



# GRADUATION REPORT

*2D Asset Creation for VR*

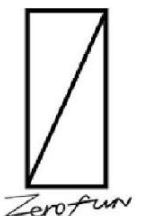
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# 1. Abstract

Antiprism is a virtual reality action space shoot-'em-up game by the company ZeroFun Games that is set for a June 2021 release. It has over 3000 wishlists on the digital video game distribution platform Steam and it introduces new mechanics to the VR shoot-'em-up genre. The production of 2D content for the game occurs in three directions: in-game asset production (character portraits and user interface), concept art, and promotional art. This report aims to determine the technical, artistic and content-oriented requirements of all three types of assets in order to create a consistent visual language for the game's 2D assets that resonates with potential players.

During the closed BETA testing of the game, an online survey was conducted with the playtesters. The players were asked to rate the in-game art based on several measurable indicators such as whether the art is readable and understandable, whether the art fits into the game's genre and 3D world, and whether the art enhances the gameplay experience. Another point of the survey was asking players to evaluate the role that the promotional art played in getting them interested in the game, and drawing them into participating in the game's BETA in particular. Additionally, desk research and literature studies were conducted in order to explore the stylistic and technical restrictions of the project, and determine the game's key selling points and target audience in order to tailor the content towards them.

When analyzing the results, it was determined that players depended vastly on the 2D art to guide them through the story and interactions. They found it to be complementary to the 3D world and crucial to the gaming experience. Adding character and enemy portraits, plus environmental illustrations to each mission increased the understanding of the game's narrative and made understanding of the enemy behavior clearer. Moreover, 2D promotional artwork played a key role in getting players to participate in the BETA and/or wishlist the game.

The results indicate that 2D art adds another layer to the gameplay experience. It also grants the game a sense of being polished and completed. Based on these findings, it is recommended to consider implementing more 2D art in future VR projects of the company as it helps generate excitement around the project and leads to a larger involvement of players, which could lead to higher profitability of the games.

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## 2. Glossary

**Concept art** - Concept art is a visual representation which tells a story or conveys a certain look. It is commonly used in film and video games to convey a vision and set the tone for an entire game or movie. Concept art provides a strong reference point that helps align the creatives working on the project (Fitzgerald, 2019).

**VR** – short for virtual reality. A space created by computers that allows you to experience and interact with a 3D world that isn't real by putting on a head-mounted display and some form of input tracking. The display will typically be split between your eyes, creating a stereoscopic 3D effect with stereo sound, and together with the technology and the input tracking, it will create an immersive, believable experience, allowing you to explore the virtual world being generated by the computer (O'Boyle, 2021).

**Shoot-'em-up** - a game that sees you take control of a craft—sometimes a character—and wage war against enemy forces, typically in horizontally or vertically scrolling aerial combat. They can be simple affairs that see you dodge, fire, return fire, and drop the occasional bomb; they can also be highly complex affairs involving counters, deflections, and combo systems (Wilson, 2021).

**UI** – short for user interface. Refers to the methods (keyboard control, mouse control) and interfaces (inventory screen, map screen) through which a user interacts with your game (Quintans, 2013).

### 3. Introduction

From February 2021 until June 2021, I was employed at an independent game development company called *ZeroFun Games* for my graduation project. ZeroFun Games is a game developer based in Sofia, Bulgaria. It was founded in 2017 and has been expanding the scope of its projects along with its staff ever since then. The studio has a background in developing single player games focusing on unique mechanics that involve puzzle-solving or cooperative action (ZeroFun Developer Steam Page, 2021). Antiprism is the first VR project that the company is tackling. The official “Antiprism on Steam” (2021) page states the following about the game’s themes and mechanics:

Antiprism is the world's first twin-ship VR shoot-'em-up. Control one space ship in each hand as you go on a series of missions, fighting swarms of enemies and dodging dangerous projectiles and anomalies. Embark on a space adventure that pits you against powerful enemies and takes you to the most dangerous parts of the galaxy. (paras. “About the Game”)

This graduation report outlines the nature of my graduation assignment in the context of the company project: I was responsible for creating 2D assets for the virtual reality action space game *Antiprism*. This report focuses on formulating the client’s requirements and priorities, and the research behind satisfying them in my work.

Firstly, it summarizes the client’s objectives by delving into the product’s purpose and limitations. The graduation report then explores the known theory behind creating 2D assets (including concept art, in-game assets and marketing art) for a sci-fi VR game, and how that theory relates to the research which was conducted. The report then distinguishes the client’s problem, which revolves around creating applicable and appealing 2D art for the game, and derives a question befitting the main problem from it. Sub-questions are established to break the large problem down into more focused and manageable areas of relevant research. After that, I analyze suitable ways to solve each sub-question efficiently, presenting in-depth research by employing various types of research methodology. To that end, a survey with the game’s playtesters pinpoints the importance and relevance of the various types of 2D content for the game’s players. Desk research accounts for the game’s target audience and technical limitations, while literature studies and experimenting explore the already established visual style of the game, and how to develop it further. Next to the theoretical research, I showcase the product, which is an archive of the work I have accomplished in all areas of 2D art in the game. I explain the considerations behind it, as well as its relevance to the game. I draw conclusions and recommendations based on each finished task. Lastly, I reflect on the production and research process, and the graduation experience as a whole.

## 4. Assignment Objectives and Limitations

### 4.1 Objectives

The graduation assignment entails producing 2D artwork for the upcoming VR action space game *Antiprism*, produced by ZeroFun Games. This section elaborates on the purpose and limitations of the three aspects of the work: the marketing-oriented art, the concept art, and the production of in-game assets.

The marketing part of the assignment is closely related to the game's approaching release date. This means that the marketing campaign is in full swing. It is a chance to create more polished 2D content that can be shared with the public instead of only sharing working concepts and sketches. In order to attract an audience, the marketing campaign needs a multi-layered array of content to present on social media and beyond, from trailers and sneak peeks to wallpapers and cover art. The latter two are the areas where my skills as a 2D artist come into play. The company will use my artworks to actively promote the game across a variety of mediums, such as web pages, social media accounts, physical posters and official merchandise.

The reason for the second part of the assignment (concept art) is that there are still characters and environments in the game that haven't been visually defined, or they could use a more concrete and elaborate exploration. This involves in-depth understanding of the game's narrative and themes, and the ability to translate them into visual assets.

The reason for the last part of the assignment (in-game assets) is that, while the game offers a 3D VR experience, most of the characters feature in-game portraits at the start of each quest or mission. Those portraits need to be hand-drawn 2D images placed on the "flat" UI surfaces. Besides that, the actual UI of the game includes 2D elements only, so that is also a task I actively tackle throughout the graduation project.

### 4.2 Limitations

The client asks to have artwork produced that is suitable for the already-established game style, is appealing to the game's target audience, and applicable in the technical aspects of game-asset production.

This poses three research questions: Firstly, researching the game's art style and effective ways of tailoring my artwork to its visual specifications. Second, researching the game's target audience, their tastes and preferences, examining examples of artwork targeting similar groups, and considering suitable methods to create appealing content for this specific group. Third, conducting research on the technicalities of preparing and exporting artwork specifically for VR productions, as opposed to regular PC and console games.

Limitations and boundaries for this assignment include:

- Time limitations. The project is working on a firmly set schedule, with an established release date around late August / early September 2021. This means that I will have a few

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days to tackle each new task before moving on to the next one. This will force me to maximize the quality / quantity ratio in my personal work, producing quality artworks quickly by working efficiently.

- VR limitations. The resolution supported by VR tools is still relatively low in modern VR headsets. This means that one cannot run a VR game's graphics in 4K or even full HD. I need to create artworks that are discernable and appealing even at a lower resolution and a more simplified UI that does not cause headaches and motion sickness to players who play extensively.
- Target group limitations. The game's target audience is adolescent and young adult males, between 15 and 25 years of age. For the marketing visuals, I need to create content that will resonate with them specifically. That means that I need to tailor both the content and artistic look of the visuals to their needs and interests, which narrows down the topics and renditions of the artworks.



## 5. Preliminary Problem Definition

The problem that the client defines across all the assignments is to have the artwork fit the technical and stylistic requirements, correspond with their target audience and generally contribute to adding a polished look to the game that will get the players excited about playing it. They ask for art that is “military-looking”, “aggressively sci-fi” and “carrying retro energy” (personal communication, 27/02/20). At the time of me stepping into the project, some key character concepts had already been produced by the studio, serving as references and a starting point when defining further visuals (Fig. 1).



Figure 1: ZeroFun Games. (2020). *Malik and Jexen: Protagonists concept art* [Digital Artwork]. Retrieved from ZeroFun in-house archives

The theoretical framework section sets out to explore the known theory behind the several aspects involved in the process of creating the various types of 2D content required for the game. The collected knowledge is used to get a good grasp on what is possible and not in terms of the client’s needs and how to realistically go about delivering on them. This is a key factor in pulling together a clear and definitive problem definition that reflects the knowledge on the subject, which enables me to then set achievable and viable solutions for it.

## 6. Theoretical Framework

In order to delve into the assignment in a theoretically prepared state, one must examine and collect data on key aspects of the task at hand.

### 6.1 The Product

The product that I will be focusing on delivering throughout the Graduation are multi-purposed pieces of 2D artwork. The main bulk of the work will be to create 2D assets that are featured in the game as UI elements, character portraits and illustrations. The artworks need to enrich the world by providing a polished, immersive interpretation of the 3D environment in which the game takes place (personal communication, 02/03/20). Assets for the game include:

- In-game character portraits
- User interface elements
- In-game environmental illustrations
- Game cover illustration

### 6.2 Technical Specifications and Limitations

#### 6.2.1 VR Graphics: Quality Decay

VR is a relatively new medium for game production (Barnard, 2021), so technical limitations that have been overcome by mainstream mediums such as PC and consoles are still present in this format. Namely, modern VR headsets still do not support high resolution graphics (Why Are VR Graphics of Poor Quality?, 2021). To illustrate the difference between VR and PC, Fig. 2 displays the same graphical elements run on PC, and on two different VR headsets. One can see how computer monitors (left side) are able to render much higher quality graphics, while the two headsets (center and right side) blur and diminish the quality of the image to varying degrees. While this example uses 3D graphics, the same applies to 2D elements as well.



Figure 2: GORN Graphics Comparison - Quest vs PC VR vs PSVR (2021)

In order to have graphics, especially intricate 2D art, be discernable in a low-quality rendered environment, the assets need to have a high readability to them. This does not mean that they should be less detailed, as VR technology is progressing rapidly and, in the near future, it is expected that the rendering capabilities will develop further, but rather, the assets should be constructed in a way that allows players to recognize them even when they are rendered in low quality.

### 6.2.2 Designing UI for Virtual Reality

Creating a functional user interface in VR is a science of its own. Many visual designers have tackled the subject and come up with efficient formulas to overcome the problems of integrating a 2D interface in a 3D virtual reality world (GDC, 2021). According to designing experts at GDC, one issue is that VR supports a different input style from PC (mouse and keyboard) and consoles (controller). Most user interfaces in VR adopt the *pointers input style*, which is similar to the functioning principles of mobile apps. For this type of interaction, users commonly point at, lock onto and drag elements of the UI to interact with them. The way a user interacts with the UI is a vital piece of knowledge to keep in mind when designing the visuals for a game's UI.

Another unique aspect to VR user interfaces is the possibility to integrate UI elements into the environment for a wholly immersive experience. This introduces a level of originality as it breaks away from the typical presentation of the user interface as elements that are not part of the game world but rather a separate layer of information “placed” on an invisible canvas for the user to see (Fig. 3). This poses the question of how to best integrate 2D graphics into 3D environments, and in which instances the user experience would benefit from such a design choice. Creating an “internal” or standard UI can pose its own set of difficulties as these types of floating menus can potentially cause players to experience dizziness in VR, unless the virtual distance from the player's point of view, the angle of tilting and the nature of movement of the UI are carefully designed and sufficiently tested out (GDC, 2021). In both cases, the UI elements of a VR game need to be clear, clean and simplistic due to lower resolution supported by headsets.

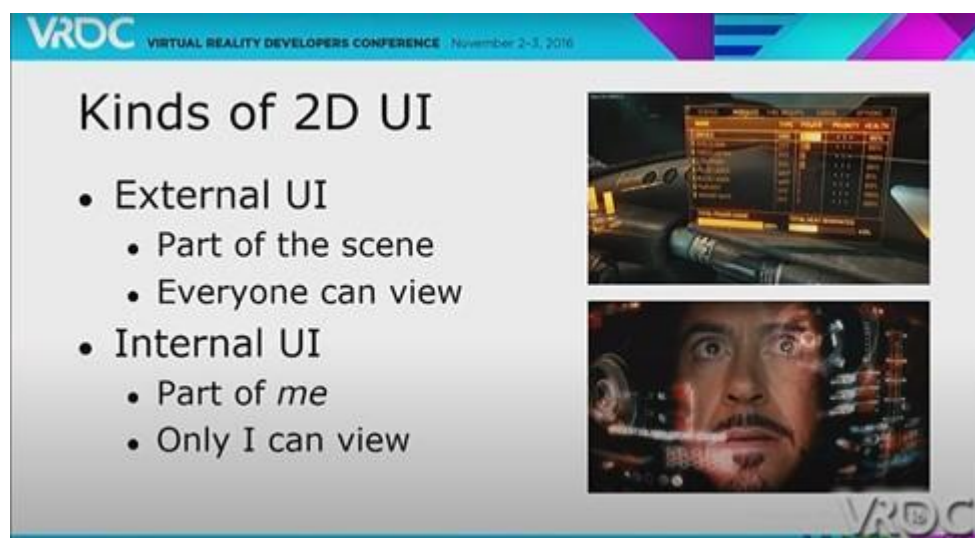


Figure 3: Internal vs External UI, CDC (2021)

### 6.3 Production Pipeline

The 2D asset production process follows an iterative structure, as seen on the chart below (Fig. 4). This chart was created with the help of my supervisor and displays the steps that are completed for the creation of a single asset, or a group of interconnected assets. This work model is based on the principles of iterative work. Certain steps might need to be performed multiple times to achieve the desired result and implement the received feedback. Internal quality checkers include fellow employees with relevant experience and / or the project's art director, while external quality checks are done via playtesting or, in certain situations, specific quality assurers that possess the required expertise to give professional feedback on a concrete subject.

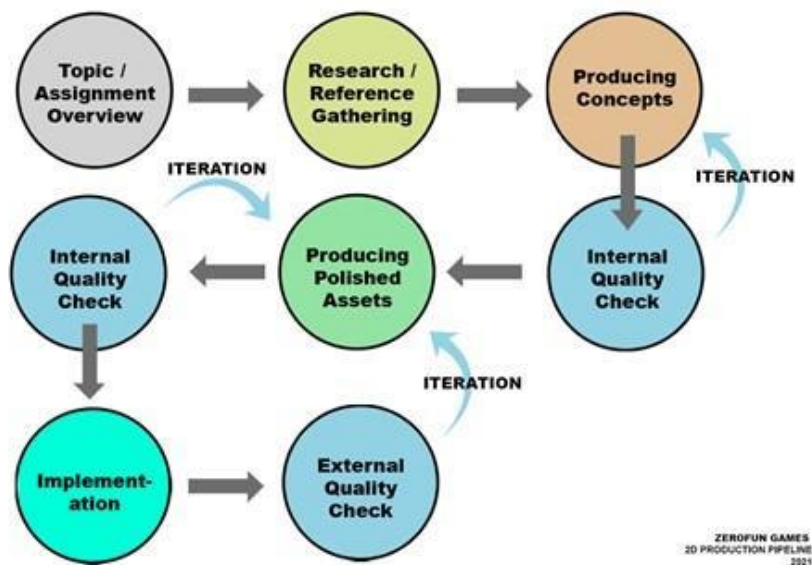


Figure 4: 2D Assets Production Pipeline of ZeroFun Games - Chart by Elena Katsarova (2021)

### 6.4 Software

The software that is going to be used for the creation of all 2D assets is Adobe Photoshop. It is the primary 2D software used by the company, and using the same software facilitates sharing work files with other artists on the team. Additionally, it is a software highly endorsed by the gaming industry as a well-organized, multifunctional drawing tool that produces quality results quickly, used to produce artworks for blockbuster titles such as the *Assassin's Creed* franchise, as stated by concept art professionals like Ivan Koritarev (2020).

### 6.5 Target Audience

The game is being designed with a target audience of adolescent males between 15 and 25 in mind. According to preliminary company research looking into the people who are responsive towards the promotional content posted on the game's social media pages, the potential players correspond with the original projections of adolescent males being the primary target audience. So far, they respond positively to the game's sci-fi theme and the uniqueness of the teased mechanics. This suggests that these are strong selling points which would make for an effective marketing effort, seeing as the content

and the marketing campaign should be tailored to appeal to the tastes and preferences of the target audience above any other.

According to Newzoo research (2017), the preferred gaming genres of adolescent males include shooter and action. Games of this nature typically take place in a highly militarized setting that supports fast-paced gameplay, with graphics that create a combative mood and an exciting, dynamic setting.

According to the same study, young males tend to dedicate more time to a single game and develop higher proficiency levels compared to females, who play a wider variety of games at intermediate skill level. In other words, young males are more drawn to “serious gaming”. The graphics of a game oriented towards them should clearly reflect progress, reward the time invested and provide gratification from achieving breakthroughs.

## 6.6 Competition and Trends

Looking at potential competition in order to draw comparisons, define successful patterns or avoid creating a product that is simply too similar to an already existing one, I account for several popular indie action space VR game titles which are currently trending on Steam, one of the leading online gaming market platforms.

A leading title in the popularity aspect is a game called *Space Ops VR: Reloaded*. It is similarly a space action game developed by an independent studio exclusively for virtual reality and adheres to the action / shooter genre. Stylistically, it also resembles *Antiprism*, in that it employs a realistic, futuristic art style with military undertones. According to Steam statistics, the game has sold over 50 000 copies, enjoying a profitable run since its release. This suggests that the market is accommodating and receptive towards games similar to *Antiprism*.

According to user reviews on Steam, *Space Ops VR: Reloaded* is lauded for having a fast-paced combat system and high-quality visuals. However, users have complaints regarding the lack of originality. In essence, the game checks all the boxes one would expect from the genre but introduces nothing revolutionary. *Antiprism* has the chance to break the mold by introducing mechanics that are unique and groundbreaking: the player controls two spaceships / characters at once, making the game a blend of single player and cooperative action. This is a strong selling point which should be emphasized as much as possible in the 2D graphics that are shared as promotional materials with the public in order to make the game stand out from the likes of *Space Ops VR: Reloaded*. Style-wise, the realistic visuals of *Space Ops VR: Reloaded* seem to be well received, so that is a successful formula that is already adopted in the production of 2D artwork for *Antiprism*.

## 6.7 Visual Style and Restrictions

As mentioned above, the style of *Antiprism* is aimed towards young males that enjoy shooter games and the corresponding visual trademarks that come with the genre. The style has already been roughly defined by the client, therefore I am acting in the capacity of executing it with only minor alterations that might better fit the game’s overall visual integrity.

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Content-wise, there are restrictions that come with both the genre and target group. Seeing as this is a futuristic space game that takes place in a fictional world, the characters, environments and weapons I design must diverge from what one would find on Earth. They need to have an alien, otherworldly quality to them while still being associable with the sci-fi genre. Moreover, certain considerations must be made in accordance with the target audience. Because the game targets young adults and not children, the graphics adopt a realistic look, confident that the players can comprehend them and enjoy the more intricate and accurate representation of spacecraft technology.

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## 7. Problem Definition

The problem stated by the client comes down to producing 2D assets that are functional in a VR application, comply with the set stylistic boundaries, emphasize the game's unique selling point and appeal to the preferences of the target audience.

The theory section shows that VR graphics should be constructed in a way that allows players to recognize them even when they are rendered in low quality. Next to this, the UI elements of the game need to be clear, clean and simplistic due to lower resolution supported by headsets.

The visual style has already been roughly defined by the client. New images should fit the game's overall visual integrity. The company works with Adobe Photoshop: for seamless integration, the assets need to be made in this software too.

The target audience seems to respond positively to the game's sci-fi theme. It is important for them that the graphics clearly reflect progress, reward the time invested and provide gratification from achieving breakthroughs. The target audience also appreciates the game's mechanics. Antiprism's unique mechanics are a strong selling point which should be emphasized in the promotional materials.

From my standpoint, the problem is to create assets that are style-compliant and technically applicable in a VR game that clearly give information on the themes, narrative and the unique mechanics. The solution depends on my ability to create artworks that meet the production standards and deliver them in a timely manner.

## 8. Main and Sub Questions

### 8.1 Main Question

How to develop 2D assets for the VR game Antiprism that emphasize the game's key selling points, appeal to target audience and fit the existing visual style?

### 8.2 Sub Questions

#### Style:

- What are the stylistic requirements for producing 2D assets for the VR game *Antiprism*?
- Which aspects of the game's style still stand to be improved and how to best go about it?

#### Technical specifications:

- What are the technical limitations and requirements for 2D asset production for the VR game *Antiprism*?

#### Goal:

- How do similar game titles tackle the sci-fi and space themes in their 2D artworks?
- What are the target audience's preferences and how does that influence the development of the game's visuals?



## 9. Research Process

The research process for the graduation project is based on the research questions formulated in the sections above. The section below breaks down the research process and offers relevant examples of how that research was applied in my work. For a full showcase of my work for the graduation project, refer to the Work Process and Showcase section of this report.

### 9. 1 What are the stylistic requirements for producing 2D assets for the VR game *Antiprism*?

#### 9. 1. 1 Methodology

In order to create fitting assets, I had to research and determine the stylistic requirements and boundaries that were established by the developers prior to my joining the project. Desk research was employed as a main method of research for this question. According to Juneja's article on desk research methodology and techniques, desk research is conducted from a local workstation and involves collecting data from existing resources (2011). More concretely, the desk research to solve this question included consulting with the art lead, examining existing art guide documents, and analysing the previously created concept art and in-game asset works and listing relevant findings. It was a suitable research method for this particular question because the information on the stylistic requirements of *Antiprism* was already established and accessible through in-house archives, and existing references discovered on the Internet.

#### 9. 1. 2 Research

From my talks with the art lead and poring over the art guides, I received a basic grasp on the direction of the art style. The project was aiming for a sci-fi inspired atmosphere that depicts futuristic technology in a semi-realistic style. I was provided with a compiled bundle of every existing concept art piece and in-game 2D asset that had already been produced and approved for the game. These works were created by different artists, each of them used to a different art style, so it was a valuable experience to analyse the pieces and search for the ways the artists had adapted to the desired style and blended their own work with that of their colleagues.

#### 9. 1. 3 Results

A comprehensive example of breaking down a pre-existing piece of concept art for the game, creating my own notes and writing down my personal observations, can be seen on Figure 5. My findings confirmed that the assets should be realistically shaded and painted, but the shapes can still be somewhat exaggerated, and the designs don't necessarily need to be a realistic representation of space-related technology, as the narrative takes place in a fictional universe that features alien creatures and mystical devices. These findings were confirmed by the project's art director Lubomir Naydenov during an interview. Because of this, no further testing of these requirements was needed. Naydenov also stressed the importance of not deviating from several of the discovered aspects of the style because they were considered core aspects of the game style: namely the realistic shading, the high level of detail, and the mixture of medieval and futuristic elements.



Figure 5: ZeroFun Games (2020). *Notes on Previously Developed Art: Style Breakdown by Elena Katsarova.* [Digital Artwork]

#### 9. 1. 4 Conclusions

The results show that ZeroFun Games prefers a well-established sci-fi art style that is consistent across all of its artworks. The process of exploring it was done before I started any of my personal work on the production of assets, because it served as laying down a solid foundation for my adapted art style. Throughout my work, I have often referred to those initial notes that I made in order to double-check certain characteristics and limitations of the game's visual signature, particularly when creating new art for various characters (Fig. 6).

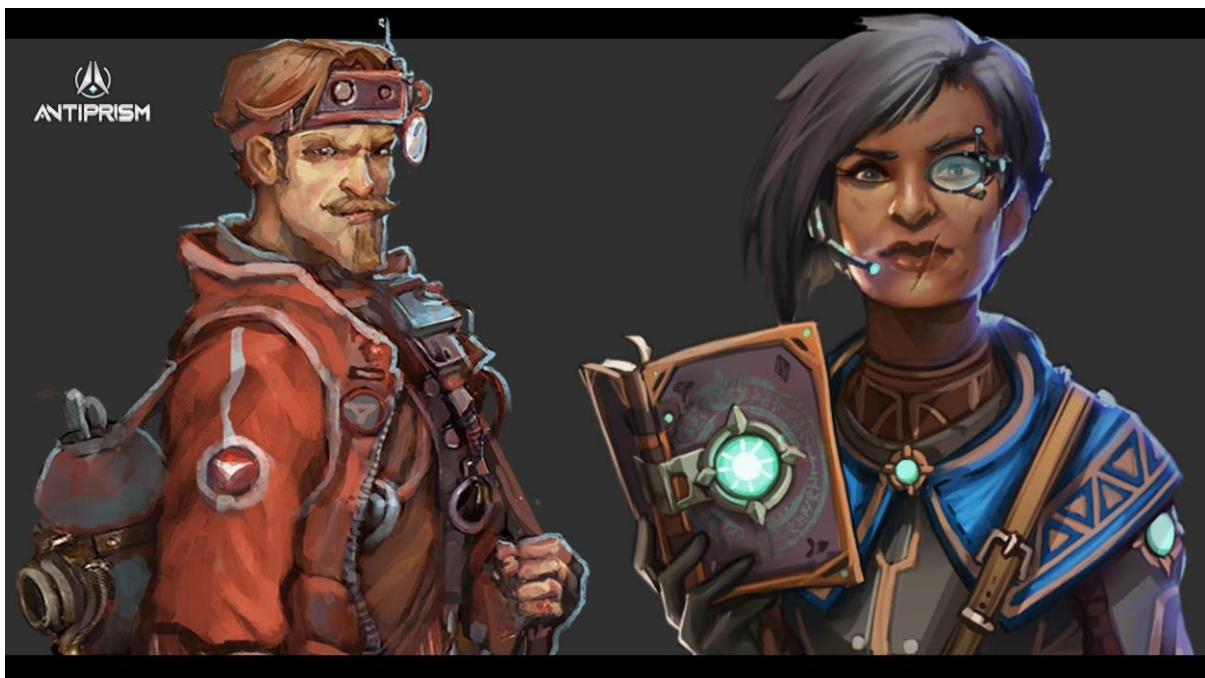


Figure 6: ZeroFun Games, E. Katsarova (2021). *Character Art Comparison: Previously Developed Character Art (left) and Character Art by Elena Katsarova (right).* [Digital Artwork]

Having a clear grasp on the art style helped me create artworks that fit the stylistic requirements and blended seamlessly with the game. This helped solve the main problem of the client by ensuring that the assets I delivered were always visually suitable for the game and therefore easy to integrate in the game world.



## **9. 2 Which aspects of the game's style still stand to be improved and how to best go about it?**

Once I had a solid understanding of the stylistic requirements that had already been set in stone for the project, I moved on to researching suitable ways to build and expand on them.

### **9. 2. 1 Methodology**

Several research methods were used to solve this question: desk research, literature study, and experimenting. Desk research was a suitable option for this section because exploring existing references is key to finding artistic influences and inspiration when building on a style. Additionally, literature study, which involves “a synthesis of [...] findings stemming from [...] research studies” according to Onwuegbuzie & Frels (2016), was a suitable method of looking up approaches to evolving an art style by reading the experiences of established artists who are familiar with the process. Experimenting is “a type of research method in which you manipulate one or more independent variables and measure their effect on one or more dependent variables” (Bevans, 2021). This was a compatible research method for this sub-question because putting the knowledge and theory into practice is a necessary step to visualize the results and iterate on them.

### **9. 2. 2 Research and Results**

This research was particularly oriented towards creating concepts that were novel to the game, such as environmental concept art. This was a field I did not have any example concepts to work with, so I had to find my own way of crafting art that would match the rest of the game world. In this case, I researched articles and presentations by established game studios, such as the knowledge shared by the experts at Kevuru Games, to discover how experienced professionals go about painting semi-realistic environment art. I then analyzed the information and extracted useful practices from it. To do that, I tried out the techniques for myself to see what works in the context of the game's style (Fig. 7, Fig. 8).

My findings from analyzing the environmental art guide articles by Kevuru Games and testing out their artistic advice include:

- I grasped the importance of understanding natural and artificial lighting: natural lighting, such as the light from stars and planets in outer space, creates a more diffused light, while artificial lighting such as that inside of a spaceship is more focused and casts sharper, directional shadows
- understanding and properly illustrating the different textures (e.g. making ice look glassy and reflective while the snow is non-reflective) is key to adding a sense of realism to the environment
- adding small details that tell meaningful information about the environment is also typical for realistic works
- drawing perspective lines on a semi-transparent layer to easily double-check the perspective as the painting comes along can be useful to keep the shapes and angles consistently directed

- thumbnailing, or creating small grayscale sketches, can help define the shapes and composition early on so that I don't have to worry about figuring out the basics while painting the details later on

Once I had that theory to work with, I put the knowledge into practice by experimenting with several ways of approaching environmental art. I tested those out with the 3D artist by providing him with different types of approaches to the same piece of environmental art. He then analyzed them and informed me which pieces contained the most useful information to him as a 3D artist, in other words, which pieces gave him enough visual clarity to be able to recreate the environment in 3D. In the process of iterating, two directions provided the most useful information for the 3D environmental artist. The first was the intricate, painterly style that gives information about composition, lighting and color (Fig. 8). The second one was the thumbnail-based approach which does not develop the environments past the compositional aspect and only gives basic information about the lighting of the scene (Fig. 7). The intricate environments were more time consuming to produce, but they would relay more of the intended atmosphere and make for potential promotional materials. Therefore, those were used to illustrate key locations significant to the narrative such as boss fights, and the introductory tutorial areas. Meanwhile, the thumbnail-based approach was employed to create most of the in-game locations where repetitive gameplay such as mob battles and regular quests takes place.

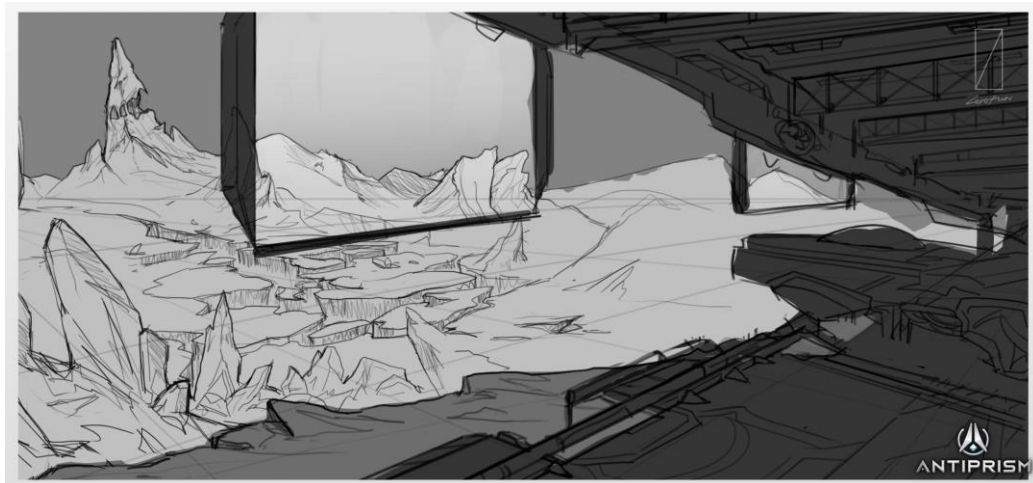


Figure 7: Environment Thumbnails by Elena Katsarova (2021)

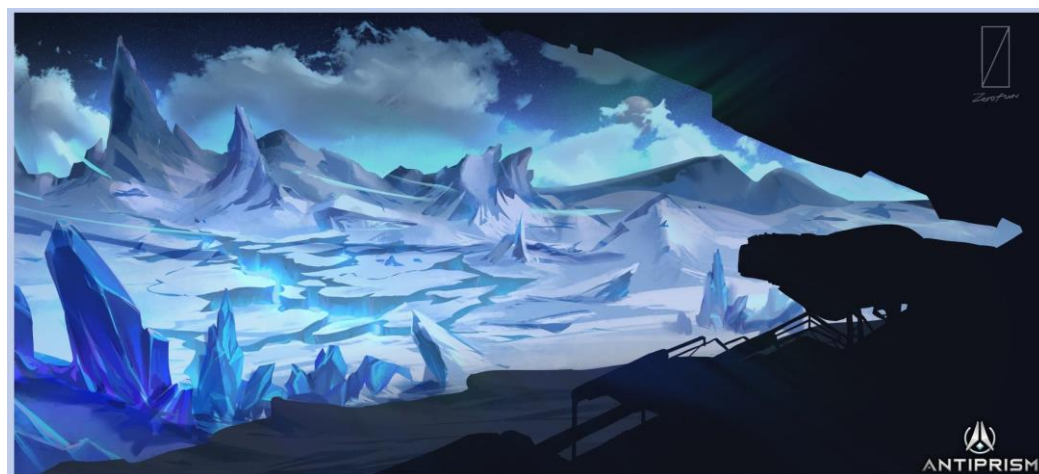


Figure 8: Polished Environment by Elena Katsarova (2021)

### **9. 2. 3 Conclusions**

In conclusion, this research showed that a strong foundation in theoretical knowledge can make realistic environmental art come to life. This research helped me gain a clear understanding of the optimal steps to go through when creating semi-realistic environmental pieces. This then helped solve the client's main problem because it enabled me to create fitting environmental art for the game that blended well with the rest of the art, making for a consistent look across all types of art for the game.

### **9. 3 What are the technical limitations and requirements for 2D asset production for the VR game *Antiprism*?**

While researching this section, I collected data in a twofold manner: firstly, I gathered information about the topics related to VR games in general, and then researched to see if there were any local exceptions and specifications for the findings that applied to the project at hand. I divided the research into the three main categories of assignments: in-game assets, user interface, and promotional materials. The common research method across all categories was desk research. It was a suitable research method for this question because, similarly to the stylistic requirements, the technical limitations were available in in-house archives of the company, and recorded presentations of industry experts on the Internet.

#### **9. 3. 1 In-Game Assets**

##### **9. 3. 1. 1 Methodology**

As accounted for in the Theoretical Framework section of this document, creating in-game assets for VR games poses the challenge of painting visually clear and easily readable assets even at a lower resolution, because the technology is yet to support high-resolution visuals. Expanding on this finding, I delved further into the theory of artwork readability and how to best create easily distinguishable assets.

##### **9. 3. 1. 2 Research and Results**

Experienced concept artist Lino Drieghe observes that at the root of good readability in artworks are a strong silhouette and balanced distribution of detail (2021). The former means that the object is easily distinguishable even as a silhouette, while the latter deals with the principles of placing details strategically over an art piece to underline the important parts, drawing and focusing the attention there. This theory was put into practice when creating the in-game portraits for the different characters - they maintain a realistic level of detail to comply with the game style while resting on a solid foundation of clean silhouettes, calculated focal points and suitable backgrounds devoid of detail in order to bring out the portraits efficiently (Fig. 9).





Figure 9: Vel Selysian Character Portrait by Elena Katsarova (2021)

Further technical specifications related to Antiprism in particular were the dimensions of every artwork. To ensure maximum consistency across all artworks, I was given size and resolution guidelines to follow to result in the best-looking assets in-game. The dimensions for Antiprism artworks vary based on the size and purpose of the artwork. Small in-game assets are created in a 300 x 300 pixels ratio, mid-sized assets should be 600 x 600 pixels large, while big assets can go up to 1000 pixels in either dimension. Next to this, I tested out the optimal PPI (pixels per inch) ratio to work in, and export files in. PPI is a variable that influences the size of the image and the level of detail it can shoulder, but does not influence the image's proportions (Watson, 2021). In order to check what export settings work best, I tried out various settings used by established game artists or fellow student artists I interviewed. This was an experimental research involving trial-and-error, as there were no prior company guidelines on this. Because VR inescapably deprecates image quality, as confirmed in the Theoretical Framework, I discovered that working in 300 PPI and exporting the image in a standard 72 PPI works well to preserve a sufficient level of detail and quality for a VR game, while reducing the size of the image for optimal game performance. My findings were subsequently added to the art guidelines of ZeroFun Games for future VR projects.

### 9. 3. 1. 3 Conclusions

In conclusion, researching into the technical limitations of in-game assets showed that there are many considerations to be taken into account when creating the artworks besides the artistic ones. It is important that the art is readable even in a state of deprecated quality so that players with headsets that support poorer quality can still enjoy the gaming experience. This helped solve the main problem of the client by ensuring that the assets are readily integratable in the game and are easily distinguishable by players.





### 9. 3. 2 User Interface

#### 9. 3. 2. 1 Methodology

As mentioned in the Theoretical Framework, designing a user interface for a VR experience employs an entire new set of rules on top of the established UI designing principles for games. In order to create a fitting and functional user interface, I researched what considerations need to be made when designing and placing UI elements within a virtual reality environment according to specialists in the area of VR user interface design, and subsequently consulted with the lead programmer of the company to ensure that the implementation of any of those findings would be accomplishable, code-wise.

#### 9. 3. 2. 2 Research and Results

According to VR experts from Google Developers, visual data is more easily digested when it's closer to the center of our field of view (2021). This means that if the UI elements are placed over a curved screen (made possible in the 3D environment of VR as opposed to the "flat" PC and console games), the information is more easily accessible for users (Fig. 10). After discussing this principle with the UI programmer, we settled on simulating a curved screen for most of the UI elements: information that I would need to keep in consideration while designing the graphical elements because placing assets on a curved screen involves some squashing and stretching of the assets themselves, and the deformation needs to be accounted for in the design.

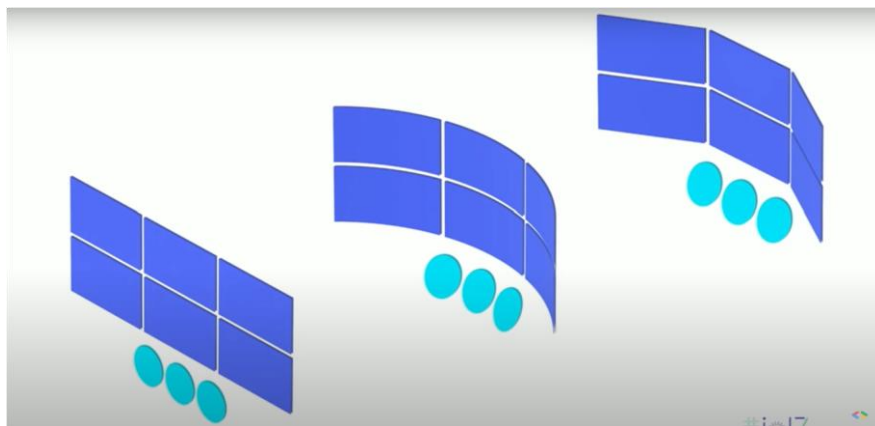


Figure 10: Designing Screen Interfaces for VR (Google I/O '17) (Google Developers, 2021)

Moreover, user interface interactions within VR are different from those of a PC game, as touched upon in the Theoretical Framework. In the case of Antiprism, UI interactions most commonly happen by pointing the controller and hitting the hitboxes of the buttons. This required me to look into appropriate sizes and proportions of the hitboxes to facilitate targeting, as well as easy to hit shapes to design the UI in. The user interface elements that were created are mostly rectangle and square based, as opposed to complex, irregular shapes that are difficult to hit with a controller pointer. Recorded examples of the developer user interface can be found in the first few minutes of the video below.



Figure 11: *Antiprism Beta* - HTC Vive + Vive Wands [Video]. Retrieved from <https://www.youtube.com/watch?v=VJ1aWdeP77k&t=83s>

### 9. 3. 2. 3 Conclusions

In conclusion, the user interface is the area of 2D art which has the vastest differences, design-wise, in VR from conventional platforms. Designing an intuitive interface employs a different set of rules and it is crucial to have the interface tested out frequently in the game. This helped solve the main question by enabling me to design a user-friendly, easy to navigate UI that was visually fitting and technically doable for the programmer.

### 9. 3. 3 Promotional Materials

#### 9. 3. 3. 1 Methodology

The technical specifications for promotional artworks differ from those for the in-game assets, mostly because promotional materials tend to be higher resolution images that are fit for multi-purposed uses, including digital wallpapers and printed merchandise. Higher quality images sustain more detail and look more appealing, which is the point of promotional materials. Therefore, I consulted with the company to check the desired resolutions and dimensions for their promo artworks.

#### 9. 3. 3. 2 Research and Results

The findings were different based on the purpose of the artwork. When creating the game cover for the official Steam page, I researched specific guidelines provided by the website. A promotional image for Steam needs to have several versions of the graphical assets. According to Steamworks documentation, “these are displayed in different places on the Steam store and in customer's libraries” (2021). Altogether, game developers must submit key art arranged in several crops and compositions, as described in the table below:

<b>Store Assets</b>		
<a href="#">Store Graphical Assets Details &amp; Templates</a> - These are the capsules and assets needed when constructing your Steam store page.		
Header Capsule	Required	460px x 215px - Just your game logo and artwork <a href="#">See details</a>
Small Capsule	Required	231px x 87px - Just your game logo and artwork <a href="#">See details</a>
Main Capsule	Required	616px x 353px - Just your game logo and artwork <a href="#">See details</a>
Hero Capsule	Required	374px x 448px - Just your game logo and artwork <a href="#">See details</a>
Screenshots	Required	1920px x 1080px or other 16:9 ratio preferred. Any size supported. <a href="#">See details</a>
Page Background	Optional	1438px x 810px - subtle artwork, not too bright <a href="#">See details</a>
Bundle Images	Optional	<b>Bundle assets required if you set up a bundle</b> <a href="#">See details</a>
<b>Community Assets</b>		
<a href="#">Community Graphical Assets Details &amp; Templates</a> - These are the capsules and icons needed for the Steam Community and Client presentation of your game.		
Community Icon	Required	32px x 32px - Small game logo or representative icon <a href="#">See details</a>
Client Icon	Required	32px x 32px .ico - Just your game logo and artwork <a href="#">See details</a>
Community Small Capsule	Required	184px x 69px - Just your game logo and artwork. Same as store small capsule. <a href="#">See details</a>

Figure 12: Steamworks. (2021). *Graphical Assets - Overview* (Steamworks Documentation). Retrieved 9 May 2021, from <https://partner.steamgames.com/doc/store/assets>

Moreover, some of these variations require an in-built logo to be uploaded with the artwork, while others instruct developers to upload the bare artwork, adding the logo on top automatically. So I had to consider the placement of the logo and account for it in every crop of the promotional images. Following the guidelines, I developed key artwork that could be arranged to fit the requirements. An example of the finished Steam cover key art I created with its varying crops can be found on the image below.

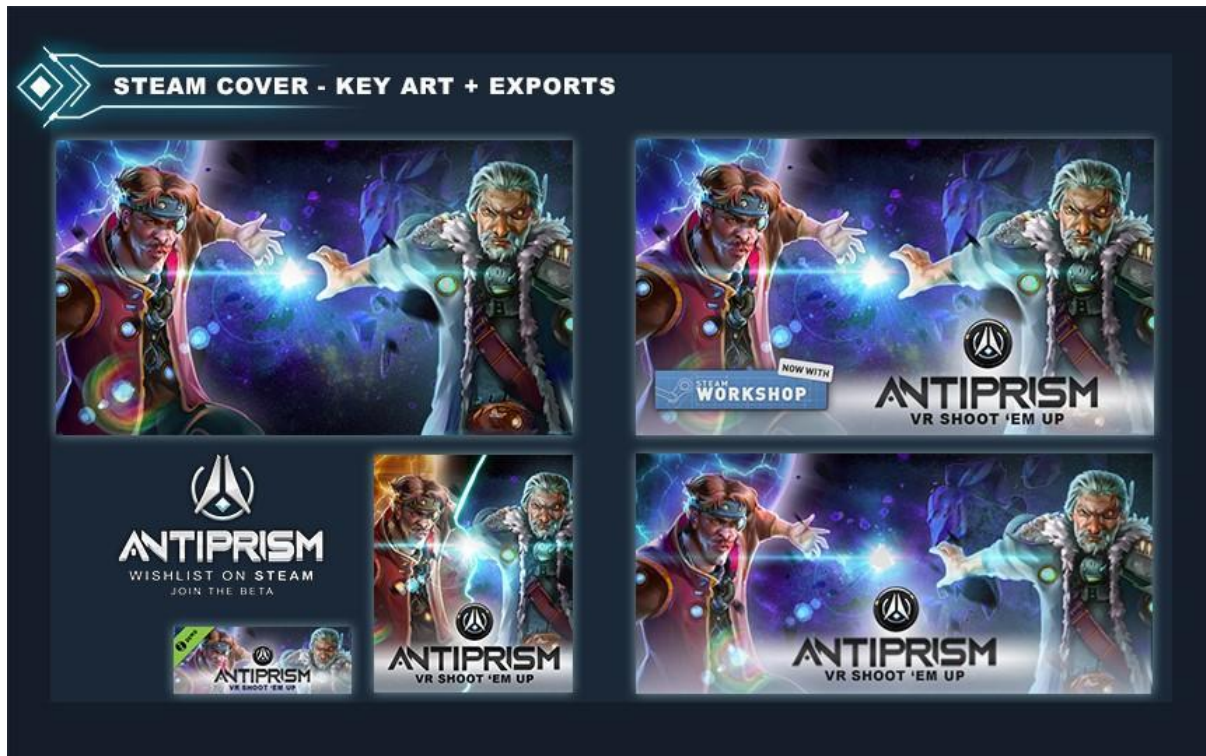


Figure 13: Steam Cover - Key Art + Exports by Elena Katsarova (2021)

### 9. 3. 3. 3 Conclusions

In conclusion, it is good to know the technical requirements for the promotional art in advance in order to plan the sizes, margins, placements, composition and colors appropriately. This part of the research was particularly helpful to solve the main question in terms of efficiently communicating the game's content to potential players.

## 9. 4 How do similar game titles tackle the sci-fi and space themes in their 2D artworks?

### 9. 4. 1 Methodology

This question is relevant for tackling promotional art, because a thorough exploration of the theme's symbols and elements helps sell the game as part of the intended genre and gets fans of that genre excited about the upcoming content. Desk research and literature study enabled me to look up existing references from published games (desk research: informing myself on the *end result*) while also reading art books focusing on the sci-fi theme and documenting useful findings on how established artists approach the subject (literature study: informing myself on the *process behind the result*). In order to explore how similar game titles handled space themes, I first needed to research what, in fact, defines a 'similar' game title. To that end I created a list of properties and tags to cross-reference across gaming platforms such as Steam in order to come up with the most relevant results. I defined some keywords after consulting with the rest of the development team. Among the keywords that we established were "VR", "shoot-'em-up", "sci-fi", "space", "twin-ship", "action", "bullet hell", and "cooperative". They encompassed the game's genre, mechanics, platform and theme, and so it was safe to assume other titles with the same tags would have a similar type of content to offer. Among the titles which had the most in common with Antiprism were titles such as Space Pirate Trainer, Space Ops VR: Reloaded, and Everspace. Once the reference games were selected, I compiled their most popular promotional artworks, and went on to research the appropriate aspects to compare them over.

### 9. 4. 2 Research and Results

According to Przybylek's online course on Understanding Visual Art, a theme's representation rests upon a few key aspects: mood (a painting's atmosphere), tone (lightness and darkness of used colors), and composition (the underlying structure of the art) (2021). I used these as the base categories to compare the similar game titles. Additionally, I added a category for the narrative or mechanics-related elements they accentuate. I also inserted a category related to level of detail in their promotional art. The findings can be seen in the table below.

Game Title	Mood	Tone	Composition	Leading Elements	Level of Detail	
<b>Space Pirate Trainer</b>	Cyberpunk military, but also hints at humor by arranging the heavily armored characters in slightly funny poses	Dark with a handful of bright, clashing accents	Mostly central compositions with simple 2-point lighting	Accent is on the characters, their personalities and skills; hardly any environments in promo art	Higher than in-game assets, achieves a more polished look	
<b>Space Ops VR: Reloaded</b>	Post-apocalyptic, gritty, military	Bright, high-contrasting colors with lots of reflective lights and post-processing	Wide space shots	Mostly environmental art, accentuating the unique environments	Same as in-game assets; promotional art is more saturated and there is heavy post processing applied	<b>Note:</b> hardly features ANY 2D promotional art, most of it comprises 3D environments with slight 2D overpaint
<b>Everspace</b>	Futuristic deep space, majestic space combat	Yellow-red contrasting on blue-purple, a typical contrast color scheme	Mostly dynamic, tilted perspective compositions featuring deep space and the player-controlled ship	Accent is on the ships and wide spacial views, hinting at extensive combat and beautiful graphics	Higher than in-game assets, a blend of 2D and 3D that creates a more realistic look than what the gameplay offers	

Figure 14: A Comparison Table Between Relevant Titles by Elena Katsarova

### 9. 4. 3 Conclusions

The conclusions I drew from the comparison include the following:

- Mood: the mood of the games is perhaps the most varying element, but one consistent factor across all of them is the military feel that hints at aerial combat
- Tone: the color schemes are different, but all of them are highly contrasting, and feature several leading colors that define the entire palette
- Composition: the compositions are, most of all, created to accentuate the action. Even though they are different, placement-wise, they are all arranged around a key element that is the focus of the scene
- Leading Element: the games focus on their most prominent element, visually or gameplay wise
- Level of detail: typically, the level of detail is higher than the in-game view so that the art can give off a sense of polish and visual appeal

These conclusions helped me create art that fits the genre and resonates with fans of space VR, which is what the main problem of the client entails.

## 9. 5 What are the target audience's preferences and how does that influence the development of the game's visuals?

### 9. 5. 1 Methodology

Desk research and literature study enabled me to cite the company's preliminary target audience research while also expanding on it in the context of 2D art. Expanding on the research in the Theoretical Framework, where I gathered and examined data on the broad interests and preferences of the target audience when it comes to gaming, in this section I conducted a survey analysing a number of questions related to the game Antiprism itself. The survey was deployed along with the closed BETA, reaching the game's actively involved testing players. The participants fill out the survey once they have played through about  $\frac{1}{3}$  of the game's released content, which gives them a perspective on the features and visuals. The survey is meant to firstly examine the age of the people who are interested in the game in order to confirm or adjust the initial target audience estimation. From then on, the questionnaire tests certain assumptions about the sort of content that the players anticipate or enjoy seeing in a game of this genre. The survey contains multiple sections related to different aspects of the game, from mechanics to user experience and visuals. The part concerning my work directly (the visuals and UX) displays various screen recordings and 2D promotional artwork to determine the level of engagement the content brings for players. Users can specify properties that would further enhance the artwork and immerse it into the 3D virtual reality world.

### 9. 5. 2 Research and Results

The project originally targeted a primary audience of males between 15 and 25 of age, but that changed on account of the survey results. The survey was taken by just under 50 participants who had played the game for at least 3 hours. Figures 5 and 6 display the age and gender distribution of the respondents. According to the results on Fig. 15 and Fig. 16, 44% of the participants were female, while 56% were male. Of the users, 54% were between 20 and 25 years old, 25% were between 26 and 30, 15% were between 15 and 19, 4% were between 10 and 14, and 2% were over 30.

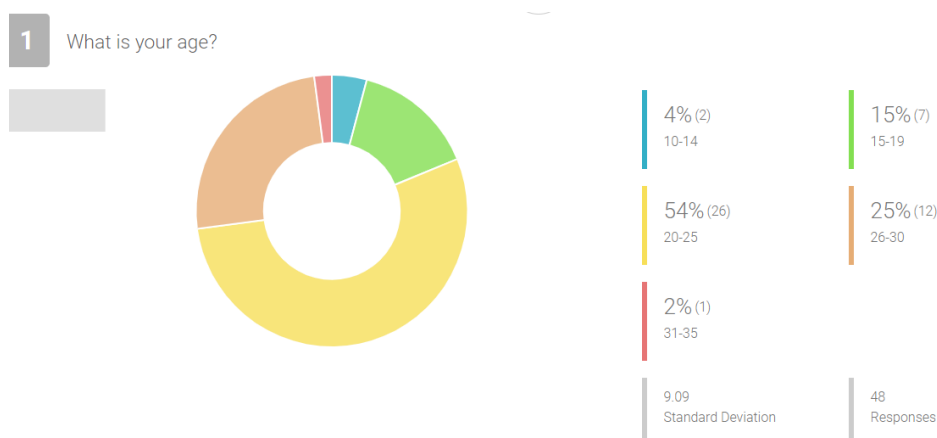


Figure 15: Age distribution of the survey participants by ZeroFun Games (2021)



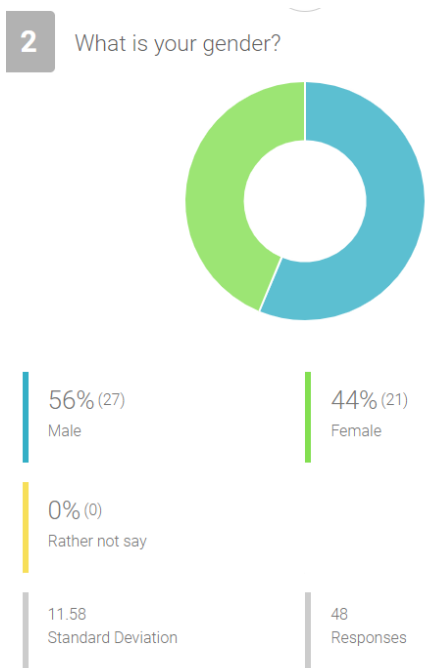


Figure 16: Gender distribution of the survey participants by ZeroFun Games (2021)

The questions in the 2D section of the survey were about whether the players felt the in-game art fit the 3D world of the game and was easily understandable. The results (Fig. 17) show that 88% of the players felt the 2D art fit perfectly into the game, 10% did not think some of the elements blended well with the world, and 2% felt that the art clashed with the 3D setting. Next to that, 77% of the respondents found the illustrations clear and easy to understand. 15% did not understand some of the images outright, while 6% and 2%, respectively, felt that many of the artworks were not readable and almost none were.

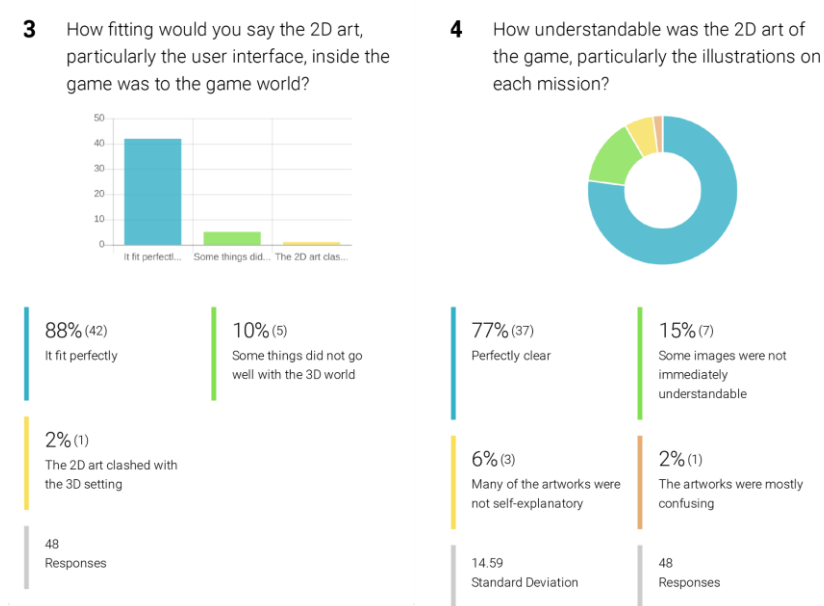
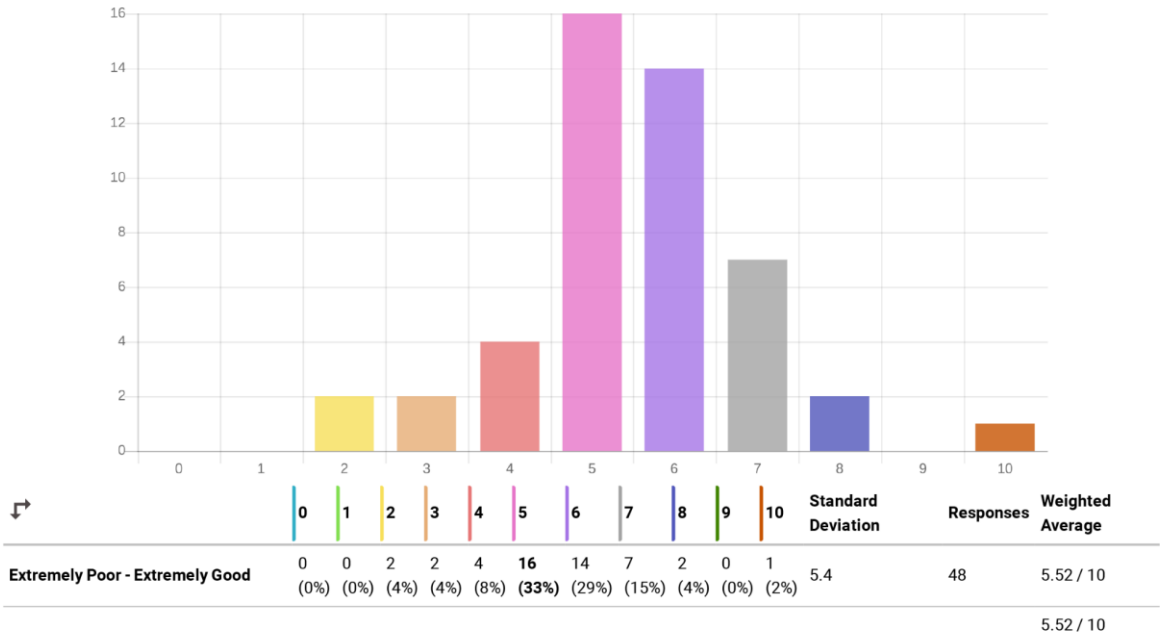


Figure 17. Results of the BETA survey by ZeroFun Games about the matching (left) and readability (right) of in-game 2D assets (2021)

The survey also had a section that was taken twice, before and after the implementation of 2D assets. Namely, a question about the level of polish in the game averaged 5.52 out of 10 prior to implementing the 2D assets I created. After that, the results of the level of polish that players found in the game were bumped up to an 8.46 average (Fig. 18).

2 On a scale of 0-10, how would you rate the level of polish of the game?



2 On a scale of 0-10, how would you rate the level of polish of the game?

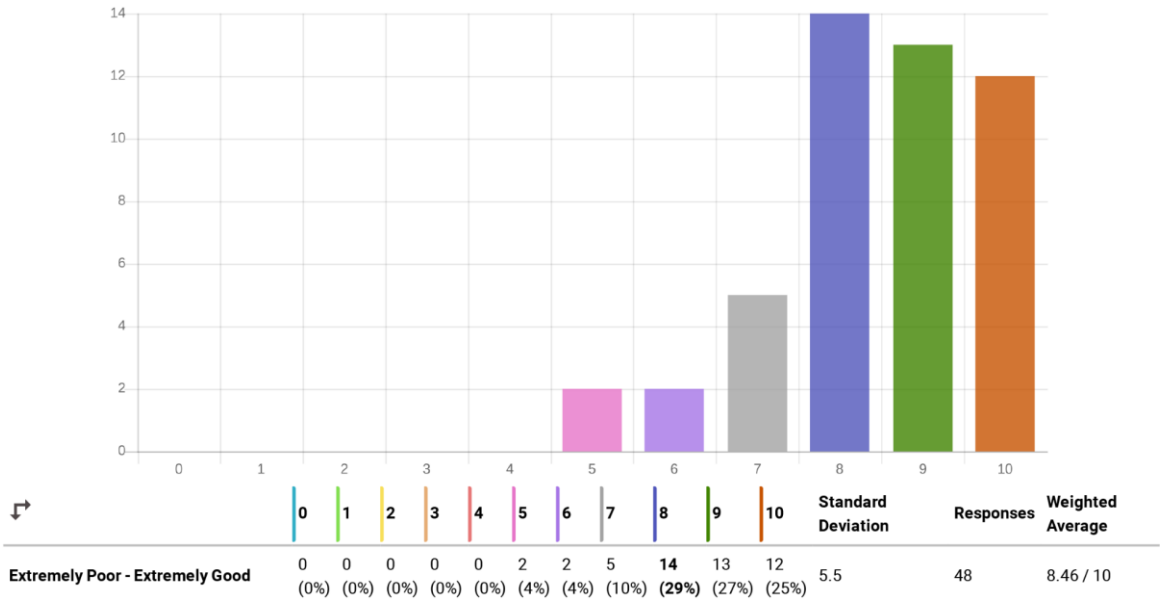


Figure 18. Comparison of results of the BETA survey by ZeroFun Games about the level of polish in the game, before (top) and after (bottom) the implementation of 2D assets (2021)

Another point of the survey was whether the promotional art on the game's Steam page influenced players' decision to participate in the BETA, or, in other words, whether the promotional materials resonated well with the target group (Fig. 19). Of all respondents, 81% joined the BETA because they found the game's promotional page to be appealing. 19% had already made up their mind to participate for other reasons, while none found the Steam page off-putting enough to reconsider joining the BETA.

- 1 How influential would you say the Steam page artwork of the game was when you were deciding whether to participate in the BETA?

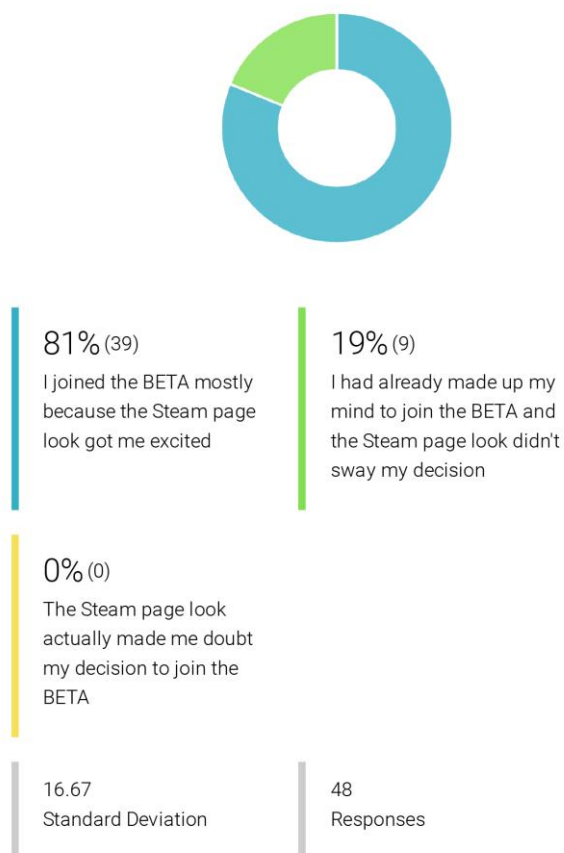


Figure 19. Results of the BETA survey by ZeroFun Games about the influence of the Steam page artwork on participants (2021)

The last 2D-related question involved the user interface and whether it was user-friendly enough. The user rating of the interface's accessibility and intuitivity averages at 7.58 (Fig. 20).

## 5 How user-friendly and intuitive was the user interface?

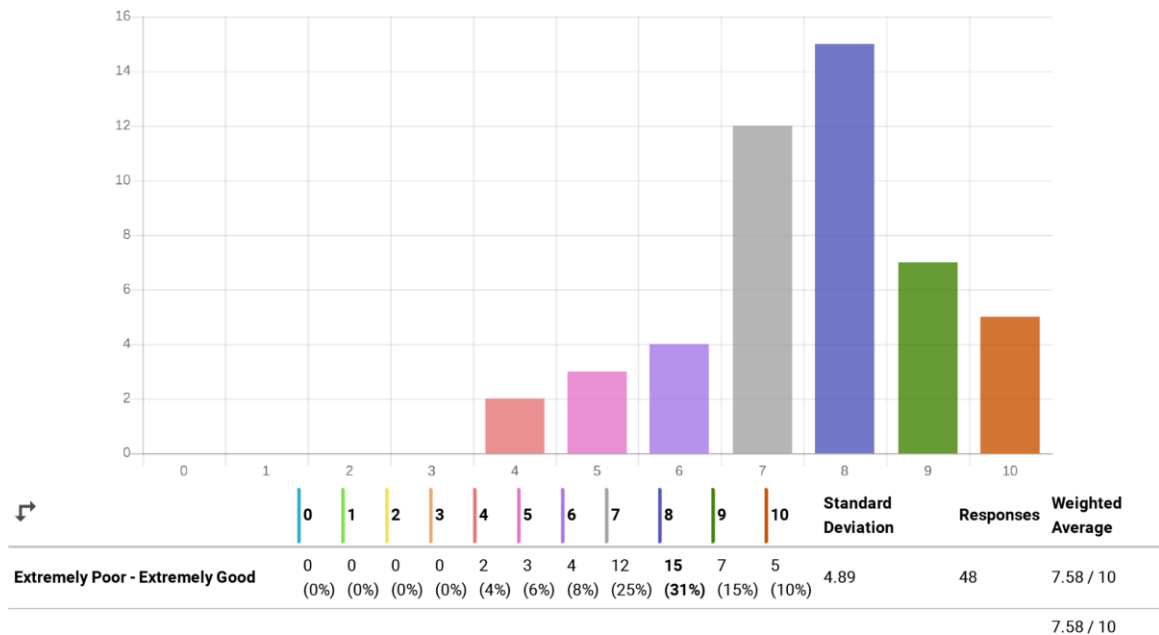


Figure 20. Results of the BETA survey by ZeroFun Games about the level of intuitivity of the user interface (2021).

### 9. 5. 3 Conclusions

It is important to research and understand the interests of the target group in order to best tailor the content to meet their expectations and tastes, particularly when it comes to promotional art, which is the players' first form of interaction with the product.

Results from the gender and age distribution showed that the players who are interested in the game featured females more prominently than expected (nearly half the players were female), and that the target audience was generally a bit older than expected (majority was 20-25 years old, rather than 15-25). This enabled me to consider creating a slightly more complex look for some of the game elements, since most of the players turned out to be adults instead of adolescents. The presence of such a wide female player base also prompted the team to include more female NPCs in order for the content to be relatable to everyone who plays it.

As for the rest of the survey, the results of the questions regarding the art fitting the game and being readable display that a satisfying number of players find the art both fitting and easy to understand. This means that I successfully adapted to the given artstyle. The drastic increase in the polish level score after implementing the 2D art also suggests that the 2D assets contribute to the overall gaming experience and add a sense of completion to the game. The game's promotional art actually proved to be the game's most successful tool of reeling in players, which means that it successfully impacted players and got them interested in the game.

## 10. Work Process and Showcase

This section tackles the process of creating the artwork required for the graduation project. Due to the fact that the work I have completed consists of dozens of separate images, it is not feasible to showcase them all in this document. Instead, refer to the Appendices, where all of the 2D artwork created by me is compiled and systemized in a comprehensive manner.

The work I have created can be split up into four broad categories: concept art, in-game assets, user interface, and promotional materials. The following is a breakdown of the process and iterations I went through while working on each type of assignment.

### 10. 1 Concept Art

The concept art assignments varied from characters, environments, ships to weapons. I was given the opportunity to design some from scratch while other concepts needed to be developed further. My basic process involved sketching out a few rough versions illustrating different interpretations of the design I had to envision. Then I would discuss with the team and pick the best-suited version to expand on. Typically, notes would be given on what to change in the direction of the sketch and I would adjust it into a detailed, clean line art work. Once the design was approved, I would move on to painting it in color. I would present the team with several color schemes to choose from, and always create little turnaround sketches of the design to provide the 3D artist with every necessary piece of information on the design. The sketch-to-final piece process of a concept art piece for a boss ship I created can be found in the images below (Fig. 21, 22). For further examples of concept art I created, refer to the Appendices.

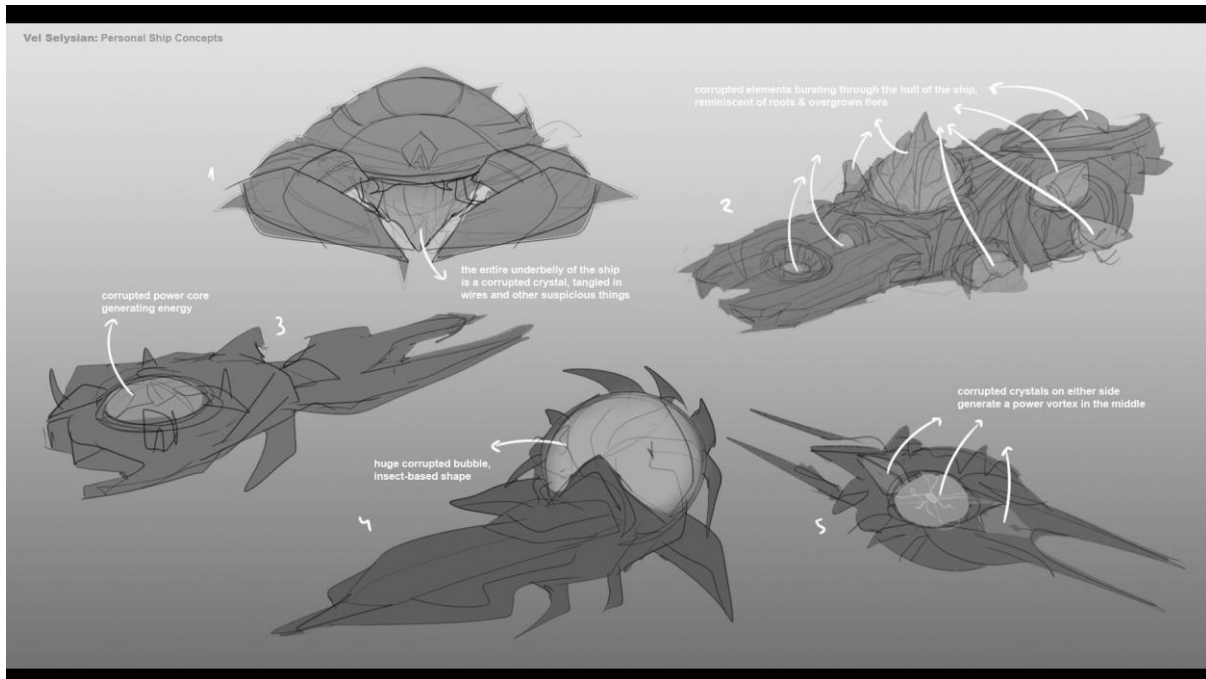


Figure 21: *Vel Selysian Boss Ship Concept Art: Initial Sketches* by Elena Katsarova (2021)

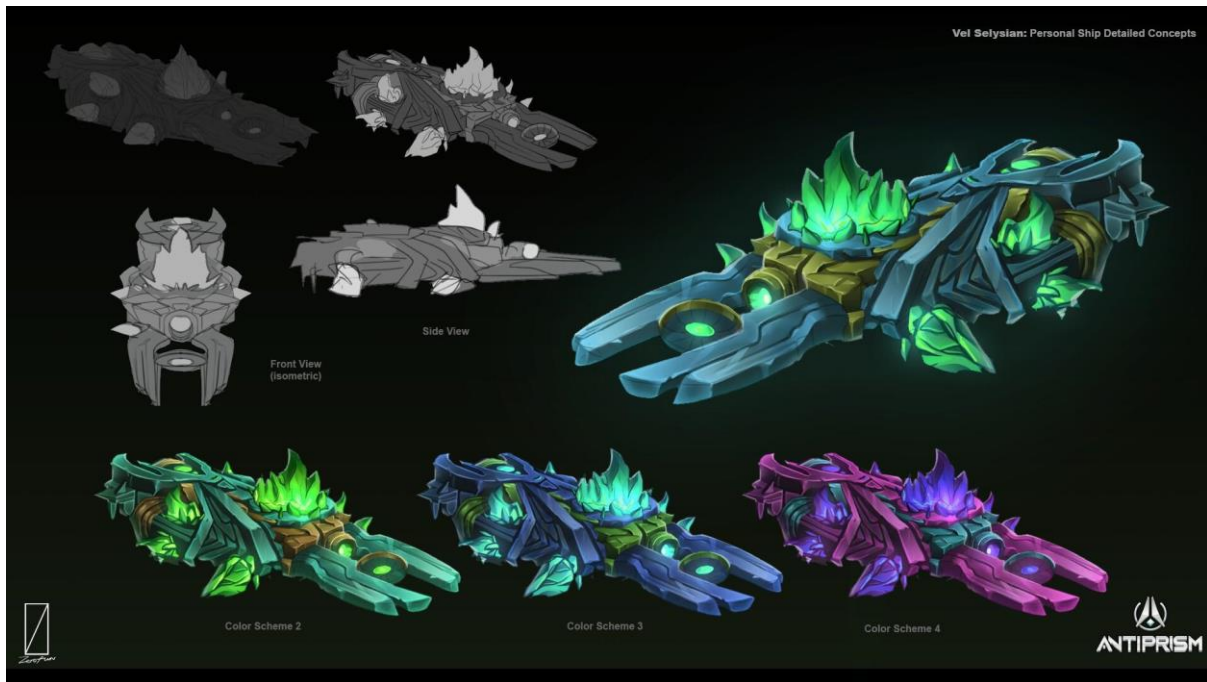


Figure 22: Vel Selysian Boss Ship Concept Art: Line Art, Color Schemes, Turnaround, and Final Version by Elena Katsarova (2021)

## 10. 2 In-Game Assets

The in-game assets I worked on included character portraits, and skill and item icons. Working on in-game assets emulated the concept art workflow formula to a great extent, except I did not need to present a turnaround of the asset as it would not be turned into a 3D model. Moreover, it was not necessary to supply several color schemes of the objects I painted. Often, the in-game assets would be based on already existing concept art, so that took the design factor out of the equation, facilitating a quicker and more technically-oriented process. An example of creating an in-game version of an already designed character can be seen on the Figure below.

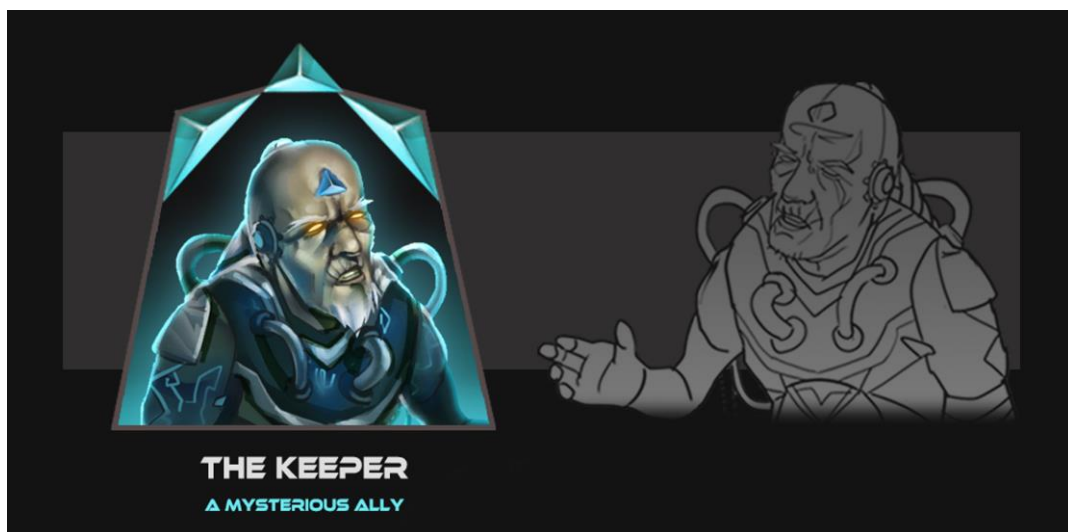


Figure 23: Design sketch (left) and in-game asset (right) of a character by Elena Katsarova (2021)

For further examples of the in-game assets I created, refer to the Research section or Appendices.

### 10. 3 User Interface

Developing the user interface involved a slightly different approach. While there was already a functional UI in place at the time I started working on the project, I had to accomplish a UI visual overhaul from scratch. From my personal experience, user interfaces are based on key elements that are incorporated repeatedly and consistently across all UI assets, so the make-or-break point here was to come up with an interesting design and a fitting color scheme. The initial UI art brainstorm can be seen on Figure 17. From then on, it was a matter of creating polished, technically correct assets (Fig. 24, 25). For the complete breakdown of the final UI, refer to the appendices.



Figure 24: User Interface, First Ideas by Elena Katsarova (2021)

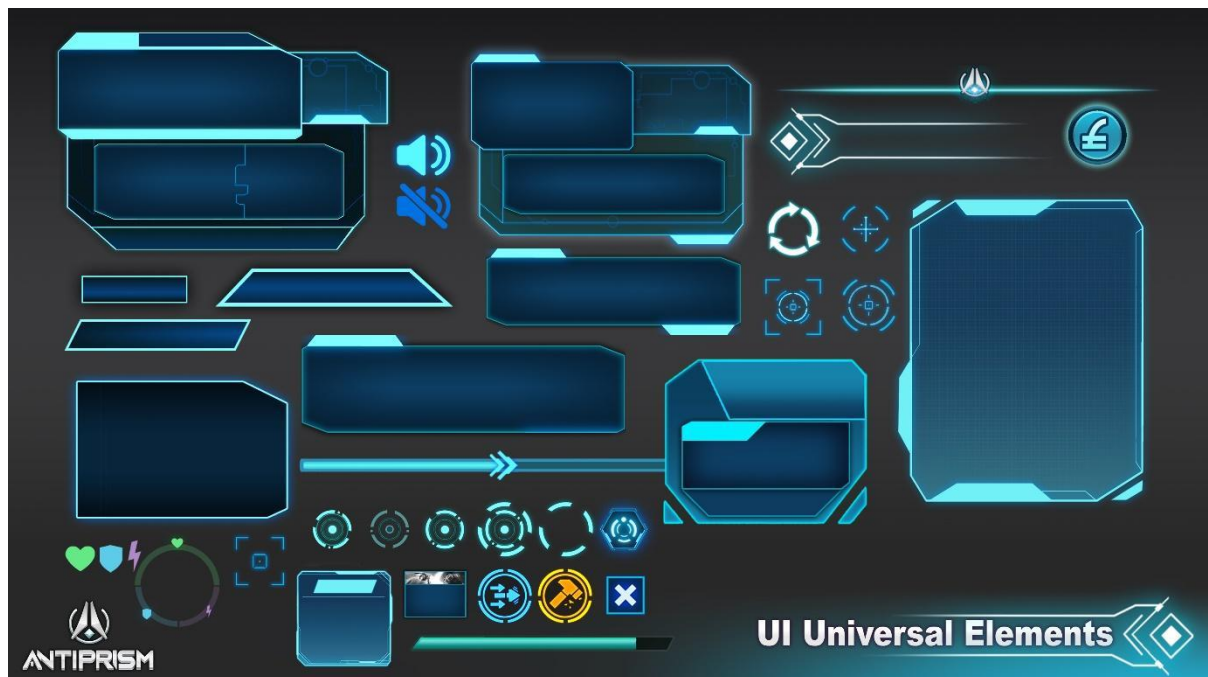


Figure 25: Final User Interface Elements by Elena Katsarova (2021)

### 13. 4 Promotional Materials

Work on the promotional materials was similar to that of developing in-game assets. However, the level of detail and polish that needed to be added exceeded that of the game-specific assets in order to create



an exciting and impressionable marketing campaign. The key element that differentiated this process from creating illustrations within the game itself and illustrating promotional materials, besides the technical aspect of infusing the artworks with more detail and visual polish, was that here, I had to be more considerate about the sort of content I included, and the messages it would send. From researching different games and their approach to promo art, as well as from internal discussions within the development team, I attempted to embody the game's key selling points into the art. This way, players would not only be drawn in by the visual appeal but also by the idea behind it. Antiprism's unique selling point is the twin-ship mechanic that allows players to take control of two separate spaceships, piloted by the two main narrative figures, simultaneously. In order to achieve that, I first considered a more literal approach to designing the Steam artwork by painting a composition of the two ships launching into battle (Fig. 26).



Figure 26: E. Steam Cover, First Version by Elena Katsarova (2021)

However, after consulting with the marketing expert of the company, the conclusion was reached that illustrations of humans resonate more strongly with players, because they hint at the narrative. Therefore, I created a new version of the Steam cover featuring the two main characters instead of the ships (Fig. 27). This still suggests the cooperative, or two-sided nature of the game's key mechanic, but it also introduces the element of relatability to the picture.





Figure 27: Steam Cover, Second Version by Elena Katsarova (2021)

This proved to be a well-received update, as the number of wishlists spiked directly after the cover update (Fig. 28), proving our theory that characters draw more attention to a product's contents than machines devoid of personality.

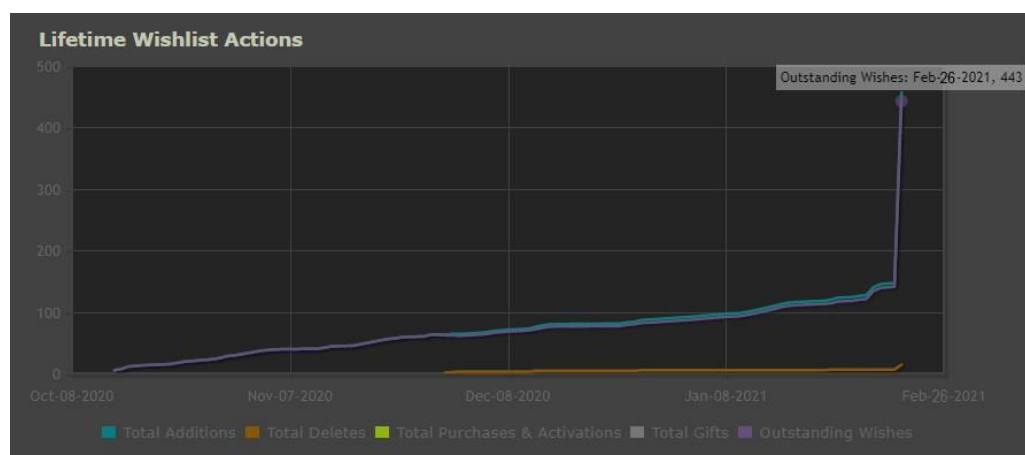


Figure 28: ZeroFun Games (2021). *Steam Analytics Data: Spike in Wishlists Directly after Steam Cover Update.* [Chart] Retrieved from in-house archives

In order to still properly accentuate the twin-ship mechanic, I created several banners later on that were placed on the release date announcement press articles (Fig. 29). These featured characters from the game, but also the two ships that the player pilots close to the title so they are hard to miss. These banners blended relatable art (the characters) with the game mechanics (the ships) in order to paint a truthful image of the game itself.



Figure 29: Release date promotional banner by Elena Katsarova (2021)

For more examples of promotional materials I created, once again refer to the Appendices.

## 11. Conclusion

The purpose of this assignment was to provide high-quality 2D assets that matched the style and the technical requirements of the VR game Antiprism, and fit various purposes stated by the company ZeroFun Games. For the client, the best case scenario is that, upon release, the game's promotional materials will draw in many players, generating a sufficient amount of revenue, while the in-game assets will make for a fun, immersive and polished gaming experience for the players.

By employing various research methods, including desk research, literature study, experimenting and conducting interviews and surveys, I was able to create 16 pieces of concept art designing a wide range of topics, 20 in-game NPC and enemy portraits, a full user interface, two versions of a Steam banner, a game logo and logotype, and two release date ad banners. All of those were approved by the client and are featured in the game, or on the game's official pages.

Throughout the work, the client was interested in advertising the game as a unique product with interesting features, so two versions of the key promo art were tested out. By conducting a survey and comparing the traffic generated by both artworks, it was established that players respond better to characters than machines in the headlining artwork. This was a valuable piece of information as it prompted further promotional materials to also include the game characters while also hinting at the mechanics by including the ships as well.

The client also had little experience creating and integrating a user interface for VR, so the research process of figuring out the best practices was done together with them. By conducting a survey, the user interface, as well as the integrated 2D assets in general, proved to be well-received in that it blended well with the in-game world and felt intuitive to users. This means that it offered the right amount of complexity to facilitate intuitive interaction, and was a stylistical match to the rest of the game.

Besides that, the client was interested in designing many characters and environments that the game would feature. The newly created concept art was shared on social media weekly, and, when various versions were present in a sketch or an outline, the potential players had their say in which version to go along with for the detailed concept. This got players involved in the development process while also helping the team figure out what players enjoyed first-hand. Most of the social media responses were very positive, which proved that the concept art matched the players' own vision of a game in this genre.

## 12. Discussion and Recommendations.

During the graduation period and throughout this report, the question of “How to develop 2D assets for the VR game Antiprism that emphasize the game's key selling points, appeal to target audience and fit the existing visual style?” has been researched.

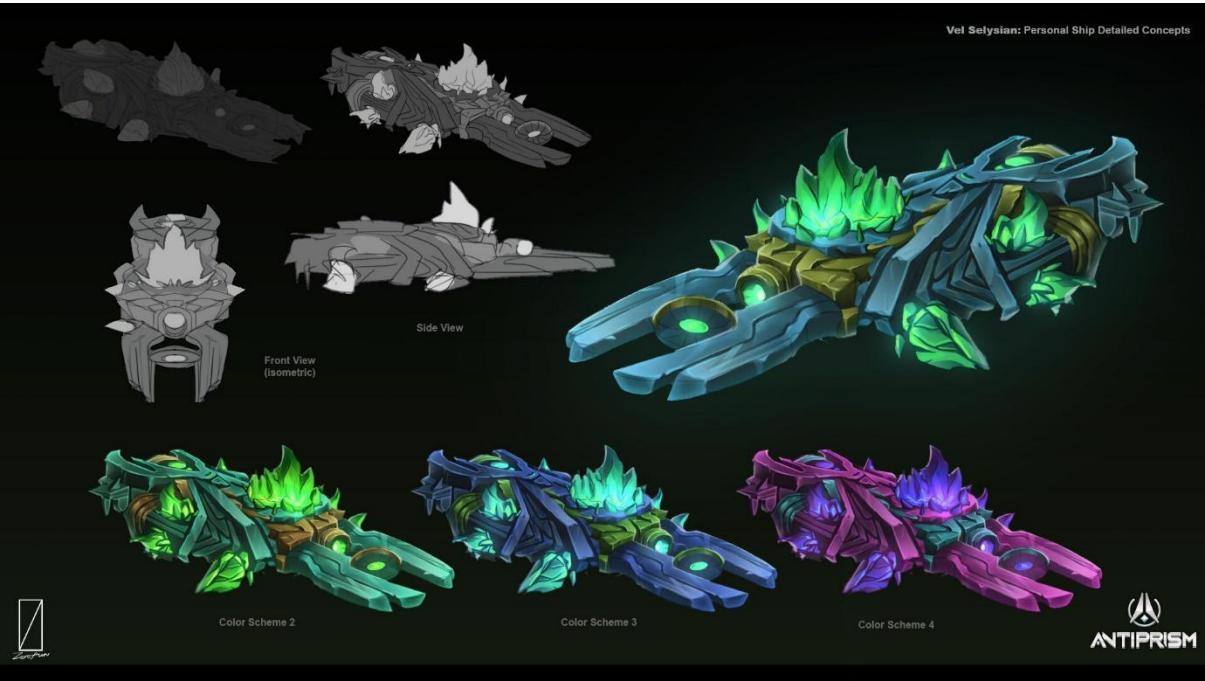
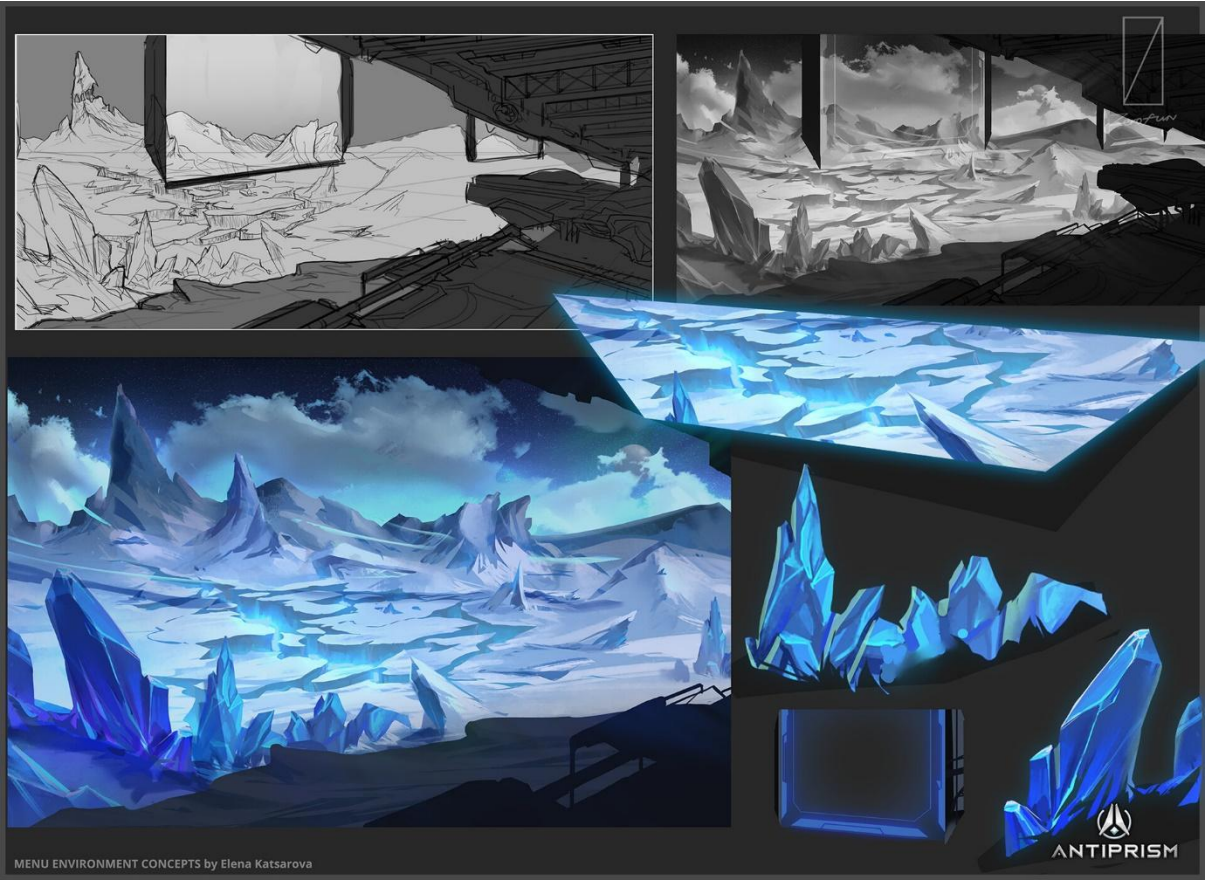
The stylistic findings indicate that a lot of the style had been defined in pre-production. However, some of the art types, such as environmental art, had not been touched upon before I entered the project, which was well into the production phase. This caused me to have to explore and adjust the environmental style with little guidelines at the same time as actually producing the assets. Therefore, I recommend that, in future projects, all key types of art are predefined or at least have moodboards present, so that an overall clear visual picture for the entire project is assembled early on.

Next to that, I observed that the game’s promotional campaign launched in the middle of production. I believe that was a successful and well-planned course of action because it enabled the campaign to have a long run and involve many users. Early testing of the working versions of the game enabled rich user feedback that was implemented on the spot, without forcing the team to guess the needs of the player base. Therefore, I recommend that this marketing model be translated to new projects as well.

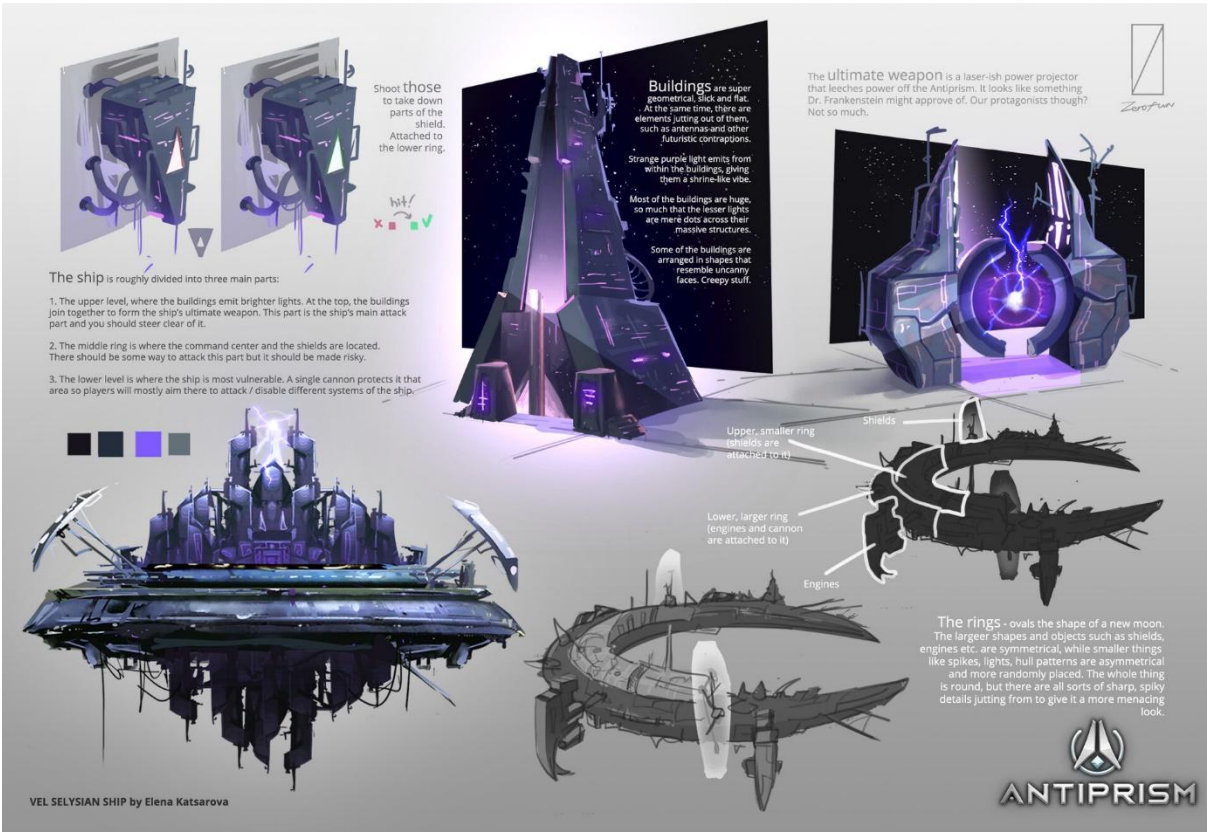
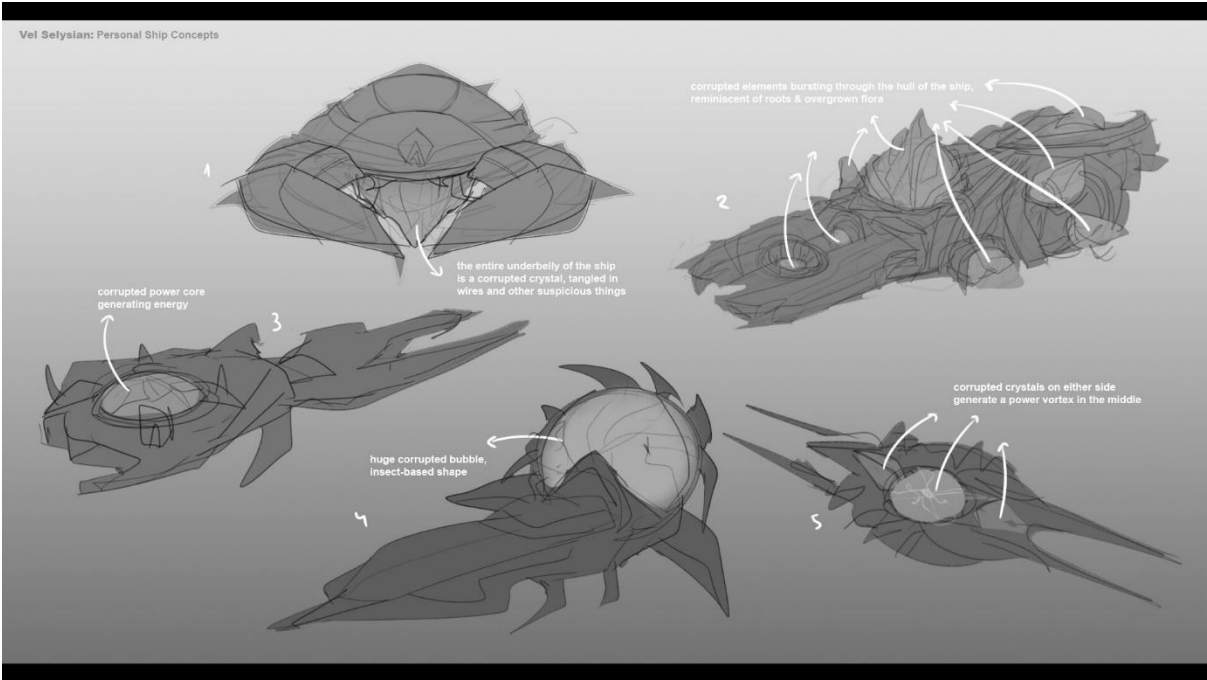
Lastly, the technical specifications of working in VR constrained many of the ideas we originally had as developers, particularly in the user interface department. After properly researching the topic, we created prototypes and those prototypes were tested out daily. A useful practice was to test out each new version on external users and not amongst the team, so that instant feedback on the clarity and readability of the assets and interaction types was given. This saved a lot of hypothesizing and helped steer the iteration process in the right direction. Therefore, I recommend prioritized external testing of problematic features for future projects as well, because it proved to be a winning strategy for building user-friendly, functional elements.

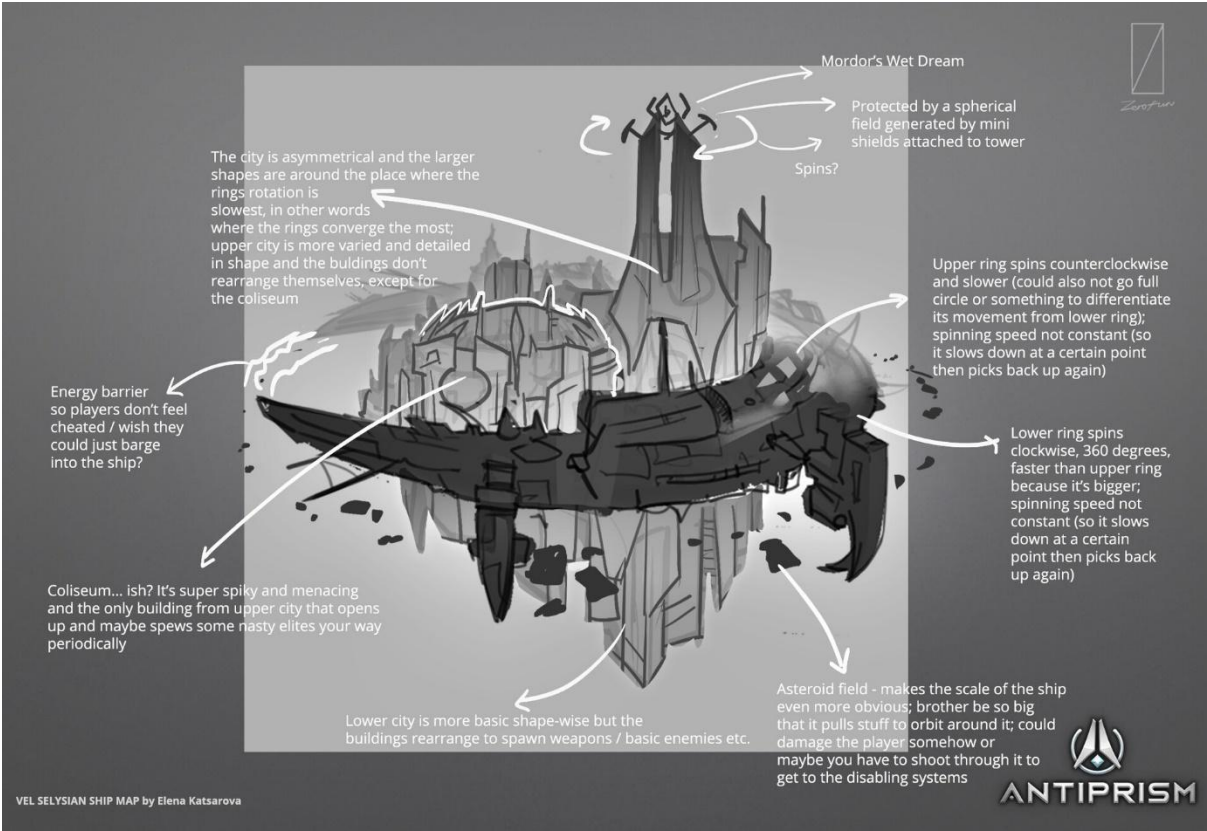
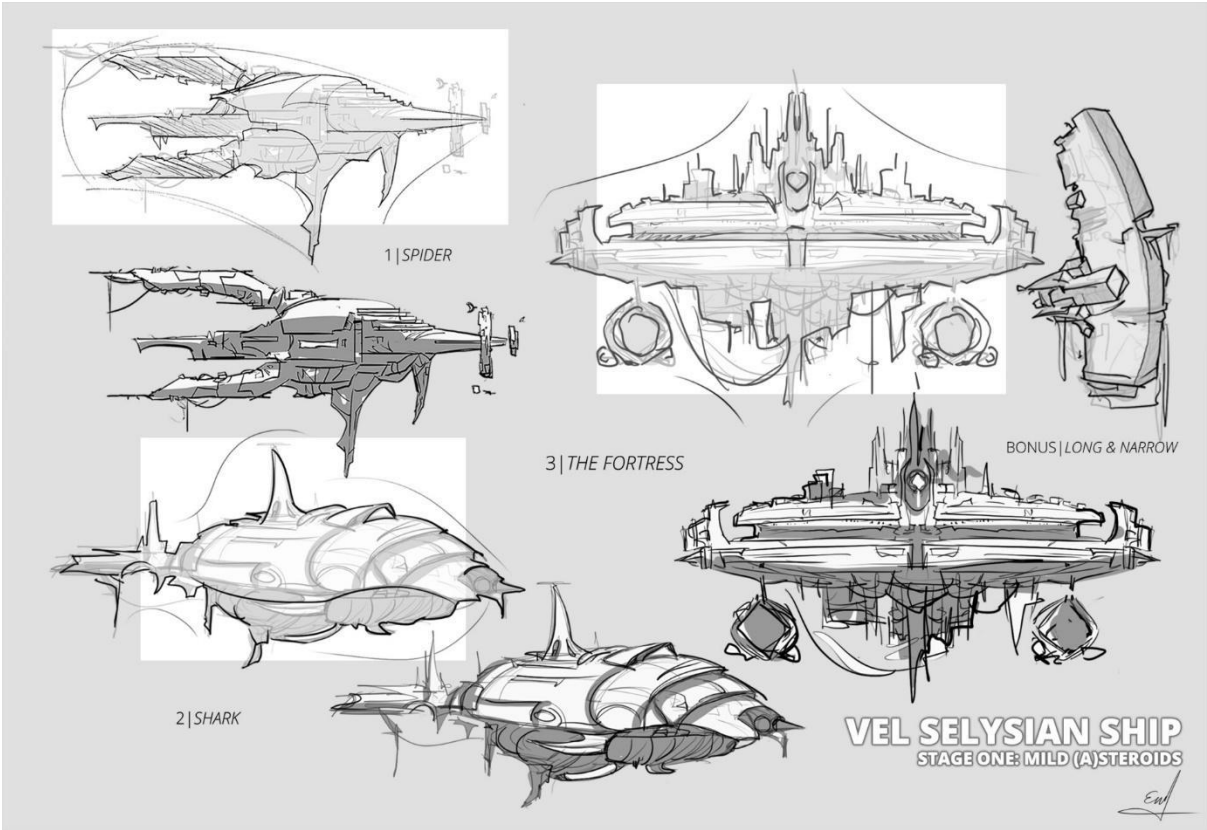
# 13. Appendices

## 13.1 Appendix 1: The Product (Concept Art)

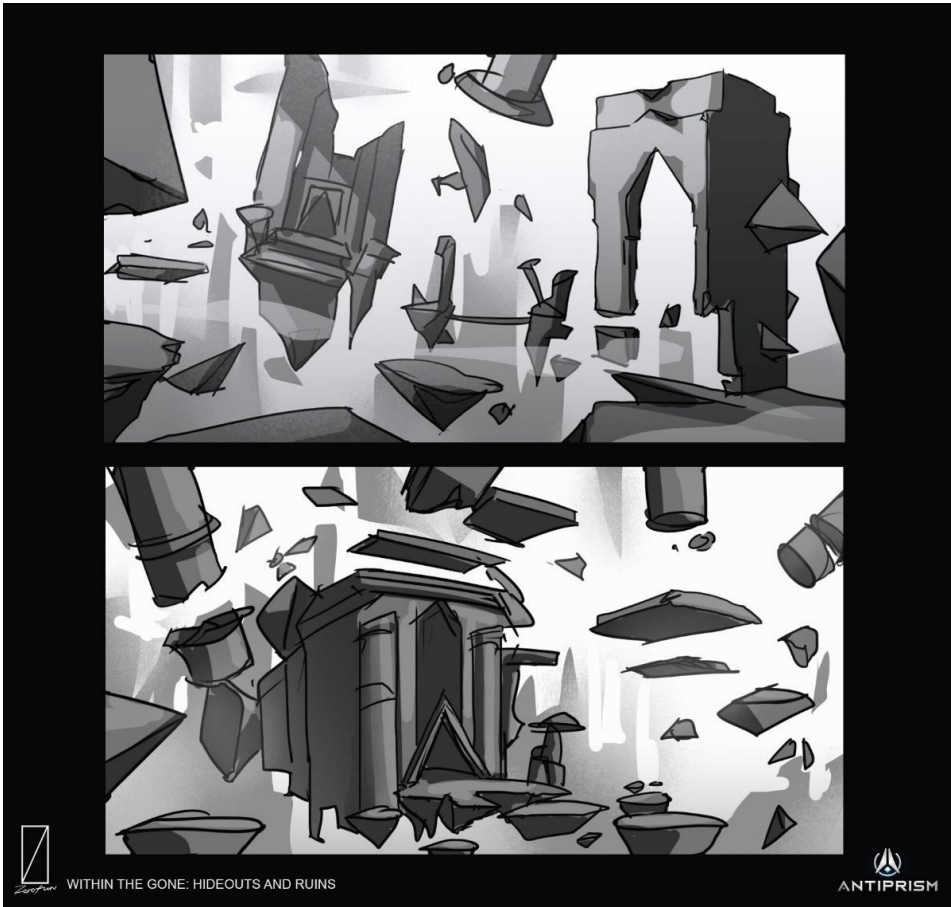
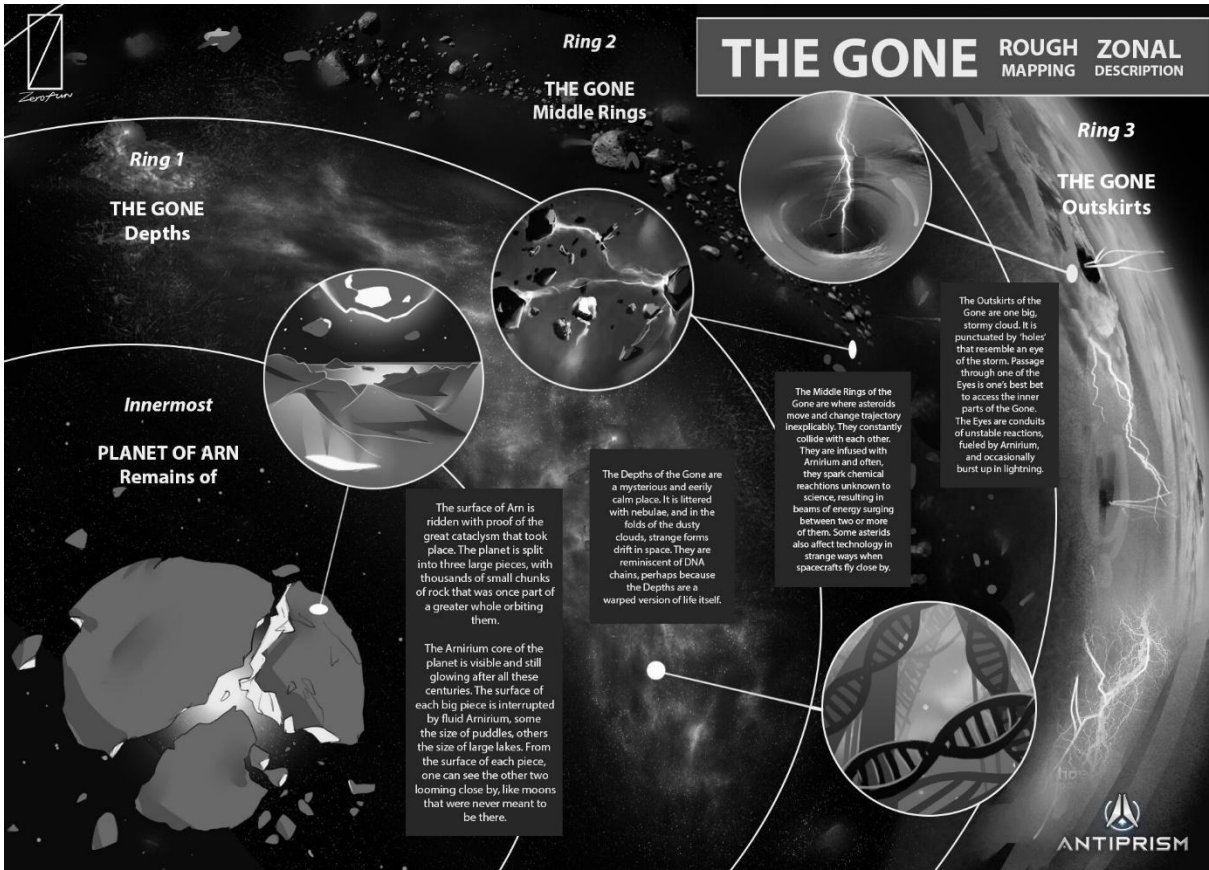




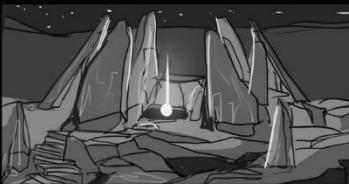
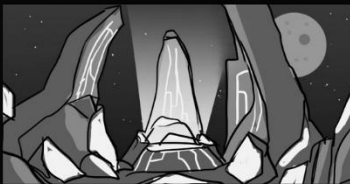




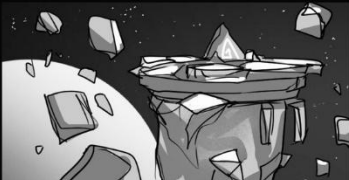
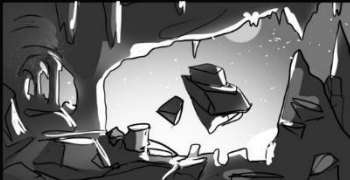




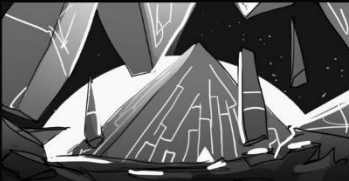
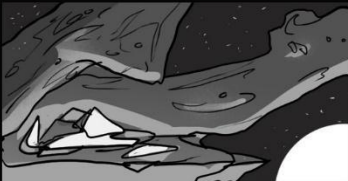




The Ancients' Ruins: strong Stonehenge vibes. Could either be a temple / building (left), a shrine-like structure with a glowing altar (center), or a massive rock formation leading down to an underground ruin (right).



The Keeper's Hideout: could be a bunch of things. A base sitting on a larger asteroid near a vortex (mid left), a floating cave (mid center), an actual structure integrated atop a larger asteroid (mid right), a camp of sorts resting on a weird, alive(ish?) rock formation (bottom left), or an actual makeshift mini spacestation with some pyramidal structures to indicate its foreign origin (bottom center).



WITHIN THE GONE: HIDEOUTS AND RUINS

Some more geometrical, floating ruins. Egypt vibes?



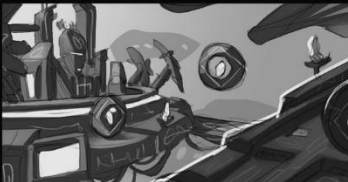
Shield Generators



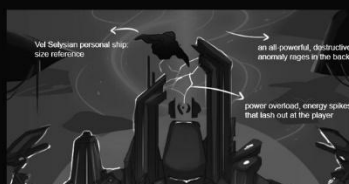
Selysian Guard



Artifact Fragment

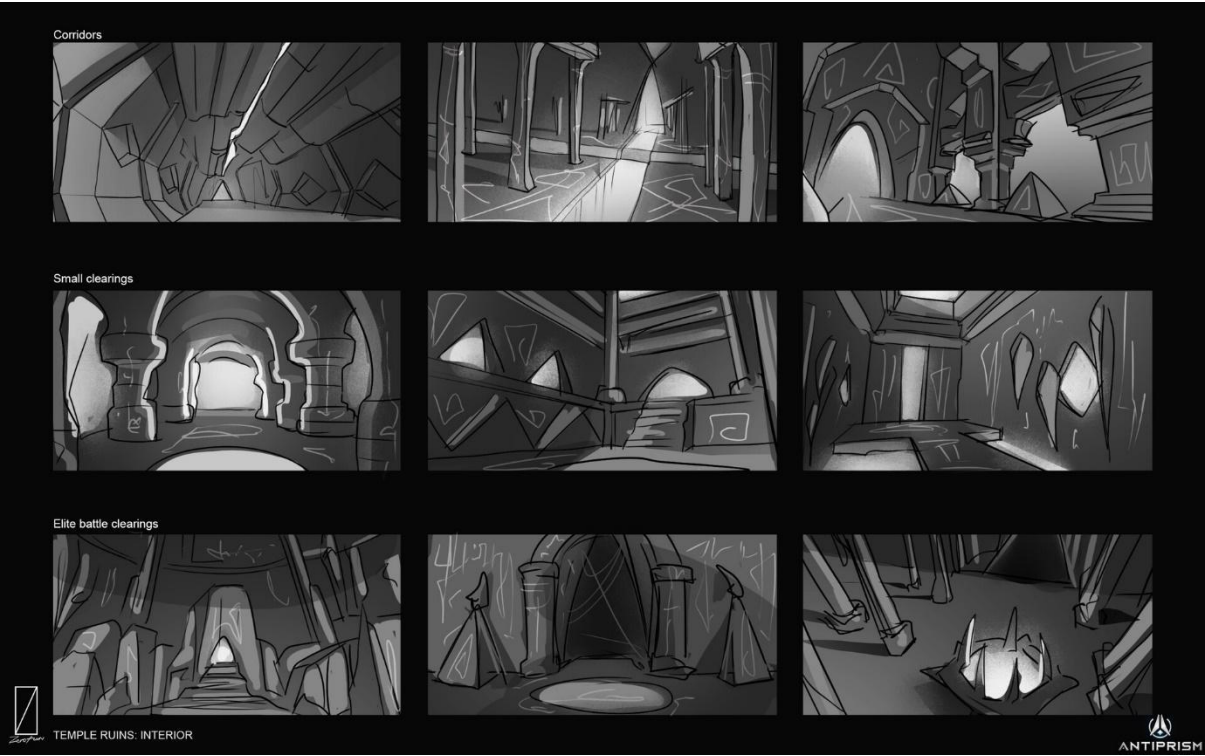
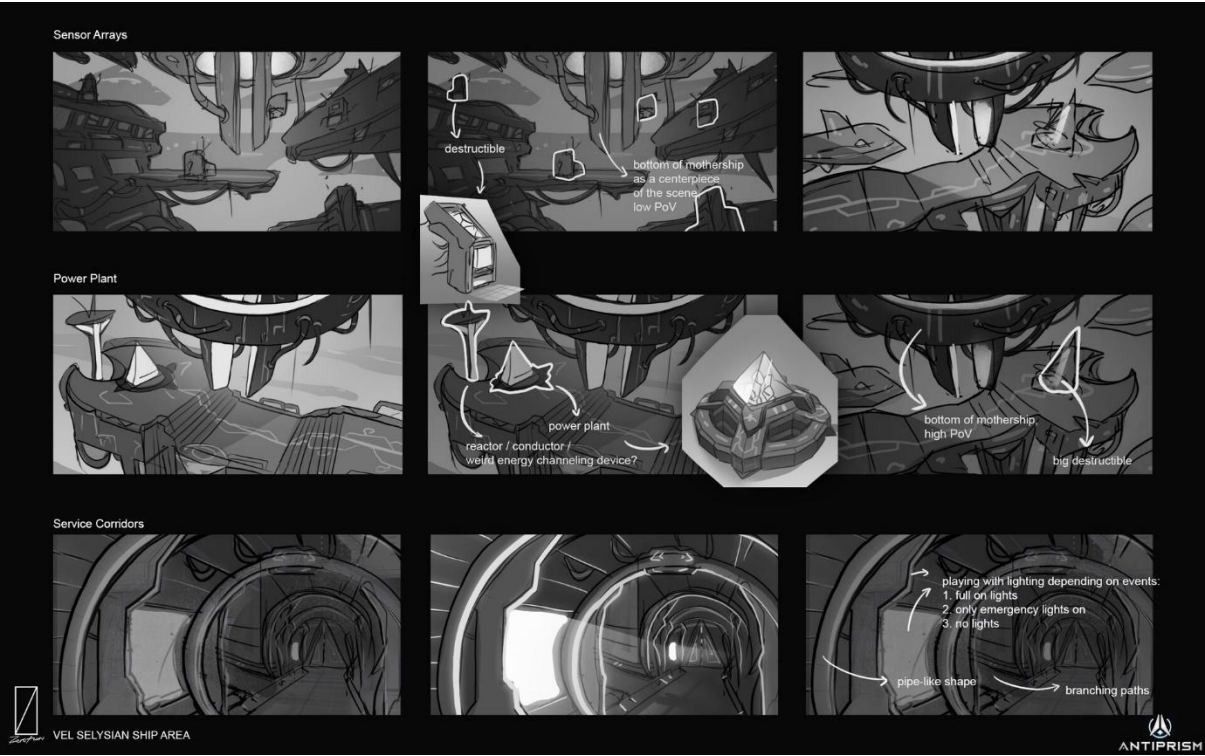


The Merging - Boss Fight

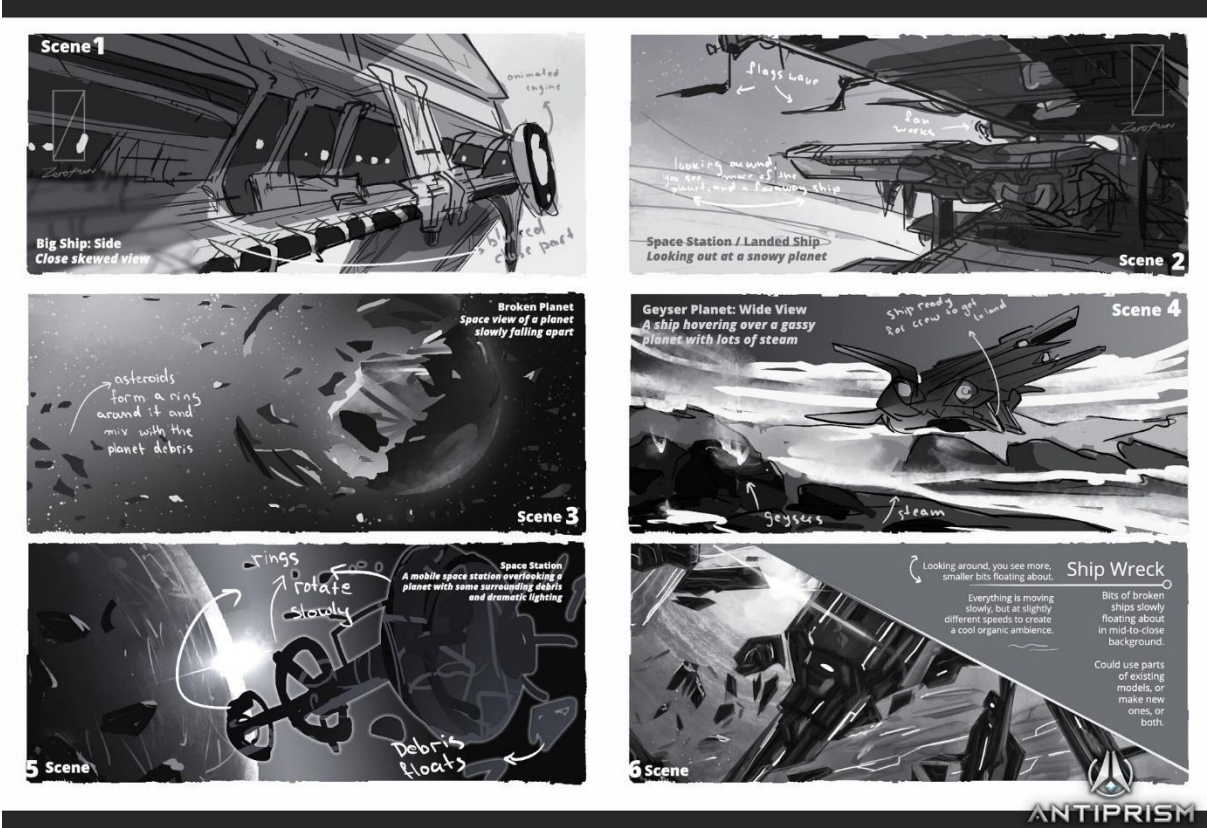
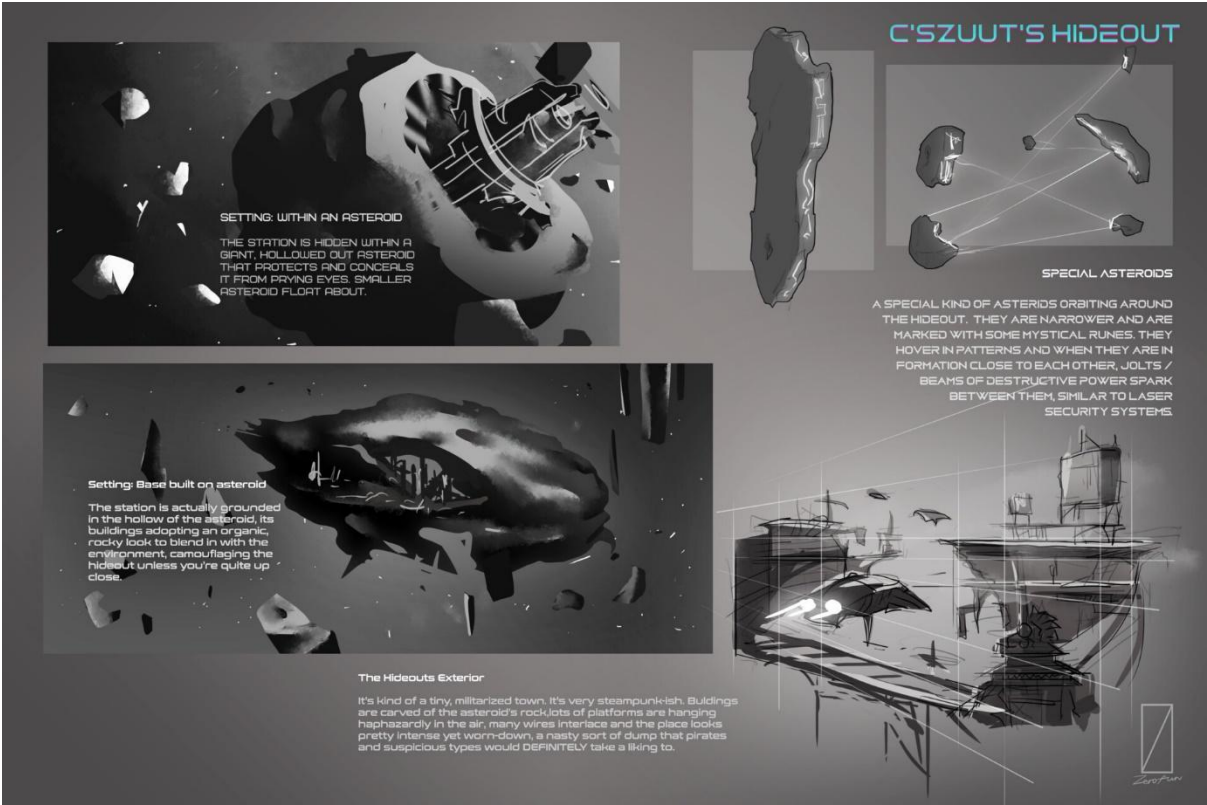



VEL SELYSIAN SHIP AREA











## ENVIRONMENT THUMBNAILS

COPERNICUS STATION NEIGHBORHOOD # 2

1. Overlooking a large ringed planet with lots of different colored / themed moons. Scattered asteroids.

2. Surrounded by unusual, very geometrical spiked asteroids. Some planets are visible (edge of a very close one, and another one in the distance).

3. Located near a portal / wormhole, a string of asteroids is getting sucked into the warped field.

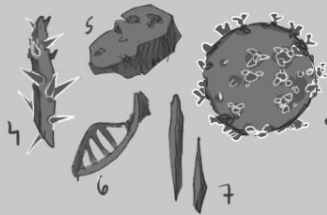
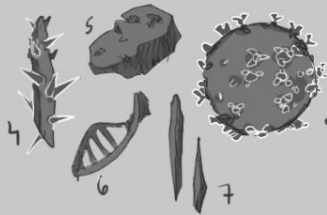
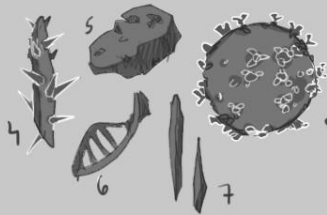
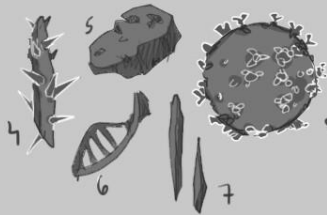
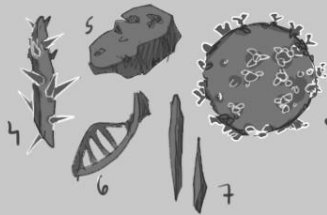
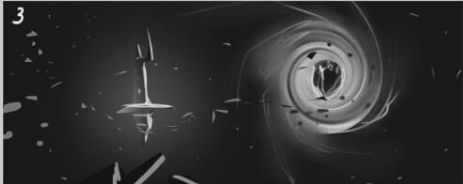


4. Spiky asteroid.


5. Flat asteroid filled with mini craters and holes.

6. A DNA-like structure, something cosmoical beyond our understanding. Is it alive? Is it a rock? No one knows. Could be spinning like an obstacle at some point in the game.


7. A geometrical, slalacite-like asteroid.

8. A germ-like asteroid.





**ANTIPRISM**  
VR SHOOT 'EM UP



## ENVIRONMENT THUMBNAILS

COPERNICUS STATION NEIGHBORHOOD

1. Inside of a large ship overlooking Copernicus Station in the distance.



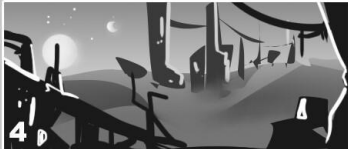
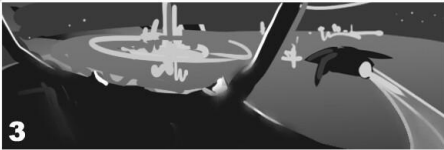

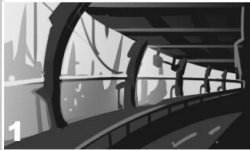
2. A view of Copernicus Station's less known 'back entrance'. It's less known for a reason.


3. A distant view of Copernicus Station's main body and the adjacent, secondary satellites.

4. A look at Copernicus Station (grounded version) from a lesser settlement farther into the planet.

5. A single ship landing strip overlooking an agglomeration of structures in the residential part of Copernicus Station.

6. Copernicus Station's slums, with a view across the main block of buildings in the Station.



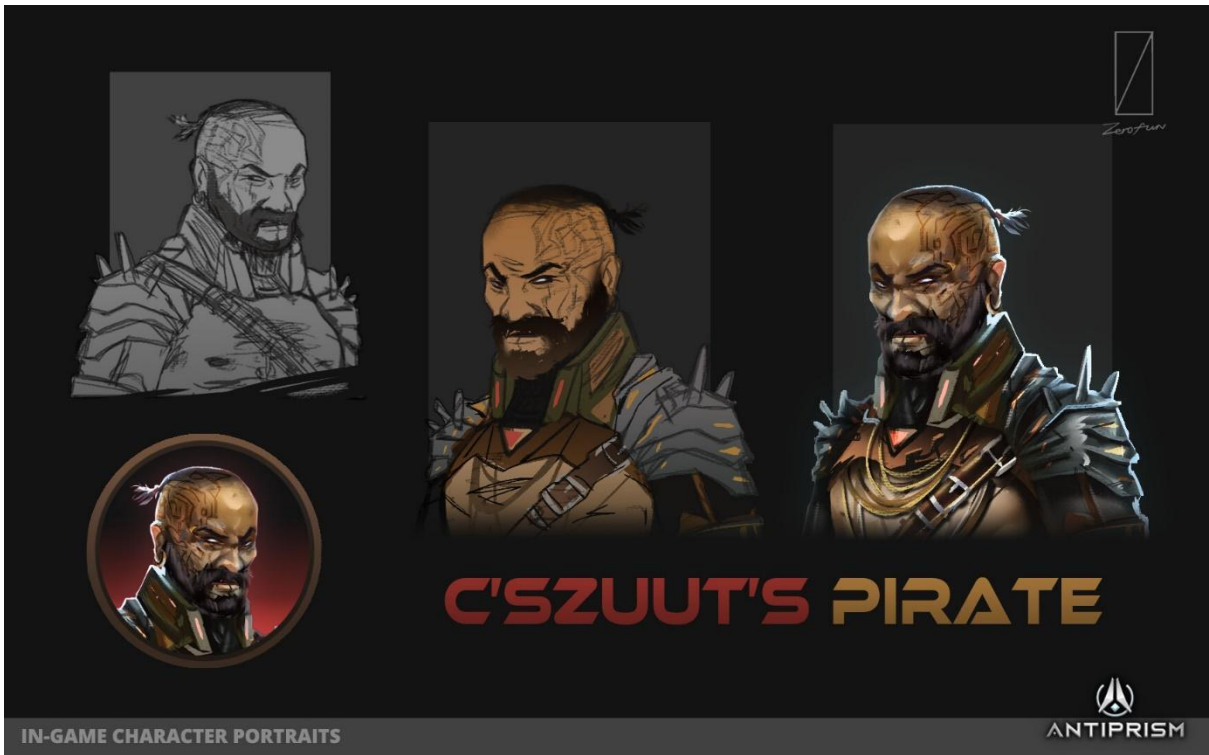
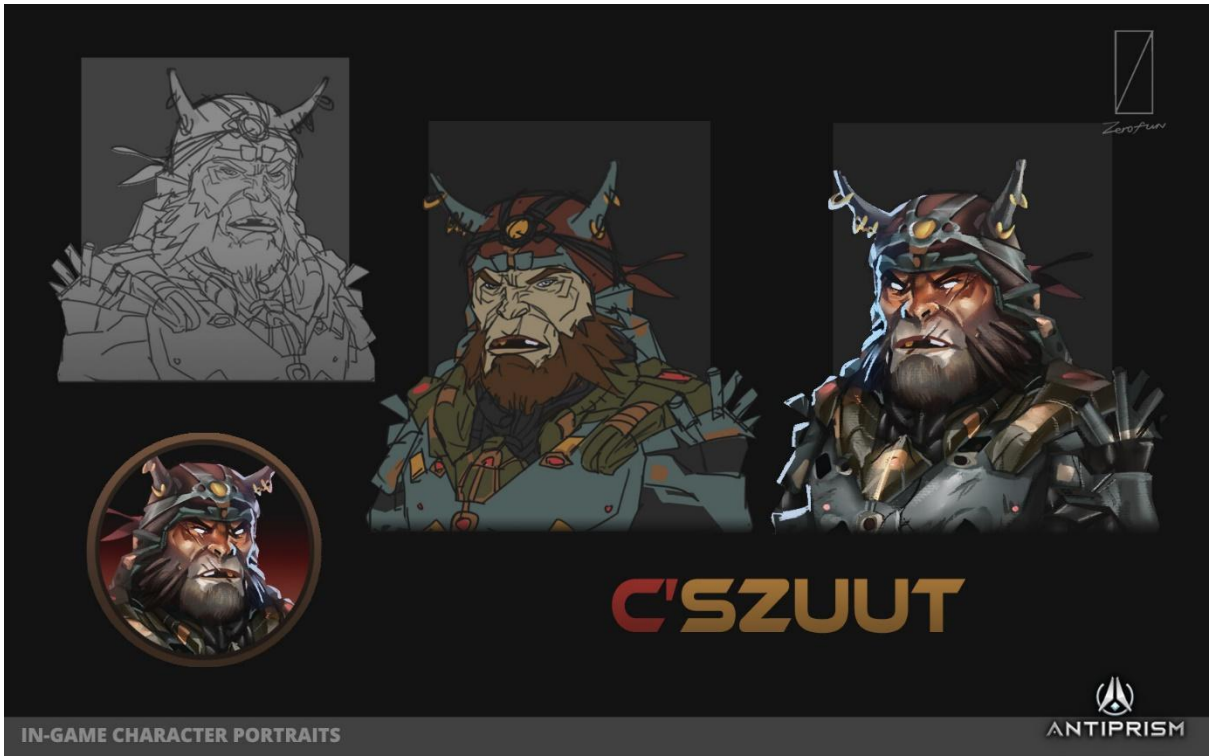


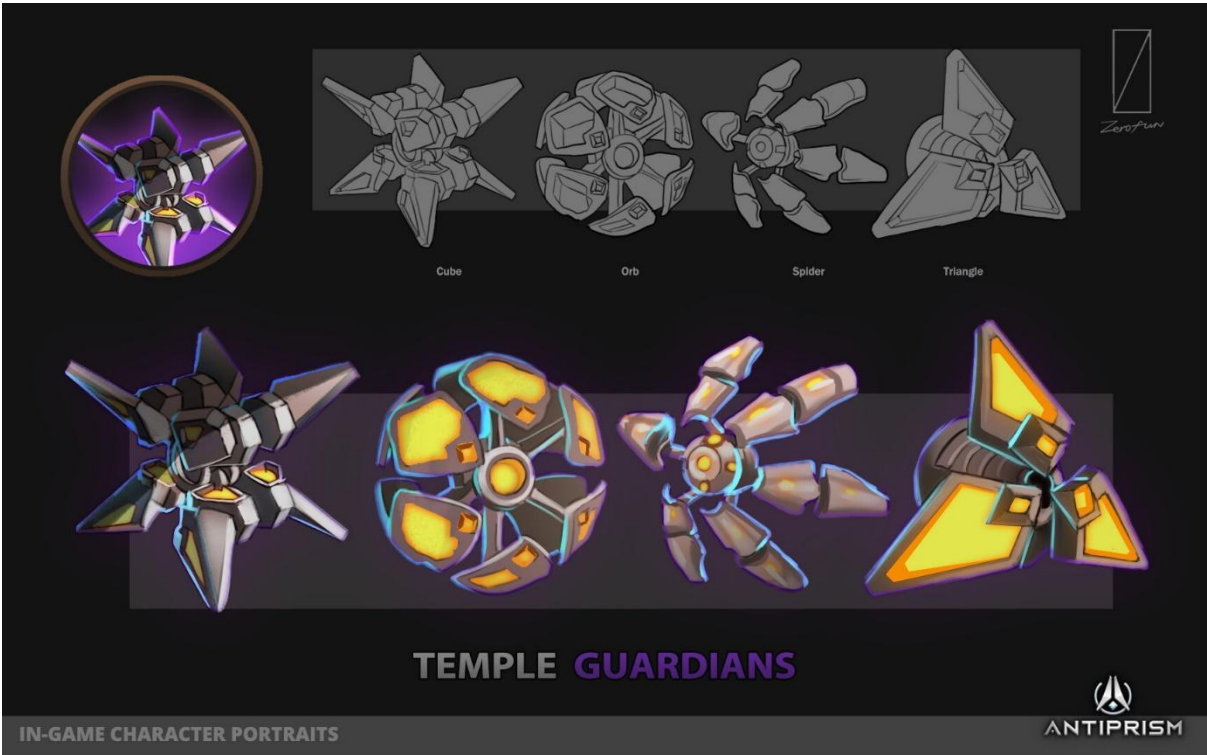
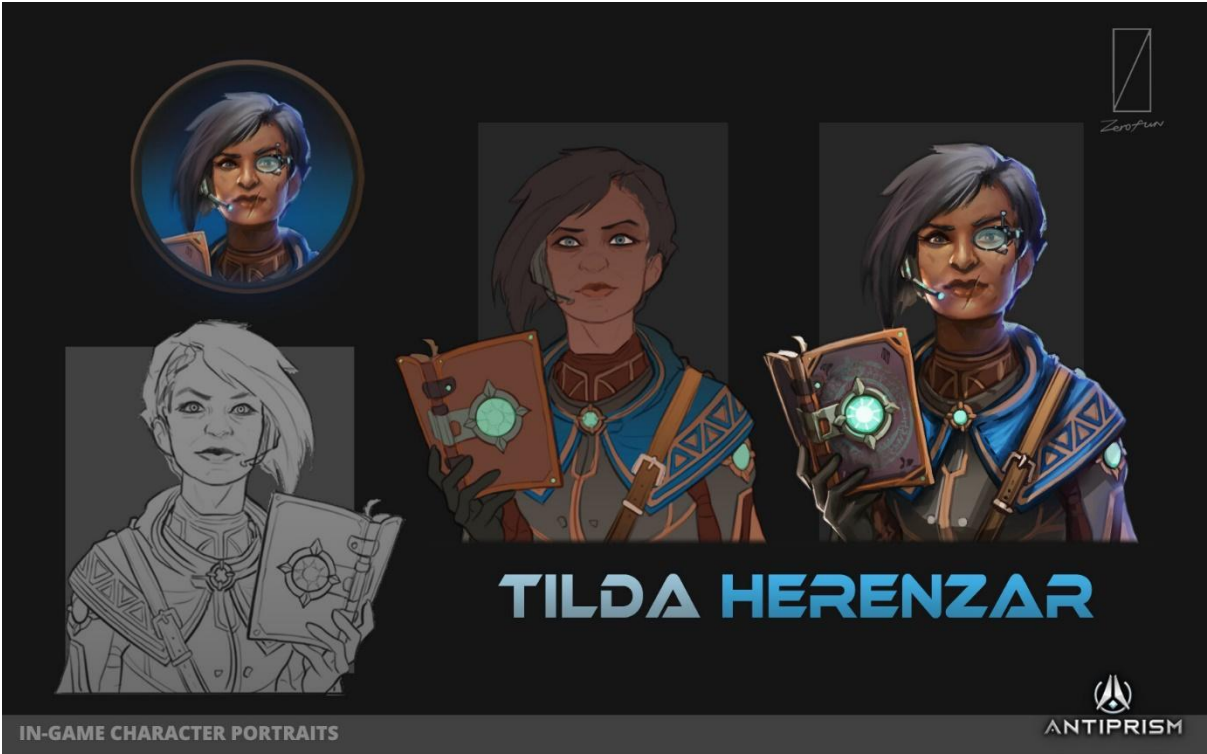
**ANTIPRISM**  
VR SHOOT 'EM UP

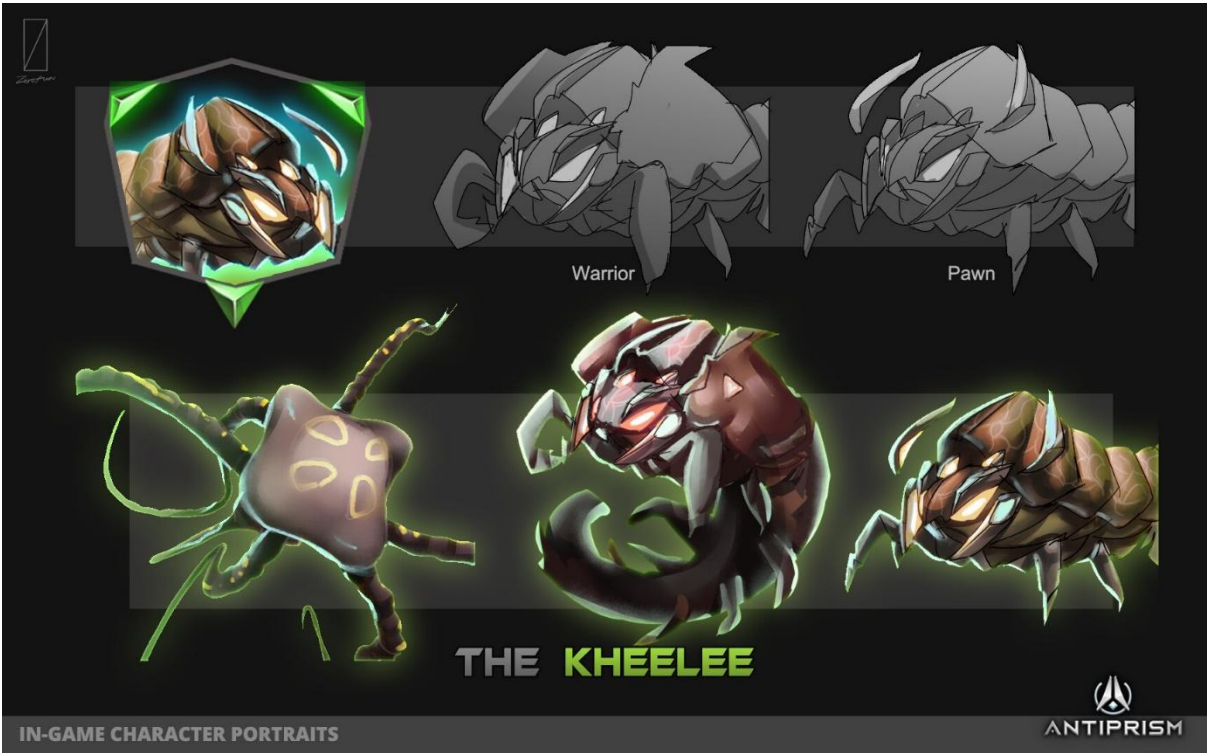
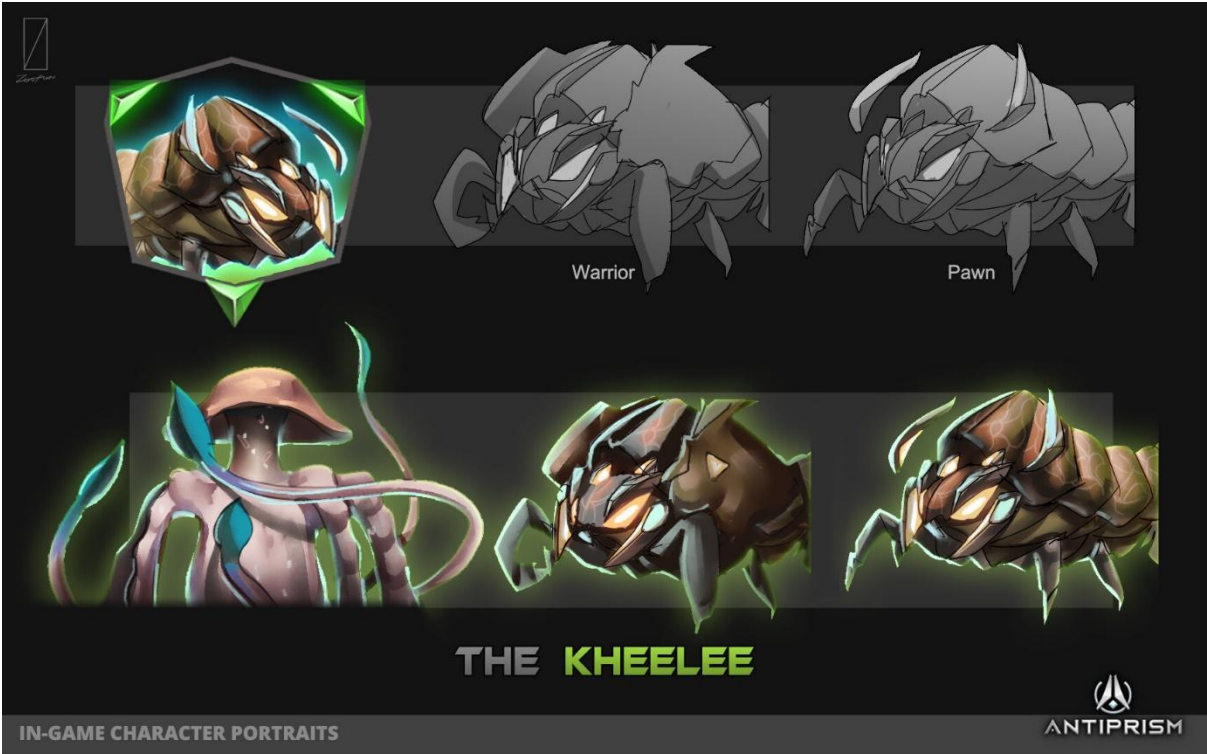
13.2 Appendix 2: The Product (In-Game Assets - Portraits)







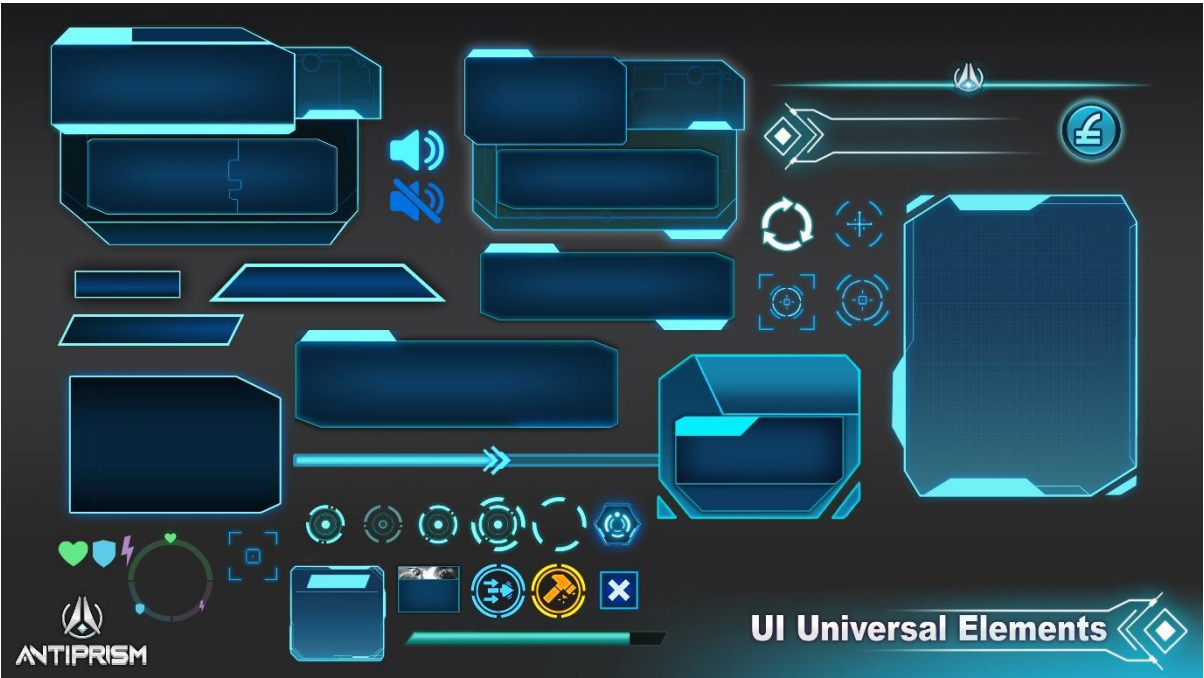








13.3 Appendix 3: The Product (In-Game Assets - UI)





  
ANTIPRISM

Achievement Icons



 Energy System

 Shield

 Hull Plating

 Engines

 Weapons

 Upgrade Levels

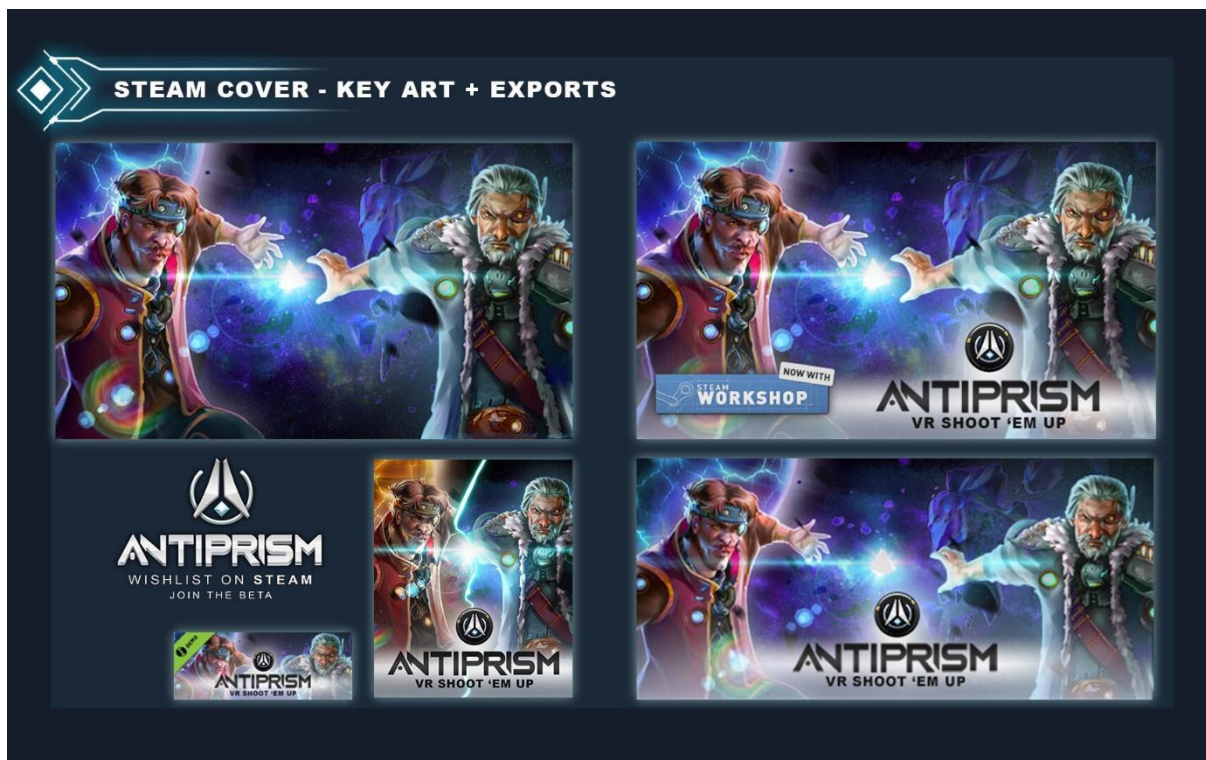


  
ANTIPRISM

Inventory Icons



## 13.4 Appendix 4: The Product (Promotional Art)









## **13.5 Appendix 5: Reflection**

### **The Project**

This five-month project enabled me to work on a VR game, which was a novelty for me. I had never worked on a virtual reality game in the past, so collecting data on the technicalities of it was an illuminating experience. I am glad I got to work on so many different aspects of the 2D art, because it gave me a clear overall picture of how to handle 2D art for practically any purpose of VR. The only downside to this was that I often had to jump back and forth between various types of work, which, at times, disrupted the flow of my work and caused me to slow down on producing the assets, but that was a necessity borne out of prioritizing certain tasks on the production schedule. On the overall, even if I myself felt like I was delivering a bit slowly, I always met my deadlines, and actually produced considerably more assets than originally planned. I am very content with the amount and the quality of the work I managed to accomplish in five months on this project, and the company was also satisfied with the results. They already offered me a position on their next project, this time in an even bigger capacity because the game will be entirely 2D.

### **The Company**

ZeroFun is a very compact team of individuals. I haven't worked in such a tight-knit team even during my university projects, where there were eight people working together. Here, it was four core members and several contractors. This experience was very insightful for me, because, working in a small team, your work is more visible. Your day-to-day progress gets more attention during meetings, and mistakes are more extensively discussed. This made me appreciate the daily feedback, and, also, being the sole illustrator of the game, it made me realize the importance of my own work to the product as a whole. It is a satisfying feeling as an artist to see all of your work featured prominently in the final product, but it also means you need to shoulder the responsibility of everything looking just right.

### **Concept Art**

Being the sole 2D artist of the project, I was keenly aware that all of my work would be featured in the game and it had to look and feel consistent and appealing. Because of this pressure, I sometimes found myself avoiding bold design decisions and sticking more with the established tropes of the sci-fi genre. I am grateful that the team then encouraged me to push out of the box and go with a different vision so that the game could bear the marks of its unique mechanics and narrative. In the future, I will certainly try to be bolder in my designing decisions from the get-go because it is a vital part of a concept artist's job to invent new and engaging designs.

### **In-Game Assets**

The in-game assets posed the biggest technical difficulty, because they involved the most considerations on account of it being a VR-exclusive game. I designed most elements first, which I had a fun time with, but converting them into usable assets had its challenges. I often found information about certain specs or tried sizes that worked well in VR on the Internet, but then I did not always systemize that information in the best way possible. That led to me getting lost in my own notes quite a bit, going back and researching the same topic twice, and issues of that nature. In the future, I would like to create clear, well-organized documents containing the useful information I have collected, so that I could freely and easily access it whenever necessary.

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## Promotional Art

Painting the promotional art posed a different sort of challenge: I had to think of a way to create art that sent a very particular message and didn't mislead users into thinking the game was about something else. For this task, a lot of trial-and-error was involved. The initial twin-ship banner was even approved by the marketing specialist, but later the team as a group decided to try out something different and test it out. It proved to be a winning strategy to reimagine the key art with characters, and I found the decision-making process behind switching the art very educational. The company decided to allocate more time and resources into something they already had, rather than have me produce assets that we didn't have yet. It didn't sound very logical at first, but then I asked them about the reasons behind it. They explained that they thought it was worth the effort to roll out something which could boost the potential sales way more than another couple of in-game assets that no one would even see if they found the banner lackluster and moved on to installing a different game. I have been familiar with the term 'agile planning' for a while now, but I think that in this instance I saw a very real and successful example of it.

## Communication

Communication within the team happened remotely due to the global pandemic, but I feel like this didn't impel the process in the slightest. We had daily morning meetings where a standup and a follow-up discussion took place, and kept in touch throughout the day. Communication in a small team is typically easier than coordinating a large team. In this case, I feel like I received very precise and clear feedback for every piece of art I delivered, and I did my best to implement it accordingly. Usually, the iteration process was short, involving one to two iterations per piece, which, at some point, my colleagues praised me for because I adapted well to their feedback. The flip side of receiving feedback is giving it, and I did my best to do that as well. In a small team where everyone has a distinct responsibility, everyone comes together to discuss the work of others to the best of their expertise. This means that I often tested out newly integrated features by the programmer and gave him feedback on how they felt. I gave feedback regarding the shapes and textures of the 3D models, the lighting of the scenes and the animations. I also had some input on the marketing side of things, where we brainstormed the type of content together. On the overall, I think this team had a lot of successful communication going on, and that is always a prerequisite for a newly joined team member to also communicate efficiently, which, I believe, was the case with me.



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