

Game Design Document

PrismWorks

Version 3.0

Position Title	Name	Signature
Game Designer	Isaiah Everin	
Lead Level Designer	Kevin Morris	
Level Designer	Blake King	
Level Designer	David Mershawn	
Lead Artist	Justin Atkinson	
Artist	Shamus O'Connor	
Lead Programmer	Anthony Fleshner	
Programmer	Srinath Upadhyayula	

Document Revisions Table

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3.0	Everin: Major document overhaul and updates; removed all references to Keep-Away game mode; changed Force Gun to Shotgun; added in-engine screenshots where appropriate and available.	Prof. Despain	4/27/15

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Concept

High Concept

Spectra is a multiplayer, first-person shooter (FPS) with one objective-based, team game mode (capture the flag). The game is set on the stylized, transcendent world of Lumina, a planet covered in powerful crystals and the ageless guardians that use and protect them. The game is **fun and accessible** to fans of the FPS genre, with **quality** gameplay, visuals, and sound that come together within a **unified** design focused on creating a **visually inspiring** experience.

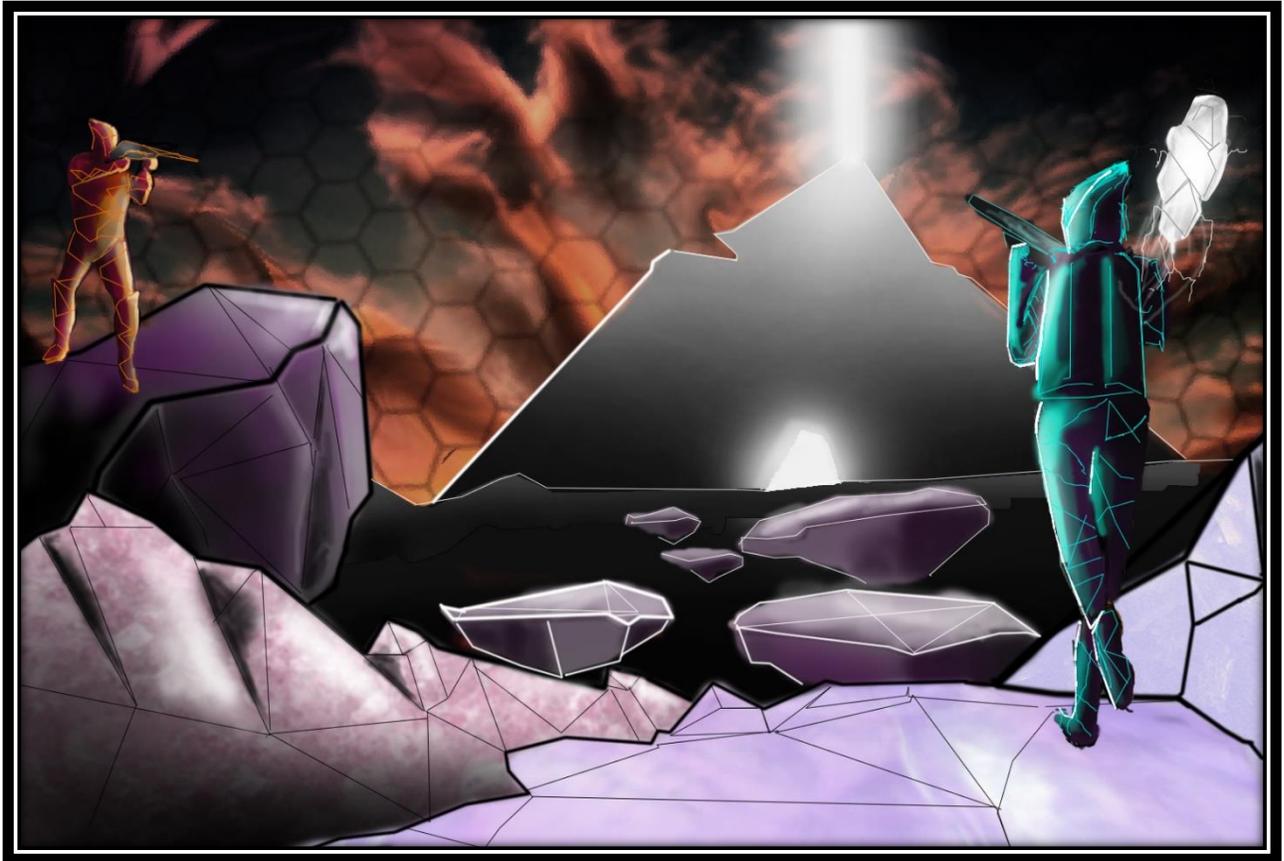


Figure 1 – High Concept Illustration

Game Description

Game Goals & Features / Story Synopsis

Spectra is an indie, student-created FPS game created within Unreal Engine 4, and its design emphasizes capitalizing on the unique opportunities that come with that development space. The major difference between this game and the typical FPS is a setting that mixes science fiction and fantasy themes, utilizing a minimalistic and mystical aesthetic as opposed to one grounded in realism (the route most FPS games take). The unifying visual elements are neon colors, crystalline and hard-surface geometric shapes, and a visually evocative atmosphere that relies heavily on lighting and contrast.

Spectra focuses on straightforward and fast-paced gameplay, dropping the player into the game with three weapons and no complicated learning curve between them and playing. The game features few but very specific mechanics, with only three weapons available to the player. These weapons have tight aiming mechanics and firing animations, no reloading animations, and use a unified source of ammunition. The player has a recharging health mechanic, which fits the controlled and tactical gameplay that *Spectra* creates. Additionally, the game features a lot of horizontal mobility with the use of jump jets, which is a major change from average FPS gameplay.

The basic premise of *Spectra* is a classic one—factions of an alien race, called Spectrans, are vying for control of an essential power source. However, there is a somewhat abstract story underlying it. With the game being a multiplayer FPS experience, it does not communicate its plot directly through narrative, dialog, or text. Instead, it presents the players with an environment and gameplay scenario from which they can notice a few essential story beats.

These story beats boil down to the following: groups of Spectran warriors are warring over Matrix Energy, a powerful force contained in objects called Matrix Shards. The Spectrans siphon this energy into monuments called Beacons. In CTF, the two teams steal Shards from one another's base.

Game Pillars / Theme

The first pillar of the game is **Fun and Accessible**. This boils down to the fact that an FPS player should be able open the game, enter a match, and understand the mechanics and gameplay goals without a lengthy introduction. It also means that the game fosters a fun experience for the player; the game design limits player frustration and maximizes interesting and exciting gameplay.

The second pillar of the game is **Quality**. Be it user interface, game mechanics, or static meshes, nothing ends up in the final game that lacks polish. All design decisions have this pillar in mind, meaning that the plan from the outset leads down a path to a quality game experience.

The third pillar of the game is **Unified**. This means that the visuals, audio, and gameplay all conform to a unified vision dictated by the game's theme of a mystical, science-fiction landscape full of glowing crystals and ancient structures.

The fourth and final pillar is **Visually Inspiring**. This speaks mostly to the visual and emotional experience the player has even after just a single match in *Spectra*. The glowing Beacon of the enemy team in the

distance, a string of platforms suspended by the power of glowing crystals, and a dusky alien sky above all of this instill in the player a sense of wonder that leaves a lasting impression afterwards.

Gameplay Minute

The following gameplay minute features mechanics and designs found exclusively in *Spectra's* CTF and Keep-Away game modes, explained on page 15.

1. Player Spawns in their base with a Battle Rifle and Force-Gun, having chosen the two weapons in the pre-spawn load-out screen.¹
2. Player heads down south path. Enemy with a Frag Launcher is about to enter Player's base.

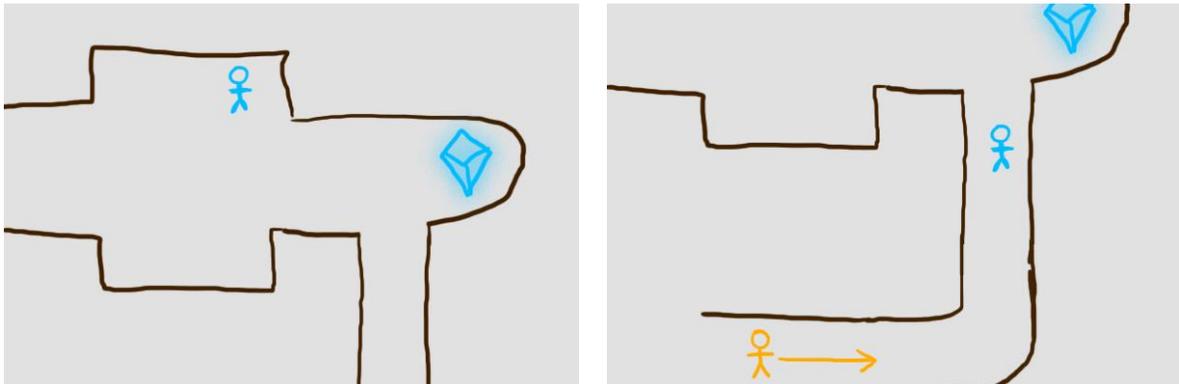


Figure 2 – Gameplay Minute Steps 1 and 2

3. Enemy sees Player and fires their Frag Launcher at Player.
4. Player retreats and fires Battle Rifle, getting a headshot and body shot, reducing the enemy's health to near zero.

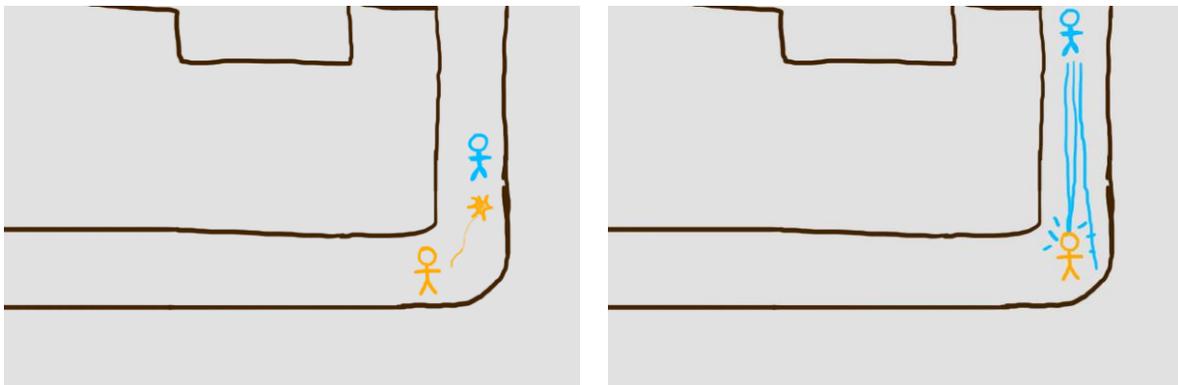


Figure 3 – Gameplay Minute Steps 3 and 4

¹ Load-out system further explained in Weapons/Skills System, 21. Note, the Force-Gun is not in the CTF mode of *Spectra*, but is included here for the sake of demonstration.

5. Enemy retreats, player chases them, continues to fire, but misses.
6. Player does enough damage to kill enemy.

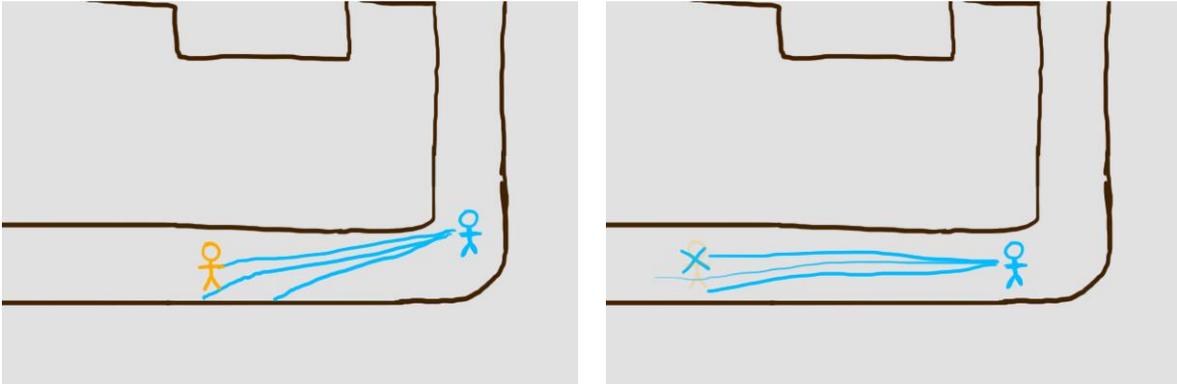


Figure 4 – Gameplay Minute Steps 5 and 6

7. Player continues along path, unaware of proximity-activated Fragmenters (floating mines) around the corner.²
8. The mines trigger, blasting the player against the wall, but the damage is not lethal.

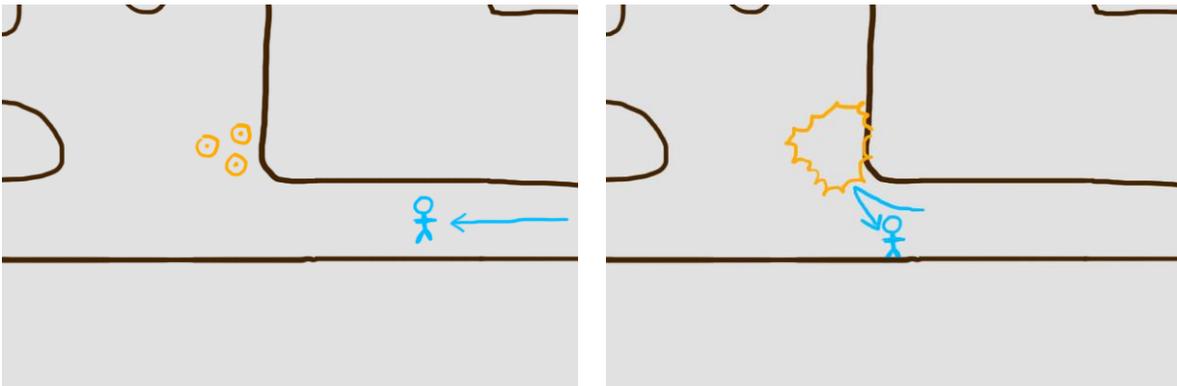


Figure 5 – Gameplay Minute Steps 7 and 8

² Mechanics of this explained under Frag-Launcher, 23.

9. Player continues on, sees an Ally coming, and clears away another batch of Fragmenters by shooting them.
10. Player waits until his health fully recovers,³ meanwhile Ally charges past.

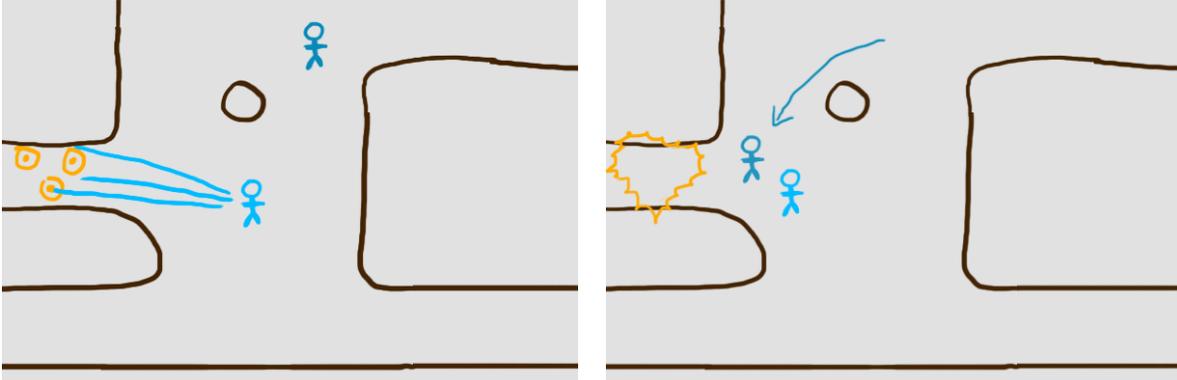


Figure 6 – Gameplay Minute Steps 9 and 10

11. Health fully recharged, Player follows Ally. Enemy with Frag-Launcher approaches from around the corner.
12. Enemy engages player with Frag-Launcher, not activating their secondary fire that freezes the Fragmenters in place. Player draws attention away from Ally by retreating and firing at Enemy.

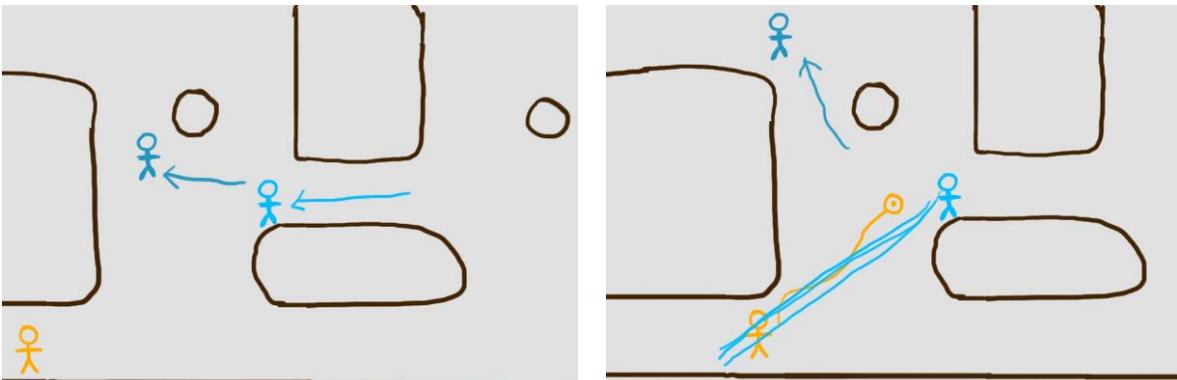


Figure 7 – Gameplay Minute Steps 11 and 12

³ Explained further in Health/Spawn System, 21.

13. Player manages to kill the Enemy using their shotgun at short range. Ally charges into enemy base to retrieve Matrix Shard.
14. Player has run out of ammo, so they go to activate a nearby Ammo Station.⁴ They recharge their ammo for 2 seconds, until they have max ammo.

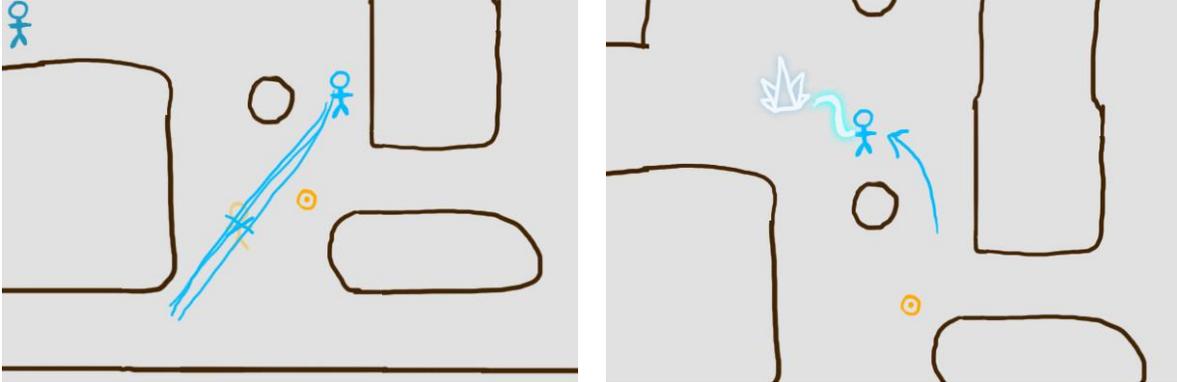


Figure 8 – Gameplay Minute Steps 13 and 14

15. Ally returns, carrying the enemy's Matrix Shard.
16. Ally use double-jumps to get on top of a large obstacle, using it as a shortcut.



Figure 9 – Gameplay Minute Steps 15 and 16

⁴ Explained in Ammo System, 24.

17. Ally travels to edge of obstacle to line up a jump.
18. Ally uses Jump Pack to double-jump to the top of the nearby pillar.⁵

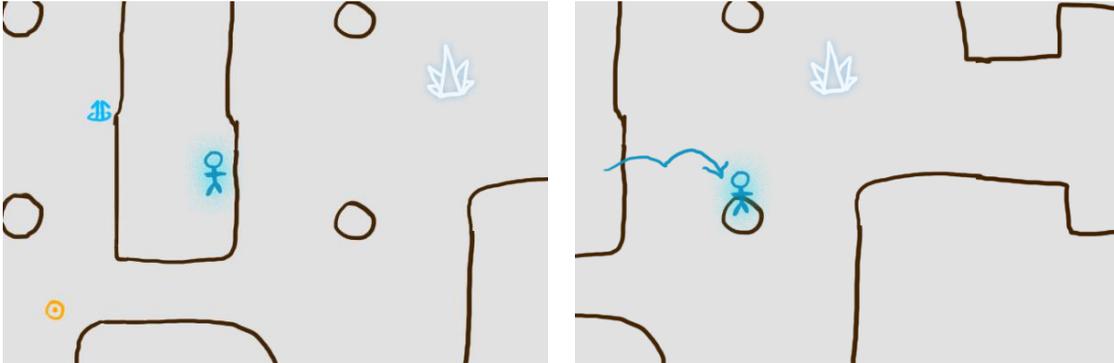


Figure 10 – Gameplay Minute Steps 17 and 18

19. Ally uses Jump Pack to jump to the top of their base.
20. Ally drops down inside of base.

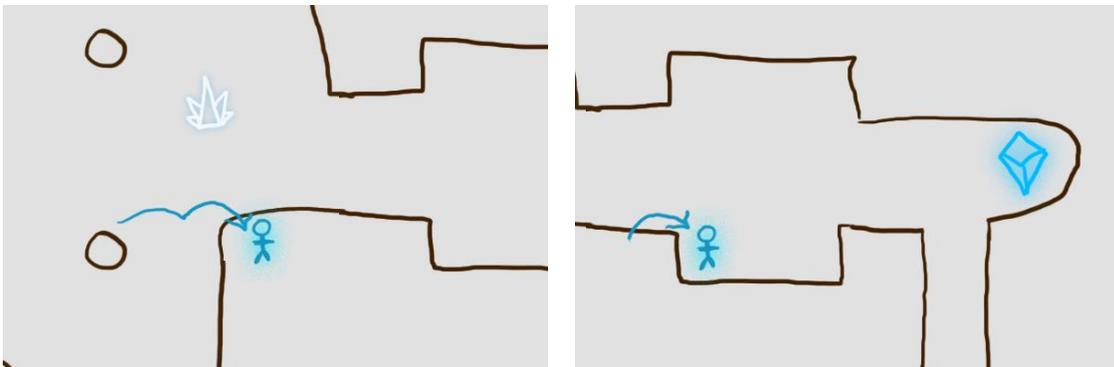


Figure 11 – Gameplay Minute Steps 19 and 20

21. Ally drops enemy's Matrix shard at their own, scoring a point for their team.

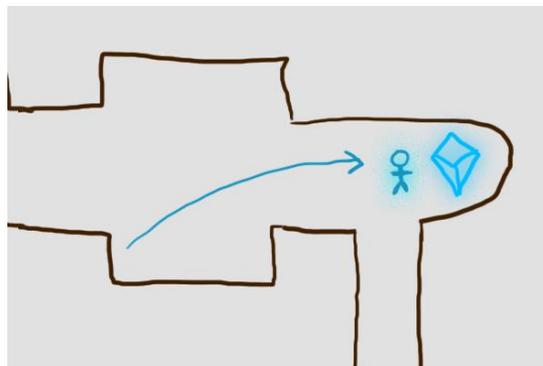


Figure 12 – Gameplay Minute Step 21

⁵ Explained under Jump , 24.

Style and Tone

The world of *Spectra* revolves around light and how light interacts with an environment inhabited by crystalline structures. At both sides of each map are the Beacons, large beams of light that project up into the sky and act as a main focal point in the player's observations. The time of day in the levels is around dusk. The light of the Beacons combines with smaller lights around the level (many emitted from gently glowing crystals) to create a high contrast interplay between light and shadows.

The various lights in *Spectra* produce a compelling experience for the player by emphasizing the material properties of the geometry's surfaces—whether stone, metal, or crystal. The detail mostly comes across through the metallic and roughness maps of the textures as opposed to high-poly detail using normal mapping. In each area of the level, light reflects on a range of surface types from high-glossy metallic to matte finish, taking full advantage of the physically based material capabilities of UE4.

Spectra presents the player with a visually stimulating world not commonly seen in first person shooters. Simple geometric shapes and crisp lines construct the environment to create an arena that comes across as abstracted and streamlined from references seen in reality. All objects of the world follow similar style—walls, doorways, natural stone structures, and the character models have faceted, simple meshes stylized to convey sharp-edged minimalism. This style not only plays off the idea of crystalline structures, but also creates a unique environment to explore not seen in many games.

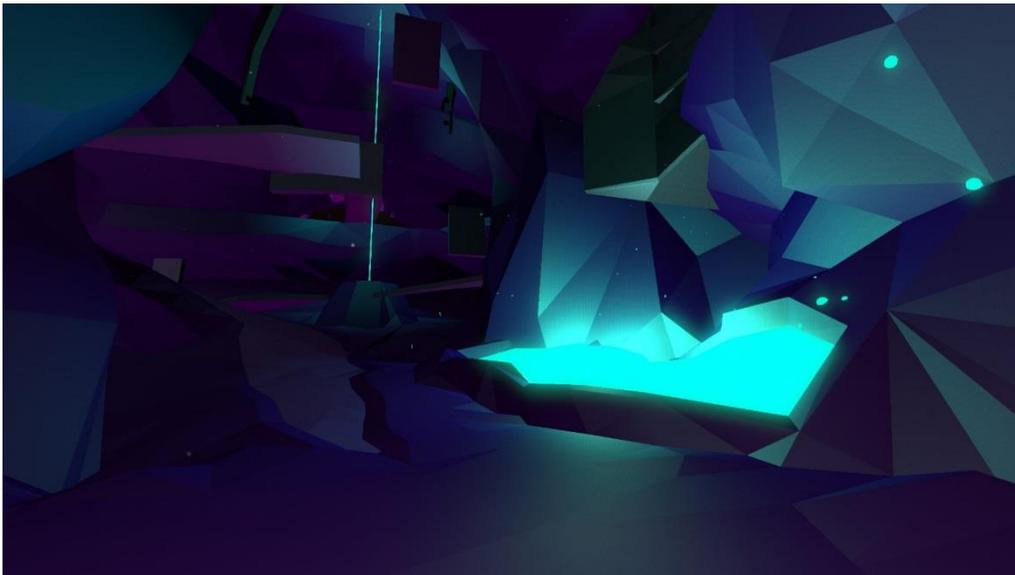


Figure 13 - Geometry reference image from the game *FRACT OSC*

Focusing on light, shape, and color instead of realism, the game is visually engaging through compelling and polished design.

Story/Backstory

The characters of *Spectra* are the Spectrans, ageless warriors that die and reincarnate in endless wars over the power of the Matrix Shards. The reasons for these wars and the motivations of these beings are stories that are lost to time; for many Spectrans, these wars are all they have ever known. Over the generations, great monuments and structures have risen across the landscape of their planet, Lumina, all in devotion to the epic power contained within the Matrix Shards. The most notable of these monuments are the Beacons, great pillars of light fueled by Matrix Energy and serving as the engine-like cores to most of the Spectran architecture and technology.

Lumina is a planet covered in various forms of crystal, but the Matrix Shards stand out, emitting constant rays of bright light that reveal their creative and destructive forces. The Matrix Energy from these Shards powers the weapons, buildings, machines, and general habitats of the Spectrans. The color of the Beacons defines the factions of Spectrans, which in turn colors their weapons, armor, and structures. The lighting and decoration of the environments in the game communicate these connections to the player.

Gameplay

Overview

In *Spectra*, the player enters a match with three teammates and four enemies on the opposing team. They spawn in an initial spawn area, which introduces them to the aesthetic of the game and then forces them to use their double-jump jets to leave. The two teams then begin playing, navigating the two bases and the map space between them towards achieving the goal of capturing the enemy team's Matrix Shard. Players use their weapons and skills to kill opposing players. This gameplay continues until either team achieves the goal score of the given game-mode or the match time runs out. The team with the highest score wins.

Player's Objectives

The core conflict of the game stems from the battle between the two rival factions of Spectrans who are vying for Matrix Shards in order to power their Beacons. The control of this energy is important because it fuels all aspect of Spectran life. Each individual player assists their team in capturing the enemy Shard and using it to score points. Players work together to utilize both offensive, defensive, and support strategies in all game modes. Like a typical FPS, the player must use weapons to attack the rival team members and prevent them from entering their home base or killing the Shard-Holder.

Primary Objectives: Accumulate points with Matrix Shards and stop enemies from accumulating points.

Secondary Objectives: Shoot and kill enemy units, defend allies, and assist the Shard-holder.

Game Modes

Capture the Flag (CTF)

In *Spectra*'s CTF game-mode, both teams have Matrix Shards in their bases that they must protect from the enemy team. Offensive team members infiltrate the enemy base, take the Shard, and bring it back to their own Shard Chamber in order to score points. Defensive team members protect their Shard and chase down any enemies who take it.

Scoring Points

Stealing the enemy Shard makes a player the Shard-Holder (explained below). A Shard-Holder scores a point by walking to their team's Shard Chamber with the enemy Shard. Once a player scores a point, the Shard instantly returns to its owning team's Shard Chamber and the game tallies the score through the UI.⁶

Win Condition

Players can set the match's time limit within the menu before the match starts.⁷ The default match time is 10 minutes, and when a team reaches 3 points, they win and the match ends.

⁶ Explained further in HUD, 28.

⁷ Methods for doing this explained in **Error! Reference source not found.**, 35.

Shard-Holder Mechanics

When a player passes over an enemy Shard, they add it to their inventory and are now the Shard-Holder. As long as they remain alive, the Shard remains attached to their back. A HUD element indicates to the Shard-Holder that they possess the Shard. Other players see the model of the Shard on the player's back (which contains a bright light making it quite visible). When a Shard-Holder passes by certain dynamic light crystals throughout the level, the lights glow brighter in the presence of the Shard. Shard-Holders are able to use their weapons as normal.

When the Shard-Holder dies, the Shard drops on the ground and any non-owning player of the opposite team can pick it up, becoming the Shard-Holder themselves. Otherwise, a timer ticks down, and when the timer reaches zero, it returns to its owning base. If the Shard falls off into unplayable space, it returns to its owning base. If the owning team picks up the Shard, it returns to their base.

Core Gameplay Mechanics

Spectra's core gameplay revolves around coordinated, objective-oriented team combat with a focus on unique horizontal and vertical mobility.

Movement: Players traverse the terrain by running, jumping and double jumping.⁸ The player runs at a medium speed.

Aiming: *Spectra* utilizes free aiming to target enemies in a similar fashion to any FPS.

Shooting: Players engage in combat using ranged weapons. Each weapon has its own unique characteristics and functionality with different ammo capacities and firing rates. Weapons do not feature reloading, and instead fire until depleting ammo.⁹

Teamwork: *Spectra* encourages teamwork by offering varying styles of play through the different kinds of weapons.¹⁰ Players rely on their team members in the effort of scoring points and stopping the enemy team from scoring points.

Scoring Points: The ultimate goal of the game, and a prominent mechanic, is the act of scoring points.

⁸ Explained further in Weapons/Skills System, 21.

⁹ Further explained in Weapons/Skills System and Ammo System, 21.

¹⁰ The mechanics of this described in Weapons/Skills System, 21.

Camera

The game uses the standard in FPS camera settings with field of view of 90 degrees horizontal and 60 degrees vertical. The camera position mimics the player's eyes, and moves along with the player. There is a camera shake when the player jumps, lands, dashes, or when a projectile that deals AOE damage strikes the player. Upon dropping below 75% health, cracks form on the periphery of the screen to indicate the amount of damage the player has taken/the amount of health the player has remaining.¹¹



Figure 14 – Example of game Camera, Screenshot from Spectra

¹¹ Demonstrated under HUD, 28.

Controls

The controls system is in line with the typical PC FPS game, but it also has Xbox 360 controller support and there is an extra button for the ammo-station interaction.

Action	Keyboard/Mouse Button	X360 Controller Button
Move	WASD	Left Analog Stick
Aim	Mouse Movement	Right Analog Stick
Primary Weapon Fire	Left-Click	Right Trigger
Secondary Weapon Fire	Right-Click	Left Trigger
Switch Between Weapons	Middle-Mouse Scroll	Y-Button
Ammo station interaction ¹²	E	X Button
Jump	Spacebar	A Button
Jet Jump	Spacebar (while airborne)	A Button (while airborne)
Jet Dash	Left Shift (while airborne)	Left Analog Stick Button
Crouch	Left Control	B Button
Statistics	Tab	Back Button
Pause Menu	Escape	Start Button

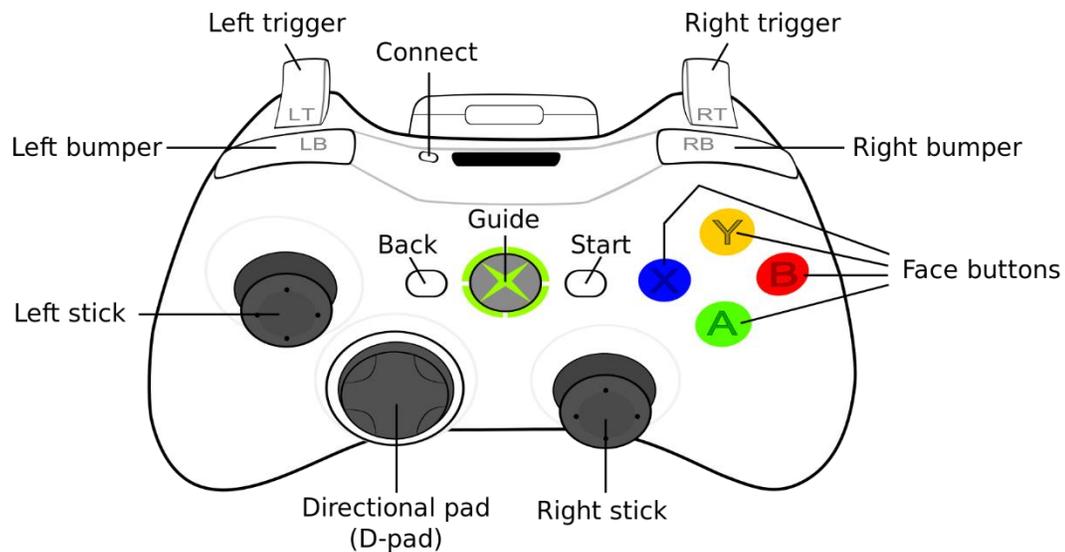


Figure 15 – Xbox Controller Diagram

¹² Explained in Ammo System, 24.

Player Movement/Interactions

The player moves at a medium speed at about 5m/second. The player moves in a full 3D environment with a first-person perspective. The player has the ability to jump and double jump. This document explains objects in the environment that the player can interact with further on and above, but they include Ammo Stations, Matrix Shards, and the projectiles of the various weapons.

Health/Spawn System

Spectra utilizes a health recharge system similar to *Call of Duty*. Players start with one hundred health and lose health when damaged. After not receiving damage for 3 seconds, the player's health begins to recharge over time at a rate of five health per second.¹³

The Spawn system utilizes the traditional FPS spawn mechanic. At the start of the game players spawn in a central spawn area, and after dying, players spawn at randomly assigned spawn points positioned in and around their team's base.

Weapons/Skills System

As the players spawn with all three weapons that exist in the game, weapons do not drop on death. All three weapons from *Spectra* share the same ammo type. As shown in **Error! Reference source not found.**, each weapon is a modular piece built on a shared weapon stock—this is both for aesthetic reasons as well as to communicate a reason for there not being droppable weapons in the game. The weapons energy cores and projectiles are colored according to the owning player's team.

¹³ Explained in Health HUD Display, 29.

Item / Skill	Primary Fire	Secondary Fire
Battle Rifle	Burst of 3 Hit-Scan Projectiles 5 damage per projectile Medium to long range	2x Scope Used to get maximum accuracy
Frag-Launcher	Grenade Launcher Fires in an arc 3-second fuse 25 damage per explosion	Mine-Creator Freeze most recent grenade in place, turning it into a mine
Shotgun	Shotgun Blast Fires in a cone of hit-scan projectiles Short Range 5 damage per projectile	Radar Vision Highlights enemies across the map in red, even through walls Consumes ammo in use (2/sec)
Jump Jets	Jet Jump (Spacebar) Useable once after leaving grounded state Can be activated at any moment when airborne to get force upwards	Jet Dash (Left Shift) Useable after leaving grounded state Can be activated at any moment when airborne to get force in the direction the player is facing
Matrix Shard	Shard-Holder As long as a player holds the Shard, they are the Shard-Holder ¹⁴	None

¹⁴ Explained under Shard-Holder Mechanics, 17.

Battle Rifle

The Battle Rifle is a medium-range rifle that fires precise bursts of three laser bolts. Within a short to medium range, these bolts are precise, but at a longer range, their paths begin to disperse due to recoil, and thus the gun loses accuracy. It is equipped with a 2x scope as its secondary fire, allowing for mid-range sniping of enemy Spectrans. The bolts deals double damage on headshots.



Figure 16 - In-Engine Screenshots of Battle Rifle, both color variations

Shotgun

The Shotgun provides short-range offensive abilities for the player, giving them a powerful cone blast attack on the primary fire and an enemy-seeking radar vision on the secondary. This radar can help them find enemies at any distance, but it can only be used against nearby enemies effectively since it will deactivate on switching weapons.



Figure 17 - In-Engine Screenshots of Shotgun, both color variations

Frag-Launcher

The Frag-Launcher's primary shot fires a ball of energy called a Fragmenter in an arc. A Fragmenter behaves as a grenade, bouncing off static surfaces until exploding after a fixed time (3 seconds), or exploding on contact with enemy units. The Frag-Launcher's secondary fire freezes the most recently fired Fragmenter in its current position. The frozen Fragmenter now behaves as a floating proximity mine that explodes after 10 seconds or when an enemy comes within a 1-meter range.



Figure 18 - In-Engine Screenshots of Frag-Launcher, both color variations

Jump Jets

The Jump Jets are a permanent ability on all players. The jets have dual functionality, one bound to the same button as the jump action, and they are only useable while airborne. The first function is the Jet Jump: when the player presses the jump button while airborne, the Jets give the player additional vertical height. The player can use this only one time after leaving the grounded state (touching a floor). The second function is the Jet Dash: when the player presses the button for this (Left Shift/Left Analog Stick Button), the Jets cancel their current velocity and replace it with a new one, giving them force in the direction they are currently pressing on the analog stick or WASD. Players can use this to gain horizontal distance in any direction.

The game teaches the players about Jump Jets through the design of the level. Upon first spawning in the match, players see a gap in front of them that they can only cross if they use their Jump Jets; the level uses specific lighting and meshes to communicate clearly that the other side of the gap is reachable. The game does not punish them for falling here (it will just be more playable space below the gap), but similar gaps and ledges exist throughout the levels that can only be reached if players experiment with and optimally use the Jump Jets.

Matrix Shard

When a player possesses this, they are the Shard-Holder.¹⁵ The Shard appears as a static mesh floating very close to the possessing player's back. It emits a bright light and causes specific dynamic level lights to glow more brightly when it is in proximity to them.

Ammo System

The weapons of *Spectra* share a singular ammo type known as Matrix Energy. The player collects the energy by siphoning it off from crystalline objects known as Ammo Stations, which players find around the map. The player can have a maximum of 200 Matrix Energy, and at spawning, they start with 150 Matrix Energy—the first Stations will be within range of the player's spawn points, which helps to prompt them into learning this interaction. However, they do not start with the maximum amount to force a choice between running towards the action and getting ammo before entering combat.

When a player's weapon is low on ammunition (< 40%), it emits an alert tone and the energy bar flashes urgently to bring their attention to this. When within range of an Ammo Station, the gun will emit a low hum that will increase in volume and intensity the closer the player gets to the Ammo Station. When standing within 1.5m of an Ammo Station, a UI element appears on the player's screen prompting them to recharge ammunition and showing which button to press.

The player interacts with these Stations by standing next to them and holding the recharge button (E on the keyboard, X on the controller) to refill ammo. The Stations refill ammunition at a rate of 20 Energy per second. While they do this, a beam of particles connects from the Station to the player's weapon, communicating the action. The player cannot move or shoot during this interaction.

¹⁵ Explained in Shard-Holder Mechanics, 17.

Since the weapons have a diverse range of power and effects, they use up Matrix Energy at different rates, meaning each of their projectiles translates to a different amount of Matrix Energy. The game communicates this to the player in a straightforward manner: when a specific weapon is equipped, there is a number displayed on the weapon that shows how many shots are available using that weapon. Below that is a bar gauge that shows how much total Matrix Energy remains.¹⁶

Weapon	Energy per Single Shot	Max Shots per Weapon (with 200 Energy)
Battle Rifle	3	65
Shotgun	5	40
Frag-Launcher	10	20

Table 1 - Weapon Ammo Capacities



Figure 19 – Ammo Station

¹⁶ See HUD Concept Art, 28.

Objectives System

Environmental Object	Purpose
Matrix Shard	In CTF, each team's base has one Matrix Shard within a Shard Chamber—it floats on a platform that charges the team's Beacon (explained below). A player can pick up the enemy team's Matrix Shard and capture it at their own base for points. ¹⁷
Beacon	Each team's base contains a Beacon of light, which projects high into the atmosphere. The Beacon of light marks the location of each team's base/Shard Chamber. The Beacon dims when a player picks up its Matrix Shard.

Objectives In-Game Art

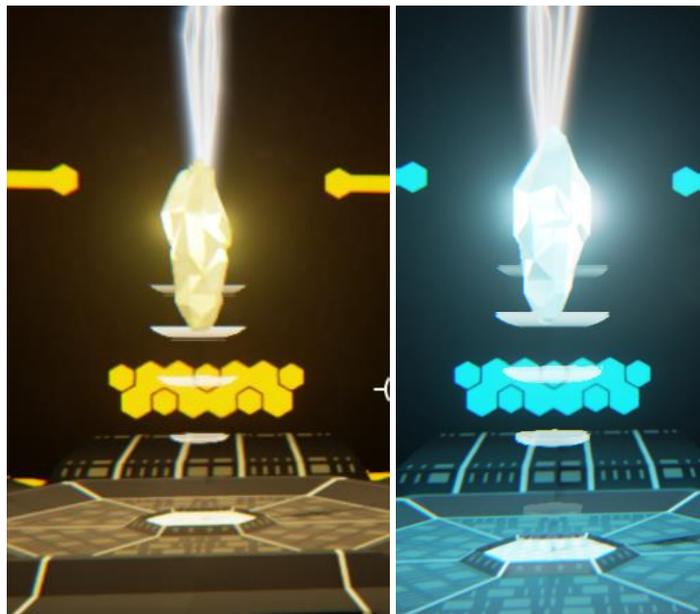


Figure 20 – Matrix Shards

¹⁷ Explained in Game Modes, 15.

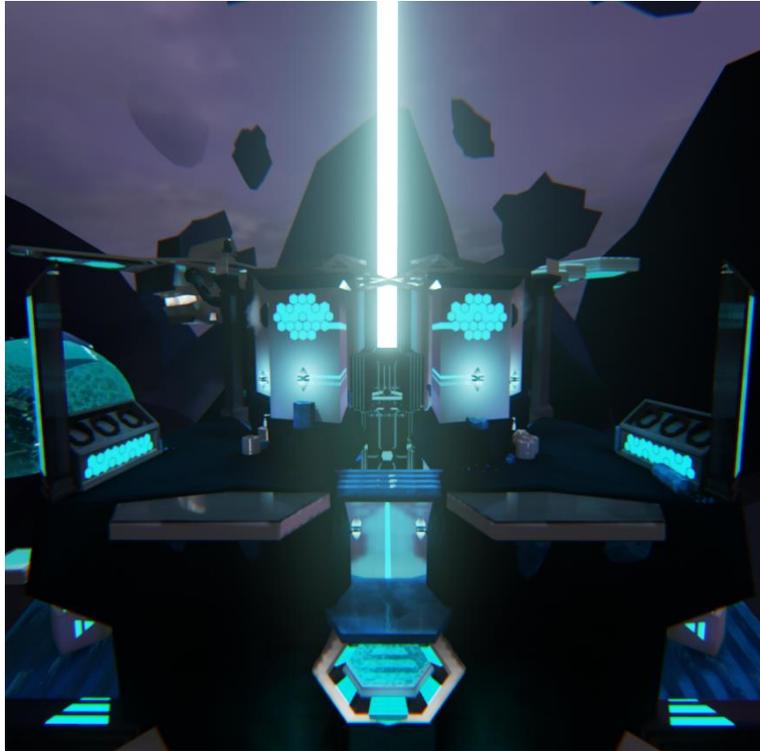


Figure 21 – Beacon, Outdoor

HUD

The HUD in *Spectra* attempts to be as minimalistic as possible, conveying most information to the player in symbols rather than numbers.

HUD Concept Art



Figure 22 – Mock-Up of In-Game HUD

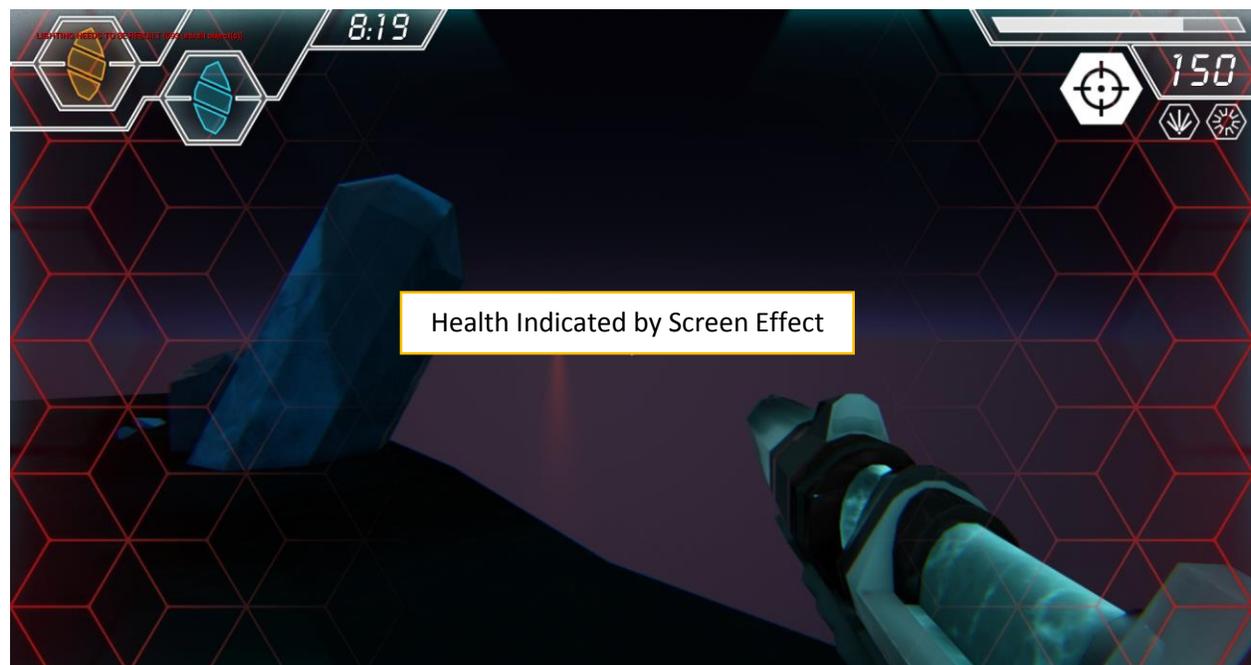


Figure 23 – Mock-Up of Damage Indicator

Ally HUD Display

At all times, the screen highlights allies with a post-processing effect outlining them in their team color so that their allies can see them at all times anywhere on the map.

Scoring HUD Display

The HUD features a timer in the top the screen indicating time remaining in the match. Symbols in the top-left of the screen show how many points each team has.

Objectives HUD Display

A small 2D icon floats above both Shards with a distance in meters above that, revealing their locations at all times. Additionally, an owning player can see their flag highlighted in the same way as to how the screen space highlights allied players.

Weapon HUD Display

The top-right corner of the HUD shows remaining ammo. A number shows how many shots of the current weapon are available, and a gauge above that shows the total remaining Matrix Energy that the player possesses.¹⁸ This gauge blinks red when energy is below 40%. Below this are icons indicating the order of the player's weapons (to communicate to them what order the weapons switch in), as well as which weapon the player currently has equipped. An aiming reticule appears in the center of the screen.

Health HUD Display

In keeping with the minimalist feel, there is no visible health bar, and the game utilizes a regenerating health mechanic.¹⁹ As the player amasses damage, cracks encroach on the screen from the left and right sides (shown on next page). Once the entire screen is cracked, the player dies. After a certain period with no damage, the cracks slowly dissipate as health recharges.

¹⁸ Described in Ammo System, 24.

¹⁹ Described in Health/Spawn System, 21.

Characters

Teams

The combatants consist of two rival factions of crystalline warriors, known as Spectrans, living on the planet of Lumia, and these warriors battle for the control of the Matrix Shards. These shards are the most valuable resource on the planet, for the Spectrans use them to power every aspect of life. The harvesting of these Matrix Shards is the basis for the core conflict of the game.

The teams are clearly denoted using colors: cyan for one and amber for the other. Cyan and amber decor also distinguishes the bases of the teams, communicated through lights and highlight materials on specific meshes within each base.

Character Model



Figure 24 – Character Model from *Spectra*

World Layout

Environment Art

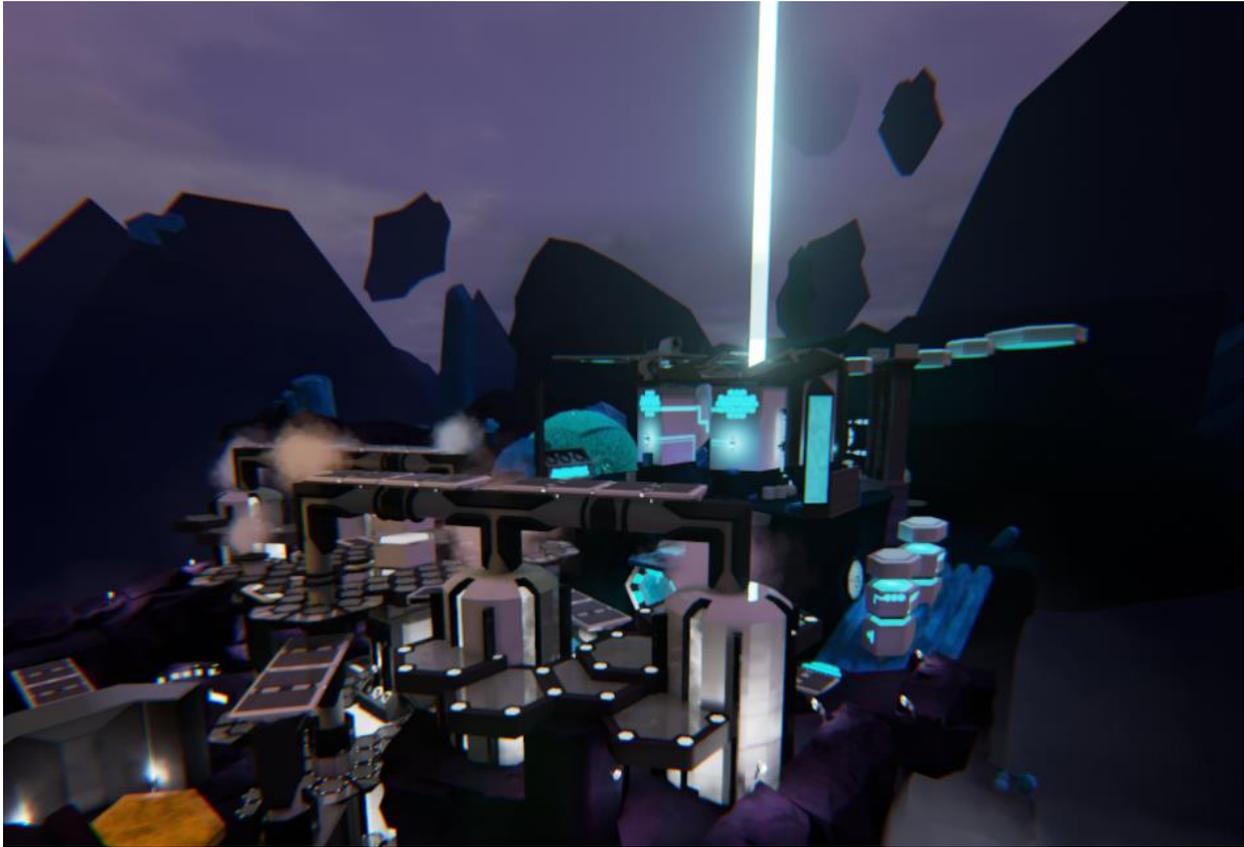


Figure 25 – Environment Screenshot

CTF Level: *Outpost 23*

Spectra features one CTF map in a classic layout. Two bases are on either end of the map, each displaying their Beacon piercing the sky. A mining rig occupies the atrium separating them, with multiple paths above and below it connecting the two bases. The LDD for this map further describes the level.

Menu System

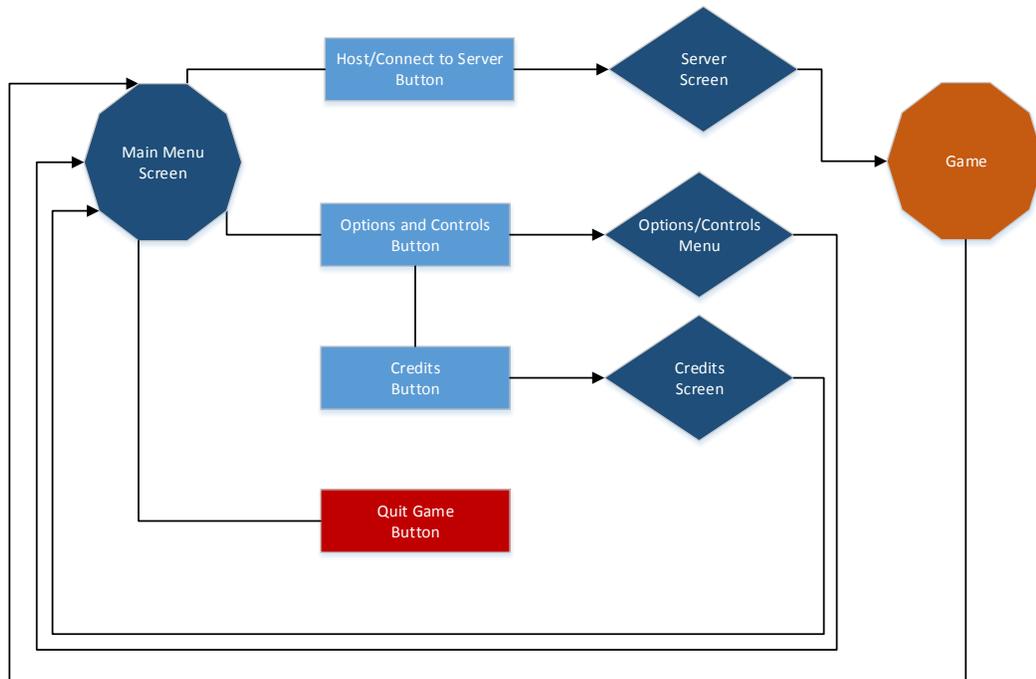


Figure 26 – Flowchart of Game Menus

Installation

Spectra auto-installs from a DVD-rom.



Figure 27 – Install Icon, Game Icon, Uninstall Icon

Title Splash Screens

- Guildhall Splash
- UE4 Required Splash
- Team Splash

Main Menu



Figure 28 – Main Menu Screen

Connect to Match

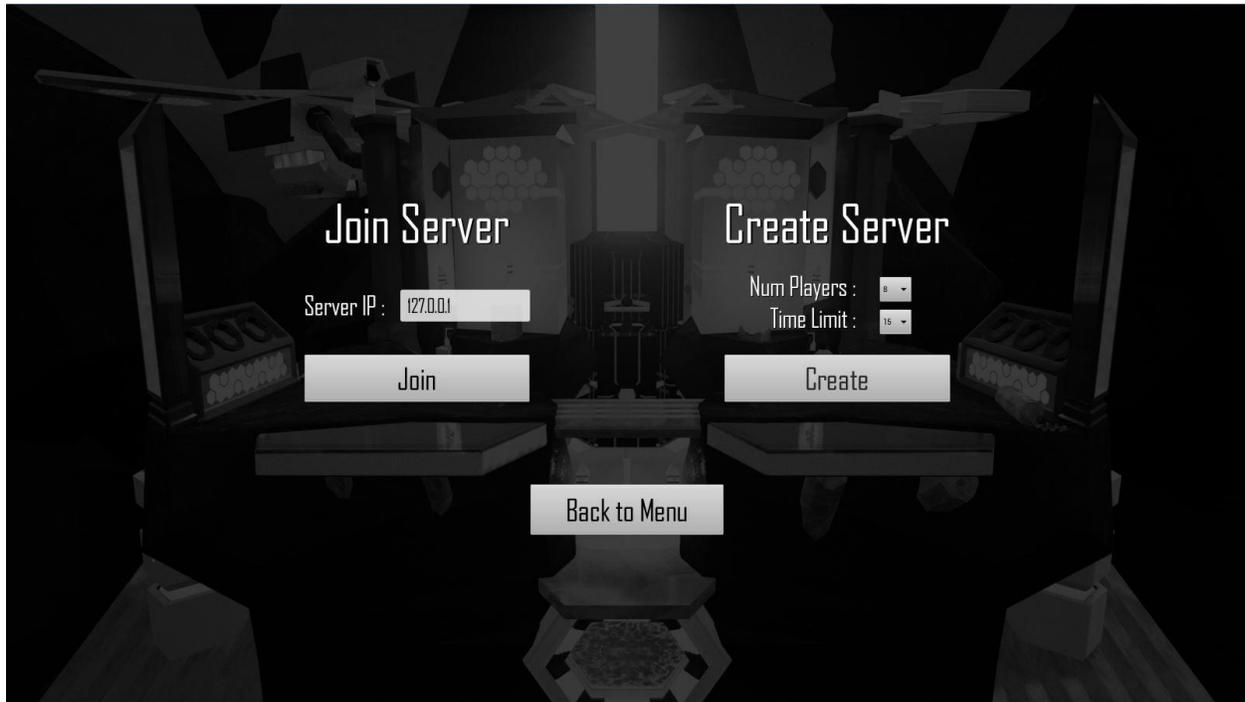


Figure 29 – Join/Host Server Screen

Options Screen

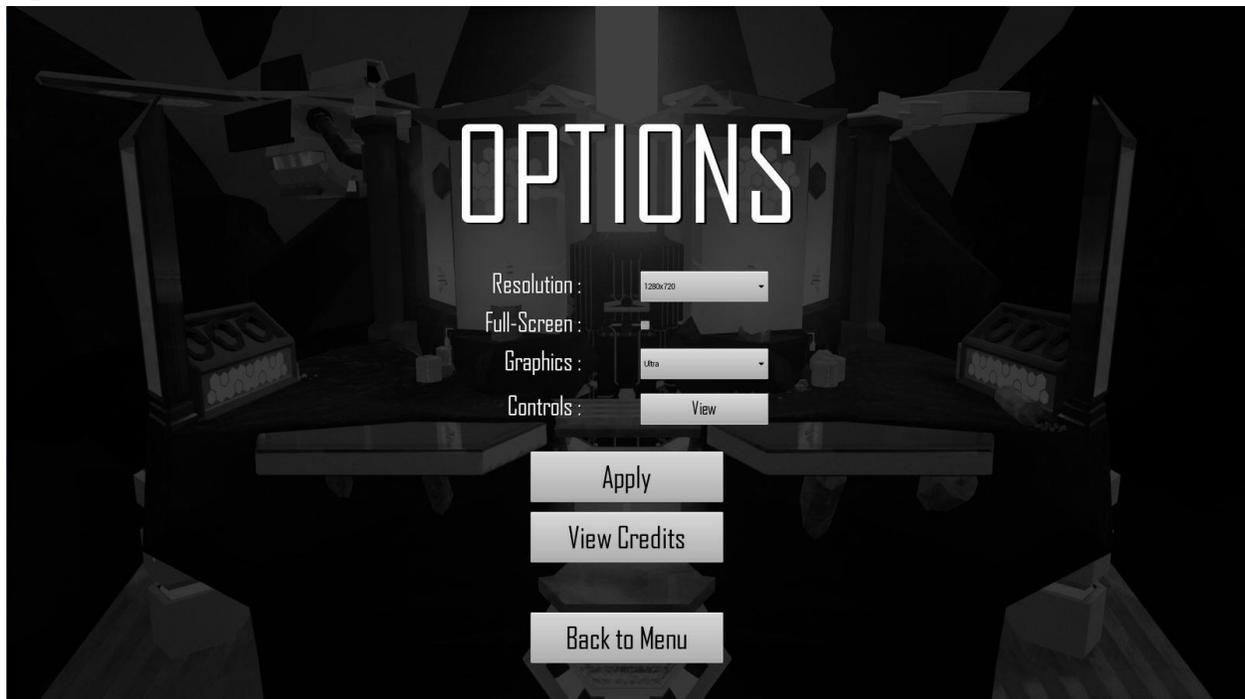


Figure 30 – Options Screen

Controls Screen



Figure 31 – Controls Screen

Pause/Exit Screen



Figure 32 – Pause Screen