



# WPI

Worcester Polytechnic Institute

## Conquest of the Verse

*Conquering the Galaxy one Ship at a Time*

A Major Qualifying Project submitted by  
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## **ABSTRACT**

*Conquest of the Verse* is a Major Qualifying Project for Interactive Media and Game Design in which a team of four students conceived, developed, tested, and balanced a two dimensional space shooting game using the Unity3D engine. The goal for the project was to showcase the abilities of the team to create a fun game while working within a seven week time frame. *Conquest of the Verse* blends sidescrolling shoot 'em up mechanics with customizable role playing game elements resulting in an engrossing and exciting experience.

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# PART 1: Introduction

## 1.1 Overview:

### 1.1.1 PROJECT GOAL

The goal of this project was to develop a polished game in the span of 8 weeks with a focus on completion of work, designing for future expansions, and play-tester feedback. Over the course of the project we hoped to work full days and follow a timeframe. Finally, we expected to improve our ability to work together and communicate as a team.

### 1.1.2 GAME SUMMARY

In *Conquest of the Verse*, we combine the action of a side scrolling shooter with strategic elements. The player acts as the captain of a spaceship at the head of a loyal crew. Each crew member mans one of the pilot, gunner, mechanic, and navigator stations. As the captain, the player guides their crew through waves of asteroids and enemy spaceships. The captain can also allocate power to different stations in the ship, allowing for customized gameplay that can vary for each player. As the game progresses the crew will talk to each other in reaction to enemy movement or approaching hazards. Throughout each level the player can collect money and at the end of each level the player can purchase upgrades for the ship. The game will continue until the player ship has taken too much damage at which point the player will be directed to a high score screen.

## **1.2 Development**

The Game was developed between December 2014 and March 2015, with one month of design preceding development. Alexander assumed the role of lead artist, ship designer and Lead Paper Editor. Owen was the Producer, UI designer, and the audio director. Josh was the technical director. Ryan was the lead AI designer and branch manager.

## **1.3 Design**

When the project was conceived we were careful to focus on how our game was going to be different from other endless runners or space shooters. We designed numerous game mechanics to accomplish this including the upgrade system, the power system, multiplayer, and crew select.

Both the power and upgrade systems add depth to the game since they both allow the player to customize their ship to suit their play style in a way that would not otherwise be possible. Many upgrades will change the appearance of the player ship as the adventure progresses. We wanted to make sure the player felt that their choices had meaning and gave a sense of reward/progress.

Multiplayer was designed but we realized soon after beginning development that we would not have enough time to implement it if we wanted to have enough time to polish the game. Multiplayer will be a main focus of any development that occurs after graduation.

With multiplayer gone we felt we needed something to add life to the game; we decided to add crew selection to the game. Each character got their own set of audio lines which was subsequently wired together to interact with each other as different events occur in game, giving the illusion of a living crew.

#### 1.4 Art

The art style used in the game is a highly saturated, realistic look. The saturated colors give a fictional feel to the otherwise realistically rendered spaceships and backdrops. Older arcade games like *Gradius Gaiden* (below) used a similar style with less resolution. The bright ships also help contrast from the dark backgrounds.



**Figure 1.4.1:** Gradius Gaiden, player and a boss enemy

We looked at *Soldner X* (below) for a reference of higher resolution styles, but its realistic style can hide the desaturated ships in the blue haze in some of the backgrounds. Each ship in our game uses a similar color palette to help distinguish them from other elements like weapon fire, asteroids, and backdrops.



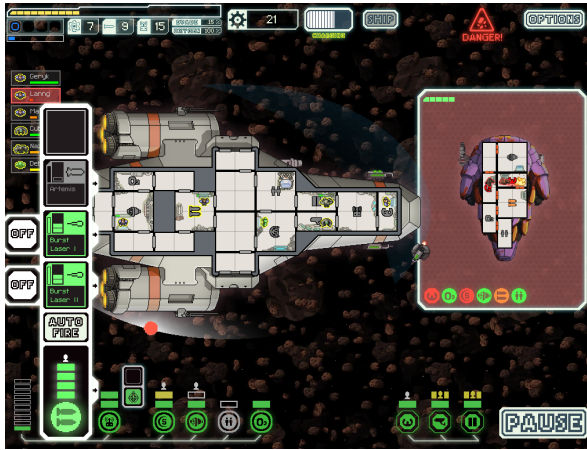
Figure 1.4.2: Soldner X; Ice world background

Figure 1.4.3: Soldner X; cityscape background



The user interfaces, menus, and buttons throughout our game have a similar geometric feel. The reference for this style came from *Faster Than Light (FTL)* which uses a wide range of greys and bold lines in their interface shown below, to the left. Our

game (below right) pushes the saturated look with a more futuristic and minimalist style. Therefore, vibrant colors, abstract layouts, and more functional geometry is used.



**Figure 1.4.4:** FTL, power managements



**Figure 1.4.5:** Conquest of the Verse, in development

## 1.5 Technology

The team decided it would be best to stick with a game engine we were all familiar with and would have most of the necessary features built in. As such, the Unity game engine was chosen, as everyone in the team had used Unity before. Even though Unity is a 3D game engine, it has adequate support and features for 2D games. It contains a 2D physics engine where the z axis is ignored, as well as 2D sorting layers where it also ignores the z value and only focuses on sorting layer values. Unity also simplifies support for multiple platforms, so the game can be played on windows, mac, or handheld devices. The wide range of features in Unity made it a very reasonable option for this project.

Git was the preferred method of choice for source and asset control. All team members were allowed full access to the repository. Using Git, art could be uploaded and technical changes could be kept up to date. Git easily allows for upload and download of repositories, as well as effortless backtracking in branches in case the current build breaks or objects disappear. Scenes were accidentally overwritten several times throughout the project, which was simply rectified by checking out the old version of the scene. The commit history in Git shows the progress of the game, and what is being changed or updated and when. This is important to the team to show what has been completed over the past week, and could be interesting to any party tracking the progress of the game.

# PART 2: Gameplay

## 2.1 Design Statement

The game is designed to challenge the player's reflexes as well as their strategy. We allow players to play the game how they want, making for a different experience for each player every time they play. Before each level the player can customize their ship's power levels in a way that allows them to specialize their playstyle. The same goes for player upgrades, as players can choose what kind of upgrades they want to buy. Some upgrades are better for immediate benefits, while some investments for the long run. When in the main game, the player must rely on their power and upgrade choices as well as their reflexes to get through the level. Players can progress far into the game with any specialization they choose, meaning that the game does not favor a single approach. Overall, the game encourages the player to try new combinations and to improve their reflexes, which makes for a more satisfied result in the end.

## 2.2 Controls

The game's controls are designed for play with a mouse and keyboard. Tests using a laptop touchpad have been done, and while such is possible, it is not recommended.

Controls and Mapping	
Menus	
Left Mouse Click	Selects various buttons or move sliders



In Game	
Mouse Tracking	Moves the aiming reticule around the screen
Left Mouse Click	Fires laser gun
Right Mouse Click	Fires blaster beam (only when power is supplied)
Spacebar	Fires Missiles (only when power is supplied)
WASD/Arrow keys	Steers player around the screen
P or Esc	Pauses the game
R	Repairs ship (only when power is supplied)

**Table 2.2.1** Controls

### 2.3 The Level

After the main menu and character selection screens, the player is introduced to the level screen (Figure 6, shown below). Here the player is shown information including player health, score, money and weapon status. Other information may appear on the screen or radar signifying boss waves or other warnings as the level progresses. The player is represented by a stationary spaceship on the left-middle side of the screen. If the player moves with the WASD or arrow keys, the ship will move appropriately, stopping at any edge of the screen. The player ship will also respond to other actions such as shooting with the spacebar or mouse buttons. Additionally, when pausing the game with the Esc or P key, the player and all other objects on the screen will stop moving, the entire screen will dim, and the pause menu will be displayed. Upon closing the menu, the game returns to a normal state.



**Figure 2.3.1** Level gameplay

The gameplay of the level follows a pattern. It begins with the spawning of the player, followed by several waves of enemies entering and leaving the screen (either by flying off or being destroyed). Finally the level will finish with a boss entering the screen, displaying its health in the Enemy Hull Strength bar. Once the boss is destroyed, the player is congratulated and sent through the upgrade scene, the power selection screen, and then back to the level scene again. When the new level begins, the enemies are leveled up. Each enemy level progressively gets harder, resulting in enemies that take more damage, deal more damage, and spawn in harder formations. Waves spawn with less time between them, giving the player less time to respond. This pattern of level progression was created to give the player a sense of flow in the game,

a ramping difficulty along with the increasing abilities of the player. The full list of all the enemies can be found in Appendix A.

## 2.4 Upgrade Screen

In this screen a list of upgrades is shown, as well as the total amount of credits and crystals that the player has earned. When the player selects an upgrade, information about the upgrade appears on the screen. This information includes the name, a description, the cost, and if applicable a visual change on the ship. The player then has the option to click the purchase button located at the bottom of the screen, which will remove the appropriate funds from the player's money pool. If the player does not have enough credits, the purchase button will be greyed out, but the upgrade can still be viewed. A comprehensive list of all the upgrades can be found in Appendix D.

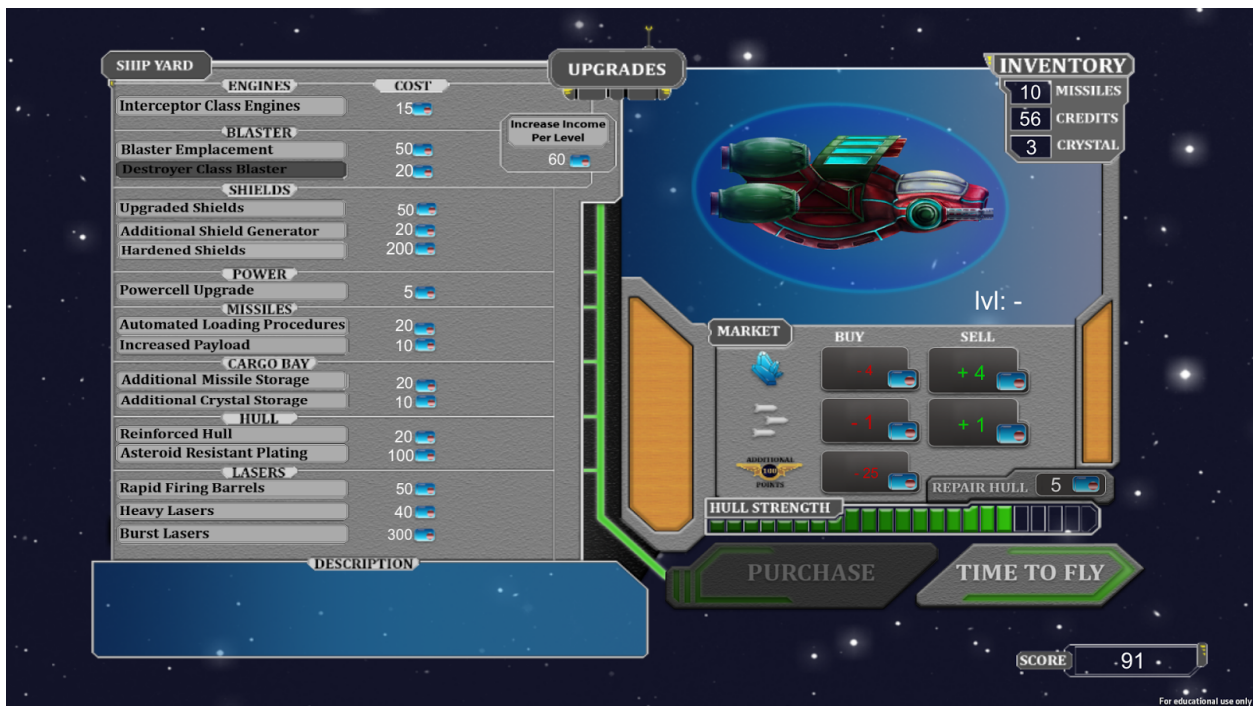


Figure 2.4.1 The Upgrade Screen

The upgrades that the player receives will affect gameplay in a number of ways. The player will be able to purchase shields, missiles, blasters, health, damage, and numerous other upgrades. As these upgrades are purchased, the ship will be altered visually, giving the player a much more rewarding sense of improvement. Some upgrades will simply enhance abilities already present, while some will grant new abilities. The blaster upgrade is an example of a new ability, as when this upgrade is purchased, the player will receive new weapon capabilities. The blaster is then visually shown by an additional turret on the player. The buying of new destructive abilities will increase the number of options the player has in each level, slowly easing the player into additional functionality while simultaneously giving the player a sense of reward.

## **2.5 Power Screen**

The power screen displays the ships different power systems, allowing the player to distribute power to suit their own playstyle. If the player prefers the blaster, for instance, they can reroute power to that system instead of missiles or lasers. Systems that can be manipulated in this way includes engines, shields, lasers, missiles, blasters, radar, and repair. When the player starts the game no power may be distributed to shields or the blaster; these systems need to be upgraded first before they can be used. The player is given five power to start, and can upgrade their power cells up to twenty using the upgrade screen. In order to power every station fully, the player needs twenty-four powercells. This means that the player cannot power every station fully and even if the player has every upgrade, they still must choose where to specialize their

power. This makes the game more interesting by preventing an all-powerful “maxed out” ship. Once the player has manipulated their ship’s “load-out” they can progress to the game play screen.

## **2.6 Winning**

The game ends when the player finally dies. There is no way to ultimately win the game, the player merely collects points until they die and their score is recorded on the high score screen. In other words, the game is endless with the end goal being to get a higher score than other players.

## **2.7 Enemies**

The enemies in *Conquest of the Verse* are designed to be diverse and to challenge the player in different ways. The game requires the player to have to adapt and react differently depending on the enemies on the screen. For example, some enemy types require the player to dodge or to shoot them in a specific area, while others can just be dealt with head on. Overall the player will build a knowledge base of the enemies they face and will have to deal with each enemy in a different way. The final game has ten basic enemies, three types of asteroids, mines, and two bosses. See Appendix A for the full list of enemies.

## **2.8 Player Selection**

Before the game begins the player is brought to a crew select screen where they name themselves and choose their crew. When a character is selected, their name and backstory is presented in a text box. A slogan, unique to each character, is also played to give the player a preview of what type of character they are hiring. After the player finds crew members they like and locks them into each role, they can begin the game.

As the player progresses through the game their choice of crew manifests in different voices that they hear through the game audio. The crew portraits will be displayed on the screen and each member will comment on different things that occur in the game and even talk to and support one another as they work.

## **2.9 Replayability**

In designing the game, our team wanted to be sure to include numerous aspects that would make players want to play again. To do this, we added numerous game mechanics including aspects of randomness, ship customization, and crew selection.

The biggest random element of the game is wave spawning. Each time a level begins, the spawner randomizes the order of a hard wave, an asteroid wave, and three normal waves. The spawner then randomly selects these wave types from a larger list of waves, making each level, and each playthrough, unique. Waves are sorted by difficulty to ensure that very difficult waves do not spawn in the early levels.

Ship customization adds another layer of replayability, since it allows players to vary their tactics. In one playthrough players can elect to upgrade their blaster and use

it as their heavy hitting weapon, while in another they can focus on their missiles instead.

Crew selection adds even more replayability since each character has their own set of unique audio. Not only that, but each character has different dialogue options at each position. In order to hear all of the audio files the player would have to play the game at least 14 times, each time choosing different crew members for each position.

# PART 3: Artistic Vision

## 3.1 Building an Artistic Vision

When we first envisioned *Conquest of the Verse* we drew from games such as *Faster Than Light*, *Space Arcade*, and *Super Shooter*. We wanted to build a space shooter, but we wanted to include RPG elements as well to increase immersion. In addition, the number of game mechanics we were planning to include on top of just a run and gun (namely upgrades and power control) meant we needed to have a simplistic but effective UI. This UI, especially in the gameplay screen, couldn't cover up any of the gameplay; we chose to make the UI as transparent as possible so the player could see what was behind it. Because of the relatively fast pace of the game, we also needed player portraits and ships that were easy readable. Characters needed to have their own personality that was evident from their features, and ships needed to be quickly distinguishable from asteroids. We began by developing a desired look based on other space shooter and which style would be easier to implement in the time allotted. Our art style was refined during the creation of ships and portraits. The process we followed is detailed in the following sections.

## 3.2 Art Pipeline

Working next to one another during the project helped the artists quickly exchange feedback on each other's pieces as well as strategize on how to better fit the art style with the game. On the few days we worked from home (either on weekends or



as a result of snow), we used the network drive to look at each other's work. Later on in the term we created a google blog where we were able to easily share our work with Professor Snyder to get his comments on how we might improve or polish our work.

### **3.3 2D vs 3D**

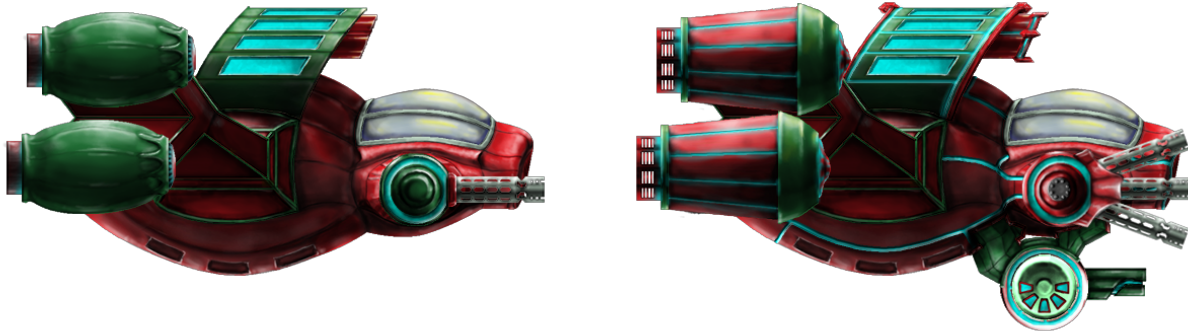
Deciding on a side scrolling space adventure did not determine whether to use 2D or 3D assets, but it did make the choice much easier. Most notably, using 3D assets would allow objects like asteroids to collide and possibly explode “out of the screen” towards the player. Light in a 3D space could also be generated rather than painted on through art assets.

Going with 3D, however, had a number of drawbacks. Most notably was the added time it would take to make assets; each ship needed different art, and making 3d models of each one would take a long time. Secondly, including many 3D models in the game negatively affect its performance. We planned on having a large number of objects on the screen at once (asteroids, ships, bullets, shield indicators etc.), and making them 3D would increase the workload that the processor needed to handle. Due to these reasons, we decided to create the game in 2D space.

### **3.4 Conceptualizing Spaceships**

Since the game is about weaponized spaceships, the ships required creative adaptations to equip weapons. Creating concept art for the few spaceships was difficult because we wanted as much originality as possible and not to be derivative of a

previous space shooter. Therefore, we did not copy ship designs from other games, nor copy the realistic space shuttle designs that NASA uses. Part of our solution was to create a sort of evolution of ships beginning with a NASA shuttle design then progress into more exotic layouts.



Player Ship: No Upgrades

Player Ship: Fully Upgraded

**Figure 3.4.1:** Player ship upgrade comparison

The increasing stats and varying abilities also gave reason to vary the designs of enemy ships. The basic enemy types are bare metal and have no modifications to them. These are known as the DogFighterA and DogFighterB class and are really simple in look. As the enemies increase in difficulty, the ships become more elegant and the weaponization becomes more elaborate. The upgrade in look presents a higher level of ability for the player to recognize the threat level that is presented.

The player's ship is purposefully made to look like an intermediate level ship in order to represent the player's ability compared to his enemies. When the player is head to head with a DogFighter he can see by the structure of his ship that the enemy is extremely weak. The opposite is true when the player encounters a boss because the boss has many more weapon systems, larger engines, and a sturdier structure.



**Figure 3.4.2:** Comparison of player ship to enemies

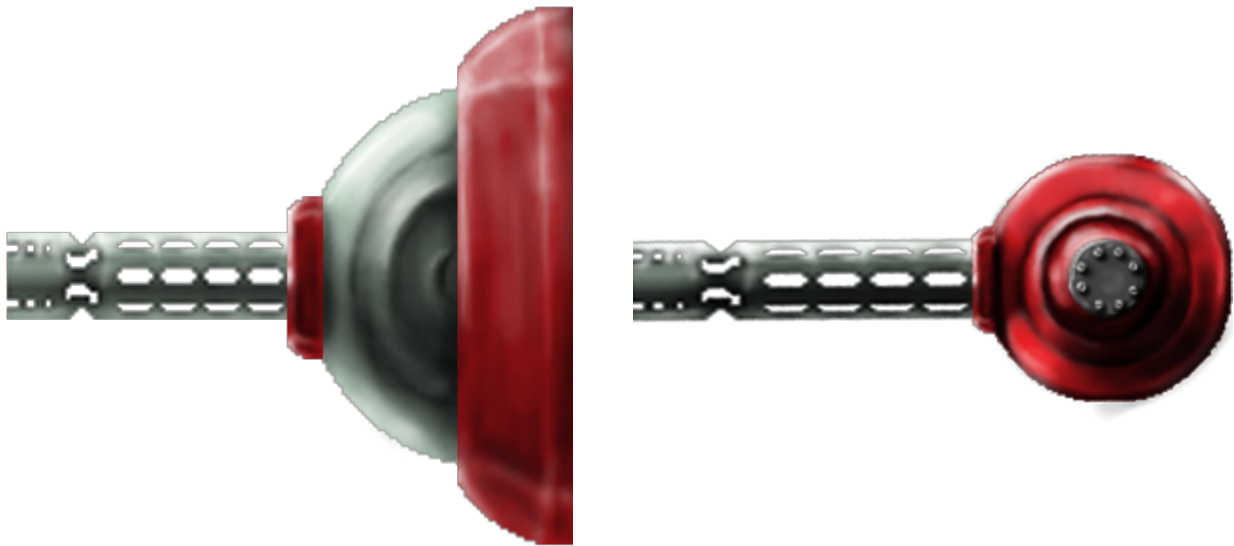
The player's weaker representation will provide two things (1) Excitement and fear to when or if they defeat the enemy, or (2) Encourage the player to buy upgrades that improve both stats and appearance for preparation to the next boss.

### 3.4.1 Spaceships Designs

After the initial concepts of the ship enemies, it was determined that each ship would have either a laser, blaster, missiles, or a combination. We even determined how

many of each weapon the ships would equip. The layout of each ship was then configured around the number of weapons needed.

To make ship construction more efficient the laser, blaster, and missile launchers were given a standardized look. The laser turret uses a metallic looking barrel similar to machine gun barrels with a rounded housing for movement. A second housing option for the laser was made for a full 360 degree pivot.

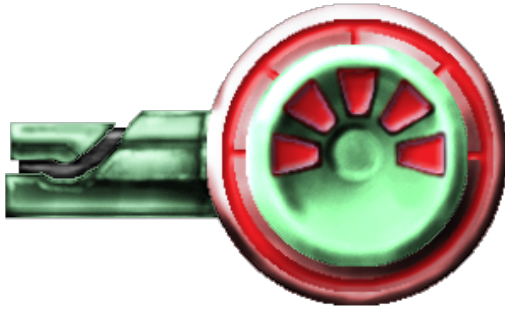


Laser turret, limited movement

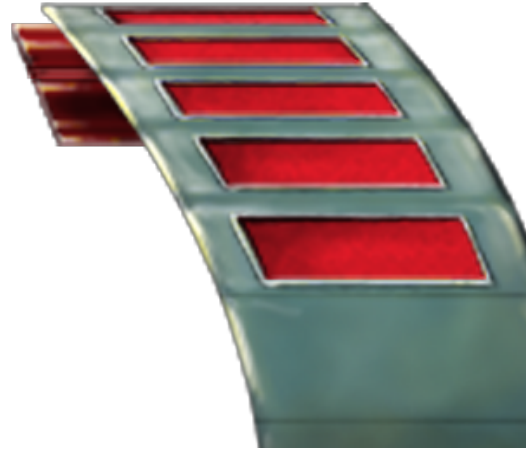
Laser turret, full 360 degree range

**Figure 3.4.1.1:** Laser turret options

The blaster has an electrical look to it, are lighting streams that circle the base and more lights on the base. The blaster barrel is based off a circuit board with a green color and a deep cut to direct the energy wave. The missile housing is like a large, sturdy wing to support firing and space for missile storage. After the weapon housings were designed, they could be quickly added onto any ship with slight adjustments.



**Figure 3.4.1.2:** Blaster housing



**Figure 3.4.1.3:** Missile housing

Every spaceship also uses the same color palette which helped to streamline design and unify the representation of the enemy alliance. The ships are all greens and reds with yellow to highlight. Solid colored shapes created the ships, then black and white were used to give them dimension. Since the color and shading were done on separate layers, the ship and its elements could easily change color. Each ship was developed this way to allow for possible player customization or visual adjustments that might be found necessary during playtesting.

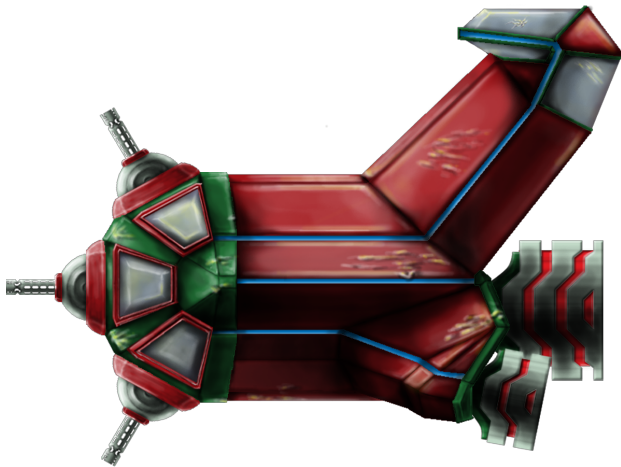
Other than just changing the size of ships, the larger ships also have more detail than the smaller ones. Enemy ships such as the Grenadier and the Seeker have dents on their sides and on their windows. The extra details are used to represent larger looking images. Of course, smaller ships use less detail because it would go unnoticed and unrepresentative of smaller more agile ships.



Seeker Enemy



Vertical Enemy



Grenadier Enemy



Ambusher Enemy

The larger ships (right) have more dents and structural details than those on the left, giving the illusion of one ship being larger than the other without altering image size.

**Figure 3.4.1.4:** Large and small enemies

### **3.5 Setting and Story**

*It is the year 2344, the 100th anniversary of space travel. Humans have abandoned Earth and now roam the galaxy in search of adventure, a means of survival, and, perhaps, a more permanent home.*

*One hundred years ago, when humans discovered space travel, few guessed it would come to this. Indeed, the initial contact with aliens was peaceful, with trade flourishing and a number of military alliances being signed. It was, however, the aliens that would be the downfall of mankind's original home.*

*This downfall was set in motion 40 years ago, when a brilliant scientist by the name Dr. Vossler Shackleton began experimenting on black-market alien technology. It is unknown what went wrong during the experiments, but Dr. Shackleton's genius certainly failed him that day; the lab was leveled by an explosion which released noxious gasses into Earth's atmosphere.*

*Soon, plants, and the animals that ate them, began to die; the soil no longer sustained life. It was not long before the world leaders decided everyone had to leave. Giant flagships were built to transport the remains of the world's population away from the now barren planet that had been Earth.*

*Some of the escapees went to live with other races, but the majority of the human race was forced into a nomadic lifestyle, doomed to travel the universe until a new planet could be found.*

## **Developing the story**

When we decided we wanted to build an endless space runner there were a number of questions we needed to answer: what caused humans to leave earth, how long it's been since they did so, and what interactions with aliens they have had since then. Rather than the cliché 'aliens initiate WWII in an effort to take over the planet' backstory we chose to have humans bring about their own demise, and instead have peaceful relations with aliens. This backstory also better suited our selection of characters, since it is possible to select aliens to be part of the crew. It actually wasn't until after we starting adding audio that we fleshed out a deeper backstory to go with the characters who lived in our world; part of this development was spurred by inquiries from voice actors looking for backstories.

### **3.6 Character Creation**

We included a mixed cast of characters in our game including various alien races, organic life forms, and humanoids of different races. We based character gender on what our voice actors felt comfortable playing. We were lucky enough to garner attention for men and women equally.

Each character had a defining trait that helped to write their script and to make them distinguishable from other characters (See Appendix C). Not only that, but we wanted characters to have different ways of looking at the universe, potentially allowing players to hire whoever they felt a connection with. Some characters are more serious and might collaborate better with someone who is very serious about the game. Other



characters have a happier or laid back attitude that will hopefully connect better with younger players.

## **3.7 Audio**

### **3.7.1 Music**

Due to our rapid development schedule we decided to outsource our game music to Renzo Heredia, a senior at Berkeley College who is majoring in music composition. Even though we didn't end up composing music ourselves, we learned about what it would take to communicate with an audio department in the industry. We negotiated salary, development deadlines, found reference audio for Renzo to work from, and iterated through a number of drafts before we settled on a final product.

As the project progressed Renzo missed a number of deadlines, prompting us to renegotiate terms. Renzo agreed that it wasn't appropriate to ask for full payment for work that was more than a week late, so rather than a monetary payment which we had initially agreed on, we instead promised to help him with a logo for his website.

### **3.7.2 Sound Effects**

We created a number of sound effects ourselves, but we also drew from [soundbible.org](http://soundbible.org) for sound effects, namely explosion and laser sounds, that we couldn't create using foley. We made sure any sounds we used from Soundbible were properly attributed, and allowed for use in a product that may someday be sold (in case we

wanted to continue development after graduation). Attributions for sound effects can be found in the works cited section.

### **3.7.3 Voice Acting**

We discussed a number of different ways to tie the audio into the game including using it to help the player get to know the characters, having the characters talk to or conflict with one another, and alerting the player to important in game events. We settled on a combination of all three, with an emphasis on using audio to alert the player of what was coming up in the level. Characters also react to other events, such as running out of ammunition or getting hit by enemy fire.

We wanted any character to be capable in whatever position the player wanted them in. This in mind, we decided to give each character different audio for whichever station they were working. There are similar cues for different lines across all of the characters, but each character has their own way of responding to things that happen in game. We also decided on adding audio to our tutorial; it required extra effort to write a script but resulted in less art assets for the tutorial.

In giving our character's voices, we gave them life. We recruited WPI students, asking them to express their interest in a number of characters that we thought up. Once voice clips had been recorded, we took each clip into Audacity (Audacity) and applied filters to make them sound as if they were coming through a radio. We hoped this extra level of effort would help increase immersion in the final product.

### **3.8 Audience Consideration**

To keep the game appropriate for all ages, we made an effort to have the characters use clean language and talk about appropriate topics. Any character traits that were at odds with this objective were replaced with less risqué descriptors. In addition, the playful art style adds to the suitability; the game lacks any blood or gore.

### **3.9 Creating Character Portraits**

Creating character images in the same style as the spaceships was not appropriate for many reasons. One reason is that humanoid beings usually require many slight color changes while the ships keep to a color and change in value. Our options became (1) Make black and white portraits or line art, possibly with minimal color changes, creating images through black and white values, or (2) Create very solid colored characters similar to cartoons, images that are made of changes in hue. We went through many iterations with different styles before opting on pursuing the second option. Our choice was not made easier by our accelerated development schedule.

One of the hardest parts of portrait creation was incorporating character personality into the portraits so the player could better understand each character in one glance. We wanted players to empathize with the characters from the start, and this was something that we believed could not be accomplished if the portraits were homogenous and did not push the exaggeration of characteristic traits.



**Figure 3.9.1:** Early concept portrait. Lacked character



**Figure 3.9.2:** Concept portrait without color



**Figure 3.9.3:** Early cartoon portrait

Initial drawings did not carry enough character, so the style shifted to line art and cartoons to exaggerate character personalities through the drawing. It was determined the images should replicate the work of Jean Giraud Moebius who uses hard edges with very detailed shading similar to “Willow” in Figure 3.9.4. We were able to transform our images from cartoony to shaded line-art similar to Moebius, however, the images took too long to develop. The style of the final portraits diverged into a cel-shaded look similar cartoons that would balance with the realistic style throughout the game.



**Figure 3.9.4:** Work by Moebius, Willow



**Figure 3.9.5:** Elizabeth portrait fully rendered, with similar style to Moebius



**Figure 3.9.6:** Malcolm portrait in the final portrait style of the game.

Other than finding a suitable style, another setback in portrait development was a transfer of responsibilities; when audio started being recorded Owen handed off character portraits to Alex. Any time that Alex spent rehashing art styles was accounted for when determining how long we had to create the final portraits.

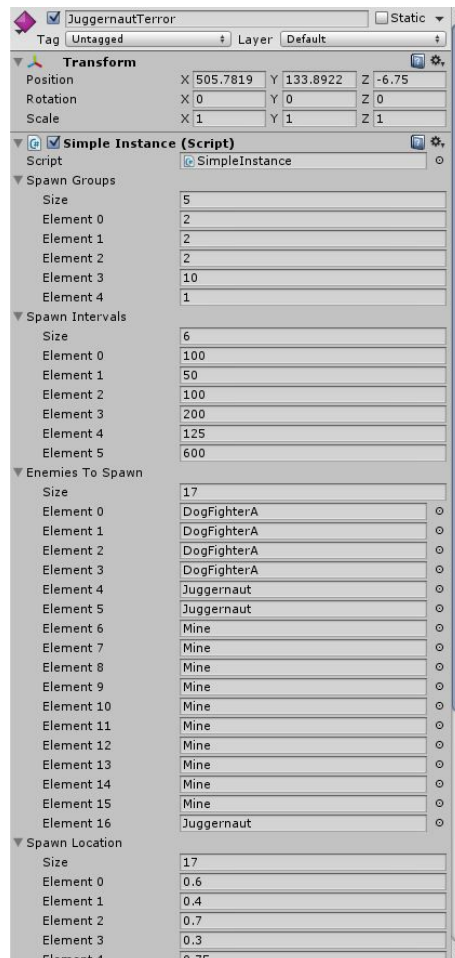
# PART 4: Technology

## 4.1 The Technological Vision

The technological vision of the game involved forethought, cooperative design decisions, and occasional adjusting. The primary technological goal when going into a major project is extensibility. One never truly knows if something will come up or some design decision will change that will require objects to incorporate other game element. A great example of this was the introduction of the level progression system (See Section 4.3 for details). In the beginning of the project it was unsure as to how exactly the levels would progress or how they would be structured. As such, the object that handles the levels was designed in such a way that it could give and receive control of the level progression. This allowed for any object to take control and move the level in its own fashion. The extensibility of this feature allowed for a seamless transition into the decided upon level system, as well as still remaining open for future extensions.

A secondary goal is reusability and simplicity of game code. If the basic functionality of multiple game objects is isolated to a singular location, a change to that should affect all objects the same way. This improves the speed at which changes can be made, and severely reduces the complexity of the code, as well as the possibility of errors in changes. There are several examples of this, but the most notable is the `AbstanceInstance` script. This script allows for rapid development of playable waves using just the Unity editor. All controls for enemy types, when they spawn, and where they spawn are all controllable without opening a script. The only requirement for doing

this is attaching a SimpleInstance script to an object, and the object will spawn the wave appropriately when instantiated by the level progression system. Every wave (except for the boss waves) uses the SimpleInstance script, showcasing a perfect example of reusability. A clear example of this usage can be found in Figure 4.1.1 below.



**Figure 4.1.1** An example of creating a wave in Unity

## 4.2 Enemy Design

Following the policy of extensibility, enemies were something that could be easily abstracted and optimized. To do this, every enemy implements the AbstractEnemy abstract class. This class outlines functions and variables that every enemy should

have, such as damage, health, speed, prefabs, collisions, and so on. These common functions make it easier to abstract and manipulate an enemy regardless of its type. This abstraction is particularly useful when dealing with damage since all enemies take and deal damage the same way, regardless of the enemy type. The enemy simply calls its abstracted `takeDamage` or `getDamage` function.

The damage getter and setter functions are used to retrieve information from the enemy during collisions. When an enemy collides with the player, `playerCollisions` will query that enemy for the amount of damage that it does on collision. Since the getter is defined in the abstract class, the calling function doesn't need to know exactly what type the enemy was.

Enemy bullets are structured in a similar manner as enemies. There is a single bullet type defined in `SimpleEnemyBullet` that most enemies use. This script also contains damage getter and setter methods for dealing with collisions with the player. Again, the player will query the bullet for the amount of damage it does. The damage a bullet does is defined inside the enemy that shot it. When shooting, the enemy passes the damage integer to the bullet and that transfers the damage to the player.

Finally, a similar approach was taken with asteroids. The three types of asteroids are small, medium, and large where larger asteroids shatter into smaller asteroids. To prevent the need to know exactly what size asteroid is being dealt with, the `AbstractAsteroid` abstract class exists. This class again has damage setter and getter methods, along with a `shatter` method. The `shatter` method is in charge of breaking the asteroid into two asteroids that are one step smaller, or in the case of the smallest



asteroids, crystals. This makes it easier to handle collisions and explosions involving that asteroid.

The simplicity and extensibility of using abstract classes make it an obvious choice for this project. Since there are many enemies and asteroid types, abstracting out a layer make it manageable and much simpler to deal with, especially with explosions. Using interfaces in a similar concept was originally attempted, but that resulted in a large amount of duplicated code. After refactoring and turning the interfaces into abstract classes, the project was cut in size by over 2000 lines of code.

### **4.3 The Level System**

*Conquest of the Verse* is a level based game where the player advances in the story and in strength through completing each level successfully. In each level, there are waves of enemies that exhibit interesting and challenging behaviors. As such, there must be a technological system that dictates how each level begins, progresses, and ends. This technological system is handled at the top level by the LevelHandler script.

This script has control over which waves of enemies appear, how many waves appear, when the boss will appear, and on how certain UI elements get updated relative to the level progression. The LevelHandler also keeps track of the status of the level, such as which wave is progressing, the boss health, and which level it is. At a top level, the LevelHandler chooses five waves, three of which are normal waves, one is a hard wave, and one is an asteroid wave. These waves are then instantiated in a randomized order. After these five waves have been completed, the boss will spawn.

In order to instantiate a wave of enemies, the LevelHandler randomly chooses from an array of waves based on the current level, and spawns it. Each wave is called an instance. The generated instance then has full control of how many enemies will spawn, where they will spawn, which ones will spawn, and at what times. When the wave of enemies are finished spawning, the instance will notify the LevelHandler that it has finished spawning, and will terminate itself. The notification returns control back to the LevelHandler to resume the level.

A similar setup is established for the boss of the level. When enough waves have spawned, the last wave will be a boss wave. The boss wave will make the boss health bar appear, and it will remain on the screen until the player kills the boss. The boss will report back to the wave that it has been terminated, which will report back to the LevelHandler that the boss has been terminated. This allows for there to be a hierarchy of knowledge. The LevelHandler does not need to know directly about the boss, and the boss does not need to know how the levels start or end, just that it was spawned by a boss instance.

The level system was an interesting design challenge that could have been tackled in a number of different ways. There could have been fully designed levels that don't change with each playthrough. This would mean that the LevelHandler would have been in charge of creating "levels" of enemies as opposed to "instances" of enemies. This option would have presented lesser replayability, as each level would in essence be the same. For this reason, this option was considered but not chosen.

The level system could have also been directly in charge of randomly spawning enemies in random locations, until enough were spawned for a boss to appear. This jumps to the other side of the spectrum, introducing too much randomness and chaos into the game. The challenges the game produces would change from interesting to absolutely random and in most cases unfair. Randomness is something that is wanted in the game, but something like this is too chaotic, and therefore the system was not used.

The decided upon approach is something from the middle of these two options. A system that would allow for some control from the level as to what types of waves could spawn and when. But also a system that allows some randomness in the waves that spawn and within each of those waves, some additional randomness in a controlled fashion. This allows for a hierarchy of controlled situations and challenges that confront the player in a fun way. The LevelHandler and Instances can also access different variables, such as health, level, and difficulty to increase or decrease the challenge given to the player. The extensibility and replayability presented in this option made this an obvious choice.

#### **4.4 The Scoring and Money System**

As with almost every arcade-esque game, there is counter that keeps track of the player's score. The system used to do that in *Conquest of the Verse* is named the ScoreHandler. This system is a highly visible container system. It accepts inputs but will not do anything on its own, meaning it does not update each frame unless prompted.

When an enemy ship is shot by the player, it will report such to the ScoreHandler, stating how many points the player gets for the action done. Then the ScoreHandler will report the updated score to the appropriate UI element that reflects the score.



**Figure 4.4.1** The Score UI Element

The ScoreHandler is also in charge of the money and crystal systems. The reason for this is that the code handling the score and the other item drops works in precisely the same way. When an enemy ship dies, it has a chance that it will drop some money which will then fly to the left of the screen, similar to asteroids dropping crystals. If the player flies over the money or crystals, the player will have picked it up. The player ship then reports this to the ScoreHandler, which will then update the appropriate UI element that reflects the pickup. Money can be spent on upgrades, which simply removes money from the total, and crystals can be spent repairing the ship.

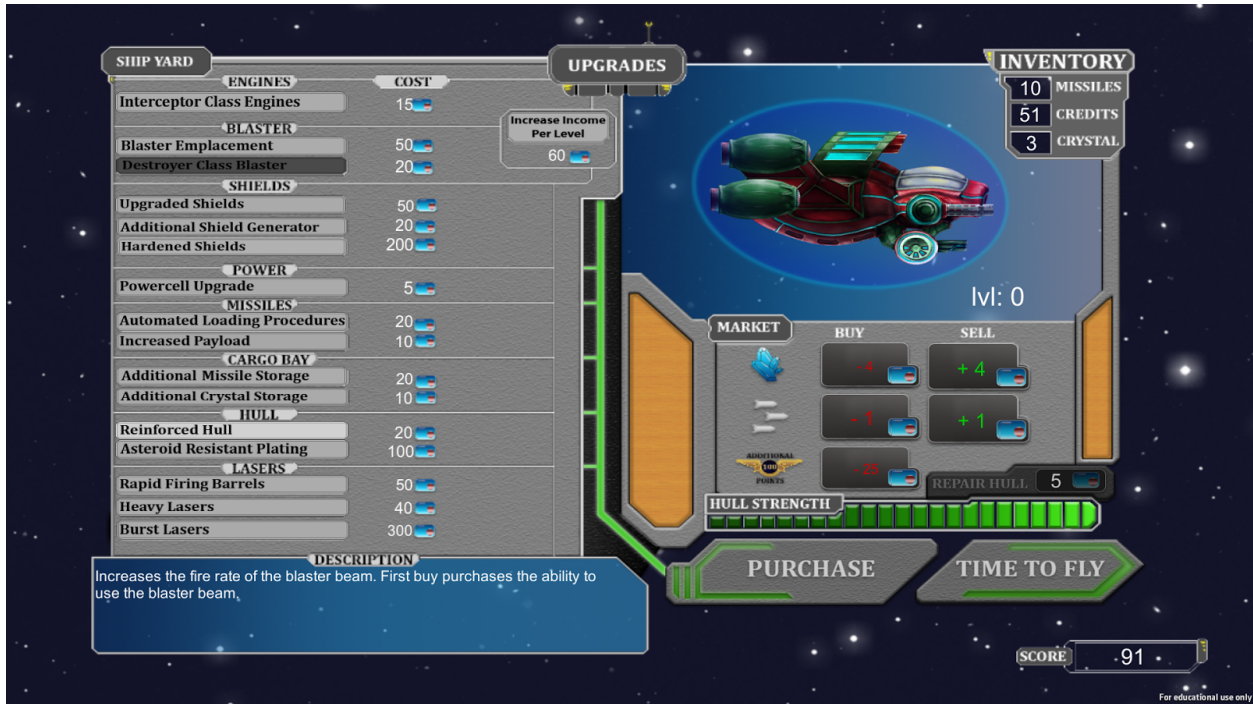


### **Figure 4.4.2 The Money and Crystal UI Element**

The design decisions behind this choice of architecture were easy. The score, crystal, and money counts are simple entities, simply a set of numbers that are shown on the screen. These UI entity counts need to be updated and known by all the enemy entities and the player entity, so creating a system that is a container object that accepts inputs seemed obvious. The only time money, crystals, or the score need to be updated is when another object deems it so. This takes the burden of responsibility off the ScoreHandler, leaving it the responsibility to just represent the data it is given properly. This system leaves room for extreme extensibility, as any source in the game could award (or take away from) the player for any reason.

### **4.5 The Upgrade System**

The upgrade system is simplistic in nature, but touches upon a lot of different objects and scripts. Upgrades can be purchased in the upgrade screen after each level with money earned in such levels. The gameplay and upgrade screens are in different scenes, so information about the player must be passed from scene to scene. This is done using playerprefs, which stores data with string identifiers. As such, playerprefs are used heavily for the upgrade system.



**Figure 4.5.1** The Dynamic Upgrade Screen

In the upgrade scene, the player is able to view all possible upgrades, read what each one does, and see the costs. If a visual change occurs from the upgrade, it can be seen on a still player ship in this scene. If the player has reached max level on an upgrade, it won't be able to be selected. Once an upgrade has been selected and purchased, the appropriate playerprefs will be updated to enhance the character. The associated cost is then subtracted from the available money.

Many upgradable variables about the player are loaded at the start of each level directly from playerprefs. This means that any values stored in playerprefs will be used to dictate the player's strength and abilities. This includes visual changes because of added weapons or abilities. The benefits of this system reflect the desired technological

goal of extensibility. All upgrades can be found in playerprefs for simplicity. The extensibility of this requires just adding a new string defined playerpref.

#### **4.6 2D physics**

It was decided that *Conquest of the Verse* would be a two dimensional game, both in art creation and in gameplay. The simplicity that comes with two dimensionality allows for the game to be created with quality in the allotted 7 week timespan that the game needs to be made in. From a technological standpoint, programming in only two dimensions means that the third dimension, the z axis, can be essentially ignored. All collisions will occur using only the x and y coordinates. Using the Unity engine's 2D support, rapid and easy development of the game can take place. Layering using Unity's 2D layer system allows displaying of certain objects over others in a consistent manner. Also, certain objects can be allowed to phase through one another based on what layer it is assigned to. The combination of layering and simplicity of 2D collisions allows for 2D development to be incredibly easy.

#### **4.7 The New Unity UI**

Unity 4.6 introduced a new UI system in January 2015 which is a complete revamp of the previous GUI system. This UI system allows for easy placement, resizing, and interactions between the numerous UI components. The UI components can be treated very similarly to game objects, and as such attaching scripts and moving/changing the UI in-game is simpler. Scaling of the UI is controlled by "anchors",

which allow scaling to be attached to corners, sides, the center, or at a static location. In other words, the game will resize itself properly regardless of the screen size of the player. This made the development of the UI very quick and painless, and because of this, all the UI present in this project is using the new UI system.

#### **4.8 Audio Integration**

Since audio is a major part of this project, it was important that the audio management was handled in a clear, logical, and extendable way. The game audio is distinguished in three major categories. These categories are music, portrait dialogue, and sound effects. Each category has its own mechanism for controlling when and how the sounds are played. All three categories of sounds are controlled at a central volume controller to adjust the volumes independently.

For music integration, it was as simple as attaching an AudioSource on the main camera of each scene and adding the music clip to it. This was kept as a standard for each scene so that the music was implemented in a consistent fashion.

The integration of portrait audio was much more complicated. In the main game scene there exists an object with the PortraitController script attached. This object has four child objects with AudioSources, each corresponding to a portrait. The PortraitController loads every dialogue clip for every character into an array and each dialogue trigger is mapped to a function. This function will detect, using PlayerPrefs, which character is in each position and then play the correct dialogue clip based on that. The function will also use the corresponding AudioSource so that multiple clips can play



at once if necessary. Each function is called outside of the PortraitController at various parts in the game so that it can be played at any point. This is a fairly sophisticated system that easily allows for more characters simply by adding new functions and adding the dialogue clips to the array.

Lastly, sound effects were implemented using the AudioHandler. The AudioHandler object contains many child objects each with AudioSources on them. Every AudioSource has a different sound effect clip loaded into it. Inside the AudioHandler script there are functions that play each of these sound effects. Again, the AudioSources are put onto multiple children so that Unity can play the clips at the same time. The AudioHandler functions are designed to be called in various places in the code, wherever sound effects are needed. Adding new sound effects is as easy as creating a new child object.

All of these audio components are then centralized into a VolumeControl script. The purpose of this script is to adjust the volume of each audio handler separately. This can be accessed with sliders that appear when the player pauses the game. There is one slider for Master Volume, Music Volume, Voice Volume, and Sound Effects Volume. Each slider, through the use of the VolumeControl script, can change every AudioSource in each of those categories. This gives the player an advanced control of the game audio so that they can adjust and disable certain parts of the game if they wish. These slider bar values persist throughout the game.

As Owen created the art assets they were given to the tech developers and put into the game. With all audio mechanisms being easily expandable, this made adding

any new assets quick and painless. Finally, each audio clip was converted into a 2D asset so that the clips were not position dependent. In 3D games, this is used for audio localization, but is not needed here.

# PART 5: Testing and Iteration

## 5.1 Playtest Strategy

Playtesting should be a process that presents a group of players the same game in the same fashion, such as to get feedback on a consistent product. As such, there should be a set of rules meant to be followed when running a playtest session to insure that outside factors do not distort the player's view on the game. The strategy of playtesting consists of obeying the following list of rules.

- Be friendly.
- Do not distract or interfere with the player during playtesting.
- Make sure all playtesters play on the same medium.
- Do not give the player any hints or instructions besides the following.
  - Sign the consent form.
  - Play the game.
  - Take the survey.
- The game speaks for itself. If the game does not say it and you feel the need to say it, then the game should say it. Take note on that.
- Do not change the version of the game.
- If the player died really quickly, let them try again, up to a 30 minute time limit.
- Take notes on what the player does, doesn't do, and gets confused about.
- If the player asks a definition question (what is the blaster?) when answering the survey (not when playing the game), you may answer them.

- Thank them for their time.

## **5.2 The Playtest**

The playtesting session lasted a week, from February 25th to March 3rd. In total 26 playtesters came and tested the game. Players from a wide range of majors and skill levels participated in the playtest. The build of the game was created at the end of February 24th and remained unchanged throughout playtesting.

The game stations for playtesting were computers found in the Zoo Lab in the subbasement of Fuller Laboratories at WPI. Players were given the consent form, then presented the game and headphones. After completion of the game, they were told to exit the game and take the survey, which was already open in another window. See Appendix E for the survey given to the playtesters. The duration of the playtest followed the rules found in section 5.1. After playtesting, discussion of the game was allowed to help give the development team a better understanding of the most important changes that should take place to make for a more enjoyable experience.

## **5.3 The Feedback**

The results of the playtesting provided us with an incredible amount of information about our game from the eyes of a new player. The feedback came from both the survey and from observation of the players. For a glance at the unparsed feedback, refer to Appendix F. This information had to be parsed, analyzed, and then reapplied to the development of the game. The information showed trends in certain

areas of the game that were lacking. These trends were identified and noted. This information will be represented in a format that pairs the feedback with the recommended change that would accompany said feedback (in no particular order).

<b>Feedback</b>	<b>Recommended Change</b>
Missiles are underwhelming, too expensive, too slow, too boring, people don't feel inclined to use them	Major buff to missiles, make them cheaper, make explosion awesome
Last phase of boss #1 spawns enemies too fast, people die too early	Decrease spawn rate of enemies, make it increase based on level
Third phase of boss #2 slams into player too fast, people die too early	Decrease speed of boss during this phase
Misc typos	Fix typos
Waves don't have enough time between them, no break	Add additional time between waves
Levels are too short	Extend level length by spawning more waves
Radar still exists when it isn't powered	Get rid of radar when not powered
Game is pixelated, accidentally started game in "fastest" mode	Set game to be in "fantastic" mode by default
Game has no title in windowed mode	Give the game a title
No feedback for player damage	Give feedback for player damage (potentially UI flash and ship flash)
Bosses have same art	Add different art for different bosses
Controls are not understood	Add a way for players to learn them before the first level
Upgrade screen is confusing	Make the upgrade process more clear, give them less options to start (grey out those they can't afford)
Power screen is confusing	Make the buttons pop out more, give more explicit instructions

Dialogue gets annoying	Decrease frequency of dialogue
Plot does not exist in game	Put the plot in the game
Damage is not clear in the game	Make popup text that indicates damage dealt and received
Laser gun is overwhelming	Increase the cost for upgrading the laser gun to make it a less overwhelming option, also increase the strength of the other guns
Blaster beam is underwhelming	Increase the possible frequency of use, get rid of crystal cost
Many people wanted to start with shield as opposed to buying it	By default have the player start with basic shields
People wanted money drops to be more frequent	Increase rate of money drops, but decrease value of money (so it looks like it spawns more)
Difficulty curve is slightly off.	Decrease difficulty early on. Increase difficulty much later.
Can't change someone in party to another job once selected	Screen could be a little more intuitive, could allow for this instead of replacing them and then putting them in another job
Purchase button on upgrade screen seemed out of place	Find a better place for it on the screen
Enemies are destroyed off screen	Prevent player bullets from killing enemies off screen
Hardened shields are overpowered (become invincible to a few enemies later on)	Make it so they do reduced damage, not no damage
[BUG] Sound levels do not persist from level to level	Fix this
[BUG] Repairing after the boss is destroyed does not save the repaired hull, but still gets rid of the crystal	Fix this
Tri-Shot is too loud	Decrease volume of tri-shot sound effect

### **Table 5.3.1: The received feedback**

Amongst all this constructive feedback, there was also feedback commending us on parts of the game that were done right. As there were a lot of players, there were a lot of mixed opinions on whether things were done right or not. The biggest concern of us amongst all this feedback was looking to see if the game was ultimately fun. From what we could tell most of the players legitimately thought the game was fun. Even after they died, they wanted to try again, and when denied, they expressed interest in playing the game another time (whether it be for another playtest or when the full game is released). According to our survey, only twelve percent of the players said they didn't want to play again.

## **5.4 The Changes**

The parsed feedback was a good starting point in where the development of the game should be focused. Of course, time is something that must be considered, so prioritizing feedback had to be done. The team looked over the feedback and discussed which changes should be addressed first. The following is a detailed bulleted list of all the changes that were made.

- **Balance missiles to make them more appealing.** - This change involved a bunch of small changes for missiles. Missiles are now faster, more powerful, lock on better, can be fired faster, explode bigger, and are cheaper. We hope this is

an adequate number of changes to make missiles a much more acceptable option.

- **Balance blaster to make it more appealing.** - Some players already enjoyed the blaster, but others bought it and then simply disregarded it. To make this a more readily usable option, we decreased the reload time on the blaster significantly, and got rid of the crystal cost. This makes using the blaster free and more fun, as it can be fired more rapidly. The damage dealt by the blaster was slightly reduced to compensate for this.
- **Fixing typos.** - The playtesters pointed out several instances of typos, and the team looked over the entire game to point out and remedy all cases of typos.
- **Reduce the difficulty of the bosses (in earlier levels).** - The bosses posed a serious threat to inexperienced players who were unable to dodge massive amounts of bullets. As such, we reduced the fire rate of the bosses in the earlier levels. In a few phases of the bosses, the abilities were well overpowered compared to other phases, so these have been balanced accordingly. This includes the “Mass-DogFighterC-Spawn” phase and the “Slam-Into-Player” phase.
- **Balance sounds and add final sounds.** - When we issued the playtest version, sounds were not perfectly balanced and not all the final audio was added. Since then we have received the final audio assets and integrated them into the game. Also sound levels have been adjusted throughout to make sure nothing was too loud or annoying to hear (or impossible to hear).



- **Hardened shields are overpowered.** - The hardened shields upgrade is an overpowered upgrade that makes all dogfighters do 0 damage to the player. Since this is the most frequent enemy type, this makes most waves of enemies completely pointless. As such, this upgrade has received a serious nerf and only does a reduction of damage.
- **Player ship does not indicate when it takes damage.** - The player ship, when taking damage, simply takes the damage and reflects that in the health bar. This is not enough player feedback for the damage, and a UI flash is added to signify damage taken. Also the player now flashes red just like enemies to show that damage has been taken.
- **Radar still exists when unpowered.** - It was weird that the player ship showed up on the radar when it was unpowered, so this has been since removed.
- **Set defaults on Unity exe.** - The Unity exe that held the game used to set the default speed of the game on “fastest”, which made the game incredibly pixelated. This has been changed to “fantastic” quality since. Also the default title of the game has been changed to “Conquest of the Verse”. The exe icon has also been changed.
- **Waves spawn too fast back to back.** - Players expressed fear and the sense of being overwhelmed when waves spawned too quickly back to back. As such there is an additional short pause added between each wave.
- **Fix up the UI to better direct the player.** - This is a general game-wide fix that was addressed in many areas. Examples of this include moving the purchase

button, making buttons look more like buttons, and adding additional instructions to different screens.

- **Dialogue occurs too often.** - The players sometimes got annoyed when a character would say the same line level after level, and the player got past level 20. Thus they heard the line 20 times. We reduced the frequency of lines possibly being said to help combat this issue.
- **Put the plot in the game.** - The players questioned where the plot to the game was. We have a plot, but it was never placed in the game. We will have an opening cinematic to show the plot of the game.
- **Fix bugs.** - There were two bugs present in the game. One was that sound settings didn't persist through the levels. The other was that healing at the end of levels didn't save. Both of these bugs have been fixed.
- **Character selection holds more meaning, with upgrades.** - A few people questioned the importance of selecting characters, wondering if there was any impact for their choices. If they weren't listening to the audio, they would feel very little impact from their choices. As such, each character now has a unique starting upgrade for selecting them. This makes these choices more impactful for the player.

# PART 6: Communication as an Artist

## 6.1. Introduction

The Interactive Media and Game Design (IMGD) program at Worcester Polytechnic Institute (WPI) is a place where technology and art converge. WPI encourages the artists, like other majors, to produce new and innovative work. In its purest form, creativity is an unrestrained flow of ideas exuded by an individual such as an artist. This work is considered divergent, impulsive, and even messy (DeFillippi, Grabher, & Jones). Yet the program is fundamentally based on putting artist in project groups with scientifically based engineers. These workers who often toil in opposing field are grouped together to compose art and technology. However, at WPI the number of artists is significantly lower than that of engineers, making them the minority group to adapt in the circumstances. They are also known to require a more fluid form of communication that challenges commonly held ideals about how to manage, organize, and create a productive group (Burger-Helmchen & Cohendet). Fortunately, part of Goals of WPI is the “fusing of academic inquiry with social needs”, yet the question of how do fundamental opposites provide a social structure to produce a video game is not well understood. At a university level, this information should be more commonplace for understanding group work and later for industry experience.

Large unknowns make up the communication of artists and that is an essential building block to working in the industry. The following study is in response to the knowledge gap in which I to answer the questions:

1. How frequently do artists converse while working?
2. What subjects do they converse about?
3. Who speaks to artists? And, why?
4. What forms of communication are used? And to what frequency?
5. How effective is the medium used?
6. How effective is the person communicating
7. How effective is the person receiving the information in understanding the medium?
8. How effective was the subject matter communicated?

These questions are in regards to an IMGD based MQP. Outcomes meant to be identified from this research include the group dynamics amongst game developers, optimal use of a medium, and the effective use of communication to and from the artists in a group. The findings from this educational study are designed to be adapted to working conditions in the video game industry and provide a knowledge base from which to establish further research. Though, the main aspect was to identify how students communicate and attempt to identify resolutions to specific issues.

## **6.2. Current Understanding of Artist Communication**

### **6.2.1. Artistic Work in the Games Industry**

The IMGD program is not different than the rest of the video game industry, since the process of creativity is not understood in the industry either. The main issue in understanding how to work with or work as an artist lies in understanding the artists themselves. Their individuality is what provides the knack for creativity. However, Ichak Adizes points out that unlike artistic creativity, games are made to be profitable. Between the not-for-profit artist and the profit-oriented businesses lies the issue in

having an innovative game. The same difference is found at the collegiate level between an artist and their technical peers. In solving this issue, the games industry has also complicated their understanding of artists by hiring more of them. Their reasoning is that games need new and adapting genres which require more creativity and in turn calls for more diverse teams and more artists. What is usually more problematic is directing the creativity of each artist towards the company's desired product. DeFillippi, Grabher, and Jones discuss this issue in their "Introduction to paradoxes of creativity: managerial and organizational challenges in the cultural economy". They delineate how normal managerial work does not motivate or effectively lead creative minds. Instead they work better with group interactions and failure toleration while the ability to generate new ideas requires team diversity and new hires. Though useful for innovation this work style, as DeFillippi, Grabher, and Jones point out, does not favor the normal management; usually consisting of proven team structures and job competition. This is the one area that the games industry has appeared to solve. DeFillippi, Grabher, and Jones found that video game studios use a hybrid form of governance that is different for management and artists. The fusion of social structures allows management to oversee a profitable project, while leaving the artists to constantly collaborate as if they were a single creative entity; therefore, requiring two styles of communication to be implemented. 1) From the management end, a standard communication system is provided that designates coordination of modules, deliverables, deadlines, budgets, and direct observation or follow-ups (Cohendet & Simon). 2) The other form of communication is the fluid interactions of artists that develop profits from the intellectual

capital, production, and organizational structure (Burger-Helmchen & Cohendet). This arrangement involves numerous communication techniques that artists and developers believe to be advantageous to game creation and believe to produce a finished and sometimes profitable product.

Game artists must be able to communicate with each other and other developers in an unrestrained capacity. Therefore, game studios are designed for people to meet and trade information throughout the building, at lunch, online, or during an outing together (Cohendet & Simon). Cohendet and Simon contend that the communication must accomplish two functions: 1) form a common cognitive architecture of the project and 2) a definition of the related standardized component interfaces. This means that each artist should be able to internalize the idea of the project and the adjunct creativity that the other artists will impose. The artists use this consensus to create components that fit into a singular ideal form. Unlike other industries, game studio employees communicate regularly with one another about their practice through informal spaces such as lunch areas, lounges, and other installations in the office. This setup allows for a functional exchange of communication at almost any time and allows artists to understand the direction and ideas of the studio as a whole. For the studio to function smoothly, this open play of communication is required (Dyer-Witthford, Pueter). However, record of the communication process during this intricate flow of ideas is scarce to non-existent (Cohendet & Simon).

Each year at WPI, students who are expected to work in the game industry are sent unprepared for the work environment that is eventually dealt with. Nor are the

students aware of the innovative structure that game studios impose. But understanding student interactions in MQP groups can provide a model for how other, possibly larger groups, should interact. The IMGD MQP is the closest simulation to working in professional world. Learning how the students communicate during this time during this time leads to better communication by understanding what techniques to follow or prevent. The interactions also identify which major, technical or artistic, pertains a lack or inability to communicate effectively to their team; ultimately, finding specificities to improve communication.

### **6.2.2. Tangential Area of Communication in Games**

Research on the process for which game employees communicate encompasses at least three areas:

- 1) The architectural layout of the building and the interactions it provides
- 2) The developers' similarity in cognitive domains or understanding of the project
- 3) The complexity of game creation and the integral teamwork required

These areas are not necessarily influential factors or the only contributors to communication, but they have been identified in the gaming industry as areas for research development.

The open communication of artists and developers across an entire office can be facilitated and altered by the layout of the building. Space, in this sense, is another part of the thought process that affects how an individual acts (Beyes & Stevart). For example, the installation of full-wall whiteboards in the Ubisoft Toronto studio is a direct way that the building directly affects communication (Quan). It is the available space

that permits actions and then interactions for the employees. In a game studio these spaces are not considered wasted flooring but areas for brainstorming and analysis. These areas provide a way to write or draw out visual explanations that are often helpful to artistic understanding. Spatial layouts like this can improve communication from and by artists to improve contiguous understanding of the projects.

Another distinguishing factor of the game industry is its employees. The interesting characteristic of game developers is that they are passionate people who are willing to focus on a specific domain of knowledge in conjunction with that of their fellow employees (Burger-Helmchen & Cohendet). They desire to be producers and co-producers of a product that others will adore. It drives them to work closely with the other department developers.

The affordances of such communication are obligatory for the game industry to combine diverse communities of specialists such as: script writers, game-designers, graphic artists in 2D and 3D, sound designers, and software programmers (Cohendet & Simon). Each department does a vastly different job that is part of the same goal. The necessity of communication and an open floor studio provides a horizontal hierarchy which helps with instantaneous feedback on any creative decisions. Team members can also combine problem solving skills by gathering in a room or around a single monitor (Cohendet & Simon). The combination of available techniques to discuss ideas can hone creative ingenuities into a game or develop into a new genre of games. The business strategy of horizontal communication is implemented in many game studios with the success of completion. Yet, the overall process is a complex web of unrecorded



information that businesses rely on to form a profitable game. With most studio environments the complexity of departments complicates this understanding immensely. However, a smaller group could provide a basic understanding for further study and allusion to a larger scale.

### **6.2.3. Artist Communication is Key**

As a practiced business model, a game studio is considered 'working anarchy' (Dyer-Withford, Pueter). The complexity allows for creative innovation in the industry but provides little trace of how or why the innovation came about. Eventually, the innovation should give way to an efficient process of invention that will determine future production styles (Tschang). For game companies, understanding the most effective way to produce new games should be a priority because it will provide a more rigid management that aids in profit-oriented work. Any procedural benefits would also preserve the creativity provided by the artists and developers. Up till now, the research into games has covered the work produced rather than what is produced around the work (Thompson, Jones, and Warhurst). Thompson, Jones, and Warhurst allude that we lack this information because past communication studies look into the effects and habits of video game production but does not evaluate the types of information game artisans discuss.

### 6.3. Methodology

Finding recommendations for artist communication during an MQP depends upon how they communicate, who they communicate to, and how effective their communication was. The first step is to observe a group production at WPI to find out how group collaboration takes place. Next, is the analysis and review of the collected information. Finally, a discourse about the communication validates optimal ways for artists to communicate. This procedure requires close observations of an artist during a game production on campus.

To better understand communication amongst game developers at WPI, I performed a content analysis on the communication habits during development. A content analysis described by Philip Weber (1990) covers different forms of communication, intentions of communication along with trends and behavioral factor in communication. The recording and analysis of communication is broadly covered in a content analysis making it well suited for an artist's communication in varying media. As Hoi Suen and Donald Ary describe in their book *Analyzing Quantitative Behavioral Observation Data* being a participant observer is the most used and recommended method for content analysis. Therefore, I dawn the role of participant alongside being an artist in a game production. My physical participation in the communicated activities provides reason for why and how interactions take place by giving me an insider's viewpoint. Suen and Ary also explain that the role is more time consuming and my personal involvement may incur validity issues. The game development I follow is a student project with a team of four developers, two technical developers and two art

developers one of which is myself. To best offset my bias as a participant observer I followed my intended observational techniques and analysis procedure to provide an objective way of recording and reviewing the data.

Since the recordings from a content analysis are heavily set in research bias, a coding system must be established to evaluate the information in an impartial manner. The coding helps categorize data for quantitative comparison. However, the study is an exploratory one so the categories are not defined. To resolve this, a set of interviews was conducted before the data analysis in efforts to find categories and relevant research topics.

The research began with an interview process with peers who have or are currently going through a game production process. The participants in these interviews are college seniors chosen based on their availability. Their projects are spread across a full school year at WPI and the project groups often collaborate before the school year begins. At the beginning of the second semester, halfway through the school year, I asked artists and tech students from other groups about their communication efforts. Their information guided my decisions on what data is relevant to record and how to code the data for analysis.

Since this project requires a self-researching process, I followed the basic steps of Donna Carlon and Alexis Downs's, "Communication, Collaboration And The Human Organization Known As The Teamsters." Their procedure begins with the previously obtained documents showing there was no research bias when they were created. Then they began looking for patterns to unitize the documents. They continued to look for

repetition in each document and any record new patterns. The procedure is reliable based on the removal of the researcher from data collection and that researchers had no preconceived annotations of the data. The encoding of personal recording into representable data is included for reliability and replication in this study.

**6.3.1. Data Collection**

The study is separated into three steps to ensure strong analytical base. The first part is peer interviews and the second part consists of content collection and observational data. The interviews were evaluated before the content and observation data. Content and observation took place during the content analysis and was reviewed afterward. The reasoning and difference between the parts are described in Table

6.3.1.1:

1) Peer and Professional Interviews	Collect information from peers and professional counterparts in order to reflect on their communication. Their information clarifies topics and issues that alter from student to worker.
2) Content Collection	Recordable data from communication events amongst group members and myself is collected. The focus of the data collection may shift based on information from the interview procedure.
3) Observational data	Other data such as verbal, unrecorded interactions or attitudinal information is collected. This is in conjunction to the physical or unbiased content collection.

**Table 6.3.1.1:** Outline of Study Procedure

**6.3.1.1. Interviews**

The biggest issue in researching is to understand the field and interpolating that data upon a student’s work environment. In this case, Berg & Lune would recommend

an unstandardized interview process when meeting with peers in order to gain insight into the communication habits and structures that are already established. From their work, I can understand the significance of communication during game production and how to better it in future endeavors.

The interviews are meant to judge the different types of communication during game development and their effectiveness during the production process. I have broken the topic into three sub-topics for questioning purposes:

- 1) Communication: general use and understanding
- 2) Communication with workers and the working community: co-workers, advisors, etc.
- 3) Communication change based on individual's job and personality: the interviewee's use of communication

Under the three sub-topics, I have devised standard questions to progress the open ended question toward more specific answers. My understanding for an interview progression comes from Steinar Kvale's "InterViews: An Introduction to Qualitative Research Writing" that has nine types of questions based upon the timing and relevancy of an answer. Each type is designed to maintain concentration and free speaking for the interviewee. Many of the questions were prepared in order to direct the interview to around the desired topics. The exception for some steps is that they do not use prepared questions in attempt to open the interviewee's answers. The nine questions types are listed below, Table 6.3.1.1.1:

A	Introducing questions:	Ice-breaking questions to start the topic and allow free speak
B	Follow-up questions:	Main questions or continuations of introductory questions
C	Probing questions:	Very open ended questions to elaborate and broaden topics
D	Specifying questions:	Specialized questions usually to elaborate on specific ideas
E	Direct questions:	Shorter answer questions to relieve the speaker
F	Indirect questions:	Questions to prod emotional responses
G	Structuring questions:	Questions to redirect or change toward a main topics
H	Silence:	Time for interviewee to think or discuss anything
I	Interpreting questions:	Clarification questions for the interviewer

**Table 6.3.1.1.1: Nine Types of Interview Questions**

The nine types of questions are sequentially linked and provide a structure to progress each sub-topic. Below are the prepared questions in order by sub-topic and progression during an interview. Other introductory questions such as, “Could you tell me about your game?” and “What is your role in the game?” are not necessarily part of the topic but are used to elicit background information of for the interview. In the table below (next page) the interview questions (center) are categorized by their topic (left) and the question type for reference during an interview (right):

Topic	Questions	Question Type
Introductions	Could you tell me about your game?	A
	What is your role in the game?	A
Communication	When and for what reasons do you communicate?	A/B
	What forms of communication do you use?	B
	What has limited your communication abilities?	C
	If you were to begin it again, are there any changes you would make in your communication?	D
	What kind of technologies or equipment would you want to improve your communication?	D
	Tell us about previous project in which you've been involved that was successful and one which was not because of communication. Why do you think these were the outcomes?	F
	Realistically, what would you do to better later communications?	G
Communication with workers and the working community	How does your communication change when you address artists, engineers, advisors, and others?	B
	How does your team communicate to you?	B/C
	What issues are there when someone communicates to you?	C
	What would you change with your team's communication?	F
	Who else do you communicate with? How do you reach them?	G/B
Communication change based	How do you plan your communications?	B

on individual's job and personality	How could you improve them or work around them?	B/C
	What your communicative strengths? Why?	D
	What are your communicative weaknesses?	D
	Do you communicate differently for different subjects? Why, please recall any events?	F
	What do you need to carry out your communication? And why is so essential?	I
Other	What do you mean by that? Could you elaborate?	D

**Table 6.3.1.1.2:** Interview Questions in Order of Timing

**6.3.1.2. Collecting Data and Observational Analysis**

The observations as a participant observer took place during a one week period of a 7 week production. I have chosen week 4 to record information and to provide time to finish the evaluations from the interviews. I collected information on any form of communication between me, a co-worker, an advisor, or another contact. Data from this time, in conjunction with the interviews, offers enough information to fill the time constraints of the study.

The process to collect the data to is done according to Ole Holsti and Krippendorff's questions of communication. In these regards the data should answer: Who said it? How (the medium used)? Where was it? Why was it communicated? What was its content? and what was its Effect? These questions provide a basis for data collection and later analysis. In this section the How, Who, and Context consists of concrete data recorded during the moment. The Why, Content, and Effect are analytical questions for after the initial conversation. The separation provides two areas of data



the Content Collection and the Observational Data. In research process, content information and artifacts are collected first then my observations or humanized connection to that data is given.

### **6.3.1.2.1. Content Collection**

#### **6.3.1.2.1.1. How/Medium:**

Records of verbal or textual communications are essential since the development team is based on communication in many respects. They were considered a discourse community and the broad categories that determine their elements of communications are thusly (Laberge):

- A broadly agreed upon set of public goals
- Mechanisms for intercommunication
- Participatory mechanisms for feedback;
- The use and possession of one or more mediums
- Specific lexis or jargon
- A level of education around a relevant topic

These categories along with Weber's sender, receiver, and message provide a thorough record of textual conversation. Still, pictorial images may require more information to grasp it's usage in a studio of artists.

Philip Bell (2001) demonstrated that the duration of time needed to understand an image is an underused statistics from conversation, as well as the amount of time it takes from the whole conversation. Both statistics help understand the importance and level of use an image has in a conversation. Since conversations are among people who commonly use images in discourse, the statistics are of more significance.

A record of each communication throughout the development process came from multiple mediums and at any time. Therefore all text, pictorial, and verbal communication are all relevant mediums. Textual forms include: emails, memos, and messaging devices written or electronic. Pictorial forms required copies for digital works and saved as images, videos, or PowerPoints. Non-digital images required photographs and scans of the images or gestures used for communication. For verbal messages I have taken the idea of keeping written records or short hands, also known as minutes. Since employees in the field are known for discussions at any time, audio recordings is not available or reliable for all instances of conversation. This decision is for both scheduled and impromptu discussions during development and should conform better to time constraints and short discourses that may occur during non-work times.

#### **6.3.1.2.1.2. Who:**

Recording the “who” and the “to who” is a much simpler task for a small development team like mine. Each developer holds many roles since there are only two art concentrated developers and only two technical developers. As an artist, my communication is only expected to occur in these fashions:

- Art to art
- Art from art
- Art to technical
- Technical to art

Due to the singularity of work, interdepartmental communication that may occur in a game studio cannot be studied in this experiment.

#### **6.3.1.2.1.3. Context:**

The context of communication is based primarily on the locations and time it occurred. The area and proximity of the participants in a discourse are part of the context, as well as the time and the progress of their work. For this experiment, the locations of each conversation are not predetermined because this study is meant to recognize and understand all aspects of conversation during development. Therefore, developers determined the context to simulate working interactions that occur moment to moment. The effects of these locations are a variable that needs more review during data analysis. For data collection, the time, progress in development, and the location are elements of context.

#### **6.3.1.2.2. Observation Analysis**

The last three questions from Krippendorff are related to the content and meaning of communication: what was the Content, what was its Effect, and Why (was it communicated). Steps 2-7 encompass these questions and provide a comprehensive way to code the data and compare it to workspace practices amongst students. Additionally, the coding sheet and procedural evaluation limits researcher bias from the analysis process. The final outcome should provide quantitative comparison for communication techniques and their effectiveness during a game's development.

#### **6.3.1.2.2.1. Content:**

According to Cohendet and Simon communication should provide 2 main functions in a game studio. Communications should so orientation toward 1) a common cognitive architecture, and/or 2) a definition for related standardized component interfaces. The first component is similar to a hive-mind in a workplace. The second component references the creative freedom developers are given with an exception that it must fit with work of the other developers.

#### **6.3.1.2.2.2. Effect:**

The effect of an unplanned conversation is information that cannot be predetermined. Records of the speaker, the listener, and the message provide data to retell the conversation and its possible effects on the participants.

An aspect that could have a possible effect on the participants is their proximity during conversation. The location of the conversation may facilitate the discourse based on Beyes and Stevart's spatio-ontology. Using the context of the conversation and evaluating the record of discourse, it was determined if the:

- Space encouraged the conversation,
- Space detracted from the conversation
- Proximity affected the communication when solving issue (Cohendet & Simon)
- Nearness and response time improved the ability to answer
- Distance help or hinder the discourse

The difference between informal and formal conversations could also be analyzed but is beyond the frame of this research. But as an exploratory study, its records could leave the benchmark for differentiating later research.

#### **6.3.1.2.2.3. Why:**

The 'Why' analysis is to determine the intent of the conversation before it took place. Knowing why it started can help determine if the conversation met its goal and how efficient it was. We know each communication could be broken down between: art to art, art from art, art to technical, technical to art. From there we can determine:

- If the goal was met
- Could it be done more efficiently, and how?
  - Is that based on inter- or intra departmental factors
  - If it was efficient then what made it so?
- Do the art and technical departments converse differently?

To answer these questions objectively, the conversations would need to be unitized and coded into comparable segments.

In game development, it is also known that workers start conversations based on their enjoyment to produce game for others (Burger-Helmchen & Cohendet). This information provides an affective reasoning to efficiency of conversations within a game studio.

- Did the conversation begin based on emotions to, and was about
- Accomplishing the project for an audience
- To improve an aspect based on self-creativity

#### **6.3.1.2.3. Recording Data**

In addition to How, Who, and Context, Robert Weber's three parts of communication should be specified: the sender of the message, the receiver of the message, and the message itself. These three aspects are informative for pictorial and textual messages making them key components to record. The recorded information

followed an example format from Bruce Berg & Howard Lune (2004) with the adaptation of key questions previously mentioned. The following layout demonstrates the desired information and questions to be answered from communication events (next page):

Where Context	Date: Time Start Time End: Location: Relevant media devices nearby:
Who The Sender and Receiver	Speaker/Initiator (if attributable): Participants: (art to art) (art from art) (art to technical) (technical to art) (other)
What/Content Message	Transaction of events: - -
How	Broadly agreed upon set of public goals:  Mechanisms for intercommunication:  Participatory mechanisms for feedback:  The use and possession of one or more mediums:  Specific lexis or jargon:  A level of education around a relevant topic:  Time used for pictorial images:  Relevant images (attach file or give location):
Why	The supposed purpose of the message: -
Effect Context	The reactions and changes from the event:  How did the space encouraged or detracted from the conversation:  Did proximity effect the communication:  Distance help or hinder the discourse

**Table 6.3.1.3.1:** Recording Sheet for Conversations

## **6.4. Data Analysis**

The rest of the procedure follows two common procedures used for content analysis. One is Krippendorff's methodology for content analysis which uses six steps. The last two require data analysis and connection to previous research. The other procedure from Hsiu-Fang Hsieh and Sarah Shannon uses a similar process; however, their last step encompasses all final analysis and the second to last step involves a double check of the coding process. I have combined both methods into one seven step procedure:

- 1) Design
- 2) Unitizing
- 3) Sampling
- 4) Coding
- 5) Justification
- 6) Drawing Inferences
- 7) Validation

Step one is involved with data collection, the other six provide a systematic approach to data analysis. My seven step process is a guideline for my content analysis. However, I begin this section with the interview evaluation as it is separate from the content analysis but relevant for its coding process.

### **6.4.1. Interview Evaluation**

The interview evaluations assisted in creating a usable understanding for the content analysis. Separating the answers based upon general communication, communication differences amongst the working community, and the individual's adaptation to communication helped categorize events during my analysis. Evaluations



involving general communications relates to the medium and context of an event.

Different communication habits among workers displayed changes based on who is involved. The individual's use of communication needed to be compared to the habits of others. The extracted understanding of each element provided a means to categorize and properly code the observational data.

The information is coded and compared to the initial coding sheet described in the next section. Differences in elaboration of a topic or its importance to the study are updated to analyze the content and observations. The overall interview process is similar to the first two steps Unitizing and Sampling because it provides data to test for usefulness.

#### **6.4.2. Step Two: Unitizing**

After the data is collected, it must be analyzed and coded in reference to its use in video game production. I previously established a record sheet for communications and developed a more detailed and simplified sheet for encoding. This step is useful for the interview evaluation and the sampling of the content data in to ensure the all the coded produces useful information.

The initial questions are as follows:

<b>Reference #:</b>	<b>Date</b>
<b>Time of Day:</b>	
<b>Duration of conversation:</b>	
<b>Location:</b>	
<b>Relevant media available:</b>	
<b>(Verbal) (White Board) (Physical)</b>	<b>(Paper (Illustration) (Writing)</b>
<b>(Pictorial)</b>	
<b>(Email) (IM) (Text)</b>	<b>(Electronic (Illustration) (Writing))</b>
<b>Relevant media used:</b>	
<b>(Verbal) (White Board) (Physical)</b>	<b>(Paper (Illustration) (Writing)</b>

**(Pictorial)**  
**(Email) (IM) (Text) (Electronic (Illustration) (Writing)**  
**(Pictorial)**  
**Speaker/Initiator:**  
**Participants:**  
**Relation of Speaker/Receiver:**  
**(art to art) (art from art) (art to technical) (technical to art) (other to )**  
**Participatory mechanisms for feedback (how was feedback given):**  
**(Verbal) (White Board) (Physical) (Paper (Illustration) (Writing)**  
**(Pictorial)**  
**(Email) (IM) (Text) (Electronic (Illustration) (Writing))**  
**Use of one or more mediums: Y / N**  
**Specific lexis or jargon: Y / N**  
**If yes, what specifically:**  
**Time used for pictorial images (in minutes):**  
**(1) (2-3) (4-7) (8-15) (15+)**  
**Number of images used:**  
**(1) (2) (3) (4) (5) (6) (7) (8) (9)**  
**Image(s) (attach file location or copy):**

**What was the original conversation about?**  
**(Visual art assets) (Technical gameplay) (Scheduling) (Gameplay) (Storyline)**  
**(Audio Assets) (Advisors) (Documents writing) (Personally related) (Weather)**  
**(Developments issues) (Art pipeline issues) (Good news) (Program related)**  
**What where its intentions?**  
**Did the conversation lead to its intentions: Y/ N**  
**Reactions to the event lead to:**  
**(More conversation) (Link to future conversation)**  
**(Ending based on confusion) (Ending based on understanding)**  
**Reference # if applicable:**  
**Does this conversation meet one or more of these goals:**  
**Create/Maintain a common understanding or desire for the production**  
**Define a component(s) for use in the same**  
**No**  
**Did the space encourage conversation: Y/N**  
**Did the space detract from the conversation: Y/N**  
**Did the (nearness)/(distances) effect communication: Y/N**  
**(Speed) (Content) (Reliability) (Usefulness) (Medium) (Delivery)**  
**Did the this proximity (Help)/(Hinder)/(N/A) the discourse**

**Figure 6.4.2.1: Coding Sheet for Recorded Conversations**

### **6.4.3. Step Three: Sampling**

From the initial coding sheet I attempted to codify 3 communication events from my observations. The coded data should help determine that the coding process yields information regarding:

- Its effectiveness from
  - The medium used
  - The person communicating
  - The person receiving
  - The subject in attention
- The frequency of forms used
- The frequency conversations are held
  - And about what subjects

The initial interviews provided information to help the direct the findings from the coding sheet and categorization of the data. Additional changes were made during this step along with iterations to check those changes. The final coding sheet breaks down each element of any conversation and to be easily teachable to another individual in preparation for the Justification step. Afterward the data can produce informative outcomes, the process can continue to coding and justification.

### **6.4.4. Step Four: Coding**

Each conversation or communication event that was recorded, scanned, or emailed needs to be broken down by the developed coding system. The coding provided a way to rate and rank conversations in a non-bias fashion. The previous steps were made to remove researcher bias and produce qualitative data for comparison. The

final information collected from coding sheets was better understood after going through earlier steps and interviews.

#### **6.4.5. Step Five: Justification**

For reliability purposes the coding should be done a second time by a non-researcher judge (Kolbe & Burnett). This step requires training and measuring for the second judge to become acclimated to the coding system. A sample conversation or single recording should be coded by both researcher and judge to ensure consistency. In this study, the questions were straight forward making the outcomes fairly consistent. This step is a reliability check and any discrepancies in coding was resolved between the coders. When a discrepancy it was reevaluated in the other conversations that held similar content. After all the data was categorized, we began steps 6 and 7.

#### **6.4.6. Step 6 and 7: Drawing Inferences and Validation**

These steps connect the observed communications in relation to the current understanding. Drawing inferences is the inherent findings from the data. These findings are validated through discussions in section 6.5 with relation to other projects and research studies. As this was an exploratory study, not all of the findings answer the questions that were summarized at the start, making them topics for further research. Overall the latter sections are a discussion of the findings, their correlation to other studies, their gaps for further study, and suggestions for project communication techniques.

## 6.5. Findings

These initial eight questions were proposed to provide direction in understanding the communication habits of artists during game development:

1. How frequently do artists converse while working?
2. What subjects do they converse about?
3. Who speaks to artists? And, why?
4. What forms of communication are used? And to what frequency?
5. How effective is the medium used?
6. How effective is the person communicating
7. How effective is the person receiving the information in understanding the medium?
8. How effective was the subject matter communicated?

Although the questions helped define the study, the answers provided a broader understanding of communication habits of game developers. The findings from the questions and the study are presented in the order of:

- I. Peer interviews
- II. Observational data
- III. Professional interviews
- IV. General Analysis

The general information that was obtained is discussed in these sections. I conclude with a final analysis of this information done in relation to the original eight questions. My recommendations for communication and further studies are provided in the conclusions section.

### 6.5.1. Using Student Interviews to Understand Communication

The data collection began with interviews with peers to reflect on the communication of their teams. My interview questions received particular answers to 1) why they communicated, 2) their forms of communication, 3) how they improve

communication. The interview questions instigated reflection and personal inspection on their team dynamics. Therefore, many responses were directed toward completion of the final project. There was no discussion about using the communication tools for socialization or outer contact with the team.

The interviews were with one artist, Suzanne DelPrete, and one technical student, Samuel Machlin, from different MQP teams. Their responses overlapped in most questions regarding why and how they communicated. Their variations in experiences were helpful in finding solutions to different and similar problems. Mainly the situations involve more frequent communication or more reliable methods of reaching an individual. Overall, the MQP teams that the interviewees were in provided struggles and successes that rounded out their experiences in group communication.

#### **6.5.1.1. Why They Communicated**

The team communication relied mainly on, as Machlin put it, “Doing the right thing” and getting the tasks done on schedule and conveying necessary ideas to the team. The communication often revolved around scheduling, specifically:

- I. Setting up meetings
- II. Informing team about updates
- III. Checking on the progress of others

Other communication subjects were used to clarify ideas and understand the perspective of the other team members. These communications vary in frequency compared to scheduling activities depending on the timeline of the project. They can be broken into these categories:

- I. Conveying changes in design
- II. Discussing game elements to ensure a singularity of ideas
- III. Reviewing others' work to confirm it is on target with design

Cohendet and Simon believe that creative communication has only two goals: 1) Form a common cognitive architecture of the project and 2) Define standardized components for the project (595). For MQPs the clarification of ideas and understanding each other's perspective accomplishes those goals. However, scheduling and setting up meetings arguably meets those goals. The communications are indirect because they are necessary in finding a meeting time to discuss the project. But the information during those conversations may not discuss specific information about the project. Although the answer is open for debate, my discretion leads me to believe that scheduling is required to set up a meeting, therefore bringing the team together and forming a common cognitive architecture.

#### **6.5.1.2. Forms of Communication**

Each MQP student used texting and email to contact other members and the interviewed students noticed a difference in their communication when reaching different developers. The change in medium was often due to what needed to be said and how urgent the matter is to communicate. Beyond the medium, the students found that their conversations went differently depending on who they spoke with. The students determined that most of the variations are based on the subject of the information and with who they are speaking.

Both teams used texting and email as constant sources to maintain conversations with their group. Although these mediums were useful they also had many drawbacks. Texting for instance was highly important for urgent matters but ran into issues with reception around campus. Email unlike texting was used for less imperative information and was expected to be seen after some delay. The pros and cons of texts and email are laid out in Tables 6.5.1.2.1 and 6.5.1.2.2.

Texting	
Pros	Cons
Easy to send Provides quick responses Allows responses while in a mobile state	Avoids using phone to call; rather sets up meeting Dead zone in computer labs Phones die May not be checked as frequently as expected

**Table 6.5.1.2.1: Pros & Cons of Texting**

Email	
Pros	Cons
Messages could reach multiple people Usable to discuss more topics or contain more information	Information is less important Expect a slow response

**Table 6.5.1.2.2: Pros & Cons of Email**

In addition to the cons presented for texting and email, there were several other issues that occurred no matter what the medium. One problem is that ideas came across wrong through a written message. When the idea is not clarified both parties to take away different understandings while believing they are on the same page. This happened a lot for DelPrete’s team and was not realized quickly because neither end



had reason to suspect that there could be multiple ways to interpret the message. A second was losing contact for stretches of time such as weekends, vacations or even during class time. Teammates were noticed to check their messages less often during those times. The gap in response times are detrimental to the usefulness of texting and ruin its reliability as a mechanism for fast responses. Human error is the main cause for these issues.

Both teams found issues and benefits for every electronic medium they used, but their communication from face-to-face never aroused any problems in understanding or contact. However, meeting face-to-face was a struggle because of varying schedules and contacting each member in time.

#### **6.5.1.3. Communication between Developers**

Between DelPrete's and Machlin's teams, there were three significant differences when communicating to a developer from another discipline. They distinctly know that their conversations to other disciplines were different than within their discipline; which may stem from their lack of familiarity in the other subject.

DelPrete's team found little need to have immediate contact with other departments. When she contacted the technical team it was through email. This caused some confusion because of misunderstood emails but never enough to change their mode of contact. DelPrete pointed out that her contact with the other artist was done almost entirely through texting. This is interesting since both MQPs labelled texting as a

more urgent form of communicating. This insinuates either a stronger bond was formed as artists, or the messages held more importance to her work.

The students noticed a difference in length of conversation while talking to other disciplines. Machlin especially noticed if he knew and was speaking to person in his department he was more likely to discuss the topic at its length. This seemed common for both technical and artistic developers because they wanted their department to know their thought process and they had confidence that their ideas were understood.

However the opposite is true when speaking about lesser known topics. Machlin recalls speaking more generically to artists because he was unsure if his thought process was followed or if his ideas were feasible to them. DelPrete recognized that her interdepartmental communication was also shorter because she felt unknowledgeable and therefore uncomfortable when speaking about certain elements of the game. Overall, the students felt uncomfortable speaking with the other departments which never got resolved because the conversations ended quickly.

Machlin also determined that when speaking outside of one's discipline it is expected that the other person corrects any incorrect information. This is a system that Machlin follows but insinuates that the rest of his team may not do that. Although the approach is useful, it may not have caught on for two reasons: 1) It was not explicitly stated as a guideline for conversation 2) The responding person may view the response as belittling to the person's knowledge. If both disciplines followed the guideline it could allow for richer conversation and the understanding of concepts outside of people's familiarity.

#### **6.5.1.4. How to Improve Communication**

Both students provided suggestions on how to fix or prevent communication from being the issue. Some of their responses came from work experiences outside of school but, nevertheless, are beneficial to know.

Meeting frequently and on a regular basis are simple preventative steps for good communication. If habits degrade, one of the strongest moves is appointing a person to ensure communication and relationships are fixed. Machlin suggested positioning people to manage communication based on work at an internship. His team was significantly larger than his MQP but the extra step helped stabilize problems and provided a single point of reference when communicating to a whole other department. No matter what the project, communicating more often would have been helpful. Setting regular meetings provided times for everyone to converse without impedances from technology.

For DelPrete and Machlin, these improvements are directed to certain problems that arose. They proposed four ways to improve communication. Below are their suggestions and why they were implemented.

- I. Communicate more frequently
  - a. Keeps people on task
  - b. Finds issues to be attended to before they become setbacks

Machlin believes that more frequent communication would have discovered the weak link in his group before it began effecting their production. The trouble group member was not known by the team and kept to themselves. His relationship was not the problem but since communication was never made to that person, the team did not

realize how far behind he was in development. That group member was subsequently dropped. Machlin believes that more frequent communication may have caught and resolved the problem earlier.

## II. Communicate on a regular basis

- a. Helps teams that cannot organize for impromptu meetings.
- b. Forces both sides to plan ahead of time to figure out what is important to talk about and what could be important later on

DelPrete's team had poor contact outside of group meetings because of fickle responses to electronic media, often causing one or members not to know about meeting times. By setting up a regular meeting schedule, DelPrete believes that their impromptu meetings would not have been needed and the hassle would not have existed.

Machlin also found use of regular meetings during an internship in order to communicate to overseas departments. Normal messages through email or phone was attributed with long delays because of time differences in work schedules. Some questions become unnecessary after a period of time thereby making the message an inefficient use of time. Machlin found that communication become more settled when weekly meetings were setup. During meetings, the questions were arranged and answered all at once. Later on, members began asking questions about events in the upcoming week in order to have the answer before the next meeting. Overall it made communication more organized and efficient.

## III. Use a middle man

- a. Removes the ability to target or blame another worker
- b. Ideas are anonymous; preventing rejection based on the speaker
- c. Forces both sides to explain issues well enough to be retold

During Machlin's internship he noticed a middle man was used when different sectors of the project needed to interact. Often the person just relayed the question or answer from one sector to another. This person was given the position because the two sectors did not understand each other and they would target their grievances to specific people. The middle man, as Machlin noted, provided a barrier between people and required answers to be answered well enough to be relayed through a third party. Hunter et al describes this scenario from a management point of view when studying leadership styles in creative industries (56). Appointing a leadership position to resolve the tension is effective but requires a sustained commitment. In a student project, the team might not have the resources for that position, however, innovative companies sometimes require an extra person to settle creative differences.

#### IV. Appointing managerial positions

- a. Supervises production and controls issues
- b. Instantiates preventative measures for communication as a third party
- c. Stays in contact with each member to stop overbearing co-workers
- d. Enforces schedules or updates to tracking devices like blogs or journal updates
- e. Provides workers with consistent updates for the rest of the team

After multiple issues with his team and communication, Machlin has found that a managerial position has helped realign tasks. This type of position is similar to a middle man in that they attempt to prevent conflicts. They do this by providing a log of what has been accomplished; this can be a physical, electronic, or verbally through the manager. The log is used to inform team members of progress without facing them individually. Having less work communication among the team should lower possible feelings of aggression and the manager's constant communication suffices for most messages.

Just as Machlin's team uses a managerial position to organize work, creative industries use similar position for the same reasons. In "Organizational Paradoxes: Dynamic shifting and integrative management", James Bloodgood and Bongsug Chae review the balance of a creativity and channeling it into a project. Their guidelines found creativity is best when individuals work alone but a leader or manager should direct the individual talent toward the project goals (88).

### **6.5.2. Use of Our Team Communication**

During 6 days of project development, 55 conversations to and from artists on our team were recorded. Both verbal and electronic messages were coded and reviewed in order to understand the communication habits of our MQP team. The data shows many differences for internal and external communications with departments, and that our conversations extended to topics outside of work. Our conversations about non-work topics display evidence for being both a benefit and a hindrance to working. However, the difference in our work habits is important to note because our project was concentrated into a 7 week period.

#### **6.5.2.1. Art to Art**

The team that made up our art department consisted of two people. Though it is a small team, it provided a close bond and easy management of the department. Having only two people easily allowed the transfer of ideas and artistic style for the game. Many of the conversations were initiated while sitting side-by-side in a computer

lab. The noticeable differences in conversation are listed in Table 6.5.2.1. Data for these findings are in Table 6.5.2.2 and all research data is found in Appendix G.

**Art to Art Communication Habits**

- Nearly all topics related to art style and contributions to the game
- At least one image is always referenced during these meeting
- All conversations were face-to-face and in front of computers

**Table 6.5.2.1.1: Art to Art Communication Habits**

Art to Art Data				
Topics	Images Used	Length (minutes)	Face To Face	Total Events
Availability	0	2	1	1
Goal Setting	10	14	8	8
Update	0	1	1	1
Totals	10	17	10	10

**Table 6.5.2.1.1: Art to Art Communication Data**

Our smaller team made cohesion easy, but expanding the same bond to a larger team on a more diverse game seems immeasurably harder. We were able to guide each other with short conversations less than 2 minutes long. For a larger team, more formal meeting would be required to suffice that guidance across the group. Our project unfortunately did not solidify a design to start so our individual influences were more accepted into the game. However, bigger teams mean bigger influences which could disrupt the game’s style; in a bigger team, these production changes would need more consistent monitoring.

### **6.5.2.2. Art to Tech**

When the artists spoke to the technical developers it involved two topics: 1) getting art into game, and 2) scheduling what assets should be worked on next. Production and implementation of art was the main priority. Artists and technical developers wanted to make sure the art looked correct and acted as expected. Our scheduling of art assets was very rare but helped both departments choose what to work on next.

Since our team used GitHub for file sharing and version control, the technical team was updated on asset completion when it was uploaded. The artists' discussions with the technical team could then focus on implementation of assets in accordance to design.

Our communication about asset scheduling was beneficial for both departments. It helped determine what assets are required next and our close proximity made topics like this very quick. Interviews with other students determined that longer term MQPs spent time to set up meetings in order to discuss those changes. Our simplified scheduling made saved time compared to other MQP teams. Conversely, interruption from the artistic developers on the technical work is unknown. The collected data provides no efficiency rating for the short meetings initiated by artists. A designated time for quick conversations may actually be more efficient for planning work, though further research would have to be done.

Other differences in Art/Tech Mediation are the time spent on conversations and the use of jargon. In Table 6.5.2.2, the distribution of time is over 4 minutes a



conversation; twice as long as the art to art conversation. The category Problem uses 14 of the 29 total minutes for a single conversation. Therefore Problem category is an outlier of the data. Without the outlier, each conversation averages 2.5 minutes which is fairly close to the time spent on art to art conversation.

Art to Tech Data			
Topics	Length (minutes)	Jargon used	Total Events
Art/Tech Mediation	12	2	4
Problem	14	1	1
Update	3	0	2
Totals	29	10	7

**Table 6.5.2.2.1:** Art to Tech Communication Data

**6.5.2.3. Tech to Art**

The tech to art conversations were scattered in subjects; data in Table 6.5.2.3. The most notable category is Availability for the technical team could relay working and off hours to the art department. Other categories are Update to inform artists of technical progress; Problem to inform artists of setbacks in programming; Art/Tech Mediation which discussed developing around artistic desires, and Goal Setting to collaborate in choosing deadlines for game elements. For our project, the technical team rarely demanded art assets. Instead, they communicated to ensure their implementation of an asset matched artistic and design needs.

Tech to Art Data		
Topics	Length (minutes)	Total Events
Availability	4	4
Update	5	2
Problem	4	2
Art/Tech Mediation	1	1
Goal Setting	2	1
Totals	16	10

**Table 6.5.2.3.1:** Tech to Art Communication Data

For an artist to anticipate these conversation and possibly preemptively solve them is difficult because they could not be planned, were coding related, or were about the working habits of the technical developers. The few conversations regarding art implementation could possibly be prevented with the setup of a more descriptive design document. However, a solidified or unchanging design would be needed, and would have to be written with enough detail for the technical team to understand.

**6.5.2.4. Interdepartmental Meetings**

Our communication as a whole team involved discussion about development and scheduling of production. The conversations on development dealt with design, such as how characters move and what happens after certain events. Conversations involving scheduling usually informed the whole team when asset were ready or how we planned on presenting our progress to advisors. The subjects of these meetings are broken down in Table 6.5.2.4. The average length of the discussion is over 3 minutes. The

mediation for this outcome is that the topics called for more time to discuss or the increased number of participants required more time. A majority of the time was spent in Art/Tech Mediation because the team was reviewing the current game play in order to make sure all elements were being implemented correctly.

Interdepartmental Data			
Topics	Length (minutes)	Images used	Total Events
Availability	5	0	4
Update	6	0	3
Art/Tech Mediation	25	0	3
Goal Setting	8	2	3
Totals	44	2	13

**Table 6.5.2.4.1:** Interdepartmental Data

#### 6.5.2.5. Use of Online Communication

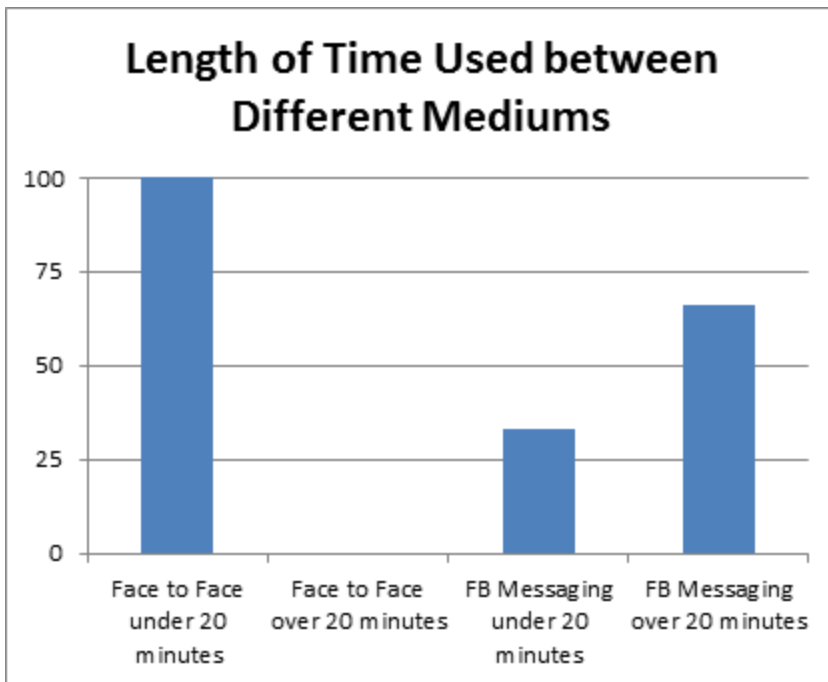
A major difference between our group dynamics and other MQPs is our use of Facebook Messenger. The instant messaging allowed us to keep in contact and the mobile app allowed us to respond anywhere. Other notable benefits are:

- I. Messaging similar to texting and multimedia messaging.
- II. Removal of data or network dependency: useful in the Fuller Sub Basement.
- III. Multiple points of contact: computers, smartphones, etc.
- IV. Provided “message received” notifications for each member.

These helped our team stay in contact and told us if each member had received the information.

Another bonus of using electronic text is that it kept topics relevant over an extended time periods. Unlike our face to face conversations that did not go over 20

minutes, the majority of our messaging conversations lasted longer than that, see Figure 6.5.2.5.1. The data in Table 6.5.2.5.2 shows that conversations could last for hours bringing the average just above 1.5 hours. However, some of the conversations extended overnight when workers were asleep which is understood as part of the medium and allows the conversation to extend into the next day. Extending the conversations gave people time to think through suggested ideas or questions. It became immensely helpful for Art/Tech Mediation when a design question was asked and allowed image sharing for added description. Overall, Facebook Messaging became helpful in deciding on or confirming design aspects.



**Figure 6.5.2.5.1:** Length Time Used between Different Mediums

Facebook Messenger Data			
Topics	Length (minutes)	Images used	Total Events
Availability	1163	2	5
Update	4	0	2
Art/Tech Mediation	461	3	5
Goal Setting	58	0	2
Information Retrieval	7	0	1
Totals	1693	5	15

**Table 6.5.2.5.2:** Facebook Messenger Data

**6.5.2.6. Personal and Social Conversation**

Out of the 55 recorded conversations, 5 present no value to the production process. However, they involve personal interactions and acts of social norms, such as saying hello or goodbye. Since these conversations held no production value as they are distractions for all members involved. Determining if these conversations are more than distractions requires a look at the changes they produced.

Unrelated conversations can bring the team closer together and help boost morale during work, but their use in the workplace is unclear. “Playing across the playground: paradoxes of knowledge creation in the video game firm” by Cohendet and Simon realized that open discussion about any topic could happen and that these conversations can happen outside of work (590). Yet, their understanding of conversations creating 1) a common cognitive architecture or 2) a definition for standardized components does not delineate conversations that are not about production (595). If the unrelated conversations must fall into a category, it cannot be in

(2) because they do not deal with definitions for asset creation. Finding a common cognitive architect, however, could have a broader definition related to personal connection or understandings of coworkers. Therefore, to be considered meaningful in a work environment each unrelated conversation must fit Cohendet and Simon's categories by having a social or personal interaction.

From the 5 conversations in question, 4 have direct social and personal interactions. Three of these conversations involved sharing a moment of joy in an attempt for their coworkers to find similar enjoyment. The fourth conversation was about an annoyance, the conversation followed into a discussion of how each person has attempted to avoid the situation. The fifth conversation was to resolve the confusion that a technical developer had about artistic tools. The conversation did not hold any personal details but provided general education of art for the technical developer; thereby creating a common understanding of each other's field. Each conversation established a greater understanding of the other workers in order to provide a better understanding of the team's personality.

Since there are few conversations and they have no definitive category other than unrelated, they provide very little significant data, more data in Table 6.5.2.6. The average time is under two minutes which is short but not the shortest. Most of the interactions were face to face and, surprisingly, the Facebook conversation was also very short compared to the average of that medium. Because of the trifling amount of quantifiable data, the best understanding of this category was through the breakdown of each conversation.

Unrelated Conversation Data			
People involved	Length (minutes)	Medium Used	Total Events
Art to Art	2	Face to face	1
Tech to Art	2	Face to face	1
Art to All	3	FB Messenger	1
Tech to All	2	Face to face	2
Totals	9	N/A	5

**Table 6.5.2.6.1:** Data from Unrelated Conversations

**6.5.2.7. Project Differences that Effect Conversations**

The scheduling of our project provided significant differences to our communication compared to other MQPs. Some changes, such as our proximity while working, were helpful while others, such as our shortened time period, were not. Table 6.5.2.6 displays a list of differences between our MQP and others that may affect the significance of the findings.

Differences between Our MQP and Others	
This MQP	Other MQPs
a) Finished in a 1 Term (7 week) period b) Had definitive working hours c) Worked in close group at adjacent computers d) Project was based on a personal idea e) Most communication was done face to face	a) To be completed in a 4 Term academic year b) Must work around other classes c) Work locations or times are dependent for individual d) Chose project from a list e) Communication is often done electronically

**Table 6.5.2.7.1:** Differences between Our MQP and Others

The comradery of our team seemed significantly good for the length of our project. It is unclear if the same level of comradery is experienced in other teams. Our

compressed schedule required hurried collaboration where other teams were able to spend months getting to know their partners. Also, our project was conceived by our team giving it a closer connection to us. Other teams may feel less engaged in their project if they chose to work on another person's idea. Either relationship could simulate the connection to a project in the industry from an Indie level to larger studio production.

Another show of personal bond is the ability to revel in the enjoyment of production. Although emotional conveyance is mostly speculative, the positive responses of our team seemed more apparent during the completion of game elements. A positive response to an individual's work most likely provided satisfaction and relief for those involved. Satisfaction would come from the good work and relief for getting through any struggles in development. Our team specifically found relief when the audio we outsourced was eventually received and implemented.

An unknown difference in communication is if other groups approached a similar level of equality in our communication. Since our group was small and each member was active in design, a horizontal communication structure was managed naturally. Dyer-Witherford and DePeuter found that this communication structure is common in creative industries, and Cohendet and Simon say it is very common in video game production (online journal)(558). However, our team is very small compared to some game productions and our design was intellectual shared throughout the team. Based on an uncooperative student in Machlin's MQP team, it seems that not every team member was worth conversing, placing an unintentionally hierarchy in their



communication. To know if structures like this common in other MQPs, more teams would need to be solicited.

### **6.5.3. Relating to Workers in the Industry**

To grasp a sense of communication in the industry, interviews were held with Greg Kinneman, a technical developer in the industry, and Beth Hankel, a lead character artist working for a startup company. Both workers provided different insight into communication habits and problems. There is a heavy use of electronic communication because of separated workspaces. Most of their issues comes from working in different regions in the U.S.A. or around the world; often limiting their ability to fix communication problems. Based on their interviews, communication habits are different than MQP students but their approach to communication is very similar.

#### **6.5.3.1. Forms of Communication**

Kinneman and Hankel were involved in two very different game companies. Most of Kinneman's communication occurred in an office environment where face to face conversations were available. Hankel's work contrasts in that her coworkers are spread across the country and are limited to electronic communication. However, both use similar means to contact other coworker or branches including emails, Skype conferences, and phone calls. Each medium of communication provides particular benefits. Table 6.5.3.1 lists the means of communication and its advantage for communication habits.

Mediums and Their Professional Uses	
Communication Tool	Advantage
Email	Allows for direct contact to an individual or group. Messages are often private
Telephone	Fast response; may rely on service area; difficult in other time zones
Skype	Free communication tool; connects multiple people; allows for screen sharing for art critiques
Face to face	Simple communication; participants understand each other better
JIRA	Project tracking software; provides 3 <sup>rd</sup> party management for team
Wrike	Project management software; allows visibility and collaboration of employees
Dropbox	Free; cloud storage and sharing software

**Table 6.5.3.1.1:** Mediums and Their Professional Uses

**6.5.3.2. Communication is Rarely the Sole Problem**

Both Kinneman and Hankel could point to issues in their communication habits, however, most of the issues could not be fixed through change in their communication. As Kinneman pointed out, “technology is an attempt to solve specific problems in communication”, yet the problems might be stemming from another issue. For example, some issues that were found are:

- i. Language and cultural barriers
- ii. Time zone differences
- iii. Lack of technical or artistic understanding
- iv. Lack of timeliness in responses
- v. Not paying enough attention during calls
- vi. Meeting too often
- vii. Not being in the same vicinity as coworker
- viii. Lack of positive feedback

Nearly all the issues stem from long distance communication. Language and cultural barriers are an example from Kinneman's projects that caused hold ups in approving certain designs because they did not conform to norms at an internationally based studio. There was a continued issue with the base since the language barrier prevented a full understanding of the cultural differences.

Another problem was dealing with time zones. Hankel's US based company has only a few zone differences, whereas Kinneman's team had to coordinate meetings with half a day time differences. These differences in time made contact harder to achieve and caused more issues when trying to get a response by a certain deadline. On an opposing end, Hankel's team had originally planned 3 meetings a week but the meetings ran out of substance and became boring. From these conversations Hankel noticed more miscommunication occurred because people had stopped paying attention to the topic.

A big problem that Hankel noticed as an artist is that most of the meetings are spent on project fixes or personal critiques so time for positive feedback is often left out. Just doing the work is problematic because the other developers are not given time to praise your good work, but they are supposed to figure out how it can be improved. Hankel feels that this one-way judgement subconsciously creates divides between coworkers since they only demean a person's work, never praise it.

Nevertheless, the mediums that Kinneman and Hankel use provide some benefit that the team finds essentially in their production; Table 6.5.3.1 lists those benefits. Cohendet, Patrick Llerena, and Simon found out that workers become highly

accustomed and dependent on these forms of communication. While analyzing Ubisoft Montreal, they found that employees revolted to the company's removal of communication and contact on mediums like forums (12). Removing these tools is almost always negative because, overtime, they become a crutch for the workers when they need help.

Most MQPs do not run into these issues because the teams live closer and do not deal with foreign teams. On campus MQPs may run into similar problems with distanced communication if they are helping a sponsor located elsewhere. If the team worked in a closer proximity much of their communication problems could be fixed. While reviewing her team's communication problems, Hankel pointed out that having an office where the whole team worked would remove a majority of their problems. The fact that our MQP was able to work side by side in a computer lab was highly beneficial for communication.

## **6.6. Conclusion of the Study**

The purpose of this study was to understand the communication that artists use while working in the game industry. Eight questions were proposed as areas that need more depth in order to understand that communication. The questions cover individual aspects such as communication to the artist, communication from the artists, and the topic of each conversation. The answers that were found are not straight forward because many studios work in small groups and this opens communication topics to everybody on the team.

The effectiveness of the communication is well summed up by Kinneman, “technology is an attempt to solve specific problems in communication.” Two points can be drawn from his statement:

1. Face to face conversations are optimal for most conversations
2. Using technology to make up for face to face communication has inevitable consequences

When using these points to evaluate the findings, the points are found to be more accurate. For instance, none of the interviewed candidates pointed out a problem with face to face communication; Hankel even said it would fix most of the company’s communication problems. Every communication issue stemmed from two areas: 1) the team’s different locations, languages, or understandings, 2) An incapability of the technology. Therefore, the effectiveness of the medium should not be based on its robustness of features but what features it has compared to what the team needs. The use of face to face conversation, however, is ultimately what is strived for in using technology. In a report on “Interpersonal and Inter-organizational Networks in the Performing Arts” Silvia R Sedita found closer proximity is a more efficient for working and increased the sense of community (499). Her findings sync with our understanding of face to face communication based on our project and the negative feelings that Hankel’s team associates with their distanced communication.

The purpose of the last set of questions was to determine if workers could only communicate effectively when speaking in their discipline and with another worker of that department. Since our MQP team was small and the departments produced little differentiation in topics, the better answer for this study seemed to be from the

interviewed personnel. Machlin described his conversations with artists to be short and he felt uncomfortable trying to explain his ideas in an artistic realm. Whereas, when he spoke to another technical developer he would discuss the information in as much detail as he could. Hankel is similar when she is critiquing because she finds the issues very quickly and is good at defining what needs to be changed. However, she finds it annoying when a coworker tries to discuss an unfamiliar topic with her. On another spectrum, Kinneman believes that specific people or disciplines of people are not responsible for conversational differences but rather that the combination of two people will naturally incur a difference. Whether that change is consistent for certain people is unclear and requires a more data points and preferably among a much larger team.

#### **6.6.1. How Student Communication Should Change**

One significant detail that Kinneman pointed out is that any fix to communication is in response to a specific problem. This was the case when Machlin and DePrete were asked about optimal communication strategies. They would suggest communications that would or had fixed their issues. Therefore no optimum communication style, although face to face provides the least amount of issues.

Inversely communication can become the issue if it occurs too often. Machlin and Hankel described how they become bored or even annoyed during lengthy conversations especially when they are unfamiliar with the topic. During Hankel's meetings she has also noticed that people will speak beyond the attention span of the listeners causing them to lose attention and miss the pertinent information. A similar

event happens if teams meet too frequently. Hankel's company had this issue and adjusted it because it took away from the significance of each meeting and not every meeting could provide useful information. Our project had begun to progress toward that problem but fixed the problem before the meetings began wasting work hours.

Often the installment of multiple meetings is to preempt any delays when communicating to teammates. For other the other MQPs this is not an issue since meeting up was very easy because of everyone's proximity to school. However, Machlin's experience with his team and during an internship showed that by limiting meetings workers had to think ahead by preparing both their past questions and questions that may arise later. For teams that cannot easily contact each other it is especially important to include questions that need answers before the next meeting. Other than balancing the number of meetings, this design could provide significant benefits for individual workflow and communication style.

Conversely, an overall issue in communication is laziness or irritability to communicate. Some people do not want to contact each other for personal or non-professional reasons. Those people avoid contact and consequently table questions that require immediate answers. Hankel and Machlin understand that a lack of motivation is often the problem. Since Hankel's studio provides little to no positive feedback she believes it affects the desire of artists to communicate to each other because they do not want to be critiqued again. DelPrete's MQP team used email in attempts to procure a middle ground so that contact was made but they knew the technology would delay the response.

One of the best communication strategies was implemented by Machlin's group because of the group dynamics. Again, this procedure is specific to their group because they have 3 technical developers and 1 artist. However, their procedure to check if a new element can be added to the game can be adapted to other teams. If a team member or designer has an idea to expand the game they have to:

1. Check with the technical developers about the capability
  - a. If the design is not feasible with the game or engine it is thrown out
2. Review with the artist to make sure there is time for asset creation
  - a. This step was crucial because they had limited artists
  - b. Talking to the artist was second as to not distract or confuse the artist about the design of the game
3. Determine if the end goal is worth the time
  - a. This is a group question and very opinionated

The original implementation may not work for every team. But the overall process was well thought out and provides a basis for other struggling teams to use.

A highly beneficial communication technique that our group used was texting application that ran on Wi-Fi. Our team specifically used Facebook Messenger and found its capabilities highly beneficial. Although these apps may not be suitable for professional work habits, it is useful on a college campus because:

- I. Wi-Fi is available near or in almost every building
- II. It can help avoid dead zones around often found in larger buildings or in labs
- III. Many provide "message seen" reports to update the sender who has seen and possibly decided not to answer
- IV. The same conversation is available on multiple devices (computer, phone, etc.)
- V. Does not require a data plan or contract to use



A significant difference to be aware of between our team work and many others was our capability for face to face discussion. Therefore our electronic communication may not be as crucial as other teams. Still it was an important tool that we used frequently for planning and project discussions.

### **6.6.2 Aiming for Good Communication**

Based on recommendations from student projects and professional work, the recommendations for good communication are separate for the number of people in the conversation. The levels of communication for these recommendations are:

- Full team: developers and advisors
- Interdepartmental: art, technical, design, etc.
- Intradepartmental: art to art, technical to technical, etc.

Large meetings between developers and advisors, or supervisors or sponsors, usually occur less frequently than other meetings. Many MQPs only meet once a week and discuss the progress and planning the team has done. This MQP originally met twice a week because of the short timeframe, but this was reduced to increase working hours. Hankel's team also had multiple meetings a week then narrowed it down to only one because each meeting began to hold little importance. Hankel found it to give more time for individual work. In that regard, meetings with the full team should be once a week, however a few extra meetings in the beginning may help get everyone on the same page.

For interdepartmental meetings the number of meetings a week is harder to balance. Small teams, like 4-6 person MQP teams, should meet at least once a week.

Machlin’s team scheduled group meetings twice a week but these meetings are often work sessions in a closer proximity. Their meetings are still beneficial since they can easily ask questions to other workers. These meetings should also be fixed so all members show up. DelPrete’s team did not schedule regular meetings which would have gotten around the poor communication between at and technical developers. Larger interdepartmental meeting may happen less frequently and be well planned. Like meetings with advisors or supervisors, these meetings should happen less frequently because of the time needed to cover all departments.

Intradepartmental meetings should be unregulated and, if necessary, be supplemented with electronic or phone conversations. Our MQP team used a combination of face to face and Facebook Messenger. DelPrete and her partner used texting if they were not working side by side. The companies that Hankel and Kinneman work for used a plethora of communication devices in order to communicate or update each other. In general, the least amount of complications are found in intradepartmental communication and that could be due to the unrestrained communication being used.

Group Communication Suggestions	
Communication Style	Frequency of Communication
Full Team	Regularly planned meetings; Once every week or two
Interdepartmental	Meetings that occur once or twice a week; Needs to be planned if regular contact is infrequent
Intradepartmental	Should occur frequently and at any time

**Table 6.6.2.1:** Group Communication Suggestions

These suggestions, recapped in Table 6.6.2.1, may vary with the size of the team, working proximity, and technical capabilities. Nevertheless, they were found to be useful communication techniques in several projects.

### **6.6.3 Closing**

Throughout this study many flaws in team dynamics were discussed and communication is certainly a large proponent, but it is only a single element of a team's system. Not every problem can be fixed by communication changes; individual capabilities, departmental pipelines, and project designs are also huge factors that came up during interviews. When trying to assess a team's problem it may help to communicate about the issue but resolving the real problem may require further action. Understanding those problems and how to possibly resolve them would require further study in each area of production.

This study was about understanding communication from an artist's perspective; however, communication is a bidirectional act which forced a larger discussion about all communication on a developer's level. It is also important to note that not every IMGD student goes into the video game industry. Each year graduates of the WPI IMGD program go into industries outside of their focus while a handful of them actually make it into game production. Some fields such as computer science and marketing may offer similar work and use similar styles of communication. But fields like business and sales use a different style of communication than developers. Therefore, studying or adjusting student communication habits for the game industry is not worth focusing as a skill in

college. Especially since game studios, like other creative industries, employ a drastically different communication style that IMGD students may never experience.

Communication in any industry is a huge factor and studying these habits will help discover paths for greater efficiency in the work place. If the communication in the gaming industry becomes well documented it could expect better means of communication and allow students working in projects, such as this one, to prepare their communication techniques as they go into the industry.

# PART 7: Post Mortem

## 7.1 Constant Communication

Communication became more important than normal when it was determined that a new project needed to be designed in November 2014. We began by holding weekly meetings to discuss project ideas and, later on, the design of our game. Outside of meetings we used Facebook messaging for internal group conversations and email for discussions with advisers.

During our winter break we continued contact through Facebook messaging in order to reach the entire team. Facebook messaging became our main medium because it was instantaneous and easily accessible on mobile and stationary devices. Facebook, in addition to being a way to communicate design updates, also became a system to notify other group members on personal progress or work habits such as starting late or having personal appointments. Our use of Facebook messaging provided numerous other benefits such as:

- Messaging similar to texting and multimedia messaging.
- Removal of data or network dependency: useful in the Fuller Sub Basement.
- Multiple points of contact: computers, smartphones, etc.
- Provided “message received” notifications for each member.

The majority of communication regarding design, scheduling, and feature implementation however, was accomplished face to face while working alongside one another in the lab each day. Email was also used but only as a source to reach

advisors; response times could take a day or longer depending on their schedules. We found email to be sluggish for intercommunication and highly recommend other means for group contact.

## **7.2 Problems with Audio Deadlines**

One of the biggest lessons we learned over the course of the project is to be wary of hiring outside help. Because of time constraints we hired a senior at Berkeley College to compose the game's music for us. Communication was difficult at times since he was off site; we sometimes went days without an update from him. Certainly, we realize that this (and the deadlines he missed), were primarily due to the fact that he did not have his entire class schedule dedicated to the project; anyone working in the game industry can be expected to respond promptly and deliver content on time. Even so, we all learned to be more wary of those who were cut off from the rest of the team.

## **7.3 Problems with UI**

. The revamped Unity UI system gave the technical team extremely powerful tools to integrate the art into the game. However, the UI system is also brand new, and there were still plenty of bugs that had to be worked through. These bugs had incredibly little documentation as to why they were happening and how to fix them. At many points, many hours of work was lost due to UI scripts going missing, and UI components breaking and needing to be replaced.

There were several ways we dealt with this problem. The first way was to reimport all assets. This occasionally fixed all the problems. The second way was to revert to a previous version of the scene. This also only occasionally worked, and would still have the broken UI components in the scene. We are still unsure as to why this is the case. If all else fails, the only thing left to do was to recreate all the broken components. This took up a lot of precious time that could have been spent developing other parts of the game.

#### **7.4 Reflection on the Development cycle**

Being a project at WPI, one of the largest difficulties of the project was dealing with the short seven week terms. We began officially working on this project a week prior to C term (Jan 15 - Mar 6) in order to have a better fleshed out plan before beginning C term. During that week we created a full game design document of the game, created a timeline, and had a Skype meeting with one of our advisors. This week of preparation allowed us to hit the ground running when C term started and we could instantly start building the game.

In order to accommodate the fast past required by WPI's term based system, the team agreed on a weekly work schedule. From 10:00 AM to 5:00 PM the entire group would work together in the ZooLab. This gave us close proximity to each other for collaboration and seven solid hours of work per day. The MQP was treated as if it were a job. Additionally, all of our documents were shared online through Google Drive. This allowed us to quickly share documents with each other and with advisors. These

techniques helped us get ahead of many of our deadlines and to create a very developed project in the extraordinarily short time that was available.

Finally, we did our best to follow the timeline created in the week prior to the term starting. This timeline can be seen in figure 7.4.1 below. While we kept to the appropriate pace to finish the project, the actual timeline went a little differently than expected. For example, by the recommendation we started work on the MQP report by the third week rather than week five. Additionally, the team had a habit of polishing the game as it was developed, meaning that the development and polishing phases of the project were meshed together. Finally, because of this, we decided to playtest the game a week later than planned. This ensured that playtesters were playing a much more finished and polished game than they would have played otherwise. In the end, the timeline was a good guide for the project, but we figured out what steps made the most sense at the time.

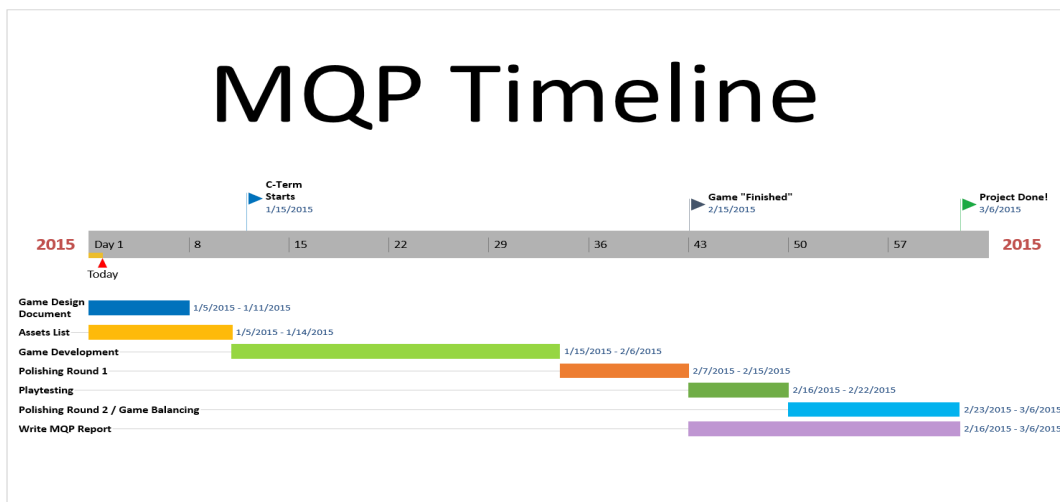


Figure 7.4.1: Proposed MQP Timeline



# PART 8: Conclusion

## 8.1 Vision

Our original vision was centered on a multiplayer experience that would distinguish the game from other space shooters and provide a very unique style of game play. Unfortunately the implementation of networking and the designing of play style that was equally enjoyable for each station proved too extensive for our time frame. Instead, the time was diverted to character creations, audio development, playtesting, and a polishing of the game.

Even without multiplayer, however, we still aimed to create a side-scrolling shooter with elements of an RPG game. We were able to implement both attributes through a power system similar to *FTL* and an extensive upgrade system like *Super Shooter*, and, furthermore, polish and streamline these sections using feedback from playtesters. The final product is a game that is immersive, challenging, and fun.

We still believe, however, that this game would be much improved with the addition of multiplayer. Luckily, development after graduation is something we kept in mind from the very beginning; tech focused on creating an easily extensible codebase and art focused on creating a unified style that could be replicated in future development. With multiplayer and additional RPG elements such as quests or character skills and levels to go with the characters already available in the game, we believe *Conquest of the Verse* can be a successful, profitable game.

### **8.3 Tech**

The technical portion of the project produced over 12,000 lines of code. This number increased and decreased as more files were added and then refactored. It is estimated about 4,000 of these lines are due to detailed comments and file structure.

Overall, the design of the software was a success. The fundamental design principles of software were followed. The project is readily extensible and heavily reusable. Any future extensions will be easy and painless.

### **8.4 Art**

The artists worked together very well. Working on side-by-side computers throughout the project helped provide quick feedback on designs and maintain a unified style for the game. The initial scope of the project was fairly light for the artists. Adding the cast of characters and a set of audio to accompany provided the sufficient work. After completion of all initial art assets both artists transitioned into the polish phase. Polish phase included making ships more identifiable from one another, making UI screens more understandable, making sure everything was properly attributed, and making sure character portraits were easily readable. Music and sound, the former of which was created by a friend of the group, was also added at this point. Both artists were very pleased with the outcome and work of the other artist throughout the many different phases of development.

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This project uses these sounds from SoundBible:

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2. Bomb Explosion 1-SoundBible.com-980698079 By Mike Koenig  
(<http://soundbible.com/107-Bomb-Explosion-1.html>)
3. Bomb -SoundBible.com-1260663209 By Mike Koenig  
(<http://soundbible.com/1234-Bomb.html>)
4. Blast-SoundBible.com-2068539061 by Mike Koenig  
(<http://soundbible.com/538-Blast.html>)
5. Grenade-SoundBible.com-1777900486 by Mike Koenig  
(<http://soundbible.com/1151-Grenade.html>)
6. Laser\_Machine\_Gun-Mike\_Koenig-1194129298 by Mike Koenig  
(<http://soundbible.com/1774-Laser-Machine-Gun.html>)
7. Bunker\_Buster\_Missile-Mike\_Koenig-1405344373 by Mike Koenig  
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8. Cave\_In-stephan\_schutze-1369506733 By Stephan Schutze  
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# PART 10: Appendices

## Appendix A: Enemies

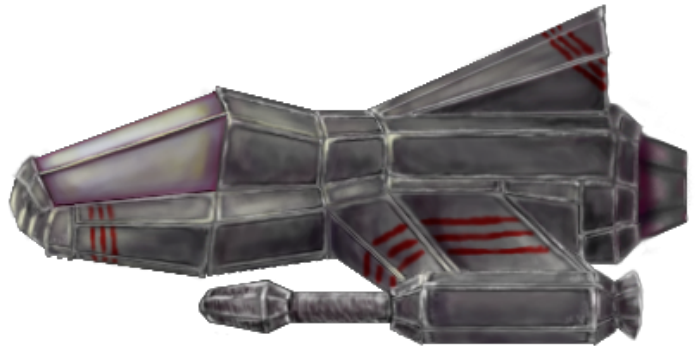
Opposing spaceships periodically appear on the right side of the screen, attempting to destroy the player in search of the loot that they carry. As the game progresses the player amasses more loot therefore more pirates come looking for a profit. The enemies use a variety of different of ships that spawn with unique behaviors and weapons. This causes players to have to adapt and develop different skills in order to survive. Periodically, larger, more powerful flagships, or bosses, will appear. These take multiple hits to destroy and have an array of powerful weapons at their disposal. Destroying enemies of any type increases your score. Occasionally enemies will drop money pickups that continue to move to the left of the screen. The need to destroy these ships becomes increasingly important for the player, therefore, the range of attacks the enemies use are essential to maintaining interesting game play.

The physical look of each enemy ship was developed from its description and attack patterns in game. Ships with futuristic parts such as stealth, shields, or speed, have brighter colors and more abstract designs. While ships with simple flight patterns and basic weapons are shown with rigid metal paneling. The ships maintain an identity by using the same color palette of reds and greens: {R:80, G:119, B:115}, {R:161, G:19, B:24}, {R:232, G:175, B:177}, {R:237, G:28, B:35}, {R:37, G:125, B:60}, {R:193, G:217, B:199}. These hues provided a base color while black and white overlays provide detailing. By managing the color palette ship designs were given continuity and modular parts for faster development.

## A.1. Enemy Types - Dogfighter

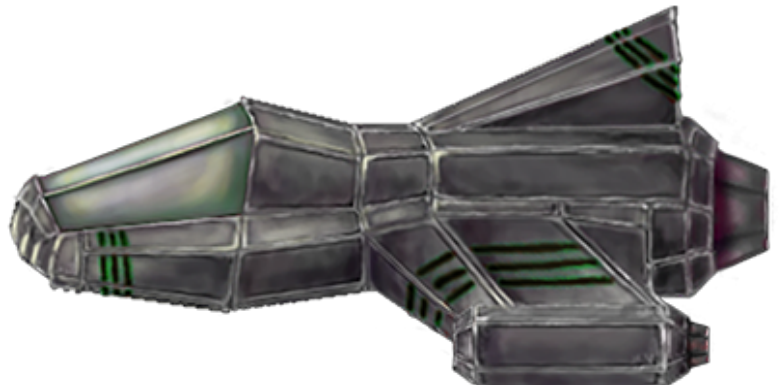
### Type A

- **Movement Pattern:** Flies left. Will disappear off screen.
- **Attack Pattern:** Fires directly to the left.
- **Durability:** Very weak hull.
- **Description:** The Type A Dogfighter is a low level shooter. It has little maneuverability and very little hull strength. But it is extremely easy to make and be made in bulk.



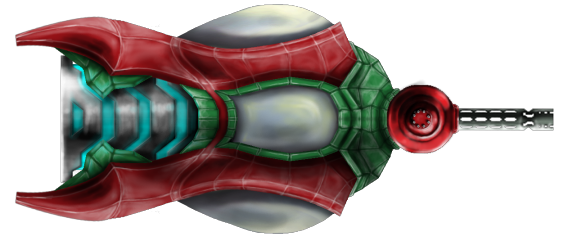
### Type B

- **Movement Pattern:** Flies left, while moving vertically to hit the player. Will disappear off screen.
- **Attack Pattern:** Slams into the player.
- **Durability:** Very weak hull.
- **Description:** The Type B has no weapons making it very light and subsequently the fastest ship in the game. Like other DogFighters this ship is easily made in bulk, however, suicidal pilots are much harder to manufacture.



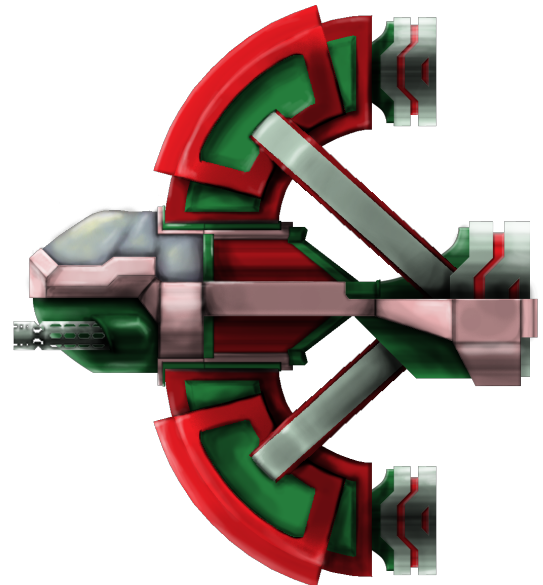
## Type C

- **Movement Pattern:** Flies to a random location on the screen, then will float around that location. Will not disappear off screen.
- **Attack Pattern:** Fires in the direction of the player.
- **Durability:** Very weak hull.
- **Description:** Type C Dogfighters are more annoying and its build is more sophisticated. His job is to find a spot to camp and shoot at the player. He often spawns during boss fights like a little puppy protecting its master.



## A.2. Enemy Types - Cruiser

- **Movement Pattern:** Will bob up and down while flying left. Will disappear off screen.
- **Attack Pattern:** Fires at the top, bottom, and middle of its bobbing pattern, directly to the left.
- **Durability:** Moderate hull.
- **Description:** The Cruiser is a basic enemy equipped with improved hull





modifications for heavy shielding and evasive maneuvers. Its downfall is it has a single gun that only shoots forward.

### A.3. Enemy Types - Interceptor

- **Movement Pattern:** Will move vertically on the right side of the screen, bouncing off the top and bottoms of the screen. Will fly left after a certain amount of time. Will disappear off screen.
- **Attack Pattern:** Fires in the direction of the player.
- **Durability:** Moderate hull.
- **Description:** This enemy doesn't seem like a big deal because he stays to the right side and shuffles up and down. But he hangs out with friends that attack you close up so he can target you from a distance.



### A.4. Enemy Types - Seeker

- **Movement Pattern:** Will move vertically on the right side of the screen, bouncing off the top and bottoms of the screen. Will stay on screen until destroyed.
- **Attack Pattern:** Fires homing missiles that track the player.
- **Durability:** Moderate hull.

- **Description:** This enemy will move vertically around a portion of the right side of the screen and fire missiles at the player. The missiles will “lock on” to the player and move constantly towards the player's current position. The player can also destroy the missiles, but they explode on destruction or impact and can damage the player. The Seeker ship is very sturdy because it is meant to carry heavy explosives. Luckily for players the ship carries missiles too, so a few good jostles to the hull will cause it to explode itself.

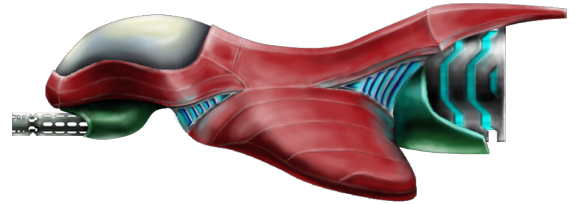
## A.5. Enemy Types - Juggernaut

- **Movement Pattern:** Will swiftly enter the screen, then slow down and move slowly across the screen. Will disappear off screen.
- **Attack Pattern:** Fires a tri-shot ninety degrees and negative ninety degrees from its shields. Turret direction slowly rotates over time with the shields.
- **Durability:** Strong hull. Has a rotating shield that blocks laser shots.
- **Description:** This annoyance of a ship can rotate two shield panels around its hull for extra protection. These shields are immune to the player's lasers. Its guns shoot a” tri-shot pattern between its shields. In

order to destroy this enemy, the player must either use a missile, blaster, or shoot the Shield enemy on a side that is not shielded.

## A.6. Enemy Types - Saboteur

- **Movement Pattern:** Will fly swiftly from the right to the left side of the screen. Upon exiting, it will turn around and re-enter, hugging the left side of the screen. It will then follow the player vertically. Will stay on screen until destroyed.
- **Attack Pattern:** Fires to the right from the left side of the screen.
- **Durability:** Moderate hull.
- **Description:** This speedster flies behind the player and follows the player from behind. It follows the player's vertical movement while shooting. This prevents the player from hiding on the left side of the screen and keeps them cautious if they want to survive.



## A.7. Enemy Types - Grenadier

- **Movement Pattern:** Moves at a moderate speed to the left of the screen and disappears.
- **Attack Pattern:** Fires a tri-shot to the left.
- **Durability:** Strong hull.



- **Description:** The Grenadier enemy will fire a “spread” shot that will shoot in a range from negative thirty degrees to thirty degrees among the x-axis. This causes the player to be more aware of enemies not in the same horizontal plane. Also, the off-duty Grenadier is great for interplanetary sightseeing.

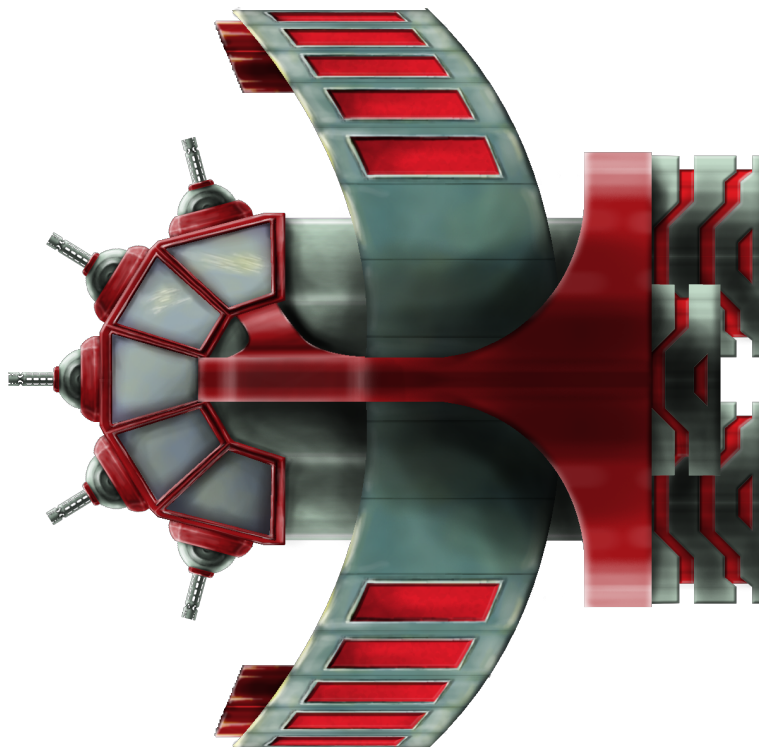
## A.8. Enemy Types - Ambusher

- **Movement Pattern:** Will move directly towards the player. Will occasionally turn invisible. Will stay on screen until destroyed.
- **Attack Pattern:** Slams into the player.
- **Durability:** Moderate hull.
- **Description:** The stealth enemy will spawn visible, and alternate between visible and invisible in a “flicker” pattern. The player needs to keep track of them or potentially target them first. Otherwise this enemy acts like the DogFighterB and attempts to dive-bomb the player. The player will have to manage this enemy along with the other enemies on screen. Fortunately, the energy required for cloaking takes away from the engines making the Ambusher very slow.



## A.9. Enemy Types - Flagship

- **Movement Pattern:** Varied.
- **Attack Pattern:** Varied.
- **Durability:** Extraordinarily strong hull.
- **Description:** This is the boss enemy that will be difficult to destroy and will combine some of the skills from other enemies in addition to a flagship only skill. For example, a Flagship will shoot missiles, shotgun shot, and be completely shielded at times. This forces the player to combine everything they know to defeat this boss enemy. Upon destruction of its hull, the boss will explode and destroy any other enemies on screen.



## Appendix B: Heroes

### B.1. Hero - Aelden Wells

There isn't much in the galaxy that scares Aelden save for Dornel-045, the space prison he spent 8 years of his life. He isn't ashamed of what he did to get him there, and sometimes, when he has had a bit too much to drink, he says things that makes you think he still takes risks that could land him back there again. If he gets caught, of course.



### B.2. Hero - Aeryn Spicer

Aeryn's father, Haldar, made his fortune through masterful manipulation of the stock markets following the end of Earth. His millions resulted in entire planets of real estate and, more importantly, at least as far as Aeryn is concerned, a space cruiser called Fearless. Aeryn likes to take Fearless from planet to planet, buying whatever she likes. Fearless cannot, however, function 24/7, so when

it's in the shop Aeryn heads to the spaceport to jump on board the swankiest ship she can find.

### **B.3. Hero - Almira Kosslyn**

Almira's past is unknown to all but her. How long she has been flying is also unclear. She moves from one crew to another, somehow managing to stay alive through everything. Ask her about her past, and she gives you a look just like the one she gives you when you steer too close to a mine.



### **B.4. Hero - Crom**

Crom hails from the planet Terariad, where his race is the dominant species. Slow to make judgments and even slower to make decisions, Crom carries with him at all times a love for all living things. The only reason he left Terariad in the first

place was to find his one true love, Ilia, who left their home planet a few dozen years ago.

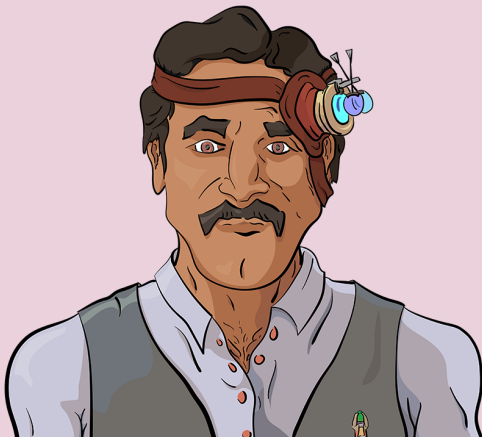
### **B.5. Hero - Daren Brant**

Daren Brant served in the UMF (The United Military Forces) up until two years ago, when he was honorably discharged. Since his two terms in the military Daren has continued to draw on the experience he gained while serving by continuing to travel throughout the stars.



### **B.6. Hero - Eitham Ramarte**

Eitham is one of few Earth scientists- those who have, even after the end of Earth, gone back to study what happened there. Eitham's current pursuit is to use his vast knowledge of mathematics and computer science to create true artificial intelligence.





### **B.7. Hero - Elenor Malukis**

Elenor's childlike enthusiasm never seemed to leave her even as she took to space and got behind the wheel of a R027 interceptor (which she may have stolen). These days, Elenor gets her kicks from knocking mines into enemy spaceships and doing elaborate maneuvering even when under fire from enemy forces.



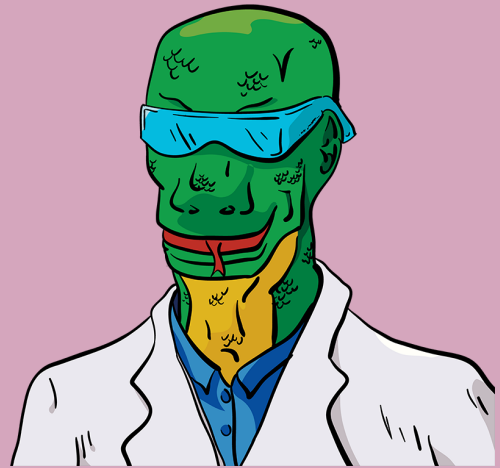
### **B.8. Hero - Elizabeth Lockheart**

After she graduated from NOA (New Oxford Academy) Elizabeth, instead of decided to put her degrees in Biomedical Engineering and Nursing to good use, gave in to her sense of duty and signed up for the UMF (The United Military Forces). During her tour she learned everything from radar operations to piloting. Her friends know her as reliable and driven. If you need something done, she's the woman for the job.



### **B.9. Hero - Garan Greson**

If at any time Garan doesn't answer his pager it's probably because he is hard at working solving the latest puzzle he has found. Word, math, or logic, you name it. His dedication to solving puzzles is trumped only by his fascination with technology.



### **B.10. Hero - Gavin Young**

Gavin conquered the waves of Inowa, a tropical planet on the outer reaches of the galaxy. He took to the stars in order to conquer waves of a different kind. Now, adventure is his calling card, assuming everyone stays "cool".



### **B.11. Hero - Malcolm Spaulding**

Malcolm was a young boy when all of the plants on Earth started to die, and the end of Earth began. He traveled with his parents or Jabor, where they found temporary shelter until they could find a place to live. He lived there, content, until his parents passed away a few years ago. Aimless, he has taken to traveling the galaxy to persuade the younger generation from wasting their lives away as nomads.



### **B.12. Hero - Mei Jui-shue**

Who Mei is working for these days is, like most other things about Mei's past, unknown. Some say that Mei only speaks when she needs to not because she is shy, because anyone who has met her knows that isn't true, but because she has seen so much that small talk just doesn't seem worth it anymore.



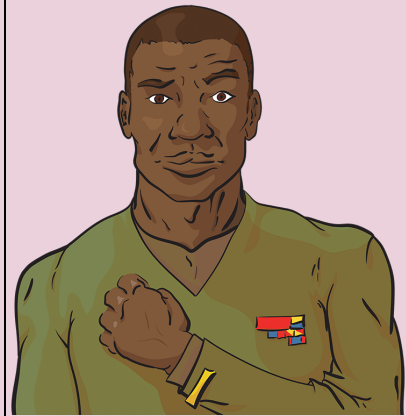


### **B.13. Hero - Rhonda Vi'Cardi**

Rhonda sometimes wonders what her life had been like if she hadn't found religion. Her faith, and her dedication to teaching other about it, was what drove her to take to the stars. Now, she serves as a guide to any who feel lost among the vastness of space.

### **B.14. Hero - Walton Homark**

Private Homark made his name as a loyal soldier and a team player while serving in the UMF (The United Military Forces). He is still serving on the armed forces, but is on leave from his flagship the Washington. Someday, the soldier hopes to return to his wife and daughter who live on the planet Komar in a small villa by the sea.



## Appendix C: Voice-over Script

### Garan Greson

Voiced by Kyle Pepper

"Gimme some power!

"You know, an upgraded hull would hold up much better against asteroids. We need some repairs."

"Lots of mooks coming in. Hang on"

"Thanks for the support gunner."

"its funny, when I went to college to study physics that is one of the last things I thought I would hear."

"The guns won't work without power!"

"Why can't any of these other ships be friendlies?"

"Uh.... Captain? Just incase this doesn't go our way... the escape pods are ready."

"Thank you. I'm doing my best."

"Did I forget to buy missiles?... We're almost out."

"Power coming your way now."

"Hull is damaged but repairable. I got this."

"Nice work collecting minerals captain! Our crystal storage is overflowing."

"The energy contained in those shots is not enough to damage that hull. Missiles ought to do it."

"This ship could really use a few upgrades."

"Why would someone reroute power from my station?"

"Asteroid field detected."

"This is exactly what I don't want to see."

"We're getting ambushed! Watch your flanks!"

"Sensors are detecting mines. Shoot them before they get too close!"

"Phew... that was close."

"Thanks for having me aboard!"

### Daren Brant

Voiced by Nicolas Adami-Sampson

"Requesting Power to engines."

...

"I'm reading multiple enemies inbound. Prepare to engage."

"Great shot."

"Thanks for the heads up."

"Requesting Power to weapons systems"

"Give me some room. They're going to pay for that one."

"I need repair teams standing by. This might get messy."

"Always a pleasure."  
"Almost out of missiles captain."  
"You got it."  
"I'm on it."  
"Our crystal storage bay is fully stocked, captain."  
"Looks like those lasers aren't doing much to the enemy hull. I'd switch tactics if I were you."  
"You know that missiles will lock onto enemies if you hover over them right?"  
"Requesting power to the radar arrays."  
"Asteroid field ahead."  
"Flagship detected. Prepare for battle."  
"We've got bogies flanking us. Execute evasive maneuvers"  
"Fly carefully. Mines ahead."  
"Got em."  
"I won't fail you."

### **Almira Kosslyn**

Voiced by Megan Errichetti

"Power to the engines is down."  
"This is so not my day. Can someone repair the hull please?"  
"This is gonna get a bit rough but it's nothing I can't handle."  
"Impressive work. Keep it up."  
Oh yeah, this is gonna go great.  
"You expect me to shoot enemies with guns which have no power?"  
"Hang on. I've got em."  
"We'll be fine as long as we work together."  
"I do what I can."  
"Might want to stock up on missiles."  
"Alright alright I'm dealing with it."  
"Consider it done."  
"I wonder how much all of these crystals would get us?"  
"That's not going to work."  
"I wonder how vast the universe is?"  
"The radios aren't working."  
"We've got some space junk coming up."  
Do you really think any of us is gonna get through this?  
"It's a trap!"  
"Mines again. Great."  
"Another flagship destroyed."  
"Once more into the dark."

### **Aeryn Spicer**

Voiced by Maeve McCluskey

"Power me up!"  
"I meant to do that."  
"Finally, a challenge!"  
"Im impressed."  
"Those won't be a problem."  
"I appreciate your flattery, but i'm not so good that I can work without power."  
"oh no you dont!"  
"Well, isnt this just a fabulous a party"  
"thanks. I could this all day."  
"what I would do for a few more missiles right now."  
"Sorry about that folks. Don't know what I was doing."  
"Dont worry about it."  
"We can use these crystals to repair the hull you know."  
"I appreciate your enthusiasm but our lasers won't pierce that hull. Use something more powerful."  
"I love how they just keep coming as if they think they can win."  
"Thats fine just use the power elsewhere I don't need it."  
"These asteroids won't pose a problem right?"  
Okay, people. If it moves, shoot it.  
"Looks like another ambush captain."  
"looks like there are some mines ahead. Fly carefully."  
"Another day of accomplishing the impossible."  
"I can take em."

### **Walton Homark**

Voiced by Owen West

"The Engines are without power sir."  
"Reporting Damage to one of the engines sir. The ship is behaving irregularly."  
"Strap in. It's gonna get rough."  
"Nice shot."  
"Roger Roger"  
"There must be a mistake. The weapons system is without power."  
"I've got your back."  
"  
""Don't worry captain, this is going to be tough, but I won't let you down.""  
"Glad to be of service."  
"Missile supply is low."  
"On it."  
"on it" (Will try to get a new clip but this is it for now)  
"We've got plenty of crystal."  
"Our lasers arent powerful enough to pierce that hull. Try using the blaster or missiles."

"Keep up the good work everyone."  
"Requesting power be diverted back to the radar arrays."  
"Asteroids sighted captain."  
"Play this by the book and we should be fine."  
"Be advised. Enemies inbound from the flanks."  
"Minefield ahead."  
"Nice work team."  
"Duty calls."

### **Elenor Malukis**

Voiced by Katie Longhurst

"doncha know? The engines won't work without power silly"  
"Ow! That hurt!"  
"Here goes nothing!"  
"Kabloowie! nice shootin!"  
"Aint nothing I cant handle."  
"Where did my power go?"  
"ow! That hurt!"  
"Time to show that big guy who's boss."  
"haha! Dont mention it!"  
"Aww... where did all the missiles go?"  
"Whoops! My bad!"  
"Good thing I have a crane to move the heavy iron plating!"  
"Cant all these crystals be used to repair the hull?"  
"You know that doesn't work, right? try the missiles!"  
"My mom says a good breakfast is the key to success!"  
"The radar thingy isn't working..."  
"Asteroids coming right up."  
"There is a big red thing on the radar screen... that isn't good, is it?"  
"Do a barrell roll! we're getting ambushed!"  
"Mines Coming up!"  
"We did it!"  
"Time for some fun."

### **Elizabeth Lockheart**

Voiced by Carol Wood

"Someone turn the engines back on."  
She's torn up, but she'll fly true.  
"Buckle up people. Were in for a bit of a wild ride."  
"Classy."  
Things always get a little more complicated, don't they?



"Could someone please give me power!"

Do you know what the definition of a hero is? Someone who gets other people killed. Watch yourself."

"So much for the little training cruise."

"Don't mention it darling."

"Ammunitions are running low captain."

"Rerouting power now."

"I've got it under control."

"The hull better be in tip top shape captain, because if not what are we doing with all this crystal?"

"Why don't you try something that actually works, captain?"

"After all this is over, I'm going to take you lads to a pub to celebrate."

"If you'd rather, I can just sit back and enjoy the ride instead of doing my job."

"Why is it we never seem to go around these bloody asteroid fields?"

"I've got a flagship on the radar. Proceed with caution captain."

So... trap?

"Mines ahead. Fly carefully."

"Close one."

"Thanks for having me aboard."

### **Mei Jui-shue**

Voiced by Hannah Brown

Calculating, perceptive

"The engines need power."

...

"I've got multiple bogies, coming in hot."

....

"I'll keep an eye out."

"Requesting power to the guns."

"No rest for the weary I guess."

"there is always a bigger fish."

...

"Missiles are low."

"My mistake."

...

...

"Good plan. Shooting the flagship with a gun that won't pierce its hull. That'll work."

...

"The radar systems need power."

"Fly slow and this asteroid field won't be a problem."

"Be warned. we're getting flanked"

"Careful. Mines can be hard to see coming."

"Where to now, captain?"

"You wont regret this."

### **Arden Wells**

Voiced by Mike Racine

"Someone give me some power"

"You better check yourself before you wreck yourself."

"Pedal to the metal commander."

"Im not even sure I could have done that."

"Roger that."

"Someone give me some power"

"Time for some good old fashioned revenge!"

"Thats no moon"

"This isnt my first rodeo."

"Gonna have to resort to the good old fashioned laser pretty soon captain"

"Maybe if you stopped yappin' it would get fixed faster"

"Calm yourself Cowboy I'm handling it."

"think of the money we can make by selling these beauties!"

Once, just once, I want things to go according to the plan!

Can you imagine having to live on one planet your entire life? That would be so boring!"

"Thats fine I'll just take a nap."

"perfect. Asteroids for lunch."

"Well, thats not something you see everyday."

"Ambushers coming in! Light em up boys!"

"Is there anyway we could harvest these mines? I think they'd fetch a pretty penny."

Hell, this job was so great I won't even charge nothin'.

"One last job."

### **Malcolm Spaulding**

Voiced by Peter Lepper

"Remember what I told you? Each system needs power to function."

"before you go running into asteroids like that you've gotta make sure your shields are stable."

"Stay calm and remember your training, gunner. We'll get through this."

"well done."

"Good to see youre adapting to your station well."

"Remember what I told you? Each system needs power to function."

"Hey pilot. You got this. Just stay calm."

"This reminds me of that battle in Sector 45. Lets hope we're one of the few that gets out alive."

"All in a day's work."

"We've only got a few missiles left. Use them carefully."

"haha I really should practice what I preach"

"Try to warn me next time you're going to do that."  
"Look's like someone's got a degree in crystal mining."  
"Remember, the hulls of flagships are impervious to laser fire. Much better to aim for the hull."  
"Your team is your most valuable tool. Keep them close and you will be victorious."  
"Remember what I told you? Each system needs power to function."  
"Keep your head about you and these asteroids won't pose a problem."  
"Hate to tell you this guys, but it looks like we're up against a flagship."  
"Looks like we're being ambushed."  
"Careful, we're coming up on one of the minefields left over from the great war."  
"Victory is sweetest when you've known defeat."  
"Lets not try anything too crazy."

### **Eitham Ramarte**

Voiced By Alex Gorowara

Methodical

"You know giving me more power would allow me to perform at my highest level of skill, right?"  
"sorry about that. My calculations were off."  
"Its the pirates again."  
Nice job  
"Naturally"  
"You know giving me more power would allow me to perform at my highest level of skill, right?"  
"sorry about that. My calculations were off."  
Evidence doesn't indicate whether or not we will succeed against this foe. Do I really have to trust chance?  
"Its just probability."  
"Someone seems to have under estimated how many missiles we use per mission."  
"Simple probability, gentlemen."  
"Time to break out the oxygen mask to patch that hull breach"  
"Logic would dictate we either sell our crystals or use them to repair the hull."  
Perhaps we should experiment with other, more effect methods of destruction.  
"Did you know that a fully powered shield is impenetrable by normal lasers?"  
"is the radar array damaged or did someone reroute the power from my station?"  
"The possibility of successfully navigating this asteroid field are 23 to 1."  
Proximity alert. We must be comin' up on something.  
"Ambush detected... I... must have missed something."  
"Mines are similar to asteroids but they will explode on impact and cause massive hull damage."  
"Probability indicated we would come out on top."  
"Excellent. Another chance to exhibit my expertise"

## **Crom**

Patrick Petersen

"I cannot do my job without power."

"Space rocks hurt more than earth rocks."

"I think they will find that they are barking up the wrong tree."

...

"exploding rocks?"

"Weapons do not fire without power. Perhaps better this way."

"what goes around... comes around."

"That ship is much larger than ours..."

"I do my best work as a tree."

We are almost out of missiles. Maybe we should branch out?

"I am CROM."

"I will patch the bark of the ship."

"What do you humans do with these purple rocks?"

Im going to... go out on a limb here and suggest you try something else."

"Do not worry. Crom will get you through this."

"I cannot do my job without power."

"Things are about to get rocky."

"Failure is not... an option."

"A bush? I am bush? how do you say it?"

"Hot rocks ahead. Watch out"

"Well, thats a re-leaf"

"I am Crom"

## **Rhonda Vi'Cardi**

Voiced by Janna Oakfellow-Pushee

"Send some power my way when you get chance."

"I have faith that we will make it through this."

"The path to victory is never easy, but we shall prevail."

"I wonder if these pirates have families."

"Thank you honey i'll keep an eye out."

"Send some power my way when you get chance."

"If we work as a team, we will get through this."

"As long as we have faith in our own cause and an unconquerable will to win, victory will not be denied us."

Happy to help"

"We are almost out of missiles, but we still have eachother."

"Coming right up."

" I thought I sensed something was wrong."

"Hey captain- take my word for it. These crystals would make the perfect gift for the girl of your dreams."

"Why don't you try another strategy? Thats not doing much of anything."

"I find that it is listening to the silence... that is sometimes most rewarding."

"Send some power my way when you get chance."

"keep an eye out- the road's a little rough ahead."

this is one enemy that will take everyone working together to defeat."

"The enemy is flanking us!"

"Minefields cause such death. make sure to avoid them."

"Onward."

Hatred and anger are powerless when met with kindness

### **Gavin Young**

Voiced by Sebastian Espinosa

"Hit me with some power man."

"Not cool man. Not cool."

"They are so not invited to the party"

"That was rad."

"Trying to ruin the party? I don't think so."

"Power me up bro."

"Not cool man. Not cool."

"After this im definitely going to need some R&R"

"Back at you."

"Almost out of missiles? At least the kool aid isn't gone."

"chill out bro I got you."

"Not cool man. Not cool."

"I bet these crystals would sell for a nice profit."

"Time to switch up our approach bro. thats not working."

"Sometimes I think about how vast space is and im like... woah.."

"Power me up!"

"These asteroids are going to make things a bit more interesting."

"Theres a big one on the horizon."

"Not cool. Ambush!"

"What out for the space rocks"

"Thats what im talking about."

"Thanks for having me man."

## Appendix D: Upgrade List

In *Conquest of the Verse* there are a wide variety of upgrades the player can purchase from the store at the end of each level. These upgrades increase the effectiveness of some weapons, increase the ships durability, and increase the ship's storage capacity among other things. Upgrades add an RPG element to the game that helps the player progress along with the increasing difficulty of the levels and the enemies. If the game is played for long enough to get enough credits, the player can purchase every upgrade. Each upgrade is listed below:

### D.1. Engine Upgrades

- **Interceptor Class Engines Level 1:** Enables up to three power to be routed to the engines.
- **Interceptor Class Engines Level 2:** Enables up to four power to be routed to the engines.
- **Interceptor Class Engines Level 3:** Enables up to five power to be routed to the engines.

### D.2. Blaster Upgrades

- **Blaster Emplacement Level 1:** Allows the player to use the Blaster weapon.
- **Blaster Emplacement Level 2-5:** Increases the firing rate of the Blaster weapon.
- **Destroyer Class Blaster Level 1-5:** Increased the damage of the Blaster weapon.

### D.3 Shield Upgrades

- **Upgraded Shields Level 1:** Allows the player to use shields. Unlocked by default.
- **Upgraded Shields Level 2:** Gives the player up to two shield charges.
- **Upgraded Shields Level 3:** Gives the player up to three shield charges.
- **Additional Shield Generator Level 1-5:** Decrease the time needed to recharge a shield charge.
- **Hardened Shields Level 1:** Reduces damage from weak enemy bullets (dogfighters).

#### **D.4 Power Upgrades**

- **Powercell Upgrade Level 1-15:** Gives the player an additional powercell for use in the power screen.

#### **D.5 Missile Upgrades**

- **Automated Loading Procedures Level 1-5:** Decreases the time needed to reload the missiles.
- **Increased Payload Level 1-5:** Increase the damage that the missiles do.

#### **D.6 Cargo Bay Upgrades**

- **Additional Missile Storage Level 1-5:** Allows the player to hold a maximum of five more missiles per level.
- **Additional Crystal Storage Level 1-5:** Allows the player to hold a maximum of five more crystals per level.

#### **D.7 Hull Upgrades**

- **Reinforced Hull Level 1-20:** Reduces the damage done to the player by one per level.
- **Asteroid Resistant Plating Level 1:** Asteroids will do one less damage to the player. Small asteroids do no damage.

#### **D.8 Laser Upgrades**

- **Rapid Firing Barrels Level 1-5:** Increase the fire rate of the lasers.

- **Heavy Lasers Level 1-5:** Increases the damage of the lasers.
- **Burst Lasers Level 1:** Causes the lasers to fire in a tri-shot when enabled power level three.

## **D.9 Miscellaneous Upgrades**

- **Increase Income Per Level Level 1-5:** Increase the amount of credits the player gains by default after beating a level.



## **Appendix E: Playtesting Survey**

The following is the exact survey given to playtesters, including the consent form.

## *Conquest of the Verse Playtesting Questions*

\* Required

### **Favorite weapon? \***

- Laser Gun
- Missiles
- Blaster Beam

### **How useful is the laser gun? \***

Check all that apply.

- Very useful
- Somewhat useful
- Not useful.
- It didn't do enough damage.
- Boring to use.
- Other:

### **How useful are the missiles? \***

Check all that apply.

- Very useful
- Somewhat useful
- Not useful.
- They took too long to reload.
- I ran out of missiles too fast.
- Didn't do enough damage.
- Boring to use.
- Other:

**Figure E.1** Survey Questions 1

**How useful is the blaster beam? \***

Check all that apply.

- Very useful
- Somewhat useful
- Not useful.
- The upgrade to get them cost too much.
- It took too long to reload.
- Boring to use.
- Other:

**What did you think about the weapons in general? \***

What about the reload speeds of the weapons? Their damage? How satisfying are the weapons?

**Do you think the shields are appropriately powerful? \***

Choose as many as you think apply.

- The shields were too powerful.
- The shields were not powerful enough.
- The shields recharged too slowly.
- I wish I had started with shields.
- Other:

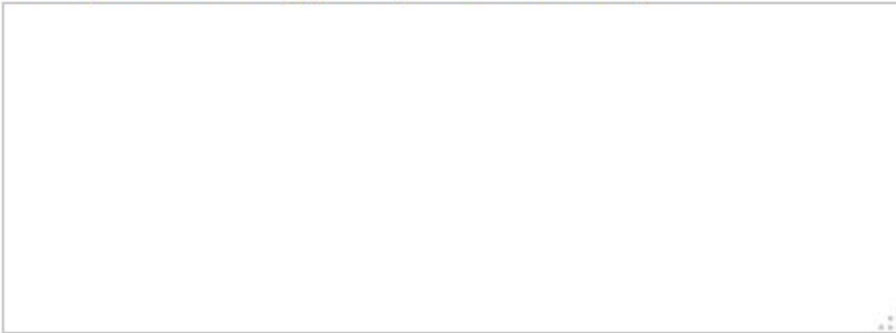
**Did you understand the upgrade system? \***

How is the progression of the player ship?

**Figure E.2** Survey Questions 2

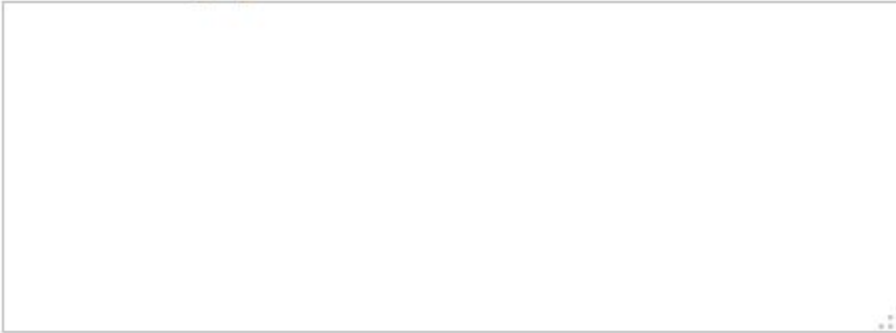
**Did you understand the power system? \***

Did the power and the upgrade system work well together?



**Did the upgrades cost an appropriate amount?**

How is the cost progression?



**Do you think the money drops should be more or less frequent? \***

- More Frequent
- Less Frequent
- They were just right.
- Other:

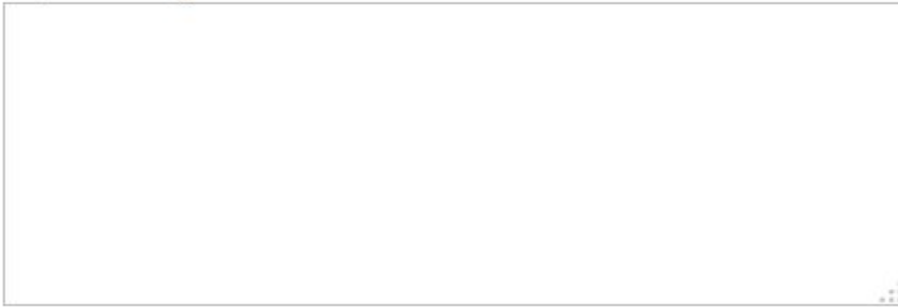
**Do you think the crystal drops should be more or less frequent? \***

- More frequent
- Less frequent
- They were just right.
- Other:

**Figure E.3** Survey Questions 3

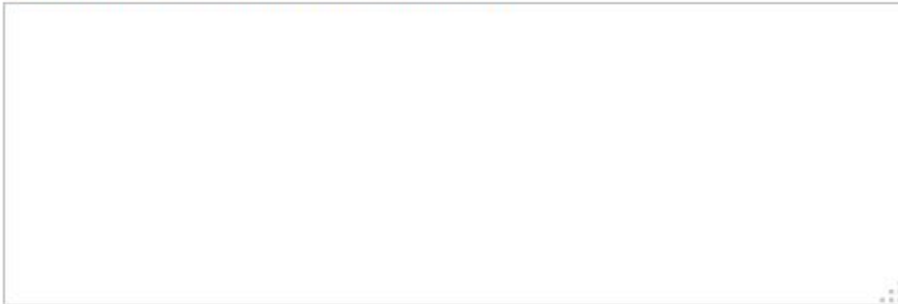
**What do you think about the normal enemies? \***

Specifically their damage, health, and movespeed. What type of enemy was the most fun/interesting?

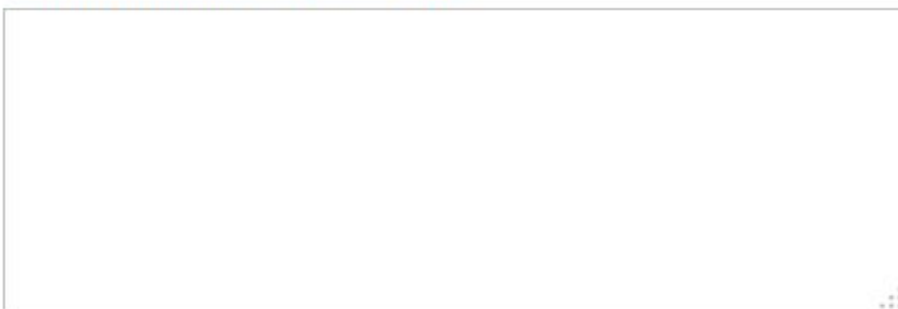


**Did any of the enemies fail to add something to the game? \***

IE Were any of them too similar to others?



**Can you think of a new enemy type?**



**Was there enough enemy variety? \***

- Too much! The game felt really hectic.
- Yes. Just right.
- No, but I dont think it made much of a difference.
- No, and it made the game less fun.
- Other:

**Figure E.4** Survey Questions 4

**The length of the level was: \***

- Too long.
- Too Short.
- Just right.

**How is the progression of the game? \***

Specifically the difficulty curve and the introduction of new enemies.

**What level did you get to? \***

**Feel like playing again? Was the game fun? \***

Choose all that apply.

- The game was really fun! I could play for days.
- I would play again. The game was interesting.
- I had fun, but I dont feel like playing again.
- This game is LAME. Worst MQP.
- Im going to tell my friends about this game.
- Other:


**What do you think of the Menu, power select screen, and crew selection screen technically? \***

Did the screens and the buttons on them function as you expected?

**Figure E.5** Survey Questions 5

**What do you think of the Menu, power select screen, and crew selection screen artistically? \***

How was the flow of the screens? Was anything confusing?



**Do you like the gameplay ui? \***

- Yes
- No
- Other:

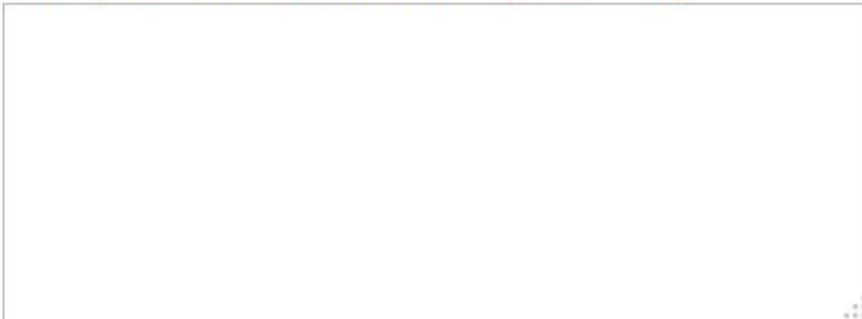
**How were the sound effects and background music? Were they annoying or too frequent? \***

Choose all that apply.

- I loved the background music.
- The background music was too repetetive.
- The sounds were too loud (and I was too lazy to turn them down).
- The sound effects were really cool!
- Sound effects were really repetetive.
- Other:

**Do you think the characters are interesting? \***

Who is your favorite character? Is the dialogue interesting?



**Figure E.6** Survey Questions 6

**Anything you would change or add? \***

New enemy types? new upgrades?

**Any other thoughts?**

Submit

**Figure E.7** Survey Questions 7



**GAME TESTING CONSENT FORM**

I, \_\_\_\_\_ voluntarily agree to participate, and be observed, while testing the game THE CONQUEST OF THE VERSE. I understand that testing and observation is being done to enhance the software in question, and that any feedback provided will be used to that end. The participant may stop at any time. Any personal information provided by me is to be used solely in relationship to this project, and will not be publicized in any way.

\_\_\_\_\_  
Participant Signature

**Figure E.8** Survey Consent Form



# Appendix F: Player Feedback

## F.1 Survey Feedback

The following feedback is raw feedback, taken directly from the survey. None of the data is altered in any way.

### Favorite weapon?

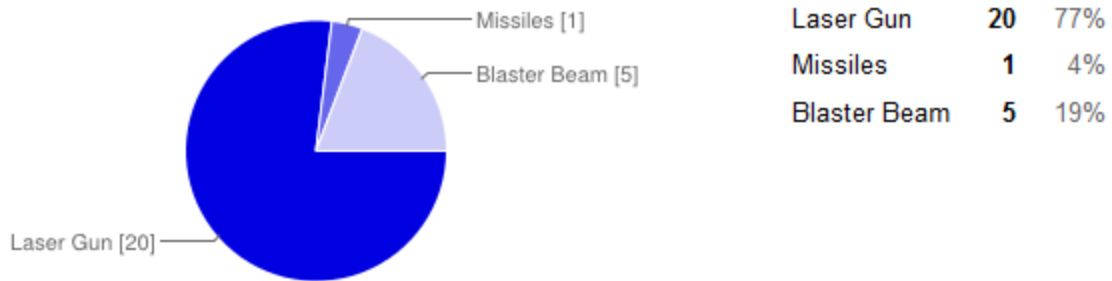


Figure F.1.1 Favorite weapon?

### How useful is the laser gun?

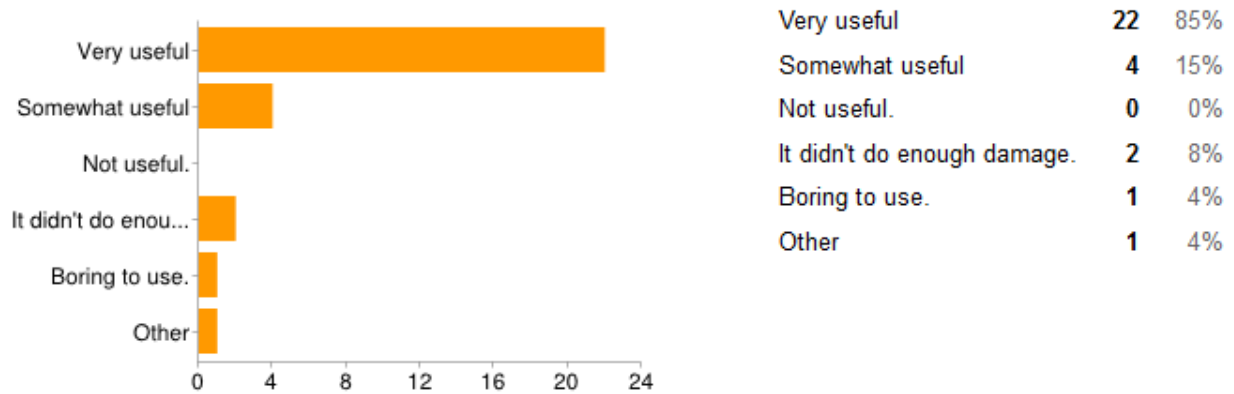
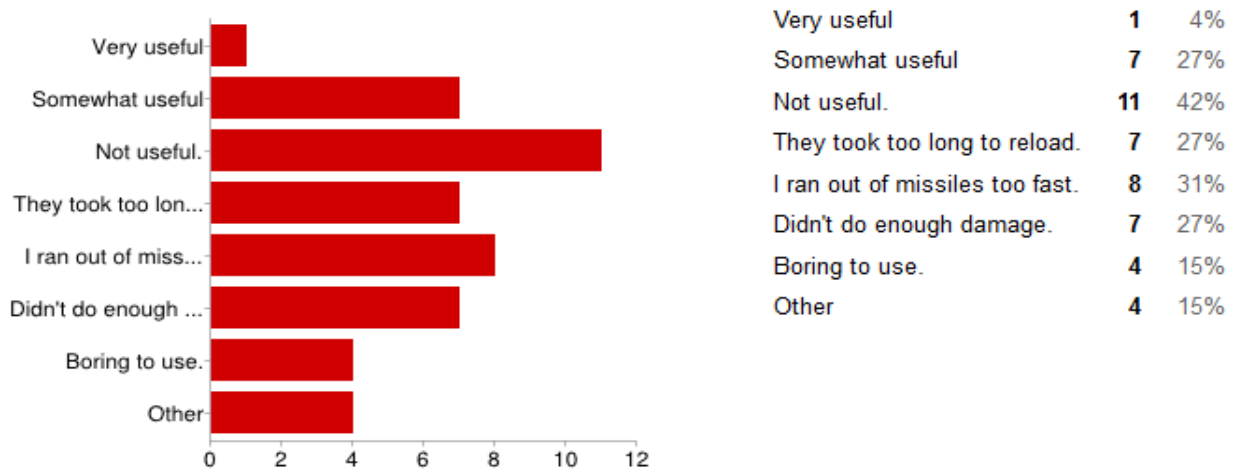


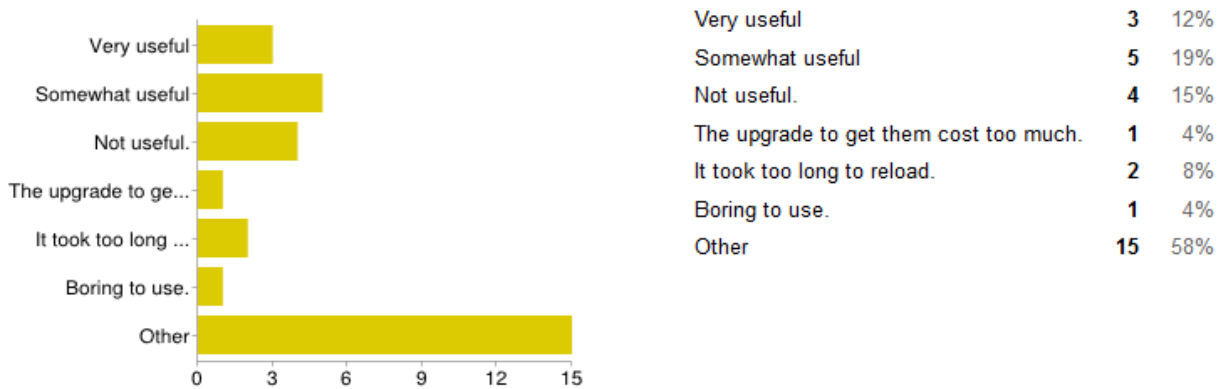
Figure F.1.2 How useful is the laser gun?

**How useful are the missiles?**



**Figure F.1.3** How useful are the missiles?

**How useful is the blaster beam?**



**Figure F.1.4** How useful is the blaster beam?

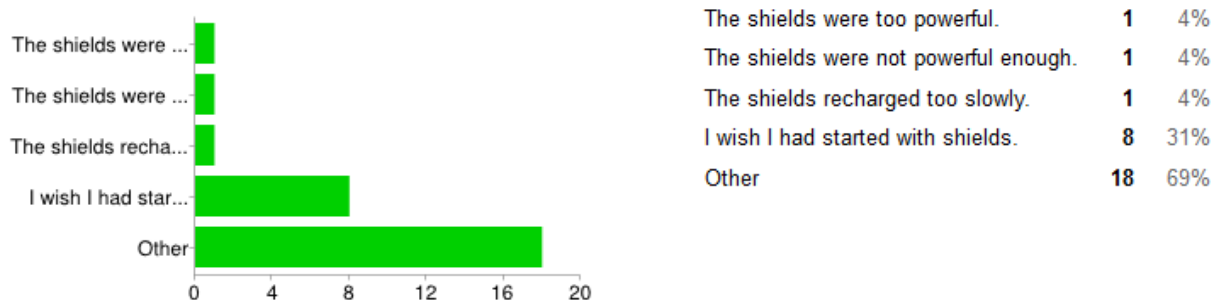
<b>What did you think about the weapons in general?</b>
It is much easier to only worry about using the laser gun, as the other weapons don't have enough uses, and don't do enough damage to justify trying to use them in addition to the laser gun
Were fine for me! Laser didn't do a ton of damage to the first boss but that's kind of expected.
i liked the weapons but i would have liked missiles to load a little faster but the lasers were nice because they never ran out

Good
Laser gun was the best weapon. Once you leveled it up to the tri-shot there was no reason to get any other weapons.
The laser gun reloaded really fast so I could pretty much just keep clicking and it would shoot. The missile did not really reload very quickly and I had trouble figuring out when it would reload and I would be able to shoot it again. (That may have been use error though)
The blaster beam is really satisfying to use.
Laser: It'd be nice if there was an autofire function Missile: If there was more than one enemy they occasionally locked onto one that I did not have the cursor over (no idea if that was supposed to be a thing) Blaster: When maxed out it did not always fire - sometimes it did not work at all on a level Also: The recharge times for the missile and blaster aren't visible enough
The reload of the missiles was slow, especially in the boss battle. I also didn't get to the blaster. The laser was pretty good for the base gun.
The weapon system fit the theme of the game and had some interesting variety to it. The missiles were slower but seem to hit harder(I couldn't focus since there was a lot going on lol). I also wasn't aware until after a few levels that I didn't start out each level with a set amount of missiles and instead had to physically pay for them at the upgrade screen.
Missiles destroyed by other missiles - made them sort of useless IMO
I mainly used the laser gun. Seemed to work well for most except the big guy who took a long time to die.
Laser is really nice. I really liked when I got to fire the blaster, but it took a long time to reload, and I couldn't always tell when it was reloaded.
The lasers did practically no damage to the enemy ship at the end of level 1. Of course, that might have been because of my horrid aim too.
The laser weapon was fairly satisfying.
It was unclear when the blaster beam reloaded, if it did. The weapons got outclassed very quickly if they could not be upgraded.
I wish the missile did more damage
I couldn't use the other weapons when I started so I never thought to use them when I did get them

The weapons are great! Although the blaster may be too overpowered at the beginning.
Blaster Beam disappears too fast to be satisfying. The laser is generic but works as a brick and mortar weapon. If possible, there should be a separate area to test out a weapon.
I put my laser at level 2 immediately and it made everything easier to manage. The blaster is incredibly satisfying.
It didn't seem worth buying missiles early-game because they weren't powerful enough without upgrades.
The blaster was very satisfying and I used it as much as I could. The laser was alright as the default weapon as I could just hold it down generally aiming at enemies while I focused more on dodging the enemies attacks. I used the missiles the least because they took too long to reload, were too hard to aim while I was focused on dodging, and it was too inconvenient to keep having to buy more.
Mention of missiles homing in on things, didn't see any homing missiles
It was pretty satisfying, I was confused why my blaster wasn't firing after the second ship but oh well :P

**Table F.1.5** What did you think about the weapons in general?

**Do you think the shields are appropriately powerful?**



**Figure F.1.6** Do you think the shields are appropriately powerful?

**Did you understand the upgrade system?**

yes, understandable. yet sometimes confusing (explain more thoroughly the difference in the guns, and their controls)
I could only seem to upgrade my energy cell, the other upgrades had costs but I couldn't figure out how to use them.
It was very straightforward.
I understood the upgrade system fairly well, the only thing I did not see at first was that you had to pay to unlock certain things (blaster, shields, etc.). Also there were so many options that I did not take the time to read all the options beforehand, and probably did not buy the most necessary things first.
Understood it quite well. Done quite nicely
The upgrade system is intuitive, however, I believe it should have displayed the current level of each part, rather than simply showing the cost to upgrade to the next level
I liked and understood it
Yes? The categories are helpful. Maybe make the repair button clearer?
Anyone who has played FTL will get it, for the most part. Purchasing upgrades was a little tricky at first. A popup explaining how to buy upgrades the first time through would help.
Yes! Looks fine
No mid game weapons. To easy to get to late game weapons
Yes, but it took me a moment to realize what was meant by clicking the +/- signs. That's at least partly because I went for shields first which didn't have those buttons enabled.
I understand it after level 2 It was great :)
The progression is good, it would be nice to start with some form of defense.
It was fairly clear, but the buttons could be more defined.
Understood the upgrade system although it was a bit on the slow side to upgrade.
I understood it but it took me awhile to figure out.
I didnt understand it well. a tutorial or a pop up screen explaining the upgrade system would be when you get there would be nice

Yes
It was easy to use and worked fine
<p>Yes the shop purchase button should be bigger and in the bottom right corner of screen. Location right now is counter intuitive.</p> <p>Interesting system. The only downside is that it seems like a big credit drop. Once you get far enough you not only have to pay for the additional space to upgrade but also had to pay for the upgrade point. It makes sense if you have some credits to burn currently and may later want, but having to drop money twice for the single advancement seems a little confusing. The radar, from what I saw, was useful at the beginning but ultimately was a power cell that I could have spent better elsewhere. Knowing how far into a level I am is nice to see if I should repair or save missiles but once I realized that I could take and reassign the power cell I quickly did so. The whole idea of upgrades being a "power cell" and that I could transfer power is great. It fits the theme of the game perfectly and would make sense in real life.</p>
Kind of got it from my experience with FTL, otherwise wouldn't have gotten it. I couldn't tell what some upgrades did at all
Progression is slightly confusing since it isn't entirely clear how much of an affect an upgrade has.
I could only get to the second level once. Not too coordinated using a keyboard

**Table F.1.7** Did you understand the upgrade system?

<b>Did you understand the power system?</b>
Didn't get it
Yes I had no real problems there
I understood the power system. While the upgrade system felt pretty open the power system felt somewhat limited.
I did not understand the power system at first but eventually figured it out.
<p>I thought the power system worked well in upgrading the ship for level progression except for one aspect. I did not like how if I didn't buy a power upgrade, I wasn't allowed to allocate a single power point for the next level. Sometimes I did not have enough to buy a power point after spending the money on more important things, and then I was out of luck when I should have put a point in shields or</p>

<p>something for the next level. Instead I believe the player should be given at least a single point every level, and they can buy more in the upgrade screen if they need it.</p>
<p>At first, I didn't realize power levels were the source of the other upgrades and not something you upgrade, but that was cleared up once I started upgrading stuff. I think it was a clever idea.</p>
<p>Yes! Looks fine</p>
<p>Yes. Made sense?</p>
<p>I understood it after level 3 I thought it worked well and I think that it was really nice that you have to prioritize and think which is the better strategy</p>
<p>Yes, very cool</p>
<p>yes i think i understood that part well enough</p>
<p>Yes, this system made sense in terms of upgrades.</p>
<p>Having two separate "upgrade" systems was confusing and difficult to pick up on right away.</p>
<p>Yup!</p>
<p>Yes but it would be nice to be able to access the power and upgrade system at the same time.</p>
<p>It took me a while to fully understand the system.</p>
<p>The power system felt kind of unnecessary, but not bad</p>
<p>Sometimes it was confusing as to what the difference was in BUYING an upgrade for the ship and POWERING a slot in the ship. Based upon the descriptions, some upgrades seemed to do the same thing as powering that slot.</p>
<p>Yes</p>
<p>Should be able to have enough power to upgrade everything fully. If you make it that far then that should be your reward.</p>
<p>I suppose so. I have never come across a game that used a system like this before so experiencing it for the first time was a minor setback for me personally, but to many people it probably wasn't as big of a deal as it was for me.</p>
<p>Yes, but I didn't feel like I could allocate power the way I wanted to. It would only let me put two points into things.</p>

**Table F.1.8** Did you understand the power system?

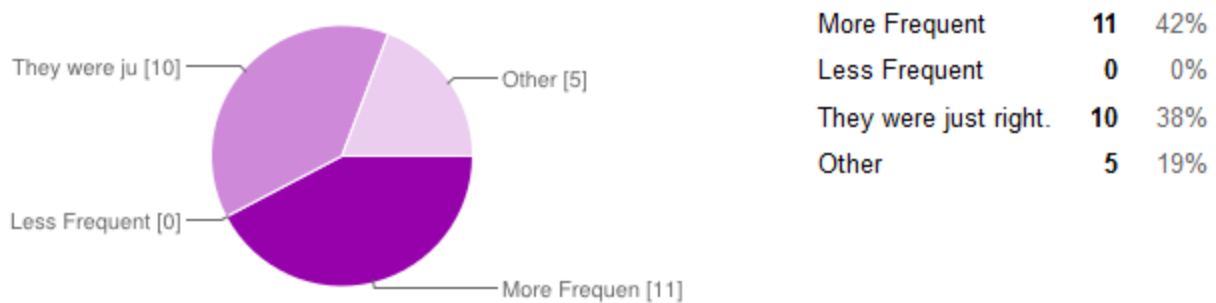
<b>Did the upgrades cost an appropriate amount?</b>
For the most part, although upgrading your own income every level seems a bit too easy
The cost was fair and progressed well.
Yes, cost progression is appropriate
Seems pretty good especially since you get bonuses when you beat a boss.
The cost progression was well done, except I think it would have helped to start getting more money later on to compensate for the higher prices.
I don't know.
Seemed ok, im sure the more you play the better you get a credits
Things were very expensive for me, maybe it's because I sucked but I felt I needed upgrades to get better and couldn't afford them because I was bad
I didn't get to the higher levels, so I'm not sure. But it seemed fine for the starting round.
I spent way too much on repairs due to the bosses having unavoidable bullets (in windowed mode at least). Everything else seemed ok.
WHY CAN't I AFFORD SHIELDS?! But seriously, I waited until level 7 to buy them. Bad plan.
Cost progression is fine. No major issues or concerns there.
I think they cost the right amount but hard to tell since i didnt understand the upgrading system to well
It is slow at first but picks up in later levels.
Only made it to level 2, so not sure.
Didn't reach this point - too challenged at playing video games, sorry
The cost progression seemed reasonable.



Overall they cost an appropriate amount. I was hoping for cheaper shields because the ship does not originally come with shields and they were quite expensive to install.
Yea
yeah :) I thought it was reasonable :P
Cost progression was good.
Yes
The hull costs stops at 255. Don't know if that is intended or not but it seemed like I could upgrade it indefinitely.
Seemed fine.
It was difficult to get past the starting weapons and on to the shields and blasters

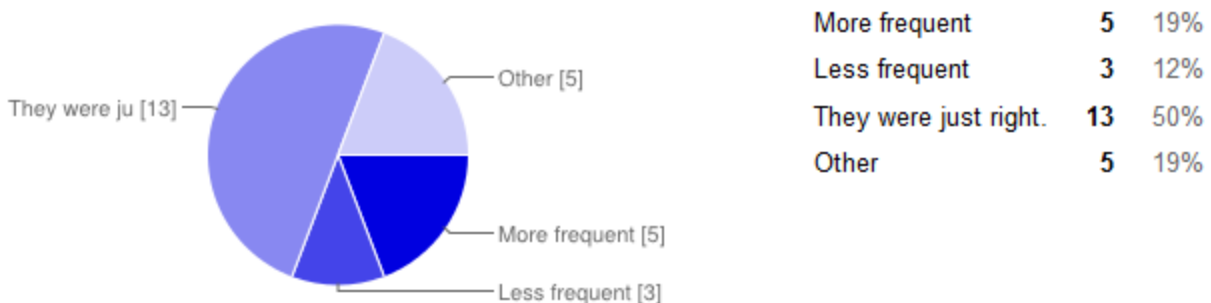
**Table F.1.9** Did the upgrades cost an appropriate amount?

**Do you think the money drops should be more or less frequent?**



**Figure F.1.10** Do you think the money drops should be more or less frequent?

**Do you think the crystal drops should be more or less frequent?**



**Figure F.1.11** Do you think the crystal drops should be more or less frequent?

<b>What do you think about the normal enemies?</b>
Fun, appropriate power. The invisible and reappearing ones were my favorite.
The normal enemies were fine, but there annoyingly many of them.
The normal enemies were okay. The enemies that moved fast were a bit of a pain to dodge. The enemies that turned invisible were kinda cool.
I shot and destroyed a lot of the enemies offscreen before they were able to fully appear.
Really cool! I liked the ones that went invisible. That was a shock. Radar upgraded twice should show them with a red outline.
I thought the enemies were diverse and non-repetitive. My favorite enemy was the ship that would fade in and out of visibility.
I liked the normal enemies who moved and didnt move the big enemies were harder but it made me happy when i beat it on level 1
I like the camouflage/invisible units :P they look cool also the sppey ones are sometimes annoying :P
Mines were kind of hard to see, but that's the point I guess :)
I liked the black triangle enemies. I also liked the gray ships because they were a challenge based on the number of them but they were not super difficult to defeat by themselves.
The little laser shooting ships that the boss ship spawns made it a bit too tricky for me. Maybe wait to have them added until a later level, they stopped me from getting past level 2. The asteroids were nice because they dropped repair crystals, and the normal formation ships weren't bad either.
They are standard enemies that are bland. The cloaking enemies are interesting but it would be cool if they didn't just go straight for you.
Some enemies moved VERY fast. damage and health seemed appropriate though
The normal enemies were interesting and I thought that their health and damage scaled well into the later levels. I think the most interesting enemies were the ones

that would rush you when they got too close and you had to shoot them or dodge them real fast. I also thought the enemies that move to a location on the screen and then started shooting at the player add to the difficulty of the game because they can cluster really hard if you don't take care o them.
Pretty good basic normal dudes
The cloaked guys were perfectly cloaked yet still just barely visible.
Big guy with the missiles kept me busy, i liked them all.
They seemed fine, except maybe the really fast ones should have less health so you have a chance to shoot them down. I liked the enemy that shoots from behind you
Most died very quickly. I liked the ones that went invisible.
From what I could tell there were suicidal pilots and shooting ones. Suicidal ones were annoying
They were good, but maybe increase their life
Health was fine, but definitely became harder to deal with as they could take more hits.
Normal enemies were fine. I probably liked the asteroids best, but that's probably because they don't shoot back and I could pick up crystals.
Normal enemies were good. Best enemies were the ones that shot from behind you. Need waves of more of them at once in later levels.
They were fine. Good amount of challenge.
Damage, and health were both good. There was variety between enemies and the different looks on them immediately told me that there was something different about each one. Later on though the small minions used to just speed by and kamikaze me. That got a little hectic lol. the enemies that faded in and out were a nice touch and were probably my favorite enemy of them all.

**Table F.1.12** What do you think about the normal enemies?

<b>Did any of the enemies fail to add something to the game?</b>
--

no
Suicide enemies seemed to be too durable. Many should attack you but with lower life. Mines made it too easy to kill the mini bosses. Their damage should not apply to other enemies.
They all seemed similar
Nope, they were all fun and interesting.
N/A
The teleporting enemies didn't add much difficulty. The enemies feel somewhat disconnected from their weapons, so for example, the enemy that went up and down the right side of the screen felt like it was just sitting there, and also there were randomly more. I'm not sure I got my point across well.
The only enemy type that I thought was too similar to another were the enemies that turn invisible. As long as you know they're there (and it's fairly obvious) then they are pretty much the same as the enemies that just fly across the screen.
The mines were pretty easy to dodge, but they were good for points.
Most of the enemies were very similar- they moved linearly and appeared one at a time. The bosses seemed identical with their shared pool of moves.
hmmmm i think the bosses are too similar to each other. Like they have a similar attack pattern also you can take out like multiple missiles with a single laser shot.
Nope!
They were individualistic, i could also easily identify which were bigger threats
No
n/a
Nah, they were good.
Not really.
I think they are all great, i really enjoyed playing this. It is addicting. I could do much better if i had a joystick controller, i dont do well with keyboards and 2 hands.
Most of the ships seemed to do same thing, there
i liked the enemies

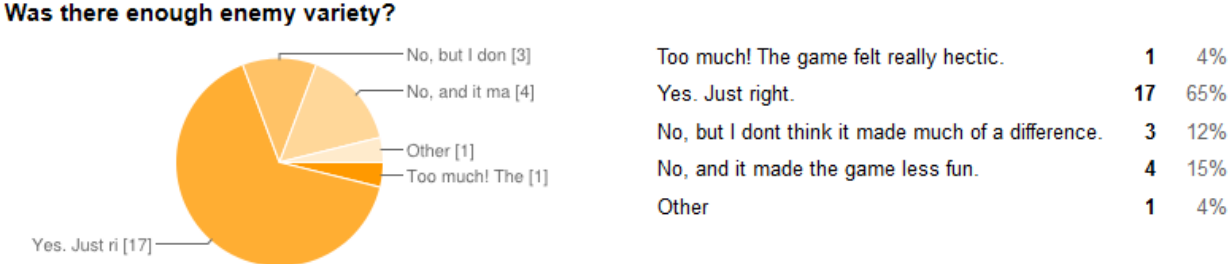
The ones I saw were good. I mainly saw the regular ships, asteroids, mines, and the big bad at the level end.
Some just died too quickly.
The boss battles seemed to have similar tactic between the different levels during the middle stage when they went to the far end of the screen and went up and down firing missiles. Spawning the small enemies as well was a nice change up.
The mines were too slow to be of any consequence, perhaps making them cloak like the enemy ships would improve their usefulness

**Table F.1.13** Did any of the enemies fail to add something to the game?

<b>Can you think of a new enemy type?</b>
Enemies that have their own version of the blaster beam, enemies that exit off the top or bottom of the screen, enemies that appear from behind you, magnetic mines that are only vulnerable when you get near them although they follow you when you do so, enemies that slowly move in well-formed formations towards you
No. Sorry
Enemy more powerful than the normal enemies, but less powerful than the boss, maybe 1 or 2 of these throughout a level
A large ship that splits into two smaller ones (maybe multiple times)
ships that shoot in 360
ALIENS
Maybe an enemy that teleports to various locations or towards you while shooting can replace the invisible guys.
Space cats with laser eyes. And space cows. And space Australians.
North Atlantic Right Whale
A ship that can circle back from behind the player, as in a ship that doesn't simply fly past the player if destroyed.

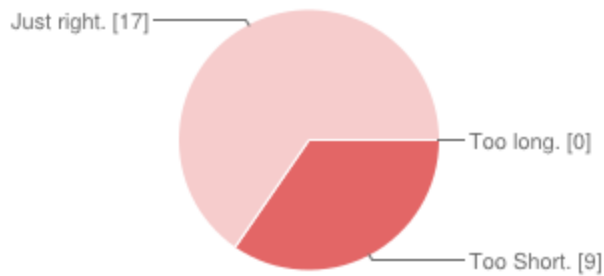
a space dragon or alien that is mean or gundam type robots with swords or guns or things that shoot out cool blades or enemies that you have to beat by doing specific things or in a specific order
Bomberman, orbiting enemies
Enemy with spinning shield you have to hit around.
An enemy that goes from left to right instead of right to left.
Dust clouds
From one that I saw in Galiga, maybe doing an enemy that loops around and fires lasers might be a cool addition. The big red enemies that sort of hopped around the edge of the screen were welcome target changes.
Not sure what you have, but you can add some sort of barrier that makes it harder to maneuver the ship. Maybe 2 enemy ships that are bound together. Or maybe a comet that occasionally streaks from top to bottom.
Maybe, but I don't think the game needs it.
teleporting units

**Table F.1.14** Can you think of a new enemy type?



**Figure F.1.15** Was there enough enemy variety?

**The length of the level was:**



Too long.	0	0%
Too Short.	9	35%
Just right.	17	65%

**Figure F.1.16** The length of the level was...

<b>How is the progression of the game?</b>
At first I thought the game was going to stay really easy but as i hit levels 4 and 5 it really started to pick up difficulty wise and I really liked the difficulty spike. In this way I believe the game progression worked well.
Good as far as I can see. Though I have to ask if the 1st level boss can be defeated with just lasers? If not... then the initial choices of upgrades can keep you from progressing at all.
Early on you could get stuck with one of the monster waves and without any AOE available at that time it was very difficult. The earliest I got it was level 3 which seemed too soon. On the other side in later levels I frequently got the waves with very few enemies and it wasn't much of a challenge.
Difficulty curve is way off. Felt as though i wasnt given any instruction for first level. First boss was much too difficult. I think it should be impossible to lose to the first boss, however that was not the case. Maybe the first level doesn't need a boss?
I died when swamped with a million of the same enemy that took forever to kill to get to the boss. If I tried again I could probably got passed it.
Good
Good difficulty curve.
Difficulty was fine. Some enemies I saw either very infrequently or only very late in the game, and they were interesting enough that I would have liked to see them more.
It is just right.

It seemed to pick up after level 3 and would be harder if the right upgrades weren't picked up
First level was a bit too challenging, but I'm also kind of video game-challenged.
Couldn't tell the difference because the ships looked the same
I don't think the curve was bad. I thought it was reasonable.
The difficulty did not seem to change although the increased damage and armor of the enemies was pretty noticeable
Seems okay. I didn't get too far.
It started out a bit too difficult I feel, but the curve was about right.
I could not get past level 2. The boss kept spawning too many little laser shooting ships all at once. I'm also really bad at dodging the laser patterns though and kept taking damage.
I enjoyed that the first level was never the same. Only saw the second level once, but would like to play it more.
Game starts out somewhat challenging, but becomes progressively easier as the player upgrades his ship and has more money.
Difficulty seemed fine until around level 4 where it seemed that the enemies started to move pretty fast and started to try and ram into me. Other than that and the boss battles changing up their attack patterns I thought it was pretty good.
I only passed the first level but i think that is mostly due to my gaming inability and not your game
The difficulty curve was just right. New enemies and elements were introduced in each level, but there was never too much introduced to the point that the game became hectic.
That's no moon. the boss got pretty difficult pretty fast
I feel like the first level was too difficult because it took me several attempts to beat level 1 (although I'm not really all that good at games anyway) but I feel like the last enemy was too difficult to beat for the first level. It's spawn was also kind of scary and made the first level more difficult than I thought the first level would be but I liked that idea and thought it would have been good for other levels,
The game progressed in a reasonable manner. It didn't get boring within a few levels.

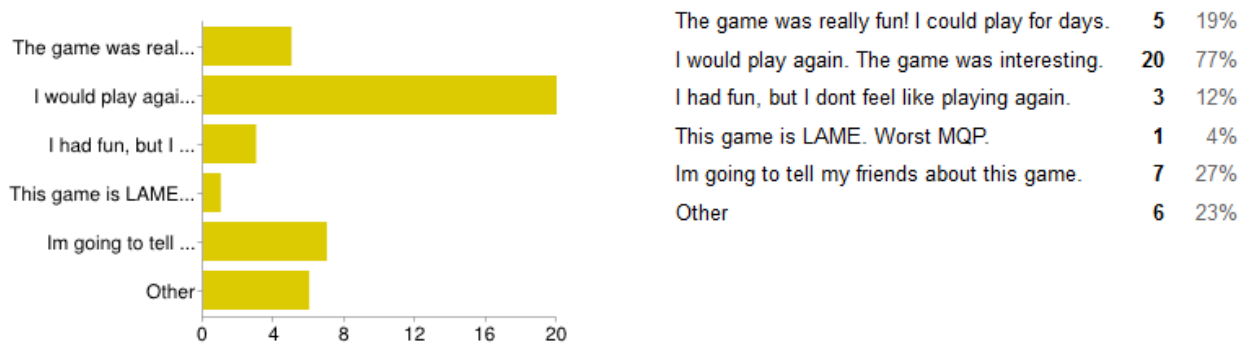


**Table F.1.17** How is the progression of the game?

<b>What level did you get to?</b>
36
3
2
1
7
6
5
4
9
I think 7
16
No idea, beat Kirk though
1....
5 (I think)
At least 17

**Table F.1.18** What level did you get to?

**Feel like playing again? Was the game fun?**



**Figure F.1.19** Feel like playing again? Was the game fun?

<b>What do you think of the Menu, power select screen, and crew selection screen technically?</b>
The purchasing screen was a little unintuitive.
They functioned as expected.
Seems cool. Umm, once selected I couldn't change someone in my party to another job.
Everything worked as expected. Felt like there should be a reason to pick some characters over others but there were none.
Yes, they worked well.
Each of these screens seemed functional, but the parts that were clickable didn't exactly "pop."
The "options" screen on the main menu should show options instead of controls. The sound settings did not stay the same from one level to another. The timing of the buttonclick sounds seemed to vary on the main menu. If you changed characters too fast on the crew selection screen the characters would talk over each other. It would have been nice to return to the shop screen after leaving it and going to the power screen.
Don't understand the crew system at all
There was some lag between button presses.

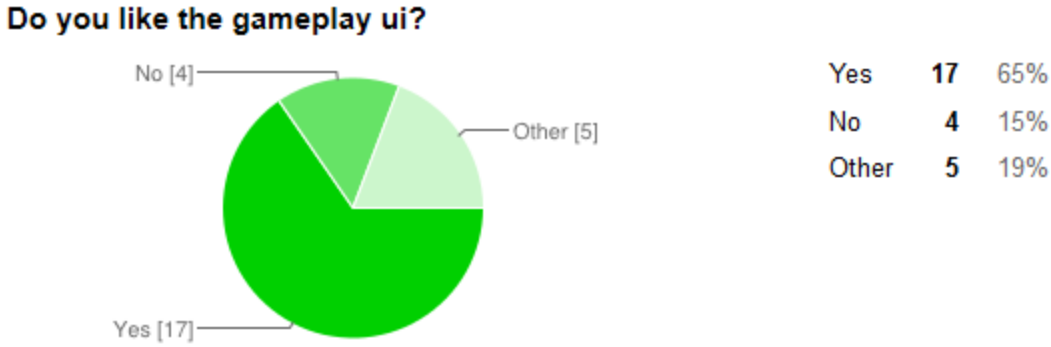
that was good the buttons worked and it seemed normal
When I clicked an upgrade to purchase it, I was confused that the "purchase" button stayed in the middle, instead of next to whatever I was trying to buy.
I like it. Although two of them weren't saying anything. It was pretty easy to understand. However I feel like the characters you choose doesn't make much of a difference. It would be cool if they give you different stat boosts :P
Alright the crew selection could be streamlined more. Power select screen was good. The menu options did not save between levels (I had to keep muting voices)
Almost everything functioned as I imagined. The only thing I didn't realize right away was that on the upgrade/shop screen, you could press the name of the upgrade to see the description and then press "purchase" to actually buy it. At first I thought pressing the name would automatically buy the upgrade.
Yes
Very low graphics quality for some of the background graphics in menus. Sometimes it was hard to read due to this low quality. Options button should be relabeled 'Controls.' Would be nice to be able to view controls menu while playing
Yes! I think they were all good
All very straightforward.
Yep, cool dialogue for clicking on the crew
Yes, all was intuitive.
Yes, they functioned well and as expected.
Well put together
The buttons all functioned as intended.
For the most part. Some of the buttons were hard to press or I had to click on them multiple times but other than that it was fine The characters voices would run over each other if you double clicked their portrait their audio wouldn't stop and repeat it would keep going and start up each time I clicked. At one point i had half the screen talking and sounded like I was in a crowded room. Also I don't understand the use of having the different characters other than for background talking. Their voices did break up any silence but other than that it didn't matter who I chose for what position. If each character had different ups and downs to their skill set that would make it a lot more interesting but given the time limit it works well.

**Table F.1.20** What do you think of the menu, power select screen, and crew selection screen technically?

<b>What do you think of the Menu, power select screen, and crew selection screen artistically?</b>
Artistic work on menu was meh.
It was pretty yet simple :)
The artistic flow works well.
i liked the crew selection artistically i also liked the voices it added to the game experience
To add to the story of the game (hinted at by the title) maybe include a paragraph explaining your situation before you select your crew
The power select screen seemed formless and confusing.
Nothing was too confusion or unclear.
Purchase button and the money upgrade button seemed out of place.
The screens looked alright. I think that the upgrade screen and the power screen (to a lesser extent) were a bit cluttered but besides that everything looked good.
The voice overs are awesome. Look over your little character descriptions though...
It was good. Might want to include a note that you are "spending/distributing power levels" to make it more clear that you have "funds" to spend on upgrades.
The flow was fine. I was not a fan of the the text/font/kerning, it was too anti-aliased, in contrast to the graphics of the rest of the game.
Buttons look not pressable. The grey is dull background. The text in crew selection screen doesn't really match with the other text on the screen.
Not overly confusing, It all seemed very well done.
They all seemed pretty good. Easy to understand and yet not boring artistically.
thumbs up, +1
It looked really nice.

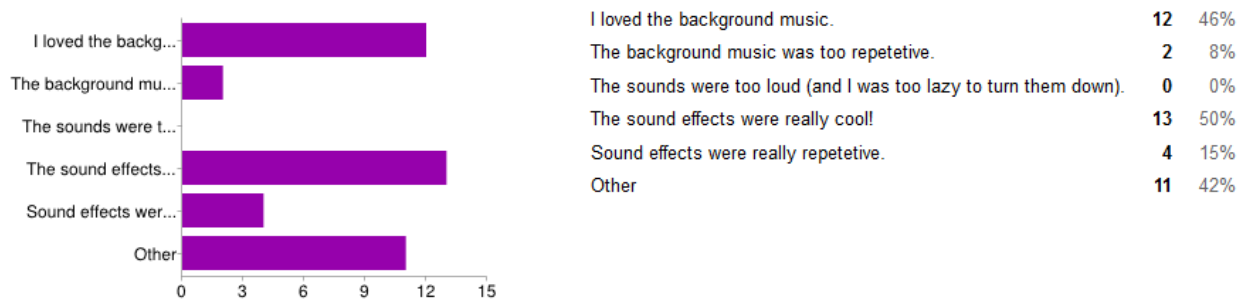
All looked about right, had to figure out how to pick crew.
Some of the characters art look a little awkward with either some details that confuse the look of the character. Some of them also look like they had more time spent on them than others. Also the characters have some similar traits among them that don't differentiate among them.
Yep, cool dialogue for clicking on the crew
It made sense once I clicked around
Can power selection buttons have an arrow pointing at them the first time?
Everything looks great!
Some of the text was really blurry in windowed mode... "name" and "character profile" in the crew selection screen, "shipyard", "engines" and "cost" in the upgrade screen (they seem to be part of the background; they'd be much clearer as unclickable buttons). The font sizes varied dramatically, especially on the crew selection screen. The tutorial button on the main menu could probably be switched out with the options button.
Cool art style. Could use some sharper colors. I understood how the game would progress by the second stage and what menus I would be seeing next.

**Table F.1.21** What do you think of the menu, power select screen, and crew selection screen artistically?



**Figure F.1.22** Do you like the gameplay UI?

**How were the sound effects and background music? Were they annoying or too frequent?**



**Figure F.1.23** How were the sound effects and background music?

<b>Do you think the characters are interesting?</b>
I like the characters. The lizard guy is my favorite. I like the dialogue, but the in-level dialogue got a little repetitive.
Didn't care at all about the characters
Sensors are detecting mines. he sounds weird.
The dialogue got a bit too repetitive. One female character kept complaining about her power supply and she got really annoying. I liked the guy who said "Its a trap".
No idea, didn't have a chance to try them all out. The dialogue was good, but obviously it gets slightly repetitive.
I liked the lady who kept talking about her mom's opinion on lunch, or something.
The characters seemed well designed and unique, however, this was one of the things that I didn't focus that much on.
The one Kyle voiced and Crom. I kinda ignored the dialogue because I was trying to shoot things.
The not-Groot character is funny!
chrom :) its awesome :L
Crom, the blatant use of and reference to Groot was funny and interesting. By far my favorite character.
Good, no favorite

There doesn't seem to be much of a difference between characters other than dialogue.
They're interesting. I'm curious about whether choosing different characters affects anything. Yes, the intros were neat.
This part didn't seem to add much to the game besides a few interesting lines. The tips were helpful, but too redundant.
the dialog is cool and i like the old dude character i liked how he was done artistically
crom, dialogue of some characters was very repetative.
I liked crom and want to throw the rest into a black hole.
Dialogue is too frequent and repetitive
Dialogue in game was quite repetitive
I love the crew dynamic. I hope a future update involves crew stats and abilities. I like the dialog.
If the characters asked me "did you know ___" one more time I thought I would scream! It'd help if there was a piece of code that limited the "did you know" dialogue to the first level. It'd also be nice if they used their catchphrases just once or twice in each level. I thought the Groot lookalike was funny especially where it says specifically that he is not Groot. Besides that I really liked the red cowboy guy, the space professor guy, and the girl who reminds me of Raven from Teen Titans. The dialogue and characters were varied and interesting.
Yes! They were all so interesting!
NA because I could not hear anything

**Table F.1.24** Do you think the characters are interesting?

<b>Anything you would change or add?</b>
Not that I can think of.
Give enemies other than the boss missiles. Add sub bosses or bigger packs of small

enemies. Killing the group of three closely spaced enemies or the giant enemy wedge was a lot of fun.

N/A

Not that I can think of other than the suggestions given previous

I would say that you should start with the lowest level blaster and the lowest level shield. Also have at least 1 power point to allocate at the beginning of every level. Other than that more final boss attack patterns and an objective of some sort (besides getting on the leaderboards) would be good additions.

1. Sound menu- to keep everything the same font size I'd change "sound effect volume" to "sound effects" and put the title "volume control" at the top of the dialog box. 2. I'd make the volume options variables constant for the entire program, not just by the level 3. I'd add text to the tutorials page for those of us who don't have speakers and / or are deaf. Also, voice volume doesn't work on the tutorials page which is fine because whoever's speaking has such a charming voice. 4. Typo on repair level 1: "The can be repaired in battle" 5. I'd find a way to make the bullets take up less memory on the boss battles. Sometimes when I fight them I'm hit with a massive lag spike that freezes everything and makes everything jump around a second later. Also, the lag spike messes up the controls... if I'm flying right and the lag spike hits I have to press "d" again and release it to stop flying right. 6. I'd put the HUD on the outside of the playing field. It's awkward when you're trying to dodge bullets and the field gets in the way. 7. I have no idea what the emblem is under the missiles in the shop so I'd make that clearer. 8. I'd reduce emphasis on the voice acting part of the game because that's a ton of work. Instead, I'd make each of the characters have their strengths and weaknesses (e.g. Smithy is a good pilot, recruiting her will boost your acceleration by 1 or Scotty will randomly repair your ship or Groot will completely heal the ship once when your health is near 0). It'd be cool if your characters could get experience, and bump up their abilities, too. 9. I'd have the enemy strength section of the HUD only appear when near a boss 10. I'd make being hit more noticeable. The ship could flash red or shake if you're hit by a laser. 11. I'd reattach the charge meters for the missile and blaster to the space right next to the ship- it's where I'm staring most of the time and I can't look away or else I risk being hit by enemy fire. 12. I'd make the enemies susceptible to asteroids too! 13. I'd change the title bar from "unity project" to "Conquest of the Verse" 14. I'd make the bosses' movement different because they're all very similar. I'd also throw in some that are a bit more intimidating and possible to dodge. Like, if there was a massive ship taking up the entirety of the right side of the screen and it aimed, froze, charged up and fired two blasterbeams that'd be cool. 15. Typo on Blaster level 2: "The blaster is a intimidating" 16. Typo in "interceptor class engines" upgrade description (maybe it was cut off?) "... if you place extra pow" 17. There was one texture on the background around level 5 or so that looked like the normal background painted with a brown spraycan tool and a bunch of paintbrush splotches. I'd clean that up a bit. 18. In order



to give a strong illusion of movement while on the main playing field I'd try to see how it looks when you have a starry background moving at one rate (1 pixel a second or whatever to the left) with an alpha channel containing planets or small bits of debris over it that move over it at a somewhat faster rate (1.5 pixels a second or whatever to the left) 19. I'd use at most 2 different font sizes
Personalized ships? Like choosing a color (a pink ship would be awesome!)
The upgrade system is well designed technically. However, I would change the system to make it more aesthetically appealing, and one that is easy to understand when first looking at it.
No
new enemy types like gundam models and pop up screen for stuff to explain how it works better
Perhaps different levels of difficulty. Some that had a more steep difficulty increase and some that had a less steep one.
There should be some kind of different in putting characters in certain spots versus other spots and other characters.
nope :D
Maybe make the shield an earlier upgrade. I feel like I would have made it to higher levels with some sort of defense.
Easier first level?
It would be nice if there was another section on the ship to power. Not sure what it would be
I prefer faster pace, like faster enemies, faster acceleration, etc.
EMP upgrade so enemies stop shooting you for one god-damned second. More varied flagships.
Maybe a way to adjust to a beginner level so i could get further.
No, seems good!
There wasn't enough visual feedback for the game. No subtitles, no on screen instructions for the tutorial, too little enemy visual variety, etc
ooh what if the missiles can split so like one shot splits into multiple
More activatable abilities like a time dilator or something.

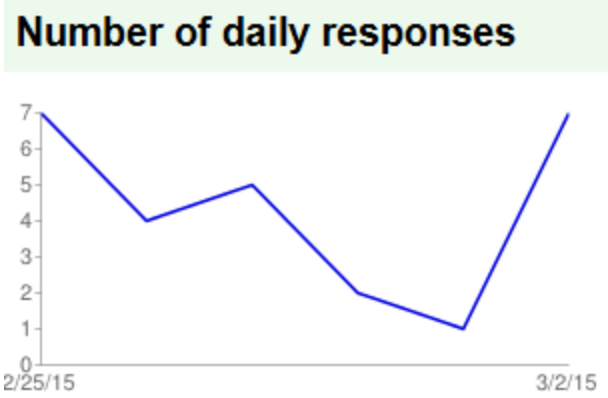
Later levels adding two bosses at once.
Not really

**Table F.1.25** Anything you would change or add?

<b>Any other thoughts?</b>
Awsome game, i enjoyed playing it!
Sorry for the long list of stuff! If you're presenting next week I'd totally consider cleaning up the blurry text, fixing the typos, and cleaning up the cosmetic stuff before anything else. Good luck!
i love your MQP Josh
CROM FOR PRESIDENT 2016
Typo on buying button to buy the repair, says repiar rather than repair. Overall great game!
On this form, you want people's honest opinions. Turning some options into jokes or mild insults will skew your results because people won't be honest with you.
I kept dying to the boss in level 2, I'm not great at arcade-bullet dodging games. Maybe scale up the boss with the levels and don't introduce the fighting ships that it spawns right away, or have it spawn fewer fighting ships in the earlier levels. I had 6 or so smaller fighting ships along with the boss on my screen in level 2. I also don't think I realized right away that R repairs the ship. Sometimes when I started the game the laser was already firing, but that may have been a side effect of my mouse. The narration in the tutorial is really great.
I feel that powering radar is quite unnecessary. Thought it was a waste of power, maybe make the radar more interesting.....Make majority of level harder (normal enemies) and make the boss easier
You're wonderful <3
Make it like Touhou
Bug with the health of the ship at the end of the level. Once you have beaten the boss you are still able to heal repair your ship. If you do so it takes a crystal from you but when you get to the purchasing screen the health did not stay.

Nice work.
The game was pretty fun and with some polish it could be a fun little arcade game to play from time to time.
The game, for as much criticism as it may seem that I'm giving it, is actually really fantastic, especially considering the timeframe under which it was developed.
If possible, a health bar that comes with radar would be useful.
There were several spelling errors that I kept noticing both on the home screen (I believe) and the character selection page in the characters' descriptions. Also, it is possible that I did not understand what was going on because I lacked sound but the tutorial was not very useful. it allowed me to fly around and shoot but it did not really help in figuring out what was the purpose of the game, what I was supposed to do, how to shoot, how the guns differed from one another, what they cards did, or what the crystals did.
Captain Poopface McButts will return
--. .-- ... C A T S
I <3 this MQP
This is amazing and Im going to go play it again.
The crystals to repair didn't save the amount they repaired once you exited the level. Was this intentional?

**Table F.1.26** Any other thoughts?



**Figure F.1.27** Number of daily responses

## F.2 Observational Feedback

The following is raw feedback, either taken as notes from the team or given directly by playtesters as an afterthought after the survey. A horizontal dashed line represents a new person. None of the data is altered in any way.

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cons:

- Menus are distractingly low resolution
- Voice acting is distractingly terrible (maybe a plus lol)
- Bugs in playing voices in initial crew selection (will play on top of one another)
- Big one: The way the ship flies is very sluggish and floaty. It gets frustrating.
- shooting and getting hit are a bit low impact. Graphically it seems like its not doing much and the sounds is a bit underwhelming
- Backgrounds are kinda low resolution
- typo in menu "Repair level 1. The can be repaired in battle."
- Bosses should be visually/audibly distinct. They are all the same at the moment
- Levels seem a little short

Pros:

- Looks really good
- Music is really good
- The RPG mechanics are really cool. I like the idea of carrying stuff over between levels
- I like the currency system
- Enemy variation good
- Like how difficulty ramps up in later levels, but hitting the boss is very unforgiving and offers little counterplay.

---

get rid of radar icons when not used  
Make alert appear when used  
Anchor images properly (Portraits/power bars)  
Stretch radar less  
Make Level smaller

- 
1. Name your window. Right now it says "Unity Project."
  2. Does Unity let you disable the splash screen?
  3. Your graphics settings should be set to the highest setting by default. It's unlikely a game of this type would put a lot of strain on the processor.

4. When selecting characters in the character screen, you can click repeatedly. While audio is playing, you shouldn't be able to click again to hear a new sound clip.
5. Be wary of "arrow to the knee" problems. If the player hears the same audio clip a few dozen times it gets really annoying.
6. Change the favicon file for the application.
7. In the shop menu, "Purchase" either needs a more prominent color or needs to be moved to the bottom of the menu. It's confusing because there are upgrades above and below the button.
8. In the Market, there is no description for any of the content. Clicking on them sells immediately. Either make a popup dialog or link it to the purchase button.
9. The game is virtually impossible to play with a trackpad. Have you considered an alternate control scheme, and allowing the user to pick between?  
WASD move  
Q E aim up/down  
Spacebar shoot  
R repair  
etc
10. There is no control indicator for the Blaster or Missiles. It's unclear to me how a new user would know to use them.
11. Update on #5. Fix this please. It's nothing short of annoying. Reduce the frequency of dialog by about 90%. In one mission I swear the engines went out a dozen times, and the captain offered to take us out to a pub five or six times. Either increase the variance in dialog or reduce its frequency. Are you using a new seed for every speech instance? That might help.
12. There is an upgrade that 'reduces damage by 1.' How much damage do enemies do? If they do 10, it's not worth it. Can this upgrade prevent you from taking damage less than or equal to your DR?
13. Missiles seem ineffective. Focus on adding upgrades to the lasers to make them more interesting. Perhaps a beam laser, a helix laser, etc? You have other weapons, but 99% of the time you use the laser. Despite that, there's only one upgrade (and it costs alot) that changes the core functionality of the laser. Add mechanics to the laser that make it more interesting. Point and click gets old very quickly.  
In our game, the abilities unlocked were in a tree format. However, when you upgraded abilities, here's what happened:  
There were 10 levels for all abilities.  
At levels 1, 5, and 10 new core functionality to the abilities was made.  
At levels 3 and 7 a new passive was made.  
At levels 2, 4, 6 and 8, existing abilities were improved.  
Consider maybe making the laser damage upgrade do something like that. Alternatively, allow the player to select from several different laser types. This would allow the player to experiment with different builds as they play, increasing replay value.

14. Does the hitbox of the ship account for the tilt of the ship? At present, it doesn't seem to be, but maybe I'm wrong. It seems like even if the ship is tilted, laser collision depends on the original, level hitbox of the craft.

15. There was a dialogue line that bothers me a lot. "They're flanking us!"

1) It's impossible to flank someone in a 2D game.

2) Even they were referring to the 3D, they *aren't* flanking. Flanking means attacking the sides; not the top, bottom, front or back. They aren't doing that. They're just running suicide head-on.

16. Is it possible to get some additional flagship textures? The bosses seem repetitive. I'm sure at least some of your art is from here, but [opengameart.org](http://opengameart.org) is a beautiful thing.

17. What's the plot? Who is shooting at you, and why are you shooting at them? It's a bullet-storm space shooter, it doesn't have to be complicated. But you go to the trouble of writing a dozen characters, who have this very rich personality for each of them, but the core of why they're doing what they're doing is missing. A quick paragraph at the beginning of the game would go a long ways.

18. Consider altering the behavior of some of the bosses.

19. Missiles should drop from enemies. Credits are short. If they do so little damage and cost so much to upgrade and purchase missiles, why not counteract that by making them drop from enemies?

20. Credits should come less for free and more from enemies.

---

The "2nd boss" moves too quickly and slams into the player too easily

Repairing the hull in game is absolutely not obvious (put points into hull repair but didn't end up repairing and died)

Unclear as to what credits are

Boss should potentially fire slower in the earlier levels, and ramp up

---

Missiles too slow. Don't do enough damage. Useless.

- Move faster and bigger explosion. More damage.

Laser Gun is OP

Someone confused about missile "lock-on"

Confused about blaster firing (probably because they had no crystals)

Recharge timers aren't visible enough

Blaster is satisfying. Mystical residue on the blaster.

Shields. Wish they had started with it. Didn't know how much damage it blocked.

Buying upgrades is tricky at first. Popup to explain?

Too easy to get late game weapons. No mid game weapons.

Confused by +- buttons. Went for shields (deactivated) first

Purchase button should be bigger and in the bot-right of the screen

Power screen is limited/upgrade is open. Interesting.

Should be able to fully power everything.

Power/Upgrade relation confusing at first. But figured it out eventually.

Spent too much on repairs (unavoidable bullets? Hah.)

Couldn't afford shields until later levels. Was bad for them.  
Hull cost stops at 255. Intended?  
Money more frequent past lv 20?  
Didn't know how much money was in each pickup.  
Make money size based on the ship you destroyed?  
Less crystals past level 20  
Overall money + crystals drops were fine.  
Destroyed lots of enemies off screen. Meep  
Radar upgraded twice should show Ambushers with a red outline.

**Konami code plz.**

Keys get "sticky"  
Hardened shields OP  
Enemy variety is good.  
Level length is good/short.  
Couldn't change character to another position  
Sound settings didn't persist  
Buttonclick sound varies?  
Return to the upgrade menu from the power menu  
Purchase + upgrade money button out of place  
Fix character descriptions  
Repetitive dialogue.  
Use player's catch phrases more?  
Typo on buying button repair  
Healing after boss death doesn't transfer health over to upgrade screen.

- 
- Character Select
    - Characters should affect ship stats
    - Time to fly button should POP (Crew Selection)
    - "Select Crew" title should be larger
  - Power Management
    - Back-glow or more POP to power management buttons
    - More explanation on systems you can't use yet
  - In Level
    - Make level 1 the tutorial
    - In level: Make score larger because its important
  - Player Ship:
    - Damage: Flash ship and Health bar
    - Noise for crystal and credit collection

- 
1. Sound menu- to keep everything the same font size I'd change "sound effect volume" to "sound effects" and put the title "volume control" at the top of the dialog box.
  2. I'd make the volume options variables constant for the entire program, not just by the level

3. I'd add text to the tutorials page for those of us who don't have speakers and / or are deaf. Also, voice volume doesn't work on the tutorials page which is fine because whoever's speaking has such a charming voice.
4. Typo on repair level 1: "The can be repaired in battle"
5. I'd find a way to make the bullets take up less memory on the boss battles. Sometimes when I fight them I'm hit with a massive lag spike that freezes everything and makes everything jump around a second later. Also, the lag spike messes up the controls... if I'm flying right and the lag spike hits I have to press "d" again and release it to stop flying right.
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7. I have no idea what the emblem is under the missiles in the shop so I'd make that clearer.
8. I'd reduce emphasis on the voice acting part of the game because that's a ton of work. Instead, I'd make each of the characters have their strengths and weaknesses (e.g. Smithy is a good pilot, recruiting her will boost your acceleration by 1 or Scotty will randomly repair your ship or Groot will completely heal the ship once when your health is near 0). It'd be cool if your characters could get experience, and bump up their abilities, too.
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15. Typo on Blaster level 2: "The blaster is a intimidating"
16. Typo in "interceptor class engines" upgrade description (maybe it was cut off?) "... if you place extra pow"
17. There was one texture on the background around level 5 or so that looked like the normal background painted with a brown spraycan tool and a bunch of paintbrush splotches. I'd clean that up a bit.
18. In order to give a strong illusion of movement while on the main playing field I'd try to see how it looks when you have a starry background moving at one rate (1 pixel a second or whatever to the left) with an alpha channel containing planets or small bits of debris over it that move over it at a somewhat faster rate (1.5 pixels a second or whatever to the left)
19. I'd use at most 2 different font sizes

---

1. Lasers OP. You can play the entire game with just lasers. Blasters take too long to recharge and don't do enough damage, and missiles are expensive. If you get damage upgrades for the lasers, and then follow up by level 4 or 5 with the tri-burst, you can rape



every boss. The boss isn't even a threat. The little enemies with tri-burst are annoying because the spread on the lasers is too wide. Two of the three lasers miss their target for small enemies.

2. Consider reworking the blaster into a sweeping screen nuke. The beam would start at the top and sweep down, damaging everything on-screen. If there's one thing you DON'T need in this game, it's single target damage. You have lasers for that.

3. Crystal storage is annoying. While it's a fundamentally sound concept, what does it add to the game?

4. Consider increasing credit drops as levels increase and removing the credits per level. Force the player to work for their money. You only pick up about 30 credits per level. The value of drops should probably increase depending on the level. To compensate for the extra credits, remove the income upgrade. A couple of income upgrades and you're rolling in credits

5. [BUG] Using Auto-Repair after defeating the boss consumes crystals, but the repair that's performed doesn't carry over to the next level.

---

Did not realize that holding down the mouse allowed it to fire continuously

Is not very good at these type of games. Just kinda gets hit by things.

Pauses for a solid second before firing a missile and returning back to normal laser fire.

---

Players enjoy selecting characters from the character selection screen

Seems to understand the power menu

Really enjoys the LEVEL COMPLETED ending to the level

Didn't understand how to fire missiles. Need controls to be readily readable.

Used repair crystal in the very end, uses crystal but doesn't keep the heal. (BUG)

Doesn't know that you can hold down mouse to fire

Definitely hates the 2nd wave of the second boss

Bought the blaster upgrade, but did not assign power to the blaster

Was unclear of how to add to power supply

---

Player 8 and 13 does not have audio clips

Thinks the player select screen is funny

very quickly (matter of seconds) learned that you dont have to click repeatedly to fire.

Very easily understood to repair hull at upgrade screen

Didnt understand that the blaster used crystals.

Died on the mass spawn of dogfighterC from the boss

Can be played by players with a dislocated shoulder

---

The tutorial is unnoticable on the main page, got skipped

The player is unaware of the controls to start, and is thrown into the game

Mines should be more obvoius

Player has a really hard time with the dogfighter B's

Player is trying over and over again to beat level 1

---

Need Subtitles for Tutorial

Must have pop-up to reinforce tutorial speech

Tutorial takes too long (finding the keys is easy and quick)

Left tutorial because it took too long.

Do characters effect ship play?

Power Level:

Can't choose stations on ship for power and doesn't know why. What does that system do (needs more descriptions)

Believe Mines are very dark rocks

Knows to pick things up, doesn't know why.

Upgrade Screen

Text appearance is different in Upgrade screen (annoying)

"I don't know what these things do"

Wants a lower level upgrade for shields just to have them.

After Level 1:

"Boss Health bar is still there and I don't know why"

Background are all the same (No theme changes) "Like at level 10 do I go to mars?"

Characters seem to play an insignificant part in the game.

Options menu DOES NOT HAVE OPTIONS. "it's mislabeled!" (Very jokingly upset)

---

Chose to click to fire. Hasn't tried holding it

Doesn't realize when damaged

Upgrade screen: Doesn't know that credits = the card image

Repair option is unclear how to use. Didn't know what key to press, didn't know that it requires crystals

Opted to skip tutorial

Boss AI 2:

Got boss to reduce wave shooting after firing a missile to start

Repeated the Level Complete noise (likes it)

Blissfully unaware that repair doesn't work properly at end of level

After upgrading laser, likes to sit on right side and shoot enemies before they show

Upgrades to burst shot: "Oh, this is so cheap now"

Only upgrades blaster and purchases more credits at end of level

Level 16: Gritty asteroid background scrolled past the image

# Appendix G: Communication Records

Ref #	Time	Length	Relevant Media	Media Used	Indicator	Participants	Relationship	Instrumentary	Way of Feedback	Education	Lesson used	# of Images	About	Topic
51008F	10:06	27 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Document Writing	Goal Setting
51009F	10:03	60 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	2 Art Pipeline	Art/Tech Med
51138F	11:28	7 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Programming	relat/Information F
51134F	11:34	17 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Art Pipeline	Art/Tech Med
51288F	12:35	11 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	1 Art Pipeline	Art/Tech Med
5255F	14:55	1 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Scheduling	Availability
7105F	13:05	12.4 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Art Pipeline	Art/Tech Med
7549F	8:45	75 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Scheduling	Availability
9540F	18:40	255 FB	A	All	A	All	Art to All	Computer	FB	None	None	None	2 Scheduling	Availability
9549F	8:48	31 FB	FB	FB	A	All	Art to All	Computer	FB	None	None	None	0 Audio Assets	Goal Setting
9255F	9:25	150 FB	FB	FB	A	All	Art to All	Computer	FB	None	None	None	0 Scheduling	Availability
10457F	16:57	1 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Audio Assets	Update
101038F	22:28	655 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Scheduling	Availability
11508F	17:05	3 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Unrelated	Update
12105F	11:05	245 FB	FB	FB	T	All	Tech to All	Computer	FB	None	None	None	0 Art Pipeline	Art/Tech Med
3455L	16:55	2 All	FB	FB	T	All	Art to Tech	None	Voice	None	None	None	0 Programming	relat/Problem
5255L	14:55	2 All	Voice	Voice	T	All	Tech to Art	Computer	Voice	Unity	None	None	0 Programming	relat/Art/Tech Med
5202L	13:02	5 All	Voice	Voice	T	All	Art to Tech	None	Voice	Unity	None	None	0 Scheduling	Update
51245L	12:45	4 All	Voice	Voice	T	All	Tech to Art	Computer	Google Docs	None	None	None	0 Scheduling	Availability
51219L	12:15	1 All	Voice	Voice	T	All	Tech to All	None	Voice	None	None	None	0 Scheduling	Availability
51036L	10:36	2 All	Voice	Voice	A	T	Art to Tech	Computer	Voice	Unity	None	None	0 Audio Assets	Art/Tech Med
51124L	11:24	2 All	Voice	Voice	A	All	Art to All	Computer	Voice	None	None	None	0 Scheduling	Update
51213L	12:15	1 All	Voice	Voice	A	All	Art to All	None	Voice	None	None	None	0 Audio Assets	Update
51137L	11:37	2 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	2 Art Pipeline	Goal Setting
51138L	11:38	14 All	Voice	Voice	A	T	Art to Tech	Computer	Voice	Command y	None	None	0 Development	Problem
51008L	10:05	1 All	Voice	Voice	A	A,T	Art to All	None	Voice	None	None	None	0 Development	Availability
51004L	10:04	2 All	Voice	Voice	A	A,T	Art to All	None	Voice	None	None	None	0 Scheduling	Availability
9500L	17:00	1 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Scheduling	Availability
9352L	2:52	1 All	Voice	Voice	A	T,T	Art to Tech	None	Voice	None	None	None	0 Development	Update
9120L	13:20	20 All	Voice	Voice	A	All	Art to All	Computer	Voice	None	None	None	1 Development	Art/Tech Med
91107L	11:07	1 All	Voice	Voice	T	All	Art to Tech	Computer	Voice	None	None	None	0 Art Pipeline	Art/Tech Med
91018L	10:15	2 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	1 Art Pipeline	Goal Setting
91255L	12:55	2 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	1 Art Pipeline	Goal Setting
91018L	10:15	2 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Programming	relat/Goal Setting
91216L	12:16	1 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	1 Art Pipeline	Goal Setting
91001L	10:01	2 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Development	Problem
11390L	15:00	2 All	Voice	Voice	T	All	Tech to All	Computer	Voice	None	None	None	1 Programming	relat/Art/Tech Med
11246L	14:46	1 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	1 Development	Goal Setting
11238L	14:38	3 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	1 Art Pipeline	Goal Setting
11240L	14:40	1 All	Voice	Voice	T	All	Tech to Art	Physical	Voice	Wacom P5	None	None	0 Unrelated	Art/Tech Med
11235L	14:25	2 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	0 Unrelated	Availability
11201L	14:00	3 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	2 Art Pipeline	Goal Setting
11158L	13:58	3 All	Voice	Voice	A	All	Art to All	None	Voice	None	None	None	0 Audio Assets	Update
11117L	13:17	4 All	Voice	Voice	T	All	Tech to All	Physical	Voice	None	None	None	0 Audio Assets	Goal Setting
11111L	13:11	3 All	Voice	Voice	T	All	Tech to All	Computer	Voice	None	None	None	0 Development	Art/Tech Med
11121L	12:15	2 All	Voice	Voice	A,T	All	Art to All	None	Voice	None	None	None	0 Unrelated	Goal Setting
11103L	12:03	1 All	Voice	Voice	T	All	Tech to All	None	Voice	None	None	None	0 Scheduling	Availability
11101L	10:10	1 All	Voice	Voice	A,T	All	Tech to Art	None	Voice	None	None	None	0 Scheduling	Availability
12458L	16:58	1 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Scheduling	Availability
13298L	15:09	3 All	Voice	Voice	A	A,T	Art to All	None	Voice	None	None	None	0 Development	Goal Setting
12211L	14:21	1 All	Voice	Voice	A	All	Art to Art	Computer	Voice	None	None	None	0 Development	Art/Tech Med
12225L	14:25	1 All	Voice	Voice	A	All	Art to Art	None	Voice	None	None	None	0 Art Pipeline	Update
111014L	10:14	1 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Unrelated	Availability
111015L	10:15	1 All	Voice	Voice	T	All	Tech to Art	None	Voice	None	None	None	0 Scheduling	Update



## Appendix H: The Game

Here are the links to download the different public versions of *Conquest of the Verse*.

Final Version	<a href="http://users.wpi.edu/~jbmorse/ConquestOfTheVerse/Conquest%20Of%20The%20Verse.zip">http://users.wpi.edu/~jbmorse/ConquestOfTheVerse/Conquest%20Of%20The%20Verse.zip</a>
Playtest Version	<a href="http://users.wpi.edu/~jbmorse/ConquestOfTheVerse/Playtest_exe.zip">http://users.wpi.edu/~jbmorse/ConquestOfTheVerse/Playtest_exe.zip</a>