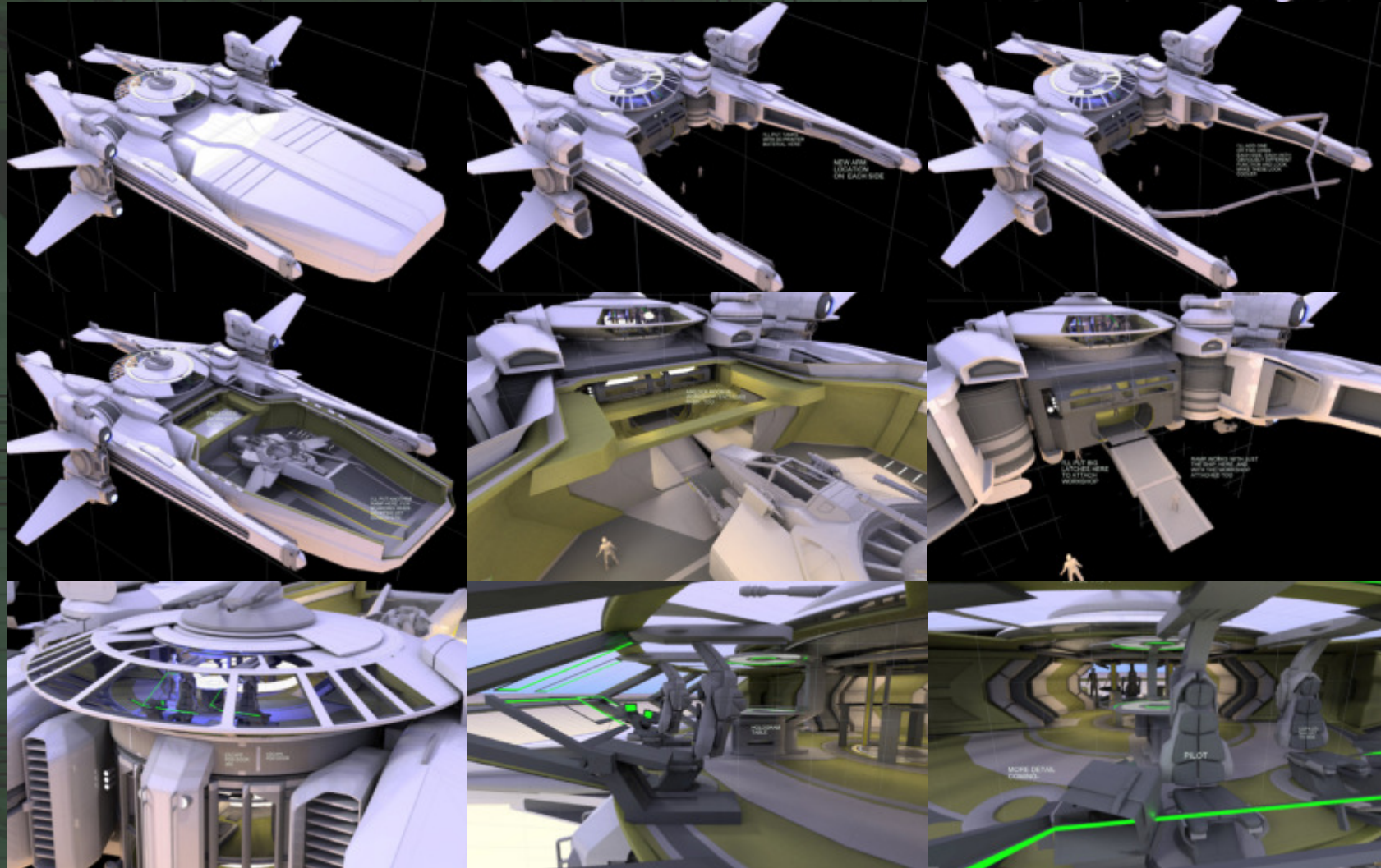
Also my previous note that we want the far end to fully open seems to be lost as we still have some rooms down that way ...

F



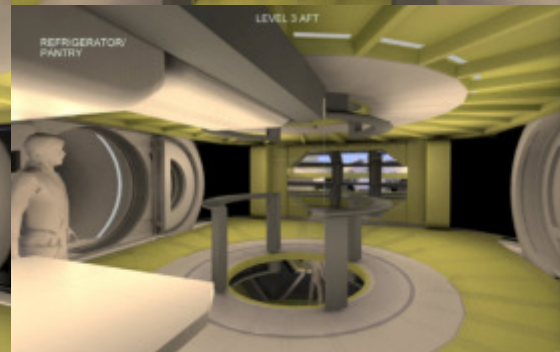
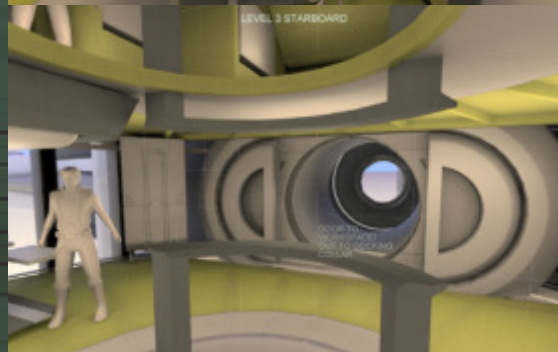
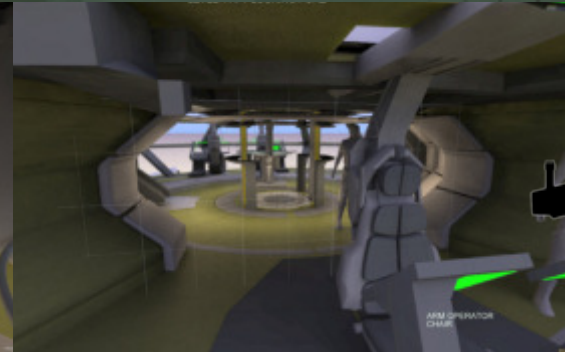
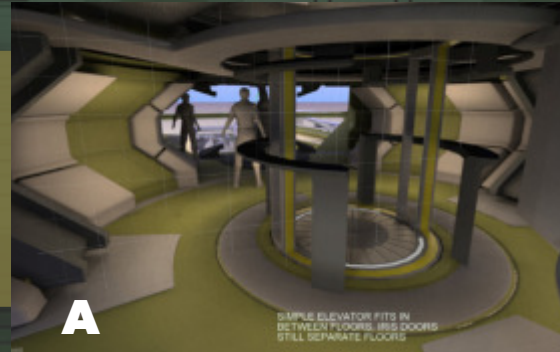
WORKING IN PROGRESS

Ryan C: Anvil Crucible work: addressing last notes and blocking in low-detail versions of components. Mostly interior work. Moved work arms to ship instead of workshop (making these arms look cooler, differentiating per function – and adding more arms would look cool). Enclosed part of the workshop for when you detach it from the ship. I think I'll add some living space to the workshop for when it's left behind somewhere. Replaced ladders with a simple elevator. Etc.

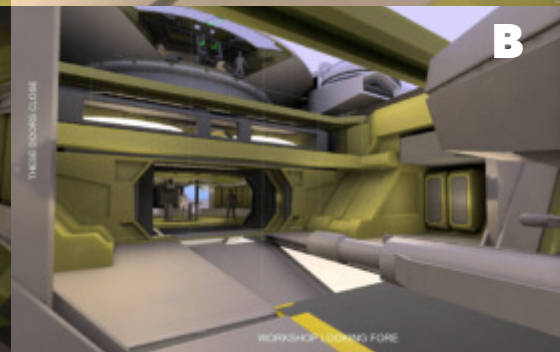


WORKING PRIORITIES

A) Chris S: While this area looks cool, I'm worried that this construction style is going a bit in the direction of the RSI ships, especially the (main) columns and the elevator guard rails. Just keep an eye on that. ;)



B) Chris S: This space is looking nice! The only part I'm worried about is the pinch zones on each side of the ramp/door area. I could see that being a potential problem with navigating players around that area, having to go to the corners of the doors to get around the hole when it's landed and the ramp is down. Some fixes that come to mind:

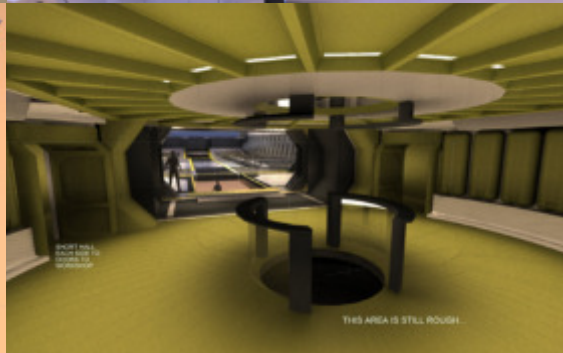
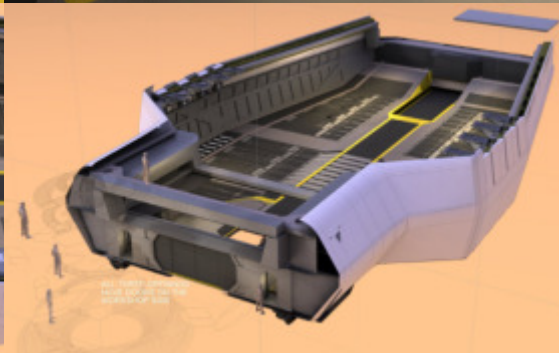
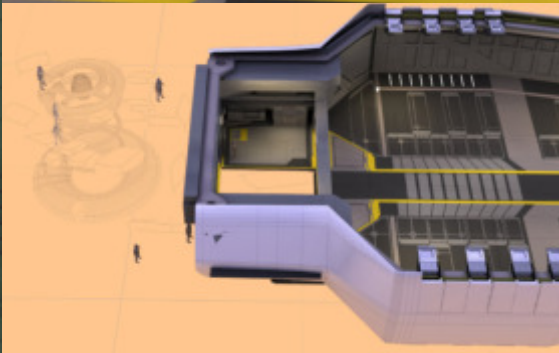
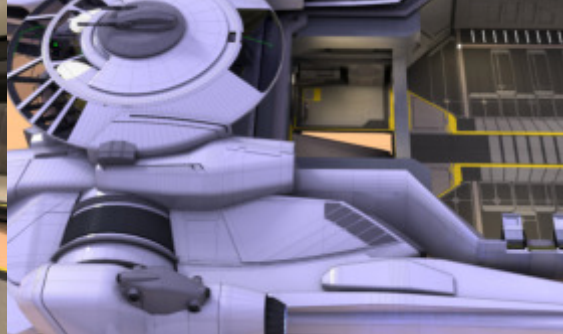
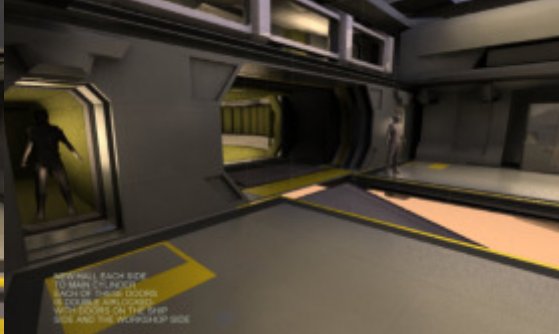
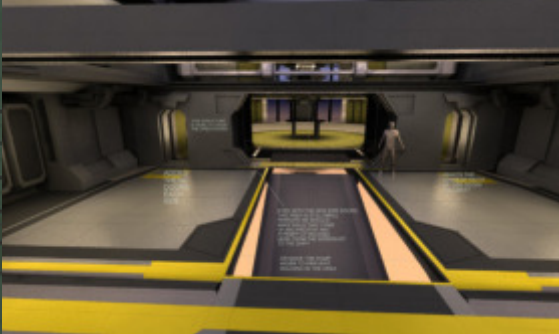
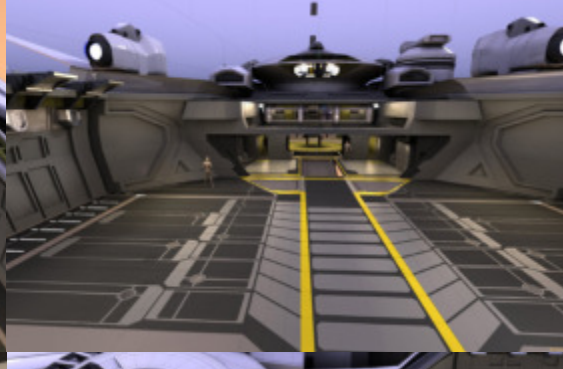
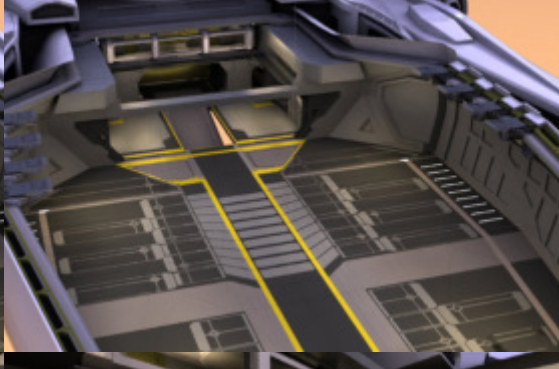
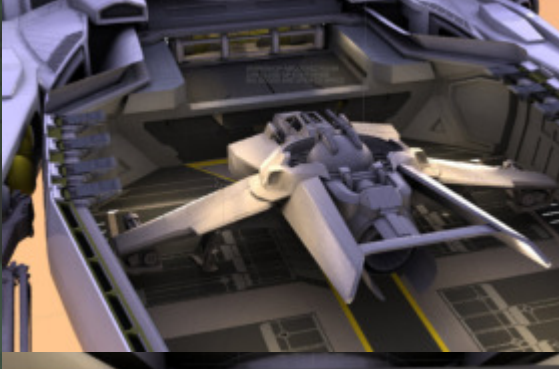
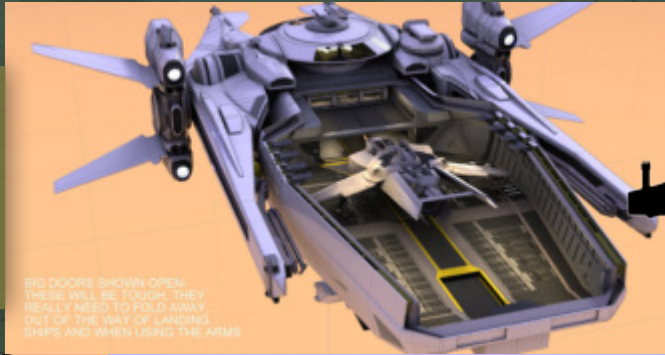


- a. Add floor 'buffer' in front of door entrance so ramp is 'pushed' a little out.
- b. Add (regular size) doors to either side.
- c. Make big door wider to give more space for player to navigate around hole in the floor.



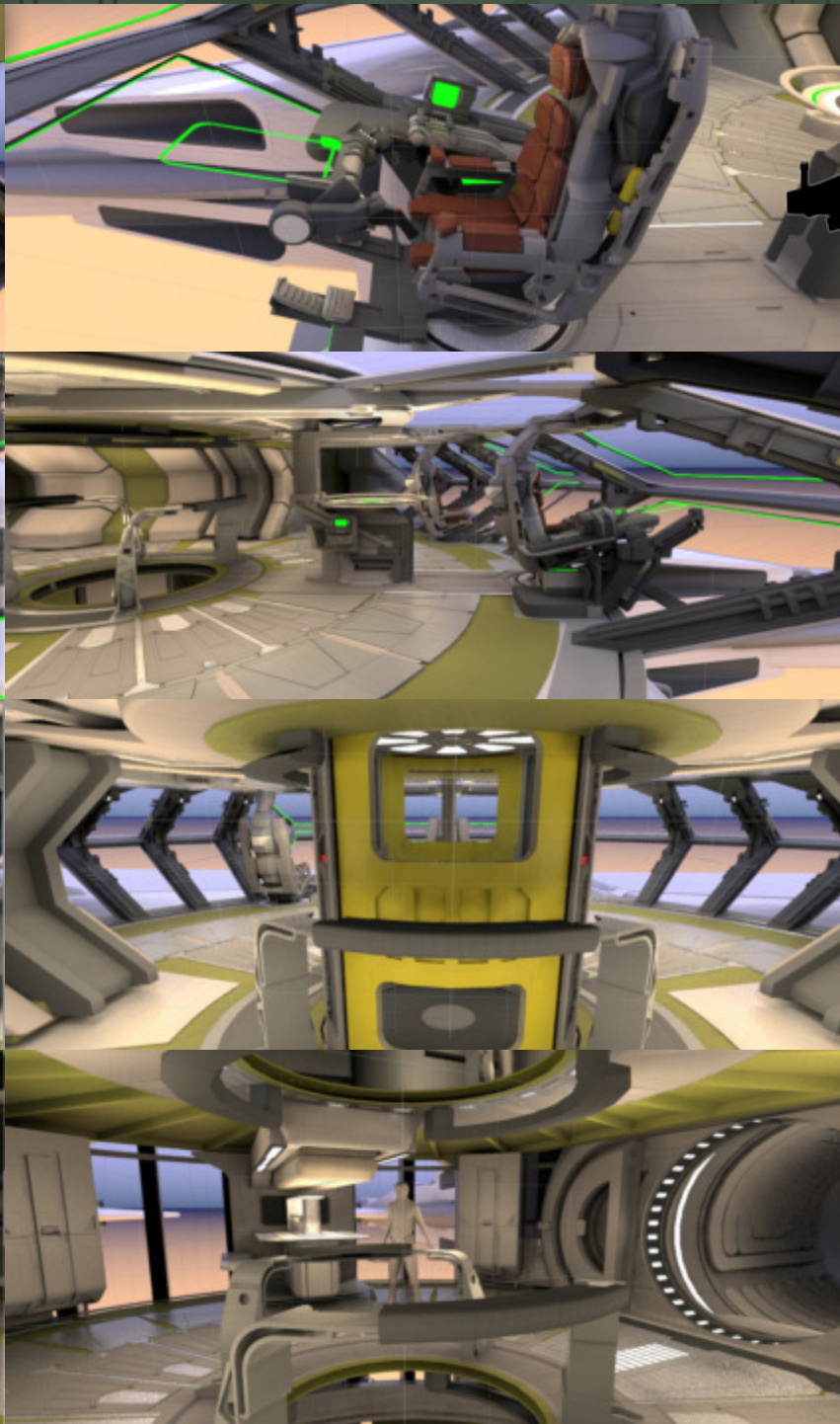
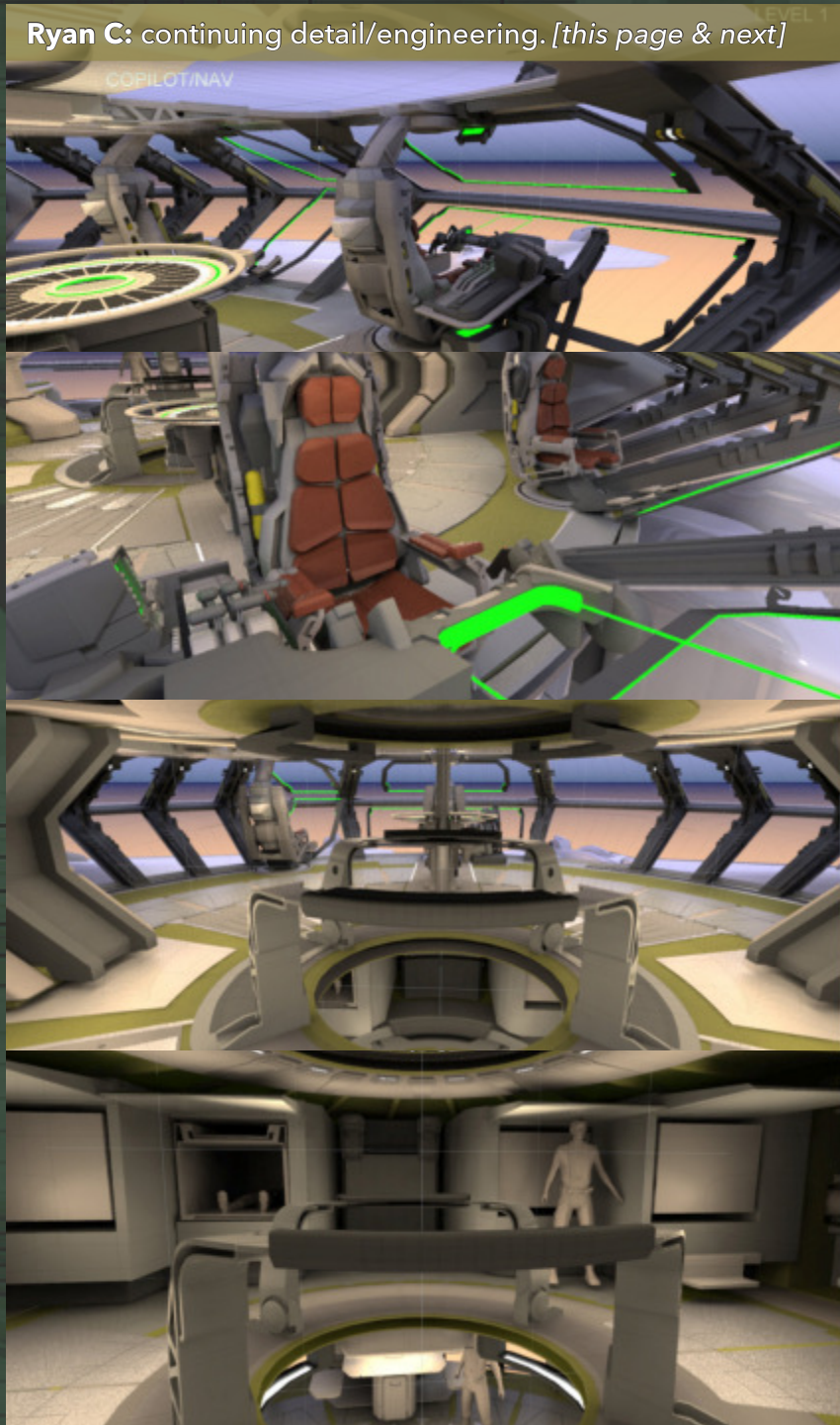
WORKING PROGRESS

Ryan C: A quick check-in with some work on areas noted in the last pass – mainly trying to address the 'pinch zones' by the doors from the workshop to the ship. I added small doors/halls on each side – what is the minimum width of the door/hallway? Shall I widen the ramp to completely remove the option of trying to cut the corner and use the big central door when the ramp is down?

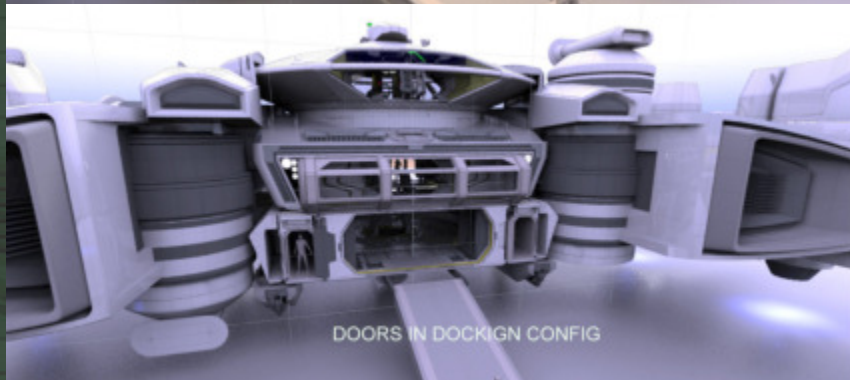
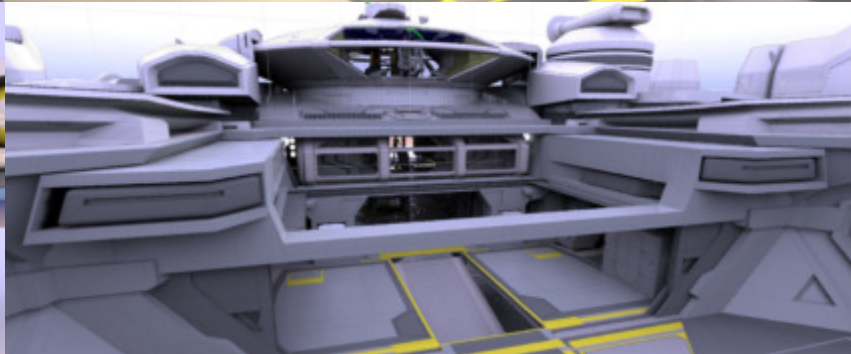
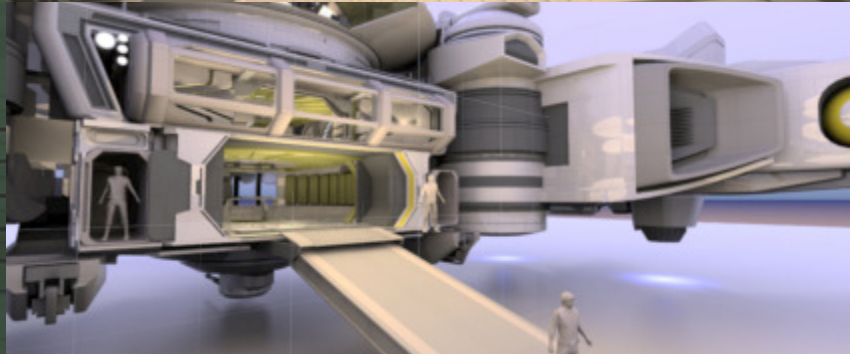
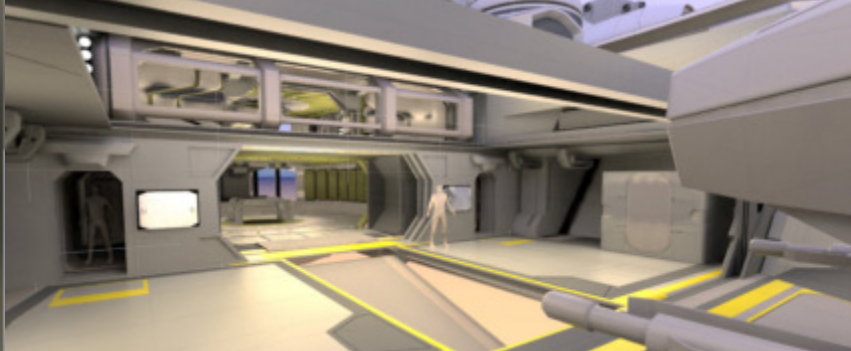
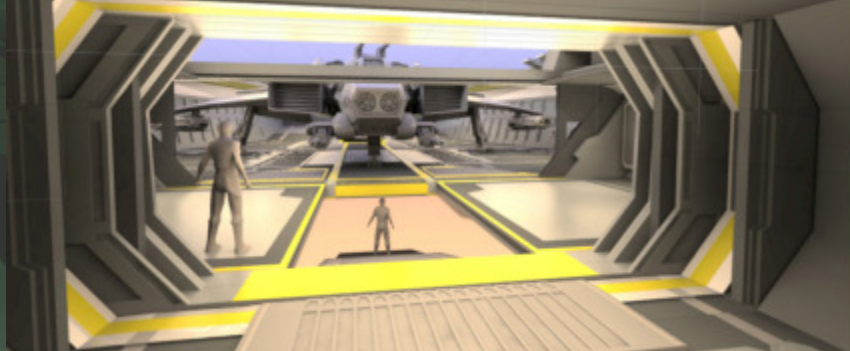
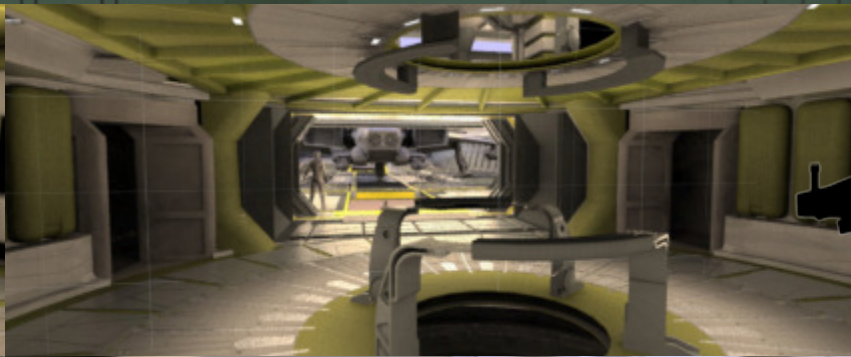
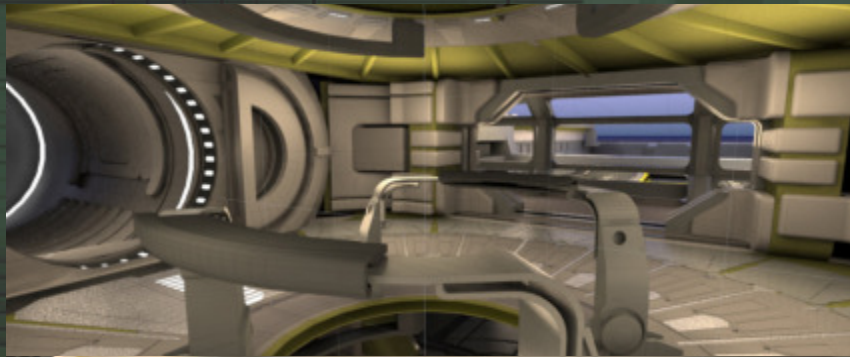


WORK IN PROGRESS

Ryan C: continuing detail/engineering. [this page & next]



WORK IN PROGRESS



DOORS IN DOCKIGN CONFIG



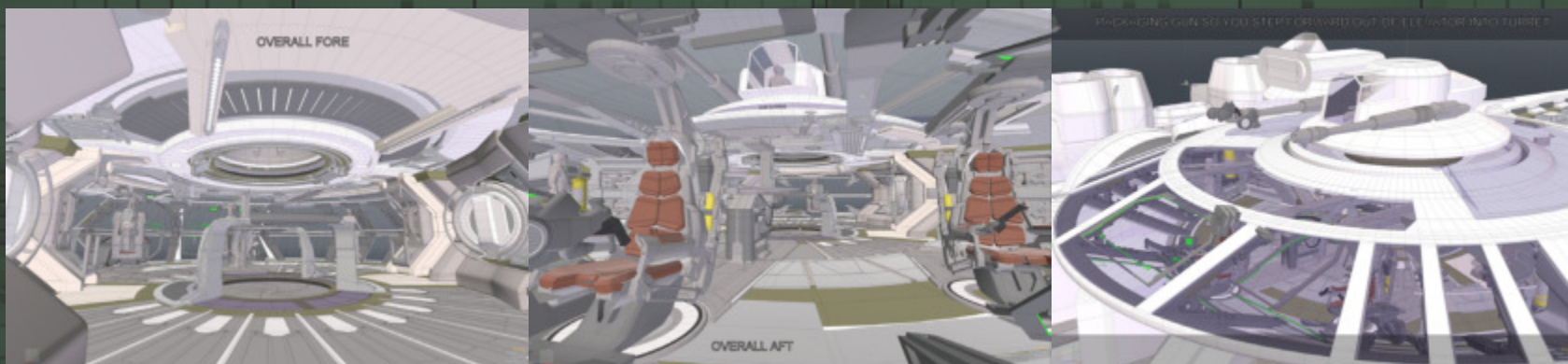
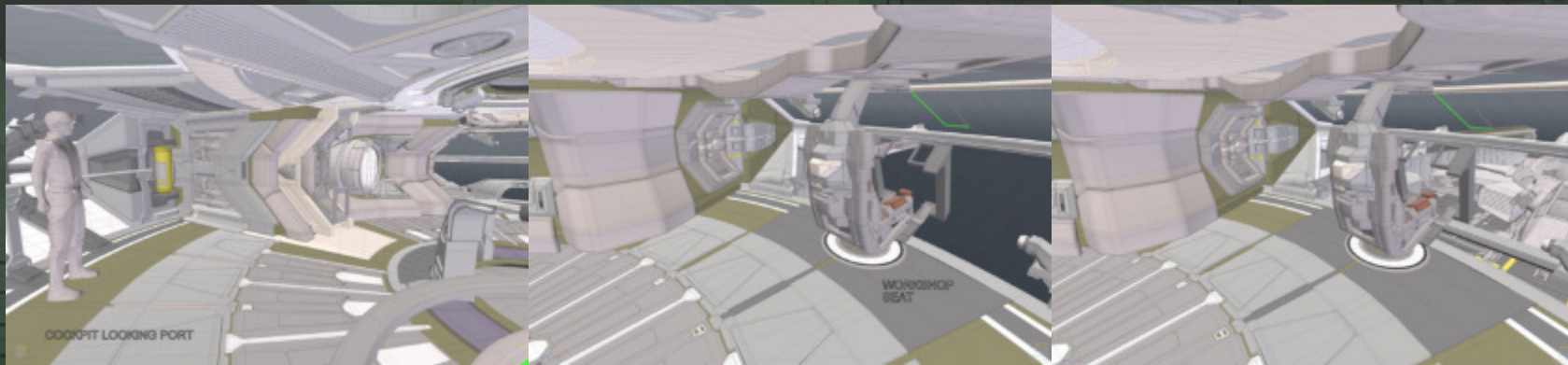
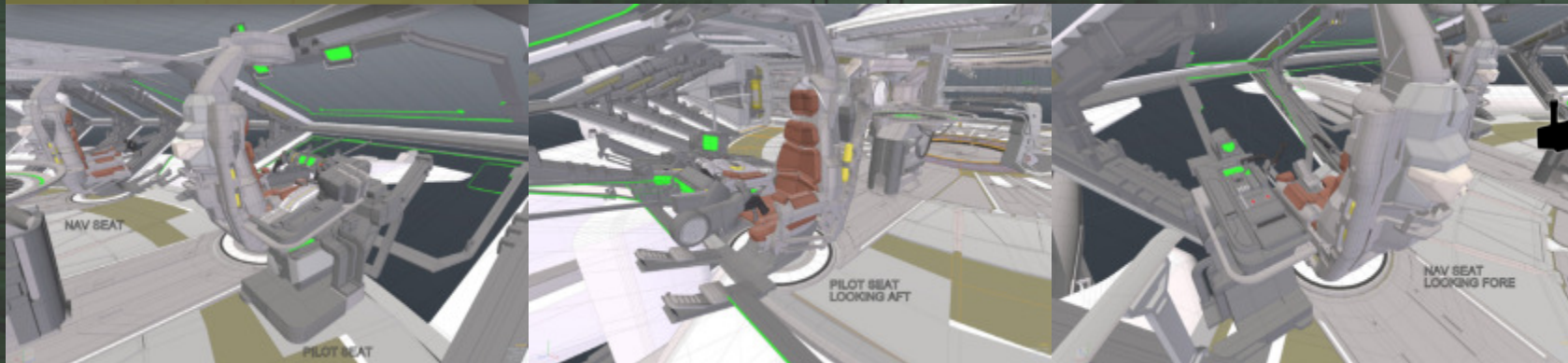
AFT SENSOR ARRAY

DOORS IN WORKSHOPLESS CONFIG



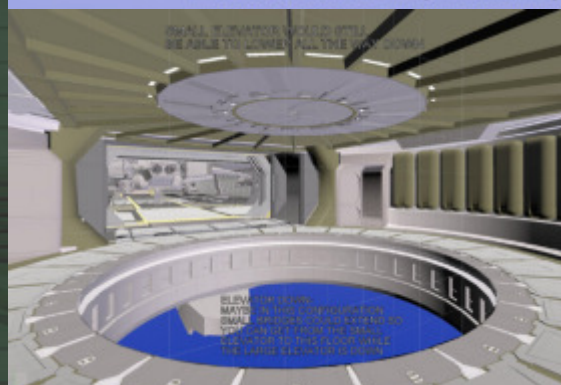
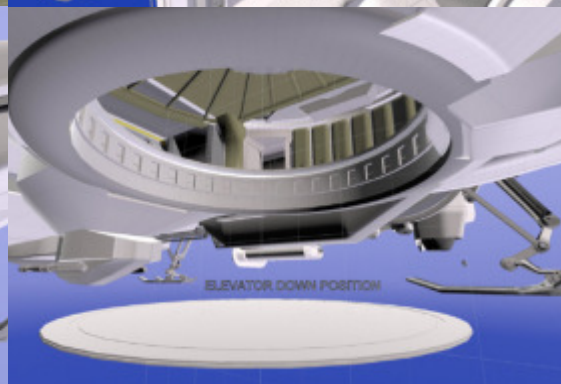
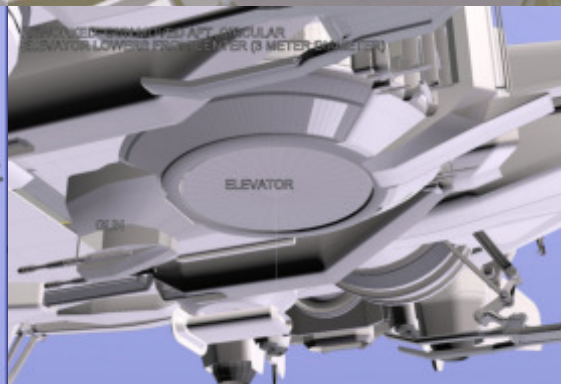
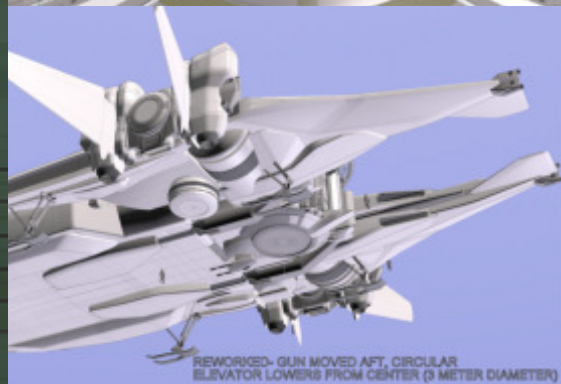
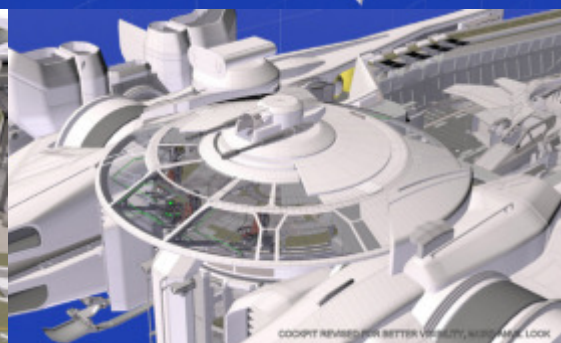
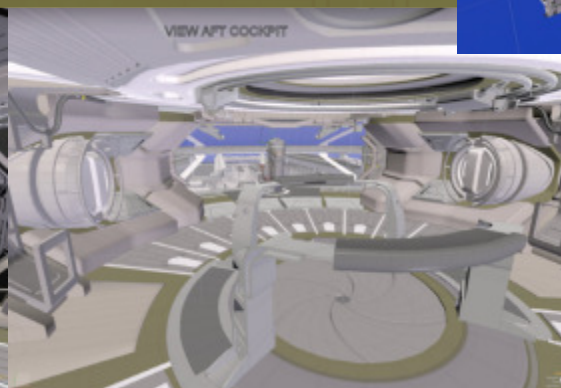
WORKING PROGRESS

Ryan C: Cockpit detail and packaging.



WORK IN PROGRESS

Ryan C: Revisions/additions based on notes; work on cockpit and seats for more Anvil look; added bottom elevator (3-meter diameter); moved bottom gun; added workshop control stations. One major revision for seating position: the Arm Operator is seated centrally with pilot/nav outboard of him, but the seats slide fore and aft for best visibility based on the configuration. I really think we should go with this option; let me know any feedback so I can run with this.

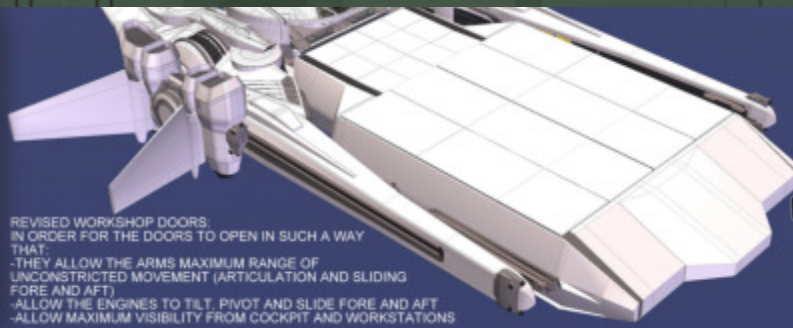


WORK IN PROGRESS

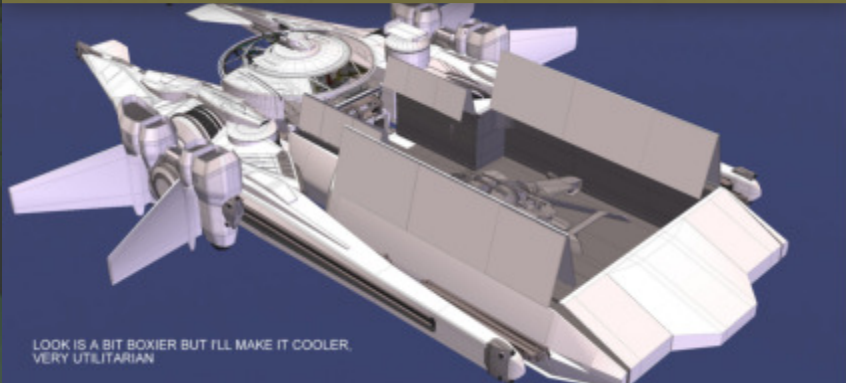
Ryan C: Revised workshop doors in order for the doors to open in such a way that they allow:

- the arms' maximum range of unconstricted movement (articulation and sliding fore and aft)
- the engines to tilt, pivot and slide fore and aft
- maximum visibility from cockpit and workstations

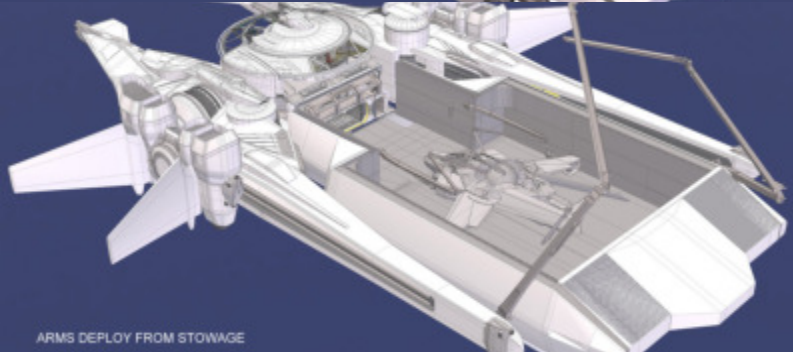
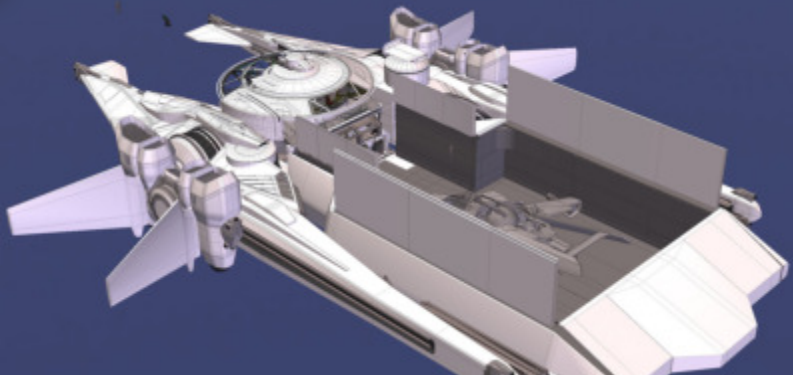
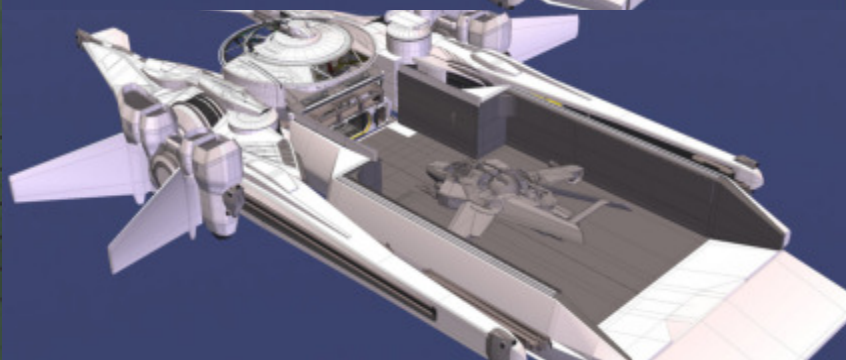
I've come up with this solution.



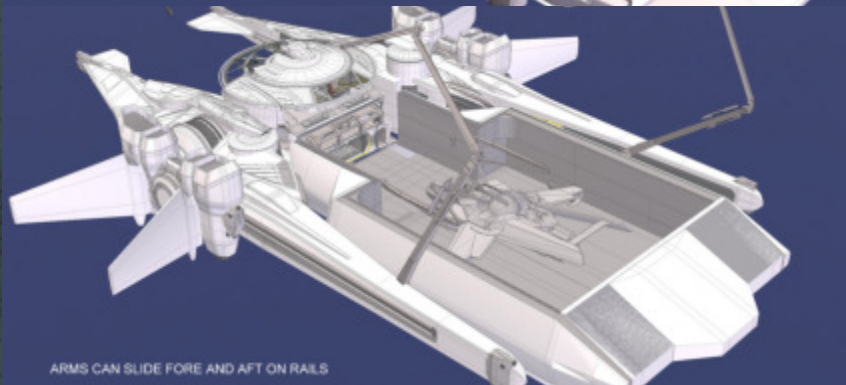
REVISED WORKSHOP DOORS:
IN ORDER FOR THE DOORS TO OPEN IN SUCH A WAY THAT:
-THEY ALLOW THE ARMS MAXIMUM RANGE OF UNCONSTRICTED MOVEMENT (ARTICULATION AND SLIDING FORE AND AFT)
-ALLOW THE ENGINES TO TILT, PIVOT AND SLIDE FORE AND AFT
-ALLOW MAXIMUM VISIBILITY FROM COCKPIT AND WORKSTATIONS



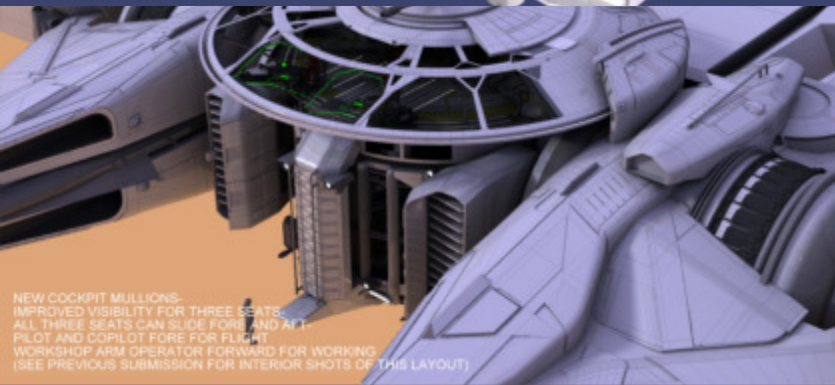
LOOK IS A BIT BOXIER BUT I'LL MAKE IT COOLER, VERY UTILITARIAN



ARMS DEPLOY FROM STOWAGE



ARMS CAN SLIDE FORE AND AFT ON RAILS



NEW COCKPIT MULLIONS-
IMPROVED VISIBILITY FOR THREE SEATS.
ALL THREE SEATS CAN SLIDE FORE AND AFT-
PILOT AND COPILOT FORE FOR FLIGHT
WORKSHOP ARM OPERATOR FORWARD FOR WORKING
(SEE PREVIOUS SUBMISSION FOR INTERIOR SHOTS OF THIS LAYOUT)

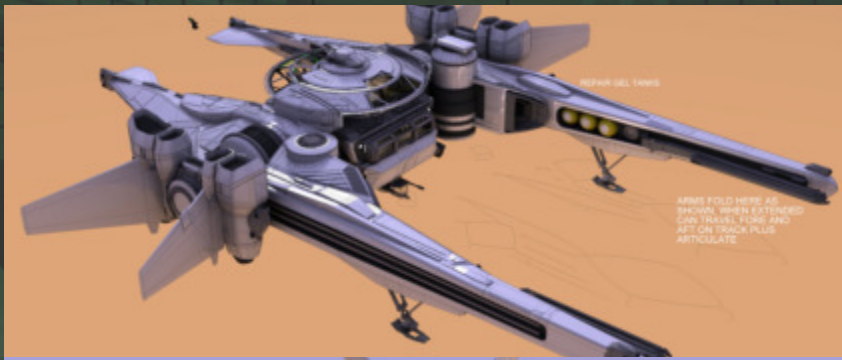


WORK IN PROGRESS

Ryan C: Continuing work in preparation for presentation illustrations. [this page and next page]



NEW WORKSHOP CAN FOLD DOORS AWAY FOR UNOBSTRUCTED WORK WITH EXTERIOR ARMS AND UNOBSTRUCTED VISIBILITY FROM COCKPIT

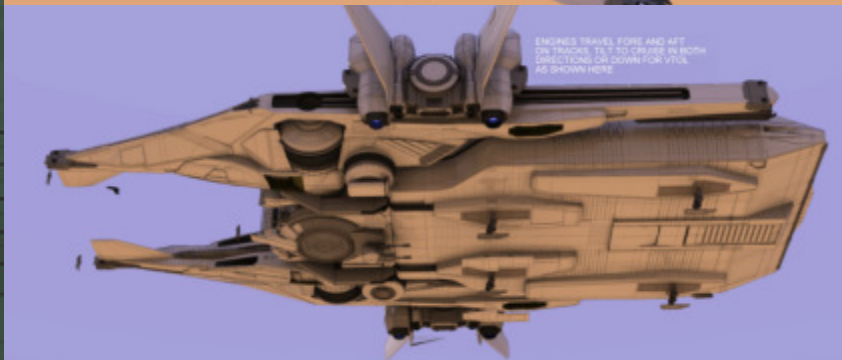


REFUEL DEL TANKS

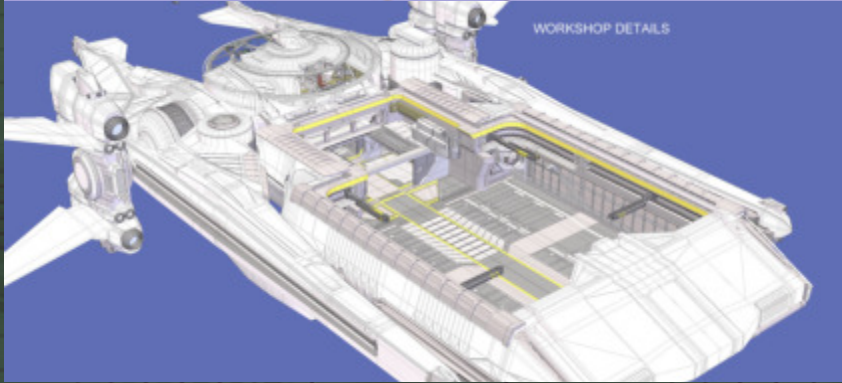
ARMS FOLD HERE AS SHOWN WHEN EXTENDED CAN TRAVEL FORWARD AND AFT ON TRACK PLUS ARTICULATE



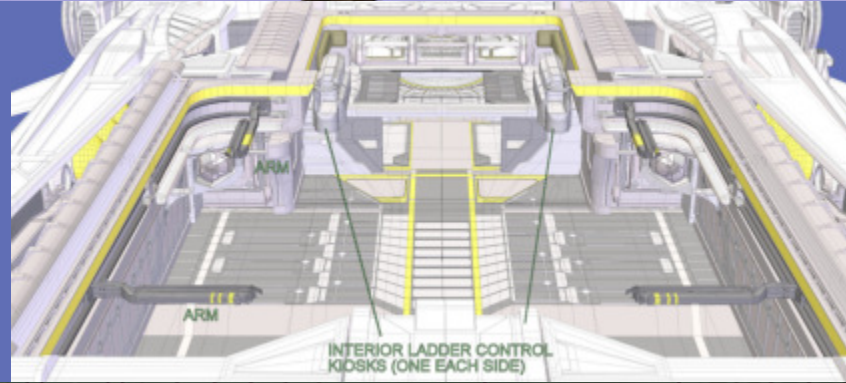
CONTINUING EXTERIOR DETAILING



ENGINES TRAVEL FORE AND AFT ON TRACKS, AS WELL TO CHANGE DIRECTION OR DOWN FOR VTOL AS SHOWN HERE

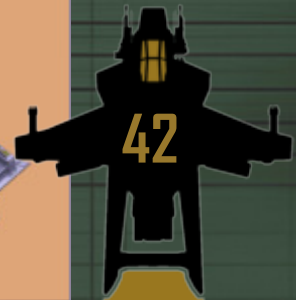


WORKSHOP DETAILS

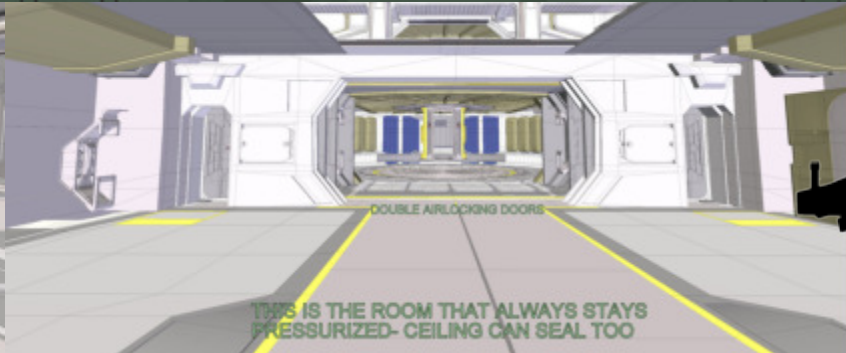
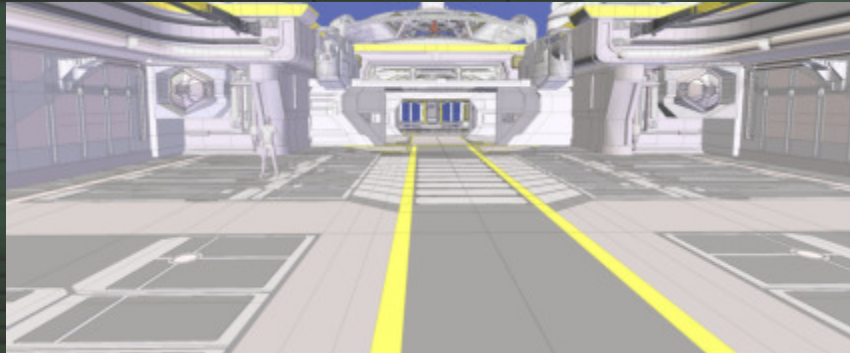


ARM

INTERIOR LADDER CONTROL KIOSKS (ONE EACH SIDE)



WORK IN PROGRESS

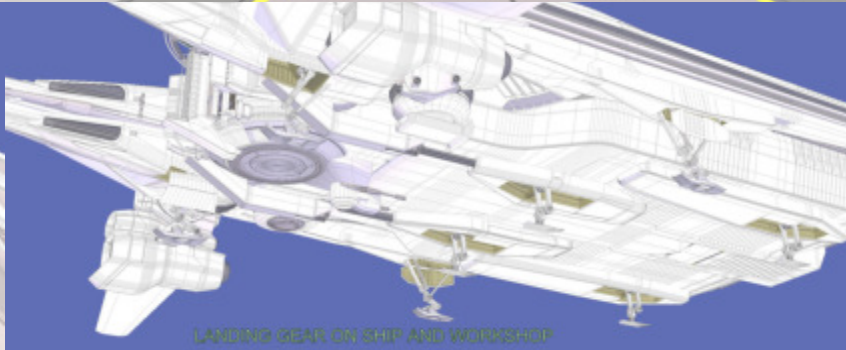
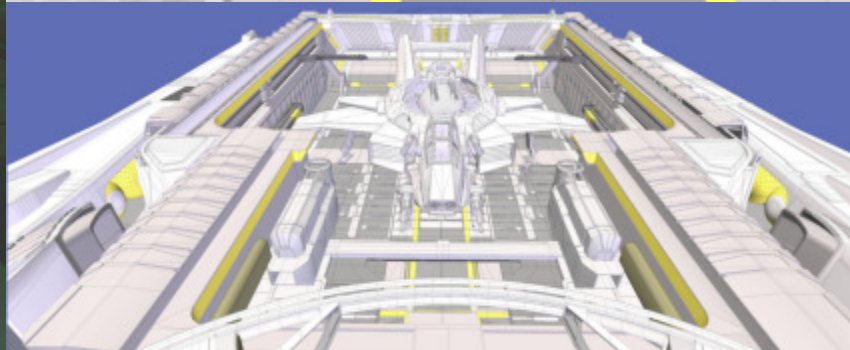


DOUBLE AIRLOCKING DOORS

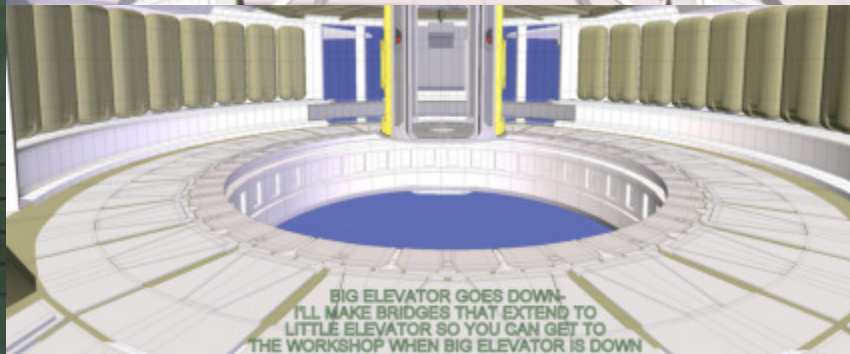
THIS IS THE ROOM THAT ALWAYS STAYS PRESSURIZED- CEILING CAN SEAL TOO



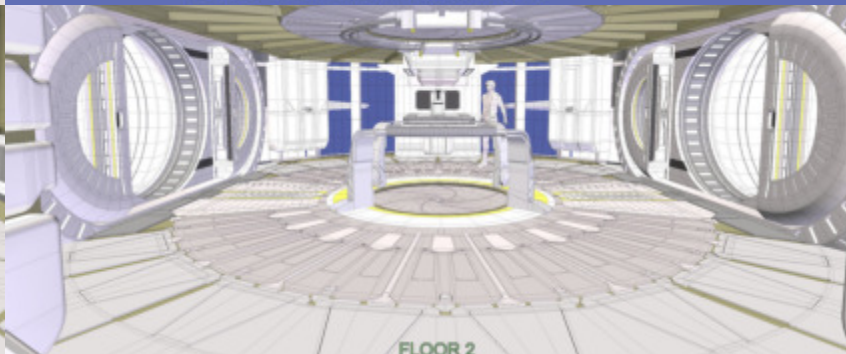
43



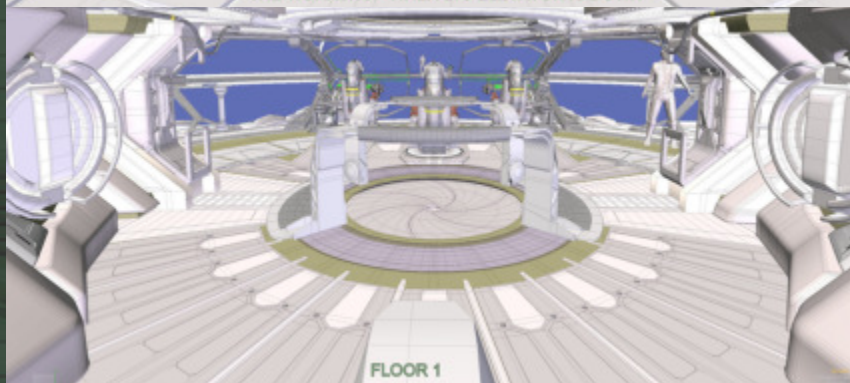
LANDING GEAR ON SHIP AND WORKSHOP



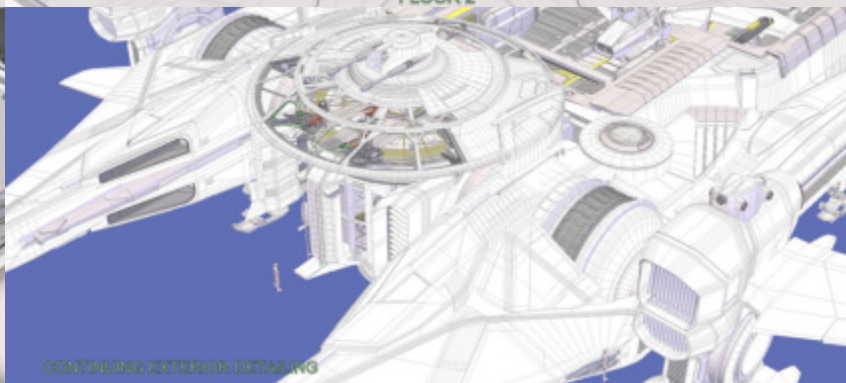
BIG ELEVATOR GOES DOWN- I'LL MAKE BRIDGES THAT EXTEND TO LITTLE ELEVATOR SO YOU CAN GET TO THE WORKSHOP WHEN BIG ELEVATOR IS DOWN



FLOOR 2



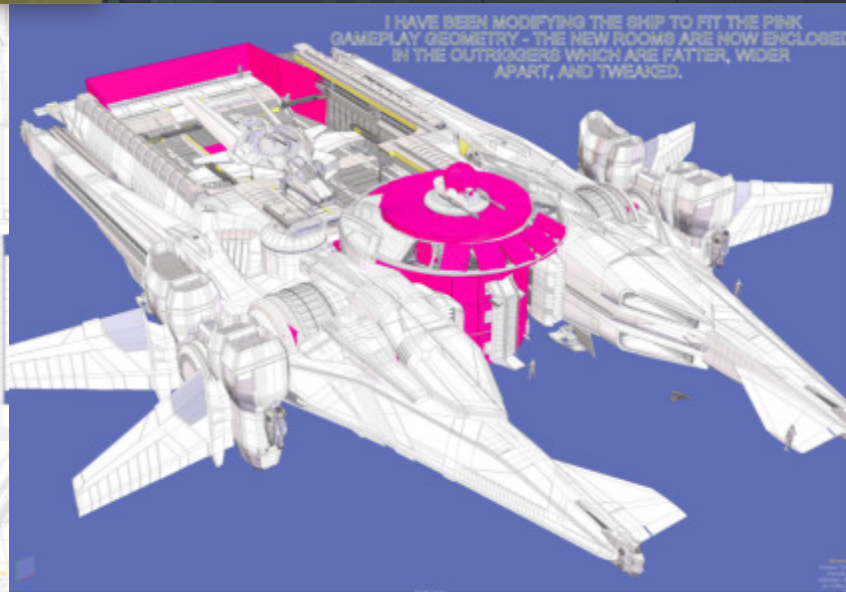
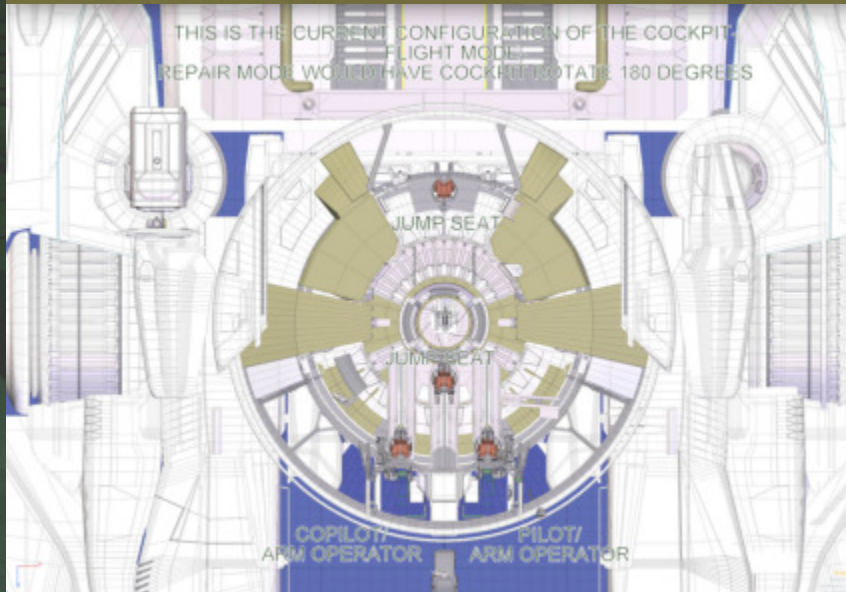
FLOOR 1



CONTINUING INTERIOR DETAILING

WORK IN PROGRESS

Ryan C: This incorporates changes to larger, fatter front fuselages to house the new drone launch and crew quarters rooms.



WORK IN PROGRESS

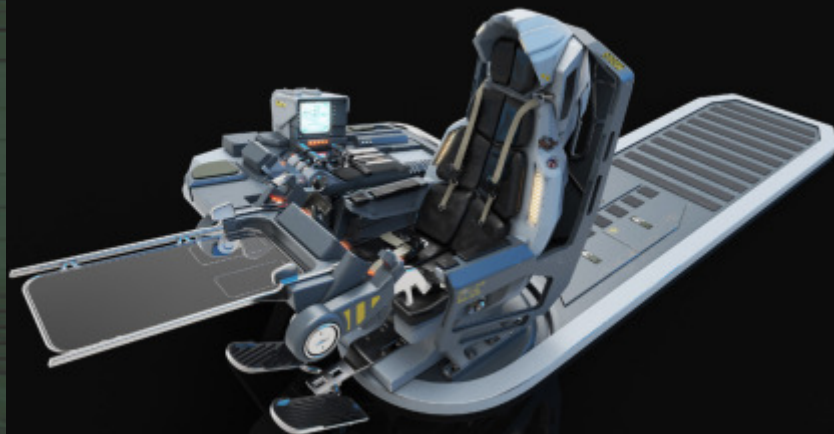
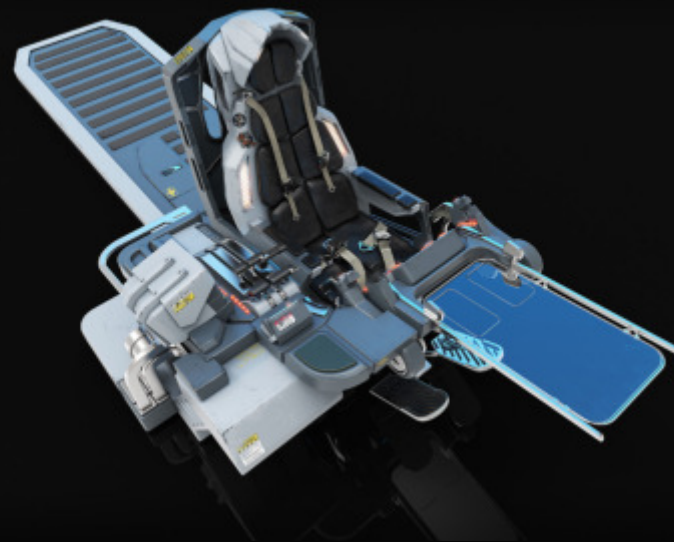


Gurmukh Bhasin, Concept Artist, CIG-LA: Here are a few renders of the Crucible command chair. I passed these along with the geometry and the new Anvil style guide to Ryan Church.

Chris R: Looks really great!

John C: Which seat fitting template does this go with? Do those screens have a template to follow for them as well? The ratios on it don't look like 1:1, 4:3 or 16:9, but could just be the angle.

Gurmukh B: The actual seat follows the yoke w/ template, but the console is Ryan Church's concept that I cleaned up a bit. I didn't want to lose the feel of his design, so once this goes out of concept and into production the 3D artist will have to make some adjustments to fit the console to the proper template. The adjustments can be made then.



WORK IN PROGRESS

RYAN C: CURRENT ANVIL CRUCIBLE ILLUSTRATIONS.



WORK PRIORITIES



SYSTEM FAILURE



A R K



DISMANTLING

Dismantling the Dark Age

The dawn of the 29th century saw Humanity struggling to redefine itself. For over two hundred years, the dynastic and despotic Messer family ruled the UEE and its people with a callous authority. The pro-Messer propaganda machine crushed dissenting voices and opinions, keeping legitimate facts that might hurt the regime from coming to light.

This information dark age was brought to an end when the Messer regime finally fell in 2792. Erin Toi ascended to Emperor and immediately worked with the Senate to restore faith in the UEE government. The Tribunal system was quickly reinstated to provide a check on the Emperor's power. The terrible terraforming policies that sparked

the successful uprising against Messer were abandoned. And in 2795, the Fair Chance Act was officially adopted to protect the habitat of developing species. These and many other actions were slowly rebuilding a degree of trust between the UEE government and its people. However, mending relations between the UEE and starfaring alien species, who the Messers often vilified for political gain, would prove to be even more difficult.

In 2793, Emperor Toi met with a young, ambitious Senator named Marshall Leon and asked him to help repair Humanity's interspecies relationships by accepting the position of Diplomatic Secretary. Emperor Toi believed a first-term Senator who never had to navigate Messer-infected political waters would be seen as an envoy of

Humanity's future, not its past.

Knowing the enormity and complexity of the task at hand, Secretary Leon immediately scheduled meetings with Xi'An and Banu diplomats. He acknowledged that the repair of relationships would take time, delicacy and – most importantly – trust, but also knew that his words and promises, or even those of the Emperor, would not be enough to mend the damage done. Only a bold act of diplomacy and peace could convince the entire universe that Humanity had truly changed its ways.

It was with that grand goal in mind that Secretary Leon conceived of the Ark.

The Dream

Secretary Marshall Leon named his project the Ark, after an ancient story about a seafaring ship that saved both Humans and the animals of Earth from a massive flood. As Secretary Leon remarked during his initial speech before the Senate, in early 2794, "Much like its namesake, this Ark will be a manifestation of one of Humanity's greatest strengths – empathy. A trait that has sadly not been seen from our government in far too long."

A bill was put forth that requested funds to construct an orbital platform with the dream that it would not be bound to any one location, species or government. It would travel between the systems of all species to promote and share universal knowledge while also providing a neutral, safe space for diplomatic discussions. Secretary Leon was convinced the future of the UEE depended on two things: access to information and stable relationships with other

species. As Secretary Leon often said during debates over funding the Ark, "Humanity is better off with friends instead of enemies."

The combination of Secretary Leon's stirring arguments, the endorsement of Emperor Toi, and the desire to distance the UEE from its recent past led to the Senate's overwhelming approval of the Ark. Construction was slated to start in late 2794 once a suitable location was chosen. A myriad of Senators, interested in the accompanying economic bump, campaigned to have it built in their system, but Secretary Leon wanted to keep the Ark apolitical. So, in a surprise move, he chose to have it built in Tayac; a system with no native population or representation in the Senate. A system long deemed off-limits to the public during the Messer era.

A system, like the UEE, looking to redefine itself.



The Reality

Construction on the Ark started in 2795 and progressed more slowly than anticipated. The plan was to cannibalize an abandoned platform above Tayac that the military had used for the recently declassified Project Vespa, a secret attempt by the Messer regime to weaponize the terraforming process. Secretary Leon hoped it would signify that the UEE was dismantling its warmongering ways in favor of peace. Disassembling the weaponized components proved to be more expensive and time-sensitive than expected, incurring major delays for the project.

As the initial budget ballooned, Senators who had previously supported the project started to question it. Mainly, they questioned the section of the bill that created a foundation, independent of any government, to oversee the Ark's operation. Senators suddenly wondered why the UEE was paying for a project over which they would not have jurisdiction, and even briefly blocked funding as a way to regain control over the Ark. It was only after Imperator Toi brought her political might to bear that the project got back online.

While construction progressed over the following years, Secretary Leon frequently visited with Banu and Xi'An representatives to discuss the Ark. He passionately argued that its future belonged to all of them. It was during these discussions that Secretary Leon learned his vision was not being embraced by others species as he hoped. Although enthusiastic participants, the Banu had little to no historical records to share. Meanwhile, the Xi'An had serious concerns that the platform might still be weaponized and outright refused to allow the Ark into their territory.

Disappointed but not deterred, Leon decided to lead by example, so he pushed for as much Human knowledge as possible to be made available at the Ark. Human companies were encouraged and incentivized to contribute any information that would not hurt business. Meanwhile, the government released a trove of information. While classified government documents, military files and personal correspondences were considered off-limits, almost everything else was considered for admission. Critics complained that enemies could use this information against us. To which Secretary Leon responded, "If anything, it will be our actions, not our openness, that cause the next conflict."

In 2800, Secretary Leon won a contentious election to become the next Imperator. Encouraged to run and endorsed by Erin Toi, Secretary Leon highlighted his work on the Ark during his campaign, claiming it proved he was a consensus builder who could also repair Humanity's relationship with other species.

Shortly after his inauguration, construction on the Ark was completed. Imperator Leon invited representatives from the Xi'An, Banu, Tevarin and even the Vanduul to attend the gala celebration. During his introductory speech, Imperator Leon appealed for everyone to help the Ark succeed in spreading peace and knowledge. "I am proud to open these doors and beg all of you to fill it with the vast and colorful history that each and every species has to offer. Let this Ark stand as a testament and proud record of the lives that we and those before us have all lived."



THE REALITY

The Present

Today, the Ark still orbits in the Tayac System. Months after opening its doors, the foundation running it realized the cost of hauling it from system to system exceeded the expected revenue from donors and fundraising. Though Tayac I provides the perfect neutral ground to permanently station the platform, a lack of other interesting objects in the system does not help its visitation numbers.

While the Ark has failed to become the bastion of interspecies diplomacy that was originally intended, Imperator Leon would still be proud of its current operations. It is the authoritative repository of information in the known universe. To this day, it collects and analyzes an awesome amount of information sent from explorers, researchers, scientists and everyday people for possible inclusion in the Galactapedia. The Ark also works hand-in-hand with a variety of prominent universities and research institutions to verify information, and even funds projects to help expand on what is already known. Among archivists and researchers, there is no job more coveted than a position curating a portion of the deluge of data submitted to the Ark.

The crown jewel of the Ark's operations is the Starmap. This essential resource of interstellar navigation is the de facto authority on what can be found in the midst of the great, black expanse. It provides an object's location, historical context, and data on a variety of useful related topics. Constantly updated thanks to the contributions of hardworking stellar cartographers and explorers, the map reflects the ever-expanding boundary of our universe and our understanding of it.

Even though the Ark may have not yet lived up to all of Imperator Leon's expectations, it is still an astounding achievement. Its dedication to truth and commitment to collecting knowledge from as many sources as possible provides an important, all-encompassing view of the universe. In many ways the Ark could be considered one of Humanity's most vital creations: an invaluable institution designed to preserve Humanity's future by keeping us mindful of its past.





THE STARMAP TEAM

With the debut of the online Starmap this month, we decided to get together with the folks who made it happen – both the content creators and the designers. As you can read below, they all have many more plans for it, but it's a seriously bodacious endeavor even in its first incarnation. Here's what they had to say.

JP: Standard first question: Please give us your title and what you do for Star Citizen.

Benoit Beauséjour, CTO, Turbulent: I am the producer for the web platform around the game.

David Haddock: Lead Writer and light janitorial services, CIG.

Robert Lizée, CTO of Gamerizon: Lead developer on the Star map (the WebGL side).

Adam Wieser: Associate Writer and CIG coffee machine guru.

Edern Talhouet, Interactive Art Director, Turbulent: I work on the design aspect of the RSI website & as Lead Artist on the Starmap.

William Weissbaum: Senior Writer, CIG.

Cherie Heiberg, Archivist, CIG: I bring order to Confluence and to the Star Map.

Roger Cyr: I work as a Web Developer for Turbulent.

Martin Lizée: CCO, Gamerizon. I worked on the design and development on the Star Map, WebGL side.



BEHIND THE SCENES



JP: Is it Star Map or Star map or Starmap or StarMap?

Benoit B: Ha! I guess that's up to David H!

Cherie H: I'm leaning towards Starmap.

Dave H: I think it's just Starmap?

Benoit B: That's what we wrote on the homescreen. :D

Dave H: Let's run with that.

JP: <Quick global search-and-replace to change all other instances to "Starmap.">

JP: How did you all get here? What have you done before arriving at CIG or Turbulent or Gamerizon, as the case may be?

Cherie H: I was a business librarian. I've also been a medical librarian, public librarian, and photograph archivist.

JP: Lots of librarianing there; how is this job different from your previous jobs?

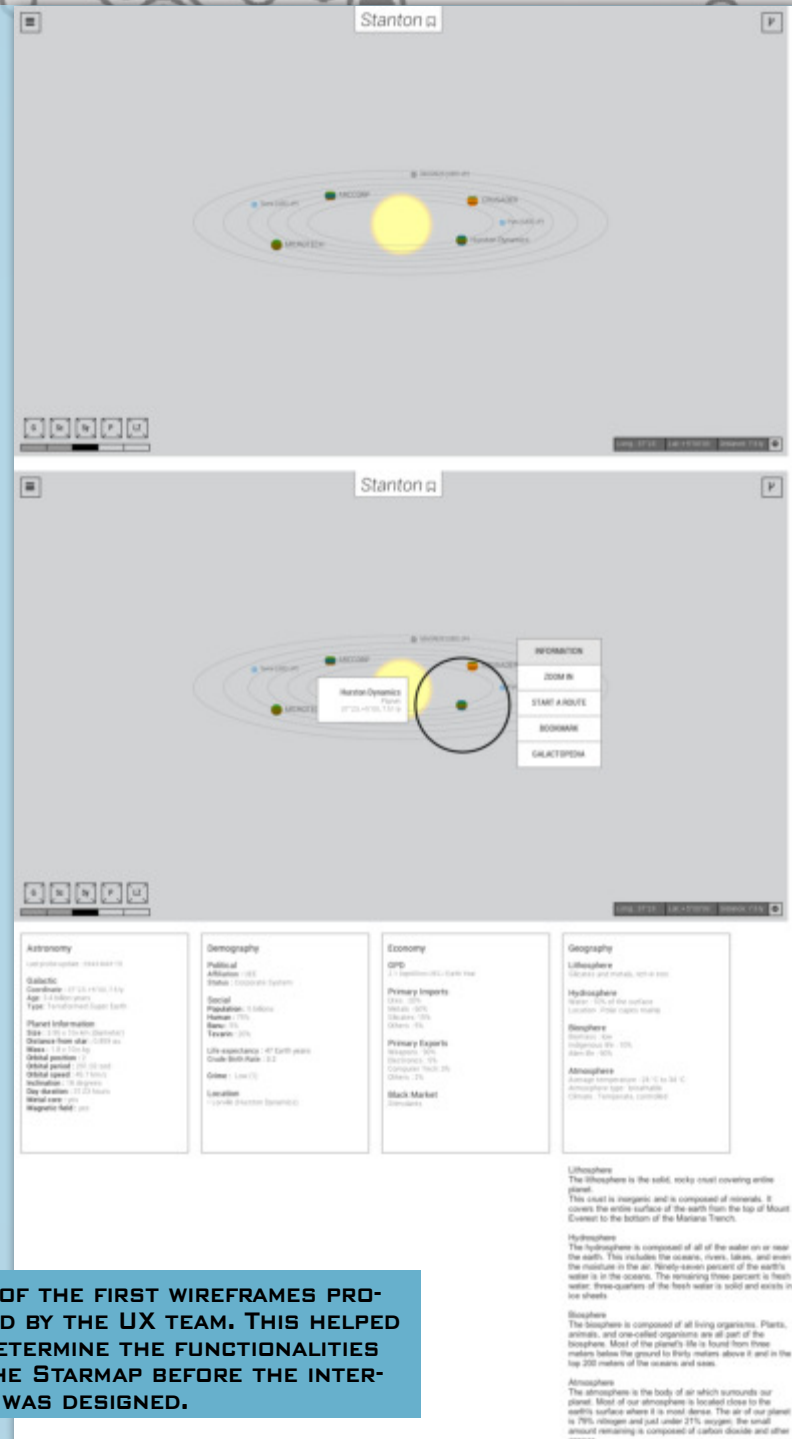
Cherie H: It has more stars in it. In seriousness, it's largely the same. The principles of information management are similar across disciplines.

JP: Even though this is fictional and all the others were more real-life?

Cherie H: What I like about my position here is the creative aspect. I get to create information as well as organize it.

Edern T: I worked eight years in advertising (mainly web/interactive side), in Paris and in Montreal, on various projects. One of the main clients I worked for in the past few years is a well-known video game studio based in Montreal.

Adam W: Before CIG, I wrote for a bunch of different things – film, TV, websites.



ONE OF THE FIRST WIREFRAMES PROPOSED BY THE UX TEAM. THIS HELPED TO DETERMINE THE FUNCTIONALITIES OF THE STARMAP BEFORE THE INTERFACE WAS DESIGNED.



BEHIND THE SCENES

EARLY MOCKUP OF THE UI DESIGN, WITH A 3D DASHBOARD. THIS PARTICULAR CONCEPT WAS CANCELLED BECAUSE IT WAS OVER-COMPLICATED AND TOOK TOO MUCH SPACE ON THE SCREEN.



Good friend. :D

Martin L: :-)

Martin L: Gamerizon is a game development studio for mobile and web. The team has also previously made games for the console market.

JP: *What does Gamerizon provide for the Starmap that we were lacking?*

Will W: I have been writing for games in one form or another since 2006.

JP: *Will, what were your highest and lowest profile games before Star Citizen?*

Will W: *God of War II and God of War III.*

JP: *Are those really a high and a low, or are they two highs?*

Will W: They are both incredible AAA titles, and an honor to be a part of. I have been fortunate not to have had any lows yet, *Star Citizen* very much included.

JP: *Yeah, I wasn't seeing either of them as a low-profile project. :)*

Benoit B: The GoW series was outstanding!

Roger C: I worked in many web agencies and built different software for web platforms in many different fields. I am self-taught and I love programming and all things web. :D

JP: *And what's the difference between Turbulent and Gamerizon?*

Benoit B: Gamerizon is another company. Same building!

Benoit B: At the time we started the Starmap project, our resources at Turbulent were all monopolized and we knew we wanted to push the envelope for this project. So we decided to enlist our friends at Gamerizon to help on the 3D/WebGL side and to have them create this project on the web. Their team has deep knowledge and many years of experience with 3D techs, and so we decided to augment our capabilities that we built in the past (like when we made the HoloViewer) by having a team dedicated to the Starmap Viewer while we handled the UI and the web API.

So we gained capacity, but also experience in the process.

Martin L: With the Holo Viewer, Turbulent showed what WebGL was capable of. We brought in our 3D expertise to push the envelope on that side. We are very impressed with what browsers can do these days.

Will W: What you all were able to achieve technically was astounding. My jaw dropped when I first saw the map running.

Adam W: Yeah, when Cherie had early access, other CIG employees would stop in their tracks when they saw it.



BEHIND THE SCENES

Cherie H: It was unreal. People would walk by, stop, and gape. The Starmap itself continues to astound anyone who sees it.

Dave H: Plus it's nice because Cherie doesn't have to kill the people who saw it before it was released anymore. That is a lot of clean up.

Cherie H: My poison skills were honed particularly well during that period.

Dave H: (light janitorial services)

Cherie H: Now I only have the coffee maker to practice on.

JP: *What have you done on the Starmap? Is this ongoing, or is your part pretty much finished?*

Benoit B: Is anything ever totally "finished"? Especially in a Star Citizen project? We're already preparing a series of updates! (1.1, 1.2, ...) The Starmap was built to be an evolving platform, we have so many things we want to add. :D

Cherie H: The Starmap is ongoing, and the maintenance of it will continue as long as Star Citizen exists. I am responsible for getting the astronomical data in place in the Starmap as it continues to develop.

Benoit B: Cherie "Galactus" Heiberg.

Cherie H: The astrophysicists we have been working with have been doing a fantastic job interpreting the lore and creating numbers that make sense. Each system they validate, I devour. It's what sustains me.

Edern T: I worked on the design of the 2D UI (mainly the menu, the navigation tool and the loading screen) and all the motion involved. I also did benchmarks and 2D sketches in order to develop the vision of the 3D side of the project, in collaboration with the Gamerizon team.

Adam W: Before the SM launch, I focused a lot on writing the blurbs for planets, systems, etc. Currently, I'm combing through previously published Galactic Guide articles to make sure the science and lore details behind each system match with what we have on the map.

Cherie H: I spent a lot of time before the launch of the Starmap adjusting apparent star size and color so that their looks were consistent with the lore. The tools and art that Turbulent provided worked extremely well for this. The task of maintaining this consistency will continue as the Starmap develops.

Benoit B: I remember a thread on Reddit /r/starcitizen titled: "The Best Job In The World: Designing Star Systems," and it was a photo of Edern doing sketches for the Starmap in our art pit. :)

Adam W: Cherie and I were told many times by other employees about how jealous they were that we got to work on this project.

JP: *Yeah, I've been a little envious, myself. :)*

Roger C: I was in charge of designing the top-level application architecture and selecting the required tooling/libraries. I also implemented the SVG UI and animations. Finally, I worked on the audio support via the WebAudio API.

JP: *Here are several subscriber questions; this first one is from Dazc. With the Starmap design, how many of the jump points would you consider are fixed in place vs. ones that will disappear?*

Dave H: We're still discussing how jump point stability will factor into the game.

JP (also from Dazc): *Are we seeing the major routes in place, or could we see a Sol to Vega jump point pop up at some point?*



BEHIND THE SCENES

Dave H: The jump points on the map are the currently known ones. Who knows what the future holds.

Benoit B: One interesting aspect of the Jump Tunnels (which is the term we've chosen for the thing that connects two jump points) is that the system is made to evolve. Tunnels can collapse, new tunnels can open. It makes for a very vivid and evolving universe. That is why we made the (currently basic) routing algorithms server side, because we expect changes in the Jump Tunnels to affect the routes you have available.

JP (from Perry_Hope): Are you still updating the Starmap every day?

Will W: We have been working on bug fixes as they pop up, with Cherie heading up the effort.

Dave H: As Adam said, we've also been going back through previously published material to bring it in line with the lore on the Starmap.

Cherie H: As we discover issues, we adjust the Starmap accordingly.

JP (from Perry_Hope): How is daily work on the Starmap for all you guys? Do you chat over Skype or emails? How do you integrate things in the map? Do you have conferences? Who decides what will be next, etc.?

Benoit B: The daily Starmap work is mostly concentrated in our Skype chan-

nel dubbed "StarMap Strike Team Force Delta." Discussions in that channel can be a bit surreal for the untrained eye.

JP: Such as ...?

Benoit B: "blowin up Hadrian so it's a big star, large and in charge"

"Neptune's rings should be white as well, please. thank you. so much."

"VISUAL CHECK COMPLETE, STARS AND ORBITS SET, WAIT NO I FORGOT THE BANU SYSTEMS"

Adam W: Lots of talk of Cherie demanding "God Mode."

Dave H: It has a pretty sweet chat logo too.

JP: I'd like a picture of the chat logo for an illustration here.

Dave H: Sadly, it's a copyrighted image of the poster for Delta Force.

JP: Ah ... then they'll have to imagine it. Or look it up.



AN EXTENDED VERSION OF THE CONTROL DISC THAT DISPLAYED ALL THE INFORMATION ABOUT A CELESTIAL OBJECT. THIS LAYOUT WAS CANCELLED BECAUSE IT WASN'T MODULAR ENOUGH TO FIT EVERY TYPE OF OBJECT, AND WAS TOO BIG TO FIT ON A SMALLER COMPUTER SCREEN.



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JP (from **Perry_Hope**): Will the map be “real time,” or is it real-time connected with the universe server? I have sometimes encountered red spots on the Stanton location, that vanished and after a few minutes came back.

Will W: Anybody know about those red spots he’s asking about?

Adam W: Sounds like Stanton should see a doctor.

Benoit B: Regarding real-time: It is not connected at the moment, but that is definitely the plan. The basic idea is that the ARK Starmap is a macro vision of the universe. Maybe the update rates are slower than in-game, but they are still relevant.

Dave H: We had talked about how connected the map will be with the game. It’s obviously still up in the air, but we felt like there needed to be a division between the Starmap and the players’ in-game map. The in-game one would be more reactive, while the Starmap (since it is from the Ark) would be more like an encyclopedia map. Then events that are massive enough (Battle of Vega II) could permeate into the Starmap.

JP: But “smaller” events are less likely to cause a change in the Starmap?

Dave H: Define “smaller.” Pirates fighting someone, probably not.

Will W: The Ark Starmap is more like an atlas, whereas your mobiGlas personal map would be like using Google Maps on your phone. It would have different layers of current information.

Players should be able to discover stuff on their own that shows up on their personal map but wouldn’t be public Starmap info.

Cherie H: Someone playing as a smuggler, for example, wouldn’t want their hidden base to be public knowledge on the Starmap.

Dave H: Unless they were a really bad smuggler.

Will W: Benoit, how hard was it making the path routing part of the map?

Dave H: Also you should talk about the variables (Economy, Crime and Population) factor into pathing. Your algorithm for that was awesome.

Benoit B: That was an interesting sub-project. The path routing is basically part of the Starmap service that the web platform provides. Building that was challenging because we needed to adapt pathfinding algorithms to the logic that the game will have.

Even though this is simple graph theory and processing, we had to map the concepts to the game rules. For example, jump tunnels are graph edges, star systems are graph nodes, avoidances are popped out of the graph, etc.

Then comes in fuel usage, jump costs, etc. For this I built a graph generator that outputs to SVG so we could test out the algorithm in real time by showing different path options with different colors and info overlays.

Keeping this fast & efficient was a real technical challenge since many users will hit the service at the same time to generate routes. Heavy caching! In this iteration we kept it simple and output only two routes: the shortest one and the route with the least jumps. The 1.1 version will output a lot more route options, like least dangerous, most fuel efficient, etc.

JP (from **Kieren_Akari**): To follow up Perry’s last question [and the resulting discussion], I find the graphical display of Threat, Economy, and Population difficult to interpret



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and compare. If this is going to be usable data to us that corresponds to real-time fluctuations, is there any way this data could be represented more clearly and at more levels of zoom? (Sorry, that's my only nit-pick. Had to dig deep for that one. Phenomenal job.)

Benoit B: In this version of the map, we opted to simplify the different system variables by quantifying the elements on the map into two [three?] "sensors": Population, Danger and Economy. We thought this was a great way to summarize the information in the map and would allow us, by using a simple mathematical model, to aggregate the values per star system. The main challenge we faced here is that the universe is still being defined and so we could not easily say "X amount of people live here." So we built a system to manage population where the writers could say, "This celestial object is densely populated" and that would translate into a population count by using the object type, density and size (radius) to estimate the population. This gave us a base platform to gather data. We're still not happy with the final outcome of the sensors when aggregated at the system level, so I expect to revise that in 1.1 :)

Will W: The numbers that we used for this first pass of the Starmap were very approximate. We just wanted to present a high-level feeling of what a system's threat level or economy would be like. Eventually, those numbers should be supported by the work Tony is doing on the engine side.

Dave H: Yeah, and again, we'll try to figure out how long it takes the realtime data to trickle down to the Starmap.

JP (from Schrike): Will the Starmap on the website eventually appear to a logged-in player with additional map data / jump points, etc. that they've picked up during PU gameplay?

Dave H: I think that will be a different map.

Will W: Or possibly a layer on top of the map.

Dave H: Yeah.



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JP (from **BaconofWar**): Was the backend of the Starmap system designed with ease of updating? If CR comes in tomorrow and says, "I just had a great idea last night, let's add 50 new systems," how easy would it be?

Dave H: The lore would definitely take time.

Will W: I just broke into a sweat imagining Chris actually doing that.

Dave H: Because we aren't going for the massive number of procedural systems, each of our systems tend to have a lot more consideration put into them as to what they contribute to the overall narrative of the universe.

Adam W: The lore team had daily meetings in the run-up to release so we could make sure each system had a distinct feel to it. It takes a lot of thought to keep things interesting.

Cherie H: Creating the lore and getting the data and then getting all of that in place takes a great deal of time. This isn't something that is slapdash. It takes a lot of careful work.

JP: So lore-wise, very much work. How about on the technology/implementation side – is the system built to absorb another 50 systems quickly?

Martin L: Regarding representation of data on the Starmap, the framework is there to represent any data in a multitude of ways, so it can continue to evolve base on users' input. So the sky is the limit ... I mean the stars are the limit! :-)

Roger C: The backend is really well written; it can support thousands of star systems without a problem. And on the frontend, everything is loaded on-demand and heavily cached.

Cherie H: Turbulent has provided an excellent, intuitive interface for the data once it's created.

JP (from **Kieren_Akari**): Will this form the backbone of something that will be available to us in-game for mapping out multi-jump trajectories, and if so, how much will the interface change and how much of your work will be transferable to such a new use?

Benoit B: Our initial plans for the Starmap Control Disc included supporting waypoints for jump routing. Ultimately though, we decided in 1.0 to keep the routing as a "Departure" / "Destination" because there are many logical complexities to a multi-star-system travel route. The UI becomes very complex too, but I'm sure we will revisit this choice in the future.

JP (from **fireblade1**): Are the unnamed dots on the Starmap known but "normally" unvisited star systems (ones without discovered jump points, that may have only been visited by slower-than-light ships/probes or not at all).

Dave H: The ones that move when you rotate?

JP: I believe that's what is meant.

Dave H: Slow-burning to planets is prohibitively difficult. They would take way too long to get there. The discovery of jump points kinda erased the need to do that.

JP: So they've never been visited by Humanity?

Dave H: Not that we know of. (We = UEE.)

JP (from **steve-2001**): What part of the Starmap work have you enjoyed the most?

Cherie H: GOD MODE.

Dave H: Not cleaning up Cherie's victims.

JP: What can you do in God Mode that we mortals can't do?



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UI DESIGN OF STATISTICAL INFORMATION OF CELESTIAL OBJECTS; NOT IMPLEMENTED IN THIS VERSION OF THE STARMAP, BUT COULD BE USED IN THE FUTURE.

Cherie H: God Mode is my nickname for Turbulent's editor mode in the Starmap, in which you can directly control the size, color, placement, and shape of everything. I used it to edit things such as the color of planetary rings, the apparent size of stars and planets, the colors of stars, etc.

Dave H: It allows a lot of manipulation for the look of everything. Will was also quite the artisan when it came to hacking the settings.

Cherie H: For example, Will came up with a creative way to represent broken planets using asteroid clusters.

Dave H: I think it was Hades IV.

Will W: Was any of the backend stuff new? What really pushed WebGL to the limits?

Benoit B: I think there are two challenging aspects to the Starmap in the browser: The UI is really advanced and using the latest web techs – of special interest is the control disc. On the viewer side, there is HEAVY use of GLSL to get the best performance and build the coolest effects. I'll pass the puck to Martin and Roger for more details on those.

Martin L: The stars, the routes, and many other objects are done procedurally in GLSL. Each time we had the chance, we put configuration options in to make it easy to create a multitude of procedural objects. The advantage of these objects for the web is that they don't cost much (mostly code), but they do require a good artist eye to find the right parameters.

JP: And the control disc is . . . ?



Roger C: The control disc is the UI that appears when you hover a celestial object then click on the "Control disc" label. You can also make it appear by right-clicking on any celestial object. That part was especially challenging because the SVG support among browsers is varying, mostly in terms of performance. We wrote it in HTML/SVG because we wanted to keep the text really sharp and selectable while giving us the possibility to have nice animations so it integrates well within the 3d environment.

JP (from Solis_Obscuri): Is there any information you can share regarding what the size classifications of jump points are intended to represent in terms of physical dimensions and what range of ship sizes they would accommodate?

Dave H: Nothing yet, still trying to work that out with Design.



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JP (from **Solis_Obscuri**): *Is player activity planned to impact the economic, population and security ratings of different worlds and systems? If so, will that impact gameplay there (e.g., the sorts of missions available or the kinds of goods in demand) beyond just cosmetic changes to landing zone areas?*

Dave H: It's still way too early to say with specificity, but on a large scale, that's the plan. If there's enough player (and even NPC) criminal activity to cripple an economy in a system, that would be reflected in the Starmap.

Will W: Or if players wipe out an outlaw scourge, the safety of a system would improve. At least until a new Pirate King moved in to fill the void.

Benoit B: I'd like Edern to outline the art process for the Starmap. How did we get here? What was the inspiration?

Will W: Yeah! +1

Cherie H: +2 on Edern, love your art!!!!

Edern T: Thanks. :) We mainly designed the UI around three objectives: the aesthetics (it has to be beautiful), the usability (it has to be fully functional), and the technical feasibility. And, of course, everything has to respect the *Star Citizen's* universe.

We started by analyzing what is done in the movie industry, and in other games. We all here love the work of Ash Thorp, who worked on the graphic design of movies like *Prometheus* and *Ender's Game*. Afterwards we designed a lot of iterations of almost every aspects of the Starmap ...

JP (two similar questions, one from **Azmodeth**): *Will we have access to this in a 3-D projected form on holotables, or something similar, or will all versions pretty much have this same format? If such a map would be in-game, will we be able to customize it with points we find ourselves, and*

share it that way, by allowing others to view it, etc.?

JP (the other from **Schrike**): *How far will the web Starmap interface integration with the in-game client be taken? Will I eventually be able to engage in commodity market research or catch up on in-game news events during a ... break at work, via the web?*

Will W: Benoit, has there been any development on the Star Citizen app front?

Benoit B: We did package the Starmap as an electronic app for the desktop, but we want to release that with more functions. :D One thing that I would LOVE to do but that is currently not in the plans is to add WebVR support to the Starmap. Can you imagine browsing the Starmap with your Oculus Rift from the browser? Booyah!

Dave H: I can imagine it and it is glorious.

JP: *We're running a bit long here, and I need to let you all get back to actually developing the game. There are several questions about possible upcoming features and other developments – **WildVolusPrime** asks about advanced profession integration; **AragornBH** asks about getting more details, such as the mineral composition of orbiting objects and about linking the Starmap to the Galactapedia; and **KronosPRIME** asks about sharing personal map information with your organization. I know these are all possibilities, but we haven't sorted out which will be developed, and how soon.*

Benoit B: Galactapedia is going to come! The Starmap laid the groundwork for this, as we now have constructs for all "structured data" in the universe. The "unstructured data" (aka: wiki content) is next ... after a few other web projects. :D I can imagine the mountain of work for David, Adam, Will and Cherie, though. :)



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JP (from **Schrike**): Do you intend to inform the community in some way when additions are made to the Starmap, or will we need to just keep checking on a regular basis?

Cherie H: Yes, we very much plan to. I've been keeping a personal log of all the changes I've made to the Starmap so far. We've talked with Benoit about getting that information out there.

Benoit B: Starmap live changelog!

Cherie H: Yeah!

JP: When do you anticipate the changelog being implemented?

Benoit B: I think that's a low hanging fruit we can tackle soon-ish. :D
January 2016, I would say.

Roger C: Sure!

JP: (from **WildVolusPrime**): What is your plan with the Starmap going forward? Are we looking at big sweeping changes/updates, improved functionality (ease of use etc.) or a mix of both?

Dave H: From the lore side, probably the addition of scientific data. We'll start incrementally adding that in.

Benoit B: Before we go, it would be nice for Martin, Robert and Roger to talk a bit about the possibilities of Javascript today. The tech stacks we use in the Starmap are very bleeding edge, TypeScript, ES6/Babel, webpack. I'd love to hear them speak of how they liked working with it.

Roger C: The Starmap frontend is written with two different, but similar, languages. The 3D part is written in TypeScript, which is a dialect of ECMAScript (what we know as JavaScript) that supports optional typing and other nice features. The application and UI are written in ECMAScript 2015. It's the newest standard for JavaScript and because it's not supported by all browsers, we used a compiler that compiles it so it works on current generation browsers.



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Martin L: As mentioned earlier, part of the technology that powers the Starmap is WebGL, and more specifically GLSL. What is great about this tech is that we can write very low-level shaders for the GPUs. These shaders are compiled on the browsers themselves. Having access to the metal (the GPUs) in a web browser is incredible when you think about it, since they were initially designed to show high-level information. We went out of our way to maximize the use of these shaders – for instance, the black hole is a single sprite with a shader in it, entirely procedural (the stars also).

Roger C: The 3D component is compiled as a CommonJS library that's included and used by the Starmap application. The final product is created by a module bundler called "Webpack" that builds/assembles and compresses the whole application into a single file that we can just put on a webpage.

Robert L: We found the use of Typescript versus writing pure JavaScript on the viewer side quite refreshing. First, it removed lots of boilerplate code, and the typing algorithm makes it easier to write solid code with confidence it will work when you execute it – stupid typing bugs are identified as you type your code instead of when you run it, making the development faster and freeing your mind to work on the important parts of the algorithm instead of having to be super vigilant to catch typing mistakes. As for the WebGL API, it brings the web development much closer to general application development or game development than specific web development, which is great.

Benoit B: I'm sure Martin and Robert were sick of seeing us coming down to their office every day (at the end) to go over the to do lists!

Martin L: We loved it, especially when you were bringing the beer! :-)

Benoit B: A well-spirited team needs its liquids. :D

JP: Any final words?

Will W: Envisioning this universe has been incredible, and the web team has really outdone themselves putting it all together. It makes me very excited for when we will all be able to explore it together. Maybe in some sort of Turbulent / Narrative team Idris.

JP: But who would be the captain?

Cherie H: I'm proud and excited to be a part of this project. The work everyone has done has continuously blown me away.

Benoit B: One thing that most amazes me about the Starmap process is that we were able to NOT leak anything about it. No leaked screenshots or art drawings, even though we had many fan visits in the offices while the map was running in the browser of all of the Starmap team members. We still managed to keep it mostly under wraps and reveal it with a big bang at Citizen-Con. I'm proud of that ... and I'm really ecstatic about the reactions from the fans. :)

Cherie H: Hear, hear, Benoit!

Adam W: It was an awesome experience working on the SM. The web team killed it and built something so incredibly cool. Also ... Cherie and I definitely high-fived a few times because we were so happy that this was our job.

Roger C: Working with CIG and Gamerizon has been a wonderful experience. :)

Martin L: Working with Turbulent and CIG was a great experience. Benoit opened our eyes to the power that browsers have to offer nowadays and we are very grateful of that.

Edern T: I would like to add that the final result is really close to what we had in mind initially, and the whole team did an amazing job and pushed the limit. Everyone paid a lot of attention to details, and it was (and is) an amazing project to work on.



SENEKSEH
BEHIND THE SCENES

Zane & the User Interface

Zane is a busy guy these days, and despite all his wishes otherwise, he isn't having enough time to answer all your interface questions. But he's going to keep chipping away at them, an answer or two at a time. This month, he talks about the "USE" prompt.

Trent Hawkins: *Is the "USE" prompt permanent? If not, what will it evolve into?*

Yes, it's on our radar to completely overhaul the current "USE" system into something much more flexible and intuitive. The current implementation essentially involves defining clunky bounding boxes of arbitrary dimension which players must position themselves within in order to activate the "USE" action prompt. Rather than defining these boxes with hardwired actions and parameters, we're instead looking to have it be contextually driven by the actual items or sub-items you're directly looking at (raycasting upon).

By doing it this way, we afford much more flexibility in terms of the specific actions you're able to invoke. A single item may have multiple actions tied to it; for instance, a drinking cup on a table may prompt three potential actions: Drink, Knock Over, or Break, with each having different outcomes.

It also allows for much more precision when focusing amongst objects. For instance, each individual button/switch on a cluttered control panel may be interacted with and have its own set of actions tied to it. The button or switch that is highlighted will depend on which one is directly raycasted upon from

your center line of sight. A dense control panel such as this could not work functionally with the current bounding box solution.

In terms of what the player feedback will look like from a UI standpoint, this will be conveyed stylistically in the same fashion as the conversation system which was previewed in the Morrow Tour demo. More generally, this is what we are calling "inner-thought," which is essentially an in-world projection of your character's thoughts. Whether it's a prompt for opening a door, sitting in a chair, or conversing with an NPC, it all uses the same underlying system for displaying these "thoughts." This way, "thoughts" are conveyed stylistically consistent to the player, but also provide our designers with a unified system for defining the interactivity of each item.



Spotlight: Eric Kieron Davis, Senior Producer: Team Building

Hey, everyone! My name is Eric Kieron Davis and I'm the Senior Producer in our Los Angeles studio at Cloud Imperium Games. Producers have an enormous amount of different kinds of work. In our previous production interview [August 2015] we talked about all the different kinds of things we do, from building comprehensive and well thought-out budgets, to strategizing the best way to accomplish our goals, to tracking the smallest of tasks, to ordering lunch for our hard working team. If something needs doing, we're the only ones in the studio that are expected to do anything and everything except build the actual product. However, today I'm only going to focus on one portion of my job and that's building the best team possible.

In previous roles, I thrived on the challenge of building a strong, cohesive team through thorough evaluation, motivation, mentorship and trusted autonomy. My previous teams won several top performance awards, creative awards, and global recognition for their efforts because I always made it not about who they were, but who they could become together with my trust, support and a clear uncluttered path to sprint down.

What is a strong and high performing team? Strong teams come in all forms. It's not just about sticking talented people in a room and saying, "Go!" It's ensuring you have the right people in the right place at the right time, working together towards the same goal. Teams go through different phases in their evolution, which are broken down very intelligently in the 5 phases of a team by Bruce Tuckman. [See the Wikipedia article on Tuckman.] Every time you put together a team of strangers, you find that immediately they all scramble to find their place within this newly formed organism and that's where the rocky road begins.

A team full of different personalities with different backgrounds is a recipe for miscommunication, assumptions and an "us vs. them" mentality. One of the great things about humans is we can't be put into a box. While there are certainly identifiable commonalities, we're much more complex than stereotypes suggest. You can stick talented people together and hope for the best, but without the right guidance and encouragement, becoming a team will take time if it happens at all. Dysfunctional teams are often the cause of failed achievements. Producers have to help them find their way by providing support, smart structure and guidance (sometimes without them even noticing). If you don't understand what your team is capable of, you can't expect to know what's best for them or how to put them in a place where they will feel the most motivated and excited.

At the end of the day, the difference between a successful project and a failed one is completing something together. Humans have accomplished some of the most incredible feats purely because they were passionate about them and worked as a team with focus. Our goal is motivating by identifying passion and then encouraging the best team members to thrive in a comfortable and healthy environment. We have that passion here for *Star Citizen*, and the team is rapidly evolving, so imagine what you'll see in the future.



BEHIND THE SCENES



TAYAC SYSTEM THE ARK



EARTH

A simple system with a complicated past, Tayac has showcased the best and worst of Humanity over the four centuries in which we have occupied it. Discovered during the early 26th century Eastern Expansion Program, the G-Class Main Sequence star system was first visited in 2524 by a UPE pilot further exploring the Terra jump point to Nexus. Home to three planets and an asteroid belt, the system, then known as 368A, was classified by surveyors for commercial development, with the innermost planet noted as a potential terraforming candidate.

Due to the bevy of other systems discovered during that decade of expansion, a backlog of planets waiting to be terraformed grew as funding and the necessary resources were claimed as quickly as they were budgeted. It was

not until 2539 that the initial steps for terraforming of 368A.01M (Tayac I) were finally taken, and construction on an orbital rig begun. However, before the process could be completed, Humanity's first official inter-species war erupted in 2541. As the battle against the Tevarin stepped into high gear, all non-essential projects were canceled in order to focus on expanding the war effort and strengthening the Naval fleet; the terraformation of Tayac was one of the projects included in the cutbacks.

TRAVEL WARNING A reminder that the Ark and its immediate surroundings are considered neutral space as accorded by the Ark Treaty, and the UEE does not have jurisdiction there.

The system remained relatively untouched until the conclusion of the war and rise of Ivar Messer to the role of Emperor. With Messer's expansion of the Empire's control, Tayac was made a military system, declared off-limits to civilian traffic, and all known jumps into the system were

shut off by Naval blockades. Completely removed from the public eye, the truth of what happened there during the Messer regime wasn't fully known till their reign came to an end centuries later.

TAYAC I

After experiencing the high cost of the Tevarin war, particularly his own experiences on the front line, Ivar Messer was eager to develop weapons that would enable the Empire to end future conflicts swiftly and with minimal loss of military personnel. Under his rule, dozens of highly classified blacklist initiatives, proposals and research projects dedicated to mass destruction were quietly established and generously funded. One such project, code named Vespa, was the brainchild of Dr. Thessaly Tayac, who believed that terraforming technology could be adapted for weaponization. The half-finished terraforming of 368A.01M was selected as the perfect test environment and in 2546, the small rocky planet was assigned to Dr. Tayac for experimentation.

For the next several decades, the planet was systematically terraformed and then de-terraformed, eventually transforming a planet with great potential into a desolate rock with zero atmosphere. Though Dr. Tayac was able to successfully reverse the terraforming process, his team was never able to weaponize the technology. The problem was two-fold: size and time. The orbital platform needed to destabilize the planet's biosphere was of considerable size. It was impossible to imagine a scenario where the Navy would be able to safely maneuver such a platform into place over a hostile world under battle-like conditions. And if they ever did manage to

move the platform into a suitable position, the destabilization process was not a quick one. By the time Dr. Tayac passed away, considerable strides had been made, but not enough to make the project feasible for actual use.

After the doctor's death, the reins of Project Vespa were passed on and the work continued in the system that was by then commonly referred to among Navy personnel as Tayac. Despite generation after generation of Messers eager to see Vespa come to fruition, the hurdles were just too insurmountable. By 2750, Tayac I had become increasingly unstable from the experimentation and could no longer be terraformed, while interest for the project had dried up along with funding. Vespa was officially shut down and Tayac System all but shuttered.

It wasn't long afterwards that the political winds of the Empire shifted and toppled the Messers from power. In the upheaval that followed, the experiments of Dr. Tayac became public knowledge. Not only was it a shocking revelation of what the Messers had been truly capable of, but it put a significant strain on the still fragile peace treaty that had only just been negotiated with the Xi'An. As a sign of trust and as an assurance that the Empire of old was a thing of the past, Emperor Toi shared all of the Project Vespa research with the Xi'An government, swearing that the technology would never be pursued again.



THE ARK

As the new government continued to distance itself from the previous regime, Emperor Marshall Leon proposed that, after centuries of distrust and war, a beacon of peace was needed to unite the species of the universe together. His idea grew into what would become known as the Ark, a repository for universal knowledge and a safe place for diplomatic discussions between species. Many sites were proposed to house the Ark, but in the end, Tayac I was chosen to symbolize how great works can shed hope and light onto the shadows of our past.

Initial construction was finished in 2800, and from its earliest days the Ark has contained one of the largest public

libraries and archival collections in the known universe. With no habitable planets in the system, the Ark has become the main hub of activity in Tayac, with knowledge seekers – along with services to cater to them – congregating around the library.

Though the Ark has yet to travel, it is rumored that as the bicentennial of its completion nears, the Ark may for the first time begin its journey through the stars as Emperor Leon originally proposed all those years ago. Those wanting to visit the Ark are urged to do so now, to take advantage of the convenience of it currently having a semi-permanent residence.

TAYAC II

A massive gas giant, Tayac II is known for its awe-inspiring planetary rings, which are some of the most dense in the UEE. The dark lines make for a visually pleasing contrast against the bright hued atmosphere of the planet they encircle.

HEARD IN THE WIND

"We shaved a full 6 hours off the process. An impressive achievement despite how much further we have to go before our endeavor proves itself useful. A very worthwhile endeavor I may add, as all our effort here is nothing compared to its potential to save our starmen's lives."

- Dr. Tayac, *Project Vespa Progress Report, 06.03.2572*

"Let this Ark stand as a testament and proud record of the lives that we and those before us have all lived."

- Emperor Marshall Leon, *Ark Dedicatory Celebration Gala, 2800*

TAYAC BELT ALPHA

A sparse belt with minimal resources, the most noteworthy thing about Tayac's asteroid belt is that it is home to an orbiting art installation that was commissioned in celebration of the Ark's centennial. Completed in 2900, the piece, known as the Silent Song, was the joint effort between Human artist Yosef Colt, Xi'An artist Aor, and a Banu fabrication team who all lived and worked together for an entire decade. Some say that the cohabitation was a more impressive achievement than the installation itself.

TAYAC III (SHEPHERD)

Orbiting extremely close to the asteroid belt, this dwarf planet earned its nickname for appearing to be keeping a watchful eye over a flock of asteroids. It is speculated that the planet was originally a part of the belt before it coalesced and separated itself from the herd.





One Last Job

by Amanda McCarter



CHRONICLES

Part 4

Ardoss' finger rested on the trigger of his gun. He always knew it would go down like this. Well, maybe not exactly like this.

He'd finally tracked down his partner, Pietro Marquez, with the help of ship pilot Jonah Ruskella. Jonah was a delivery boy for the pirate Mickey Black who chose to turn on his employer.

But everything had gone wrong. Ardoss' cover was blown, the ship had been temporarily hijacked, and now that they were finally here, it turned out that Mickey had double-crossed Pietro and the promised cargo was missing.

Now, they stood in an old, abandoned fueling station, guns drawn on one another, Jonah caught in between. After

everything Ruskella had risked for Ardoss, he couldn't let Pietro shoot him.

As Ardoss watched a bead of sweat trickle down his ex-partner's face, he couldn't help but think to when the Advocacy had first assigned him as his partner. Pietro had been a fresh-faced rookie.

That young man was gone. Ardoss hadn't really noticed until this moment. His black hair was graying and thin. Lines surrounded his mouth and eyes and the youthful exuberance was gone. Now all that was left was an older man, tired and scared.

"I remember this place," said Ardoss. "It was held by a pack of contraband runners."

"Slave traders," said Pietro.

"Contraband's contraband," said Ardoss.

"You always did simplify everything, Ardoss," Pietro said. "Things don't fall into neat little piles of good guy and bad guy, contraband and not contraband. It's so much messier than that."

"I'm beginning to see that," said Ardoss. His hand began to tense. They couldn't do this forever. Eventually, someone was going to shoot.

"I don't think you do," said Pietro. "If you can't see what Mickey Black is doing, you're blind."

Ardoss realized the man was tired. He wasn't some master spy who had betrayed his principles. He was trapped. Ardoss didn't want to kill him any more than he wanted to kill Jonah. It wasn't their fault.

"I've had my eyes opened," said Ardoss. "Mickey Black is a monster. I want to help you any way I can. You don't have to run. We can take him down."

Pietro laughed. "You don't take down a man like Mickey Black. Do you know how big his organization is? Thousands of people. Everything from couriers like Jonah, to spies like me, to hitmen you don't even want to think about. He's a nightmare. A walking, talking, breathing nightmare. There's something coming. It's big, bigger than big. It's going to change everything. I'm just a small piece of it."

"You don't have to live in fear," said Ardoss. "Just talk to me. Tell me why."

"I don't even remember anymore," said Pietro. "It doesn't matter. My life is over. I have to get away from here."

"You had to know someone was going to find out," said Ardoss. "Things like this don't stay secret. And the Advocacy won't stop. Even if you go into Banu territory, they'll keep searching."

"It beats being dead," said Pietro.

"A life of fear?" said Ardoss. "Sleepless nights? Always on the move? Looking over your shoulder? You and I have both seen those guys. Eventually, they take their own lives or isolate themselves so far from the known universe they lose their mind, don't know what's real anymore. That's not a life, Pietro. That's its own prison. Let me take you in. Give the Advocacy everything you have on Mickey Black and we can take him down."

"There will always be someone to take his place," said Pietro.

"Sure there will," said Ardoss. "But he'll be one less. We can make it harder for them. Look for people they've forced into their service. We can help, Pietro. You know we can."

"Seeing as I'm stuck between a couple of gun barrels right now," said Jonah, "I'd like to chime in."

Pietro glanced at Jonah.

"I'm in the same place as you," Jonah said. "Constantly afraid of what Mickey Black might have me do next. Scared I'll get arrested or my family will be hurt. But I'm standing up. I want to stop living in fear. I know you feel the same way. You have to. This is not a life, not one worth having anyway. We have to at least try."

"Listen to him, Pietro," said Ardoss. "He's got a wife and kids at home. He's thinking about them. You need to think about your own family. Do you want them worrying about you, never knowing where you are? Or do you want to protect them?"

"I want to keep them safe," said Pietro.

"Of course you do," said Jonah. "That's all you've ever wanted. What any of us want."

"You'll put them in protective custody, won't you?" said Pietro, lowering his gun. Jonah took the gun and pocketed it. Ardoss lowered his own.



“Yes,” said Ardoss. “Mickey won’t find them.”

“I’ll tell you everything,” said Pietro. “Pickups, info drops, who I met with and where. You should know he’s planning —”

But what he was planning, Ardoss would never find out from Pietro. A shot rang out across the docking bay and Pietro dropped like a puppet with its strings cut.

Jonah dove for a stack of crates as Ardoss dropped to the floor.

Ardoss crawled under cover and scanned the area, looking for a shooter. There were too many vantage points here. He should have surveyed the station first, but there wasn’t time. Now he saw several crannies. Old ducts, abandoned crates, elevated crosswalks, doors into adjacent rooms. And worse, it echoed. It made finding the source difficult.

Another shot rang out and ricocheted. The shooter was good, having hit Pietro in one shot. But wherever the shooter was perched, there wasn’t a line of sight to Ardoss. He made a choice.

He rushed forward, crouching, and knelt by his old partner.

Blood soaked through Pietro’s clothes and his skin was pale. They were out in the open here. He lifted him by the shoulders and quickly dragged him back to his cover.

Pietro spoke barely above a whisper and Ardoss had to crouch low to hear it.

“The Senate,” said Pietro. “The Senate.”

Then he was gone. Ardoss stared at him, unsure what to make of what his old partner had said. Mickey Black was planning something and it had to do with the Senate.

* * *

They had been so close. Pietro had agreed to turn on Mickey, knowing it would eventually mean his death. They just

didn’t count on it being so soon.

Ardoss looked down at Pietro. It was a waste. Pietro was a good man, or at least he tried to be. If only Ardoss had known sooner what was going on, maybe his partner would still be alive.

He peeked out of his cover, trying again to see where the shots had come from. Who else knew they were here? There was no way anyone could. Pietro had waited until Jonah contacted him to give him the coordinates. Not even Mickey could know.

That left only one other possibility. There was a spy on board Jonah’s ship.

His vantage point was lousy. He couldn’t see much of anything from where he was. Cautiously, he left his cover, gun drawn, and began to creep across the old cargo bay.

But before Ardoss could investigate further, another shot rang out and he staggered backwards. It felt as though a man twice his size had just punched him in the chest. He looked down to see red blossom down his suit from his left shoulder.

Another shot rang out, ricocheting off a bulkhead. Shaking off his momentary daze, Ardoss managed to duck behind some old crates. They stank of rotting food.

“It’s higher up,” said Jonah, crouching beside him.

Ardoss had forgotten he was there.

“How can you tell?” said Ardoss. Jonah was a coward. Ardoss couldn’t imagine him looking for the shooter.

“There’s an energy burn on the floor, just there,” said Jonah, pointing.

Ardoss blinked and followed Jonah’s finger. Sure enough, there was a burn mark on the floor. If the shot had come straight across, the burn would be behind them or further back on the floor. The shooter was most certainly up higher.



"I don't get it," said Ardoss. "That sniper got Pietro in one clean shot. Then he misses? Is he playing with us?"

"It's more likely he's under fire," said Jonah.

"Char?" said Ardoss.

Jonah nodded. "I asked her to keep lookout in case Pietro lied. She's a crack shot."

"Then why is that sniper still firing?" said Ardoss as another blast rang out.

Jonah shrugged, "You assume it's the sniper."

The gunshots stopped. Jonah cautiously peeked his head above the crate and Ardoss pulled him back down.

"Char, did you get him?" said Ardoss. "Char?"

"No," she said. Her voice bitter. "She's still in here. Stay on your toes."

"Wait," said Ardoss, "she?"

"Yes," said Char, "now keep your eyes open."

Ardoss felt the adrenaline pumping. Pietro was dead and this woman was still hunting them. How many did she plan to kill? Just Ardoss? The whole crew? What about the other passengers?

That's when he realized it had to be the businesswoman. She was so quiet and unassuming, the perfect cover for an assassin. It made him sick to think about the time he had spent in close quarters with her. He crept out from the crates, gun still drawn, his left arm useless.

Jonah grabbed his good shoulder. "You'll be shot."

"Already been shot," said Ardoss. "We have to find her. She's not going to just leave us be. We know too much."

Jonah worked his jaw, but didn't say anything else.

Ardoss stuck his head out. He needed to know where she was, what her options were.

Then, movement.

Ardoss leveled his gun. It was not as high up as he expected, not in the ducts or on a crosswalk. She was on top of some crates. Maybe.

He didn't think a trained gun would be so sloppy.

Char's head poked out from behind the crates. She pointed to Ardoss then behind him. He turned on his heels, still crouched. His shoulder throbbed, but thankfully the intense pain he knew was coming was still being kept at bay. Too much adrenaline, he figured.

He glanced back to Char, but she was gone, creeping among the abandoned cargo. He moved behind the stack of moldy food where Jonah still hid. Jonah just looked at him as he passed, eyes wide.

There was another stack of crates further along, and some old tanks. A perfect place for her to hide.

How many shots had she fired? How many rounds did she have? Enough to take down one or two people? More?

Ardoss knew he would be the main target, then Char. Jonah would be last, if she didn't just go ahead and kill the teen and Thrumm after that, to remove any witnesses.

The stack was shadowy and stank. There were too many dark corners for someone to hide. Ardoss scooted along the edge of one crate and around a fuel tank.

There he found himself face to face with his partner's killer.

Her business suit was torn and bloody in places. Sweat matted her short hair to her forehead. Her skin was flushed and her chest pumped heavily.

"Drop the gun," she said. She aimed the pistol Jonah had tried to use on him earlier.

"Not likely," Ardoss said.



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"I'll shoot," the woman said.

Ardoss smiled. "If you had any more rounds, you would have killed me already."

The woman grinned, but it was gone in an instant, replaced by a snarl. She dropped the gun, and lunged.

She put all her effort into impacting his left shoulder.

There was the pain.

He cried out and crumpled to the deck. She scabbled over him and went for his gun. Ardoss rolled over and grabbed her leg with his good hand, yanking hard.

The woman cursed and kicked at him. The first kick hit his forearm, but he held fast. The next connected with his knuckles and his grip loosened. She shook free and crawled to the gun.

Ardoss started to crawl towards her, but the gun was in her hand. She flopped over on her back and fired.

The shot went wild and Ardoss used the moment to roll for cover. He glanced behind him.

The woman was on her feet.

"I'll make this quick," she said, "I promise."

He crouched to pounce on her, but he never got the chance.

There was a scream, primal and terrified as a dark blur collided with the assassin. Two forms fell to the ground and the gun skittered across the deck.

Ardoss went after the gun, all but throwing himself after it. His fingers closed on the grip and he spun around.

Jonah lay on top of the woman, knees straddling her hips, hands on her shoulders.

Jonah punched her and immediately grabbed his hand, rubbing the knuckles.

"Feel better?" said Ardoss.

"No," said Jonah, "my hand hurts."

Ardoss laughed.

Jonah glared at him and then he began to laugh.

"Did I miss something funny?" said Char.

Ardoss looked. She stood behind Jonah and the assassin, gun slack in her hands, eyes wide.

"Pietro?" said Char.

"He didn't make it," said Ardoss, his laughter gone. Jonah stopped as well.

"She got you," said Char.

Ardoss glanced down. "At least it wasn't a few inches over."

"Small consolation," she said.

"So how did we miss an assassin on the ship?" said Jonah. He rolled off the woman.

Char crossed the few feet between them. She pointed her rifle at the woman's head. "Start talking."

The woman licked her lips, smearing blood across them.

"None of your business," she said.

Char cocked the gun. "That's not a good answer."

The woman glared.

"If you kill her, we won't get our answers," said Ardoss.

"Who said anything about killing her?" said Char. She swung the butt of her gun around and slammed it against the woman's knee.

The assassin screamed and clutched her leg.

"Pietro was never meant to leave alive," she said, panting.

"What?" said Jonah.



Char nudged the woman's knee with the barrel of her gun. "Go on."

The woman winced. "The drop-off was a farce," she said. "It was a setup. Mickey knew Pietro would only trust you, so he set the whole thing up, arranged for passengers, made sure I could book passage."

Jonah slumped. "Why?" said Jonah. "Why all of this?"

The woman shrugged. "I do what I'm paid to do. Mickey's going to kill you when finds out you're working with an Agent."

"Don't count on it," said Char. "What do you want to do with her?"

"I'll need to take her back to the Advocacy," said Ardoss.

"I want a deal," the woman said. "I gave you information. You have to protect me."

"Why?" said Ardoss. "You did your job."

"And when Black finds out you're still alive, I'm dead," the woman said.

"I'll think about it," said Ardoss.

"You've as good as killed me, then," she said.

"You should have thought about that before you signed on with Mickey Black."

Char nodded and kicked her.

Local authorities collected the politician Thrumm at the next port. Advocacy Agents took Ardoss' statement. He advised them the assassin was a material witness and should be protected. The Agents also took custody of Pietro's body. Ardoss had started working on the request for his partner to be given full honors on the flight back. He had just sent it off when his new orders from Junior Director Vami arrived on his Glas.

Return. Immediately.

Not likely, he thought.

Ardoss wanted to warn the Advocacy that Black had something planned against the Senate, but he had no evidence. He couldn't follow Vami's orders until he found it.

The three of them sat in the cockpit, drinking a bottle of rare Bourbon from Croshaw.

"What will you do now?" said Jonah.

"I'm supposed to go back to my office and quietly retire," said Ardoss, "but I don't think I can do that."

"You want to go after Mickey Black," said Jonah.

Ardoss nodded. Mickey had destroyed one of the best men he'd ever known, and he wasn't going to let the bastard walk away from that.

"Pietro said he had plans," said Ardoss. "Something to do with the Senate. But without evidence to back up the story . . ."

"You want to find that proof," said Char.

"And nail him to the wall with it," said Ardoss. "I want to make sure he can never hurt another living soul."

Just then, the ship's comm started to beep. Jonah held up a finger and Ardoss stepped out of the way of the vid.

Jonah hit a button and Mickey's ruined face filled the screen.

"Jonah, my boy, I heard the mission was done," said Mickey.

The pilot clenched his jaw. "You killed Pietro."

"Yes, sorry about that, had to be done," said Mickey. "Terrible business, but I couldn't risk him blabbing."

"I don't like being used," said Jonah.

"I'll use you however I see fit," said Mickey. His voice was dangerous. "What did you do with my assassin?"



"I had to turn her in to local authorities," said Jonah. "Pietro is dead and so is his partner. The Advocacy wanted answers."

Mickey's eyes went wide. "I didn't actually think you'd do it."

"I didn't," said Jonah. "Your woman did that."

Char glanced at Ardoss. He felt pretty good for a dead man, but he stayed silent. He hoped the Agents would keep the assassin safe.

Mickey looked impressed. "I had hoped to get my hitwoman back. She was rather good, but I suppose you can't win all the time. I'll have to take care of her, of course, but that's my problem, not yours."

"I did what you asked and nearly died in the process," said Jonah. "I want my money."

"It's coming lad, it's coming," said Mickey, "but see, you didn't do exactly as I asked. My woman killed the Agent, not you."

Jonah stared, his eyes full of rage.

Mickey shrugged. "Hey, a deal's a deal. I asked you to do something and you didn't. You still owe me."

"You knew I wouldn't," said Jonah.

"Every man has to make that choice," said Mickey. "You made yours."

"What do you want?" asked Jonah.

"Go to these coordinates for further instruction," said Mickey. "And Jonah, I really am expecting you to see it through this time. All of it. Screw it up, and you'll be so deep in debt with me, your kids will be paying it off long after you die."

The screen went blank before Jonah had a chance to argue. He turned and looked at Ardoss.

"That's what he wanted," said Char, "to hold something over you."

"Well, Ardoss," said Jonah, "looks like you'll get your chance to get even. I'll do whatever I can to help you end this bastard."

"Great," said Ardoss, tossing back the last dregs of whiskey in his glass. "We've got a lot of work ahead of us."

The End

Amanda grew up reading the works of Mercedes Lackey, Anne McCaffrey, Frank Herbert and dozens of other fantasy and science fiction writers. As time went on, it occurred to her to write her own stories.

Encouraged by her mother and her family to write, a one-time hobby became an obsession and a passion. An obsession she hopes to one day make full-time.

Currently, Amanda lives in Tulsa, OK with her boyfriend, two dogs, two cats, and a snake. When not dreaming of faraway places and distant lands, she spends her time knitting, reading, and playing video games.

*Other works: If you enjoyed "One Last Job," check out **Cybergensis** and **Alone in the Night**. For more information about Amanda and her published works, go to <http://amandamccarter.wordpress.com> or sign up for her newsletter at <http://eepurl.com/0VRe9>*



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