CUBOID
GAME DESIGN DOCUMENT

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Concept

Overview

CUBOID is a 3rd person isometric platforming game designed for current and next generation consoles. The gameplay is a mix between linear and non-linear levels that focus heavily on platforming skills and fast-paced reflexes to properly switch and interact with different sets of world geometry, hazards, and collectable items.

Story

CUBOID is a clumsy program lost in a seemingly endless simulation, there appears to be a path ahead, but it is fraught with danger. The player finds themselves controlling CUBOID in order to escape the simulation one level at a time.

Immersion

Through the experience and excitement of platforming through a collapsing simulation that is full of hazards and puzzles a suspension of disbelief is created wherein the player is able to invest in the main character. At the climax of my story there is a cognitive dissonance established where the player learns the world is not what they previously believed that continues until the end of the game.

Target Audience

Xbox, PlayStation, or Nintendo Switch console gamers aged 12-30 in English speaking nations that enjoy 3rd person platforming and puzzle solving game mechanics, appeals to competitive players and speed runners that enjoy setting high scores and the fastest times in games.

Gameplay Details

- The player has the ability to rotate their camera from an isometric perspective around the character at four set intervals. The player must use this in order to determine the proper distance between platforming segments through a parallax effect that is established when a platform is viewed from two different perspectives.
- The player has the ability to jump and double jump while in midair in order to platform through the environment.
- The player only has one life per level and must restart from the beginning when they die.
- The player can slide downward on floor geometry that is at a 30-degree angle or greater.
- The player can switch between multiple sets of world geometry and hazards becoming visible and collideable within the levels through pressing specific buttons. There are two different sets of geometry and hazards to switch between which are represented through four different colours, two in each set (red and blue, orange and green).
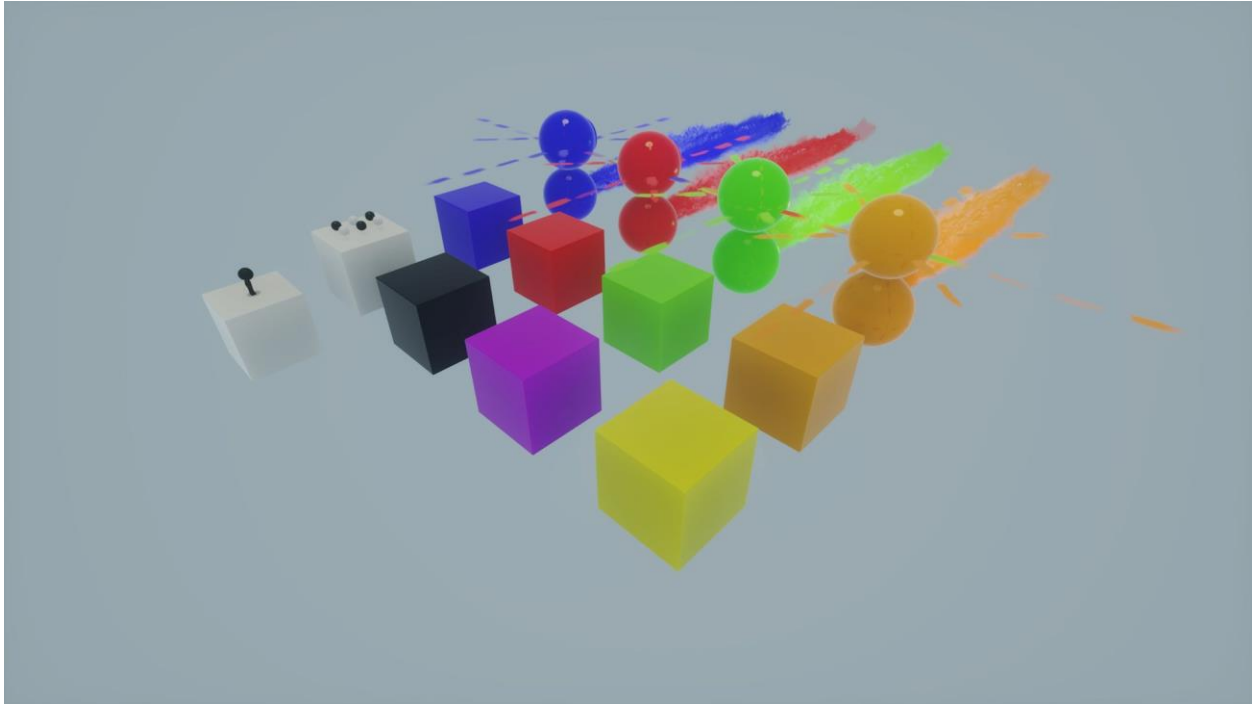
Figure 1 - Prefabs for Each Game Object

- When a set of world geometry is not currently set to be visible, it will have an outline that can be used to identify it.
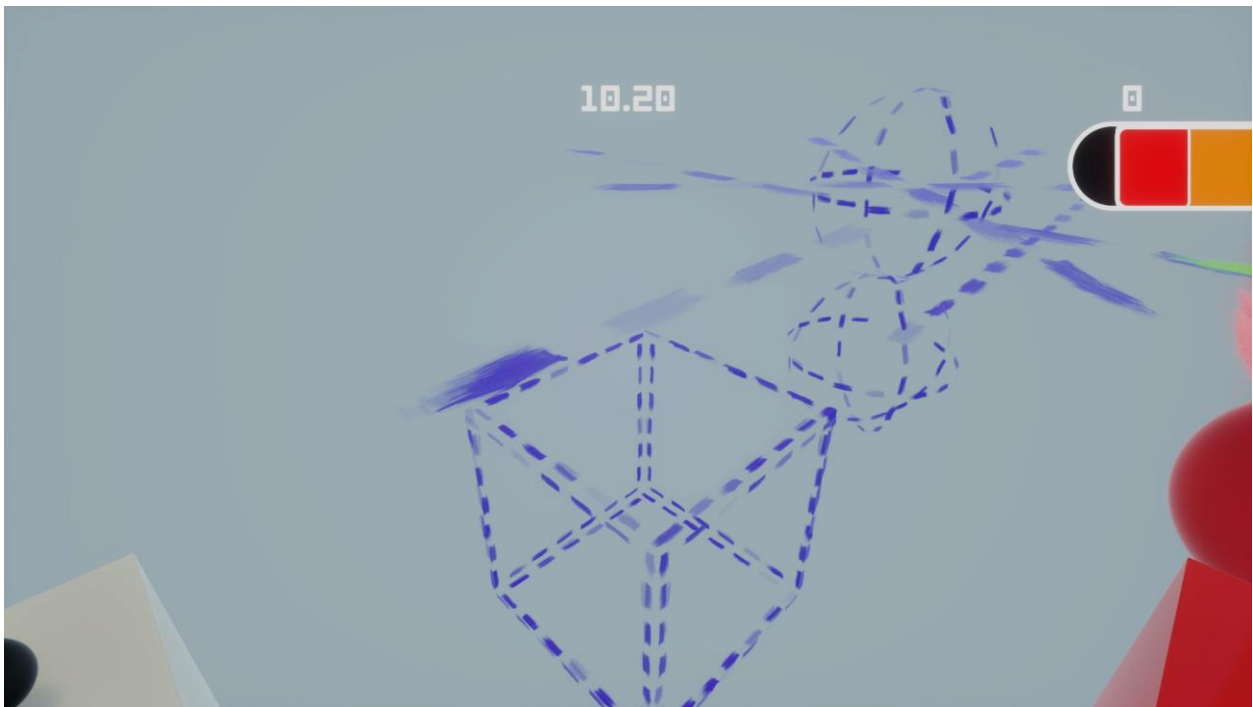

Figure 2 – Outline Visualization of Objects When Not Selected

- There are specific types of world geometry that will react differently when they are stepped on by the player. Yellow geometry will rise upwards, while purple geometry will sink downwards.
- The player can switch the colour of their character (black and white) and doing so will allow the player to interact with different collectable orbs that reward points. All orbs reward the same value of points.
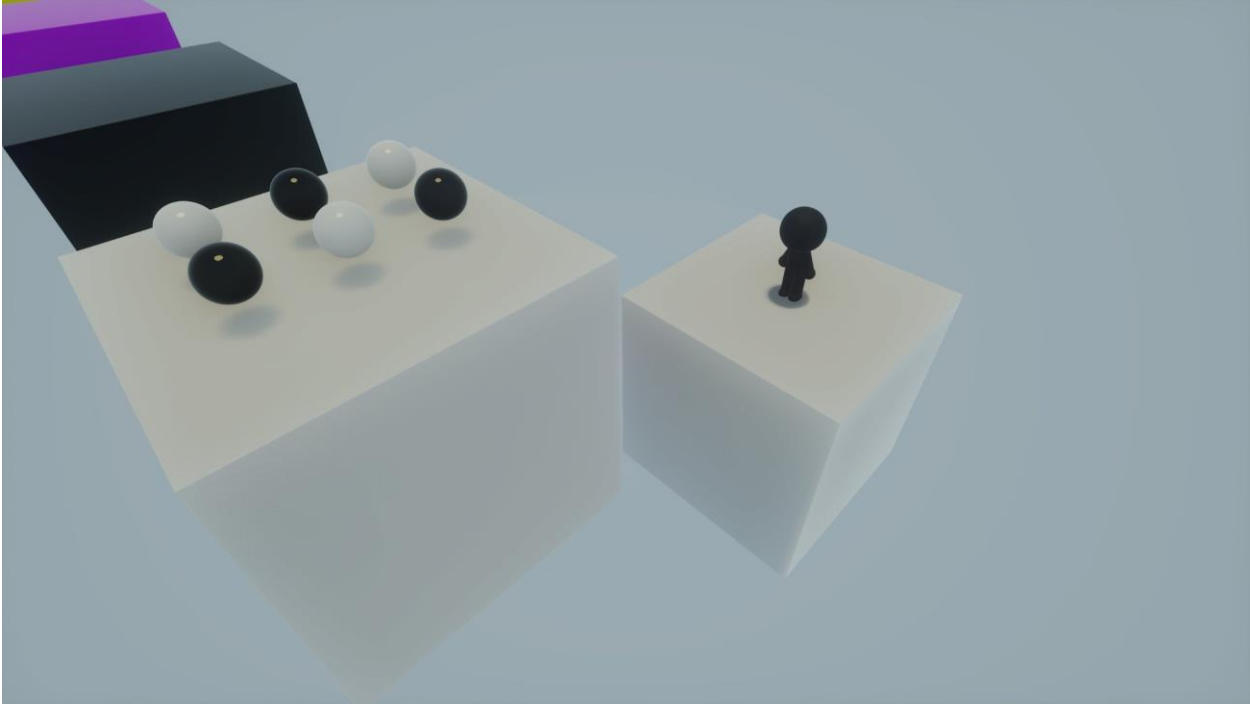
Figure 3 - Collectables and Player Character

- The hazards the player must avoid are both spheres, one that emits a large flame in a direct line or can be rotating in a circle that will kill the player immediately, and another that will remain still and actively track the players position when within a certain range and fire projectiles in a straight line that will push the player backwards and potentially knock them from platforms.

Figure 4 - Turret Hazards (top), and Flame Hazards (bottom)

- The player must collect five special gems per level in order to unlock the level exit point, a level cannot be completed unless all five gems are collected first.
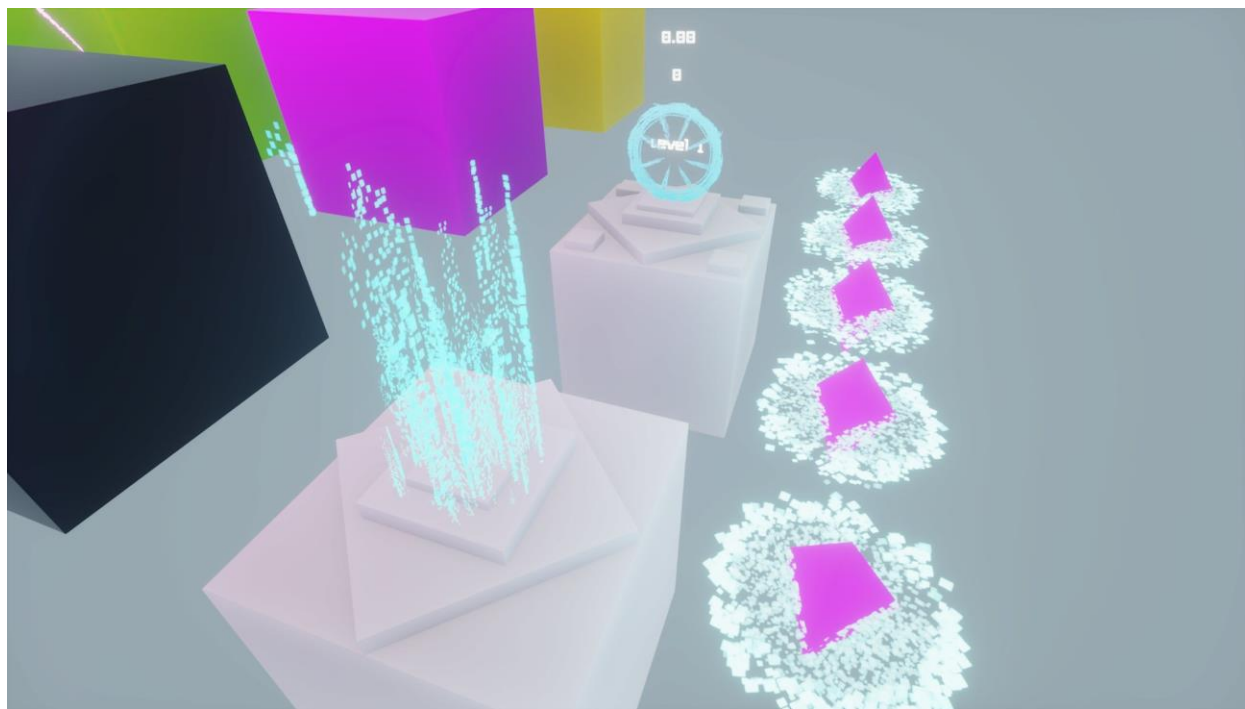

Figure 5 - Level End Zone (Bottom Left), Level Portal (Top), Collectable Gems (Right)

- The player can choose which level they want to play from the levels they have unlocked in the HUB world/ main menu of the game, they can also change between colour sets and view player analytics in this scene. Level portals are unlocked one by one starting at level one and ending at level twenty. The twenty levels are broken down into five distinct regions in the HUB world represented by four corners and a final central region. In future development this HUB world will be significantly expanded to include larger regions, each region will feature terrain and geometry featuring one colour in particular based on the already existing corners and their respective colours.
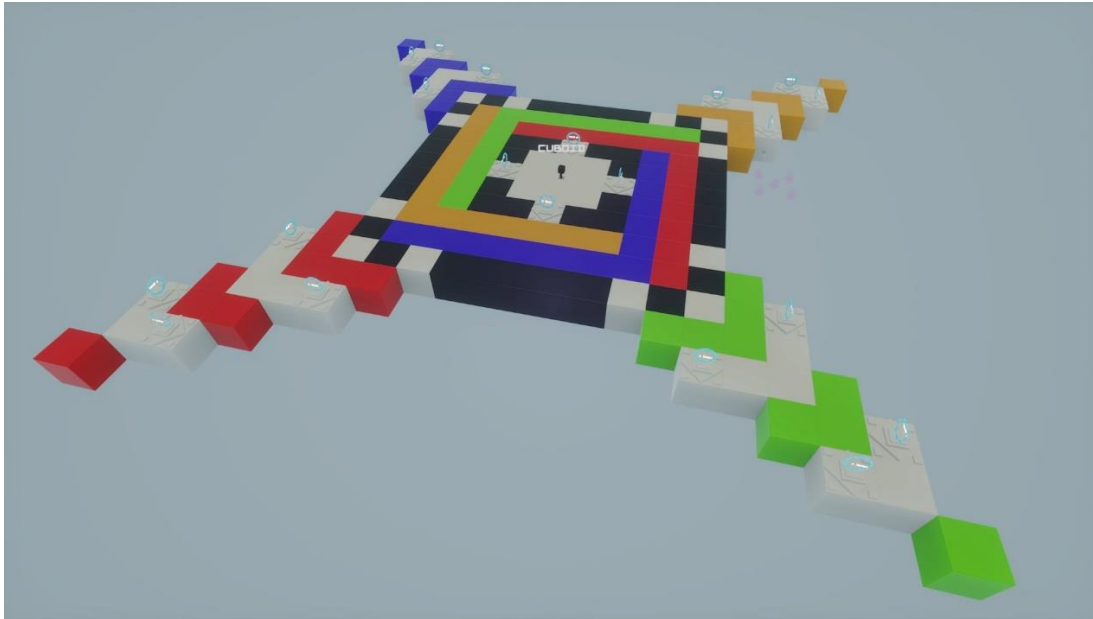
Figure 6 - HUB World/ Main Menu With Twenty Level Portals
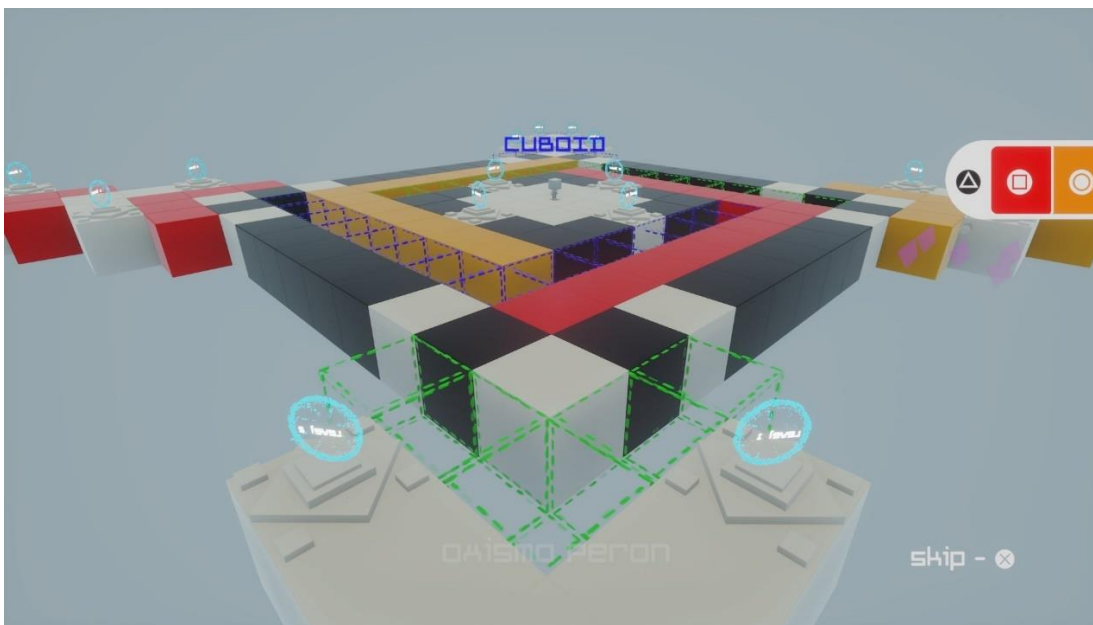
Figure 7 - HUB World/ Main Menu During Game Runtime

Controls

CUBOID - Controls

Share Content (Console Default)

Options/ Menu (Console Default)

None

None

Rotate Camera

Rotate Camera

Move Character

Black/ White Switch

None

Red/ Blue Switch

Orange/ Green Switch

Jump, Double Jump

Hide HUD/ UI Elements

None

Exit to
Main Menu (Hold)

Restart Level (Hold)

None

Change Song
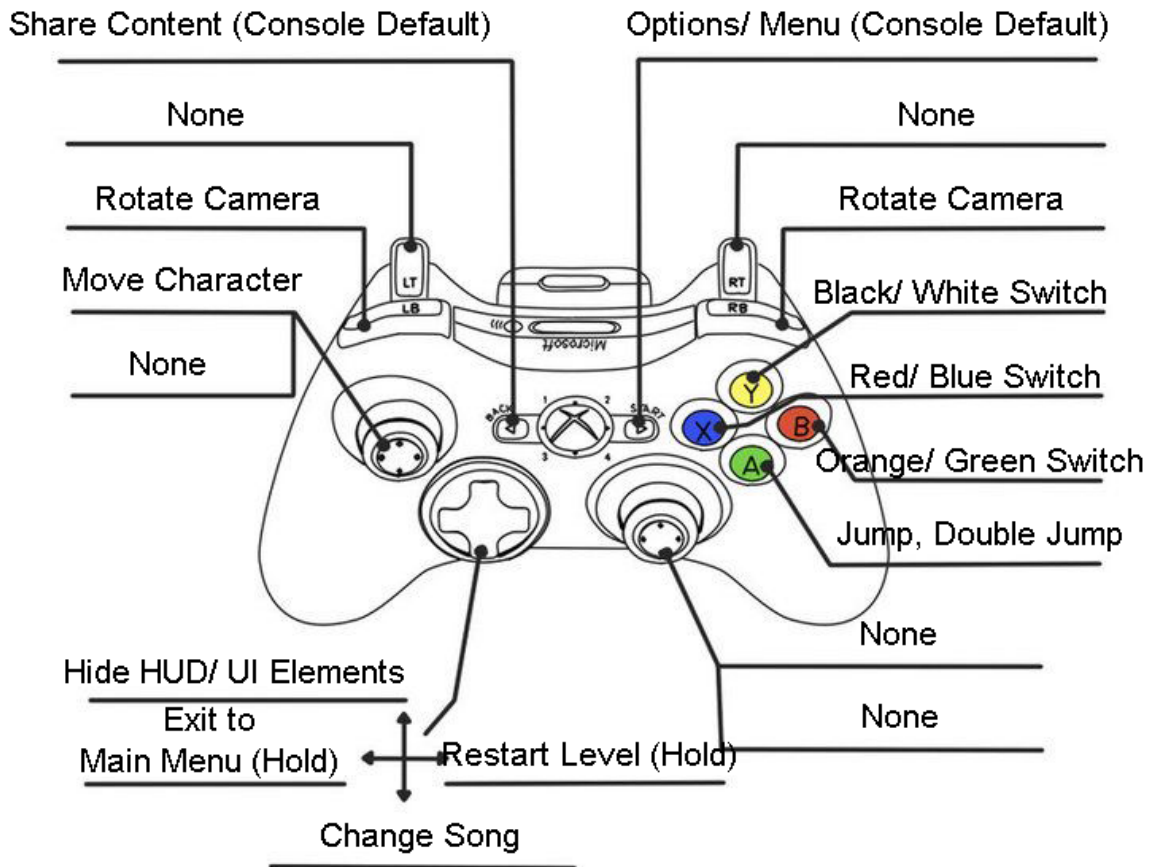
Xbox 360 controller used for demonstration purposes only.
Controls designed for current and next-generation
Playstation, Nintendo, and Xbox consoles/ controllers.

Figure 8 - Controller Map

Rules

Rules/ Actions	Can	Can't	Player Reaction	Env. Reaction
Cross Button - Jump, Double Jump Button	Press a single time to jump, press another time in air to double jump.	Jump again after double jumping until a floor surface is landed on.	Jump height = 1m, double = 1.5m.	Jump, double jump, and landing sound effects play when required.
Left Joystick - Walk Joystick	Move in any direction to move the character around.	Player can only walk on currently visible geometry, will fall to death otherwise.	Player will fall to death if not on visible geometry.	Footstep sounds played while walking through levels.
Left and Right Bumper Buttons - Rotate Camera Buttons	Pressing either will rotate the camera 45 degrees in that direction from an isometric perspective.	Move the camera in any other direction or orientation.	Roughly a one second transition time between camera angles. Four camera angles in total.	Camera transition sound effect will play once per button press.
Square Button - Red/ Blue Switch Button	Pressing a single time will switch between red and blue geometry becoming visible and interactable.	Hold the button for a different effect, or to rapidly switch between geometry.	Instant transition, geometry that is not selected is highlighted with an outline for the player to see. Colour is randomized on level start or reset.	Sound effect will play once per button press.
Circle Button - Orange/ Green Switch Button	Pressing a single time will switch between orange and green geometry becoming visible and interactable.	Hold the button for a different effect, or to rapidly switch between geometry.	Instant transition, geometry that is not selected is highlighted with an outline for the player to see. Colour is randomized on level start or reset.	Sound effect will play once per button press.
Triangle Button - Black/ White Switch Button	Pressing a single time will switch between the player becoming either black or white, and allowing collectibles of	Hold the button for a different effect, or to rapidly switch between colours.	Instant transition, collectibles are visible at all times even if the player is not the same colour. Colour is randomized on	Sound effect will play once per button press.

	those colours to be collected.		level start or reset.	
Directional Pad – Up Button	Press the button to disable HUD/ UI elements one at a time through multiple layers. Pressing the button four times will return to the default setting of full HUD/ UI visibility.	The player can't hide HUD/ UI elements by default and will have to hide them per level. The HUD/ UI elements can't be hidden in the level end sequence, so that the final time and score is displayed to the player.	The HUD/ UI elements are hidden one at a time starting with the button displays, then the colour state displays, then the information displays (Level time, score, gem count).	A sound effect is played once per button press.
Directional Pad – Down Button	Press the button to change the current song being played, song order is randomized on scene restart into a new shuffle order. There are 10 songs in the games soundtrack to choose from.	The player can't use the button for any other purpose, holding the button down only counts as a single input.	The current song that is playing is changed to the next item in the current shuffle order, the song name is displayed for two seconds on screen fading in and out quickly.	A sound effect is played once per button press.
Directional Pad – Left Button	Hold the button for 3 seconds to exit the current level and return to the central HUB world/ main menu of the game.	The player can't use the button for any other purpose, pressing the button down momentarily will not do anything. Releasing the button before 3 seconds have passed will reset the system. The player cannot use this button when they are already in the HUB world/ main menu of the game.	A message that states "Exiting to Main Menu" will display on screen and flash while the player is holding down the button.	A sound effect is played while the button is being held down.
Directional Pad – Right Button	Hold the button for 3 seconds to restart the	The player can't use the button for any other	A message that states "Restarting Level" will display	A sound effect is played while the

	current level and return to the beginning of the level.	purpose, pressing the button down momentarily will not do anything. Releasing the button before 3 seconds have passed will reset the system.	on screen and flash while the player is holding down the button.	button is being held down.
Options Menu Button (Console Default)	Pressing a single time will open the pause screen/ options menu of the game.	Play the game or make any progress while in the menu.	The player can navigate through the menu with similar controls to the main game.	No sound effect for opening menu.
Share Content Button (Console Default)	Pressing a single time will open the consoles content creation and sharing screen system.	Play the game or make any progress while in the menu.	The player can navigate through the menu to create and share content.	No sound effect for opening menu.
Touchpad Button Pressed	Pressing a single time will display the game controls on screen for five seconds, fading in and out. Holding the touchpad down will show the controls on screen continuously.	Cannot use any of the other touchpad features or use the button for any other feature.	The controls can be viewed at all times while playing the game.	No sound effect is played, only a text fade is applied to the controls text on screen.
Player Dies	The player can fall 25m before they die, or if reaching the floor boundary, they will die.	Recover from death from a fall greater than the maximum jump height from the players foot level.	Level resets upon death, score and time reset, all collectables and geometry reset to their initial state.	Digital artifacts, pixelization, screen lines, distortion, and oversaturation effects are applied while a negative sound effect is played upon death.
Player stands on yellow geometry	The player can walk on and off of geometry with no restrictions.	Switch the geometry to become invisible or non-interactable.	The geometry will slowly rise upwards roughly twenty feet over the course of seven seconds	A rising sound effect will play when the geometry is in motion upwards, a sinking sound

			and then stop moving. When the player steps off the geometry will move back to its initial position.	effect will play when the geometry is in motion downwards.
Player stands on purple geometry	The player can walk on and off of geometry with no restrictions.	Switch the geometry to become invisible or non-interactable.	The geometry will slowly sink downwards roughly twenty feet over the course of seven seconds and then stop moving. When the player steps off the geometry will move back to its initial position.	A sinking sound effect will play when the geometry is in motion downwards., a rising sound effect will play when the geometry is in motion upwards.
Player gets near a turret hazard	The player can get shot at by turrets when they are in range and visible through the switching system.	The player can't interact with the turrets when they are not visible. The player can't stand on the turrets without dying.	Turrets can only shoot at the player in a straight line and on a single horizontal axis. Projectiles push the player backwards in a straight line.	A shooting sound effect will play each time a turret emits a projectile towards the player.
Player stands in a fire hazard	The player can get instantly killed when standing in the flame and it's visible through the switching system.	The player can't interact with the flame hazards when they are not visible. The player can't stand in the flame hazard without dying.	Flame hazards can only be in a straight line or rotating in a circle.	A constant flaming sound effect will be emitted from the hazard, the player will hear this when nearby.
Player enters a level portal	The player can walk around a level portal and it will track their position to face them at all times. The player can see their previous level time and score above the portal.	The player cannot collide with the portal other than the block it is floating above.	Portal rotates slowly to face player, portal displays previous level score and time above it if level completed before, otherwise displays 0 for both values.	Sound effect plays when the player is near a level portal, screen fades to black on entrance.

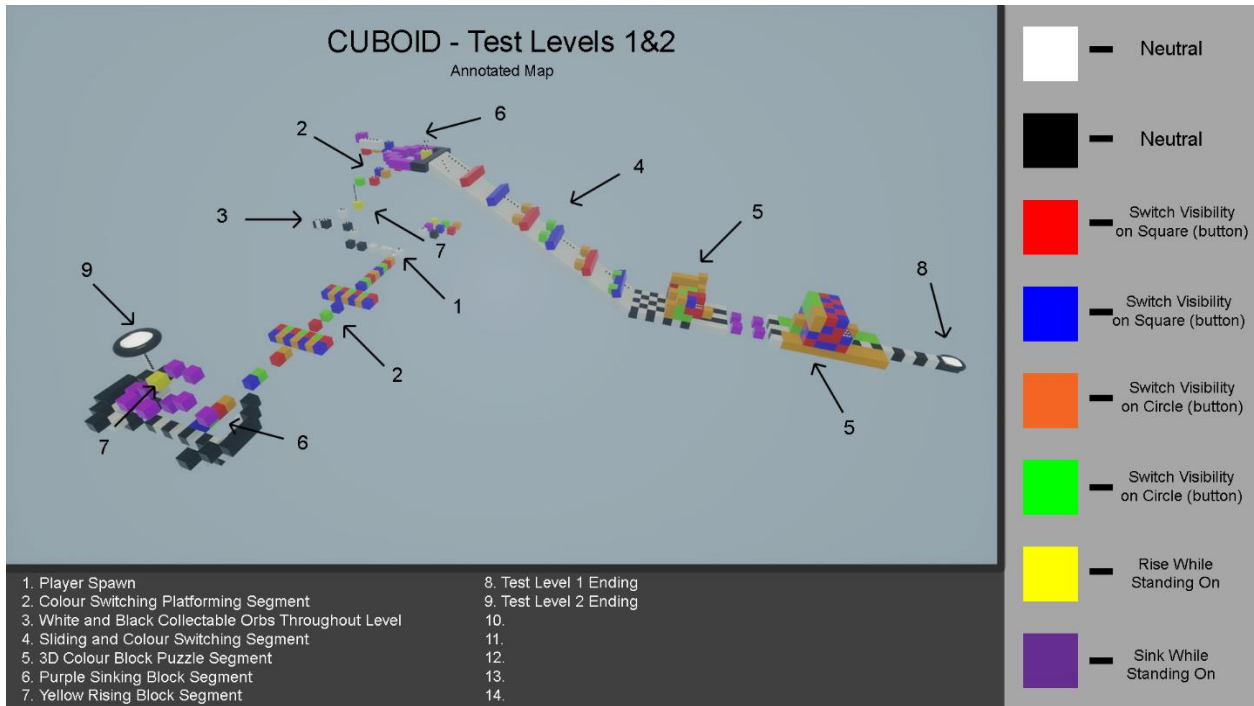| Player starts a level	Skip the introductory panoramic camera sequence by pressing the X button, use all controls and settings before the countdown finishes.	Input any other controller signals in the introductory sequence other than the X button, move outside of the starting block before the start sequence countdown ends.	An introductory panoramic camera sequence plays for eight, followed by a start sequence that has a five second countdown before the level begins.	Countdown sound effect plays for five seconds, sound effect plays on countdown end. Text "Start" is displayed when countdown ends.
Player enters a level end zone	The player can enter the level end zone to complete the level they are currently in and save their score and completion time.	The player cannot see or enter the level end zone or block it rests on until they collect all five gems in a level.	When all five gems are collected an "Exit Unlocked" message is displayed.	Sound effect plays on level completion, level time stops. If level time or points score are better than previous, they are saved.
Player ends a level	The player can choose to go to the next level, restart the current level, or return to the HUB world/ main menu of the game.	The player cannot perform any other actions or navigate to a previous level without returning to the HUB world/ main menu.	The player can navigate through the options with similar controls to the main game.	Fade to black on level end/ transition, no sound effect plays on level end.
Player picks up a points collectable	The player can pickup the collectable and receive +15 points.	The player can't pickup the same collectable more than once, the player can't collect a collectable that they are not the same colour of.	Collectables slowly grow and shrink in size in a loop as an idle animation.	A collection sound effect and a small particle effect will be played when each collectable is picked up.
Player picks up a gem collectable	The player can pickup the collectable and receive +1 gems. The player can and must collect 5 gems per level.	The player can't pickup the same collectable more than once.	Collectables have a circular ring particle effect around them that is animated.	A collection sound effect and a small particle effect will be played when each collectable is picked up.

Methodologies

CUBOID - Test Levels 1&2
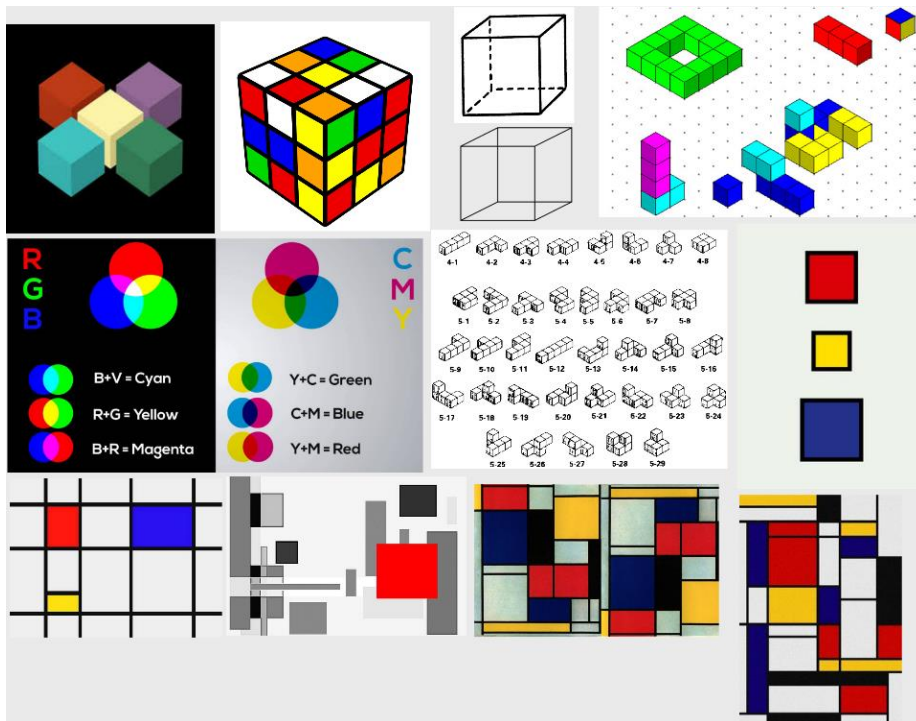Annotated Map

Legend:
- White — Neutral
- Black — Neutral
- Red — Switch Visibility on Square (button)
- Blue — Switch Visibility on Square (button)
- Orange — Switch Visibility on Circle (button)
- Green — Switch Visibility on Circle (button)
- Yellow — Rise While Standing On
- Purple — Sink While Standing On

1. Player Spawn
2. Colour Switching Platforming Segment
3. White and Black Collectable Orbs Throughout Level
4. Sliding and Colour Switching Segment
5. 3D Colour Block Puzzle Segment
6. Purple Sinking Block Segment
7. Yellow Rising Block Segment
8. Test Level 1 Ending
9. Test Level 2 Ending
10.
11.
12.
13.
14.

Figure 9 - Annotated Map for Test Levels

Figure 10 - CUBOID Moodboard

Goals

Gameplay Goals

1. Solve puzzles and platform throughout the world to reach the end of each level, some levels are linear while others offer more open exploration and a greater focus on puzzle solving skills rather than fast paced platforming.
2. Switch between visibility between different sets of blocks to platform throughout the world and solve puzzles.
3. Collect as many points as possible and complete the level in the fastest possible time in order to set a new record and compete against your friends for the highest score!
4. Avoid hazards or falling from platforms and complete each level with only one life available.

Internal Goals

1. Makes the user feel excited and immersed in a minimalist and vibrant environment.
2. A feeling of tension and conflict while avoiding hazards.
3. A desire for completionism of the game by practicing the level through multiple runs to achieve the best score and time. Easy to learn but very hard to master.

External Goals

1. Develop skills in level design using only fundamental basic geometric shapes, this adds to the minimalism and cubism present in the visual design of the game.
2. Create an excellent portfolio piece in order to gain an internship as a game designer or level designer.

Thematic Guidelines
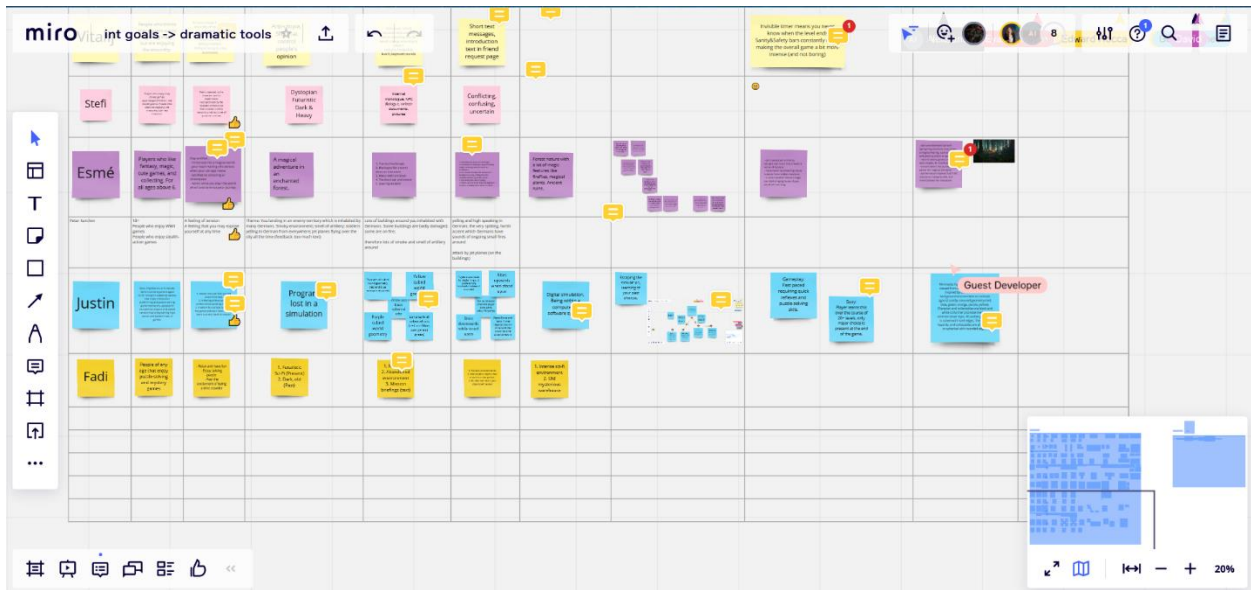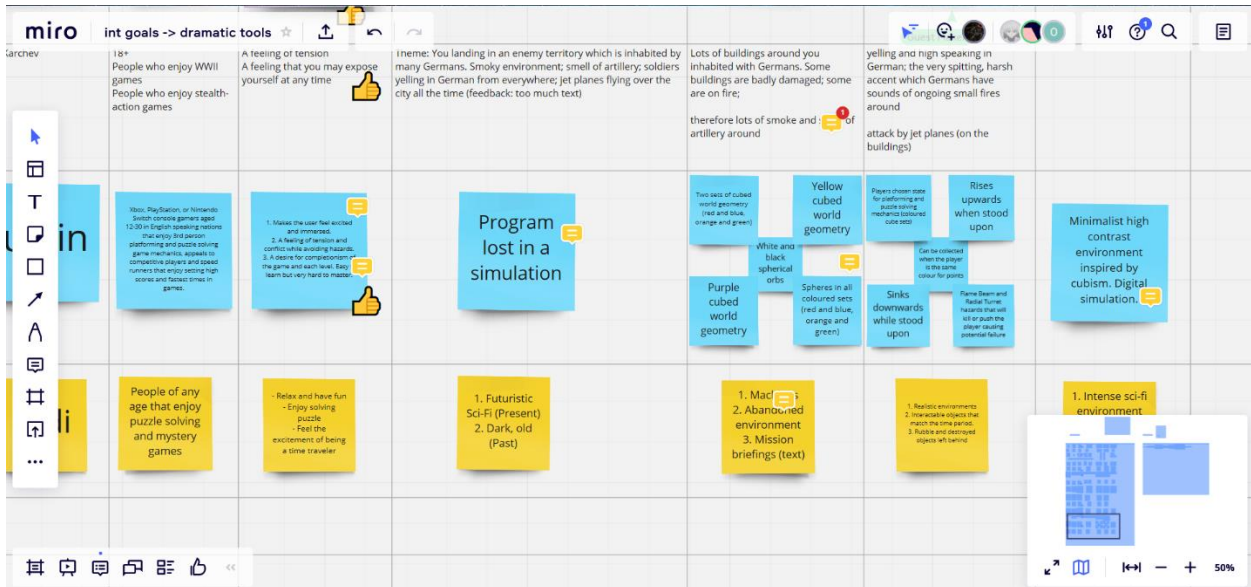

Figure 11 - Dramatic Tools 1

Figure 12 - Dramatic Tools 2

Theme and Mood

Program lost in a simulation, endless expanse of space.

Form

- Two sets of cubed world geometry (red and blue, orange and green)

- Purple cubed world geometry

- Yellow cubed world geometry

- Spherical flame hazards in all coloured sets (red and blue, orange and green)

- Spherical turret hazards in all coloured sets (red and blue, orange and green)

- White and black spherical collectable orbs

-Magenta and teal pyramid shaped collectable gems

Style

- Players chosen state for platforming and puzzle solving mechanics (coloured cube sets)

- Purple sinks downwards while stood upon

- Yellow rises upwards when stood upon

- Flame Beam and Radial Turret hazards that will kill or push the player causing potential failure

- Collectable orbs can be collected when the player is the same colour for points

Setting

Minimalist high contrast environment inspired by cubism. Digital simulation.

Plot

Overall Plot: Escaping the simulation, learning of your past choices.

Freytag's Pyramid Structure

Exposition: The player begins the game in the simulation with no knowledge of how they got there.

Initial Incident: The player begins the first level and realizes they are stuck in the simulation.

Rising Action: The levels become increasingly challenging to platform through and slowly present more and more hazards. With each level completed a short cutscene plays that shows the simulation slowly being corrupted in different ways behind the player as they progress through the levels.

Climax: The player reaches the climax of level difficulty and learns that they are responsible for trapping themselves within the simulation. They learn that they have been trapped in the simulation for what seems like lifetimes, and that there seems to be a repeating cycle of the simulation becoming corrupted and then resetting itself.

Falling Action: The player uncovers the true purpose of the simulation, the player has died in real life and the simulation is a tool that converts cranial stimulation into usable electromagnetic energy. The player agreed to this in their past life (like an organ donation), but was not made aware of the true nature of the simulation.

Resolution: The player reaches the end of the final level and enters the control room of the simulation, escaping the corruption temporarily and finally gaining control over their fate.

Dénouement: The player must make a choice: reset the simulation to remove the corruption but at the same time reset your memories and repeat the cycle, or shut down the simulation and die to prevent your body from being used as a power source any longer.
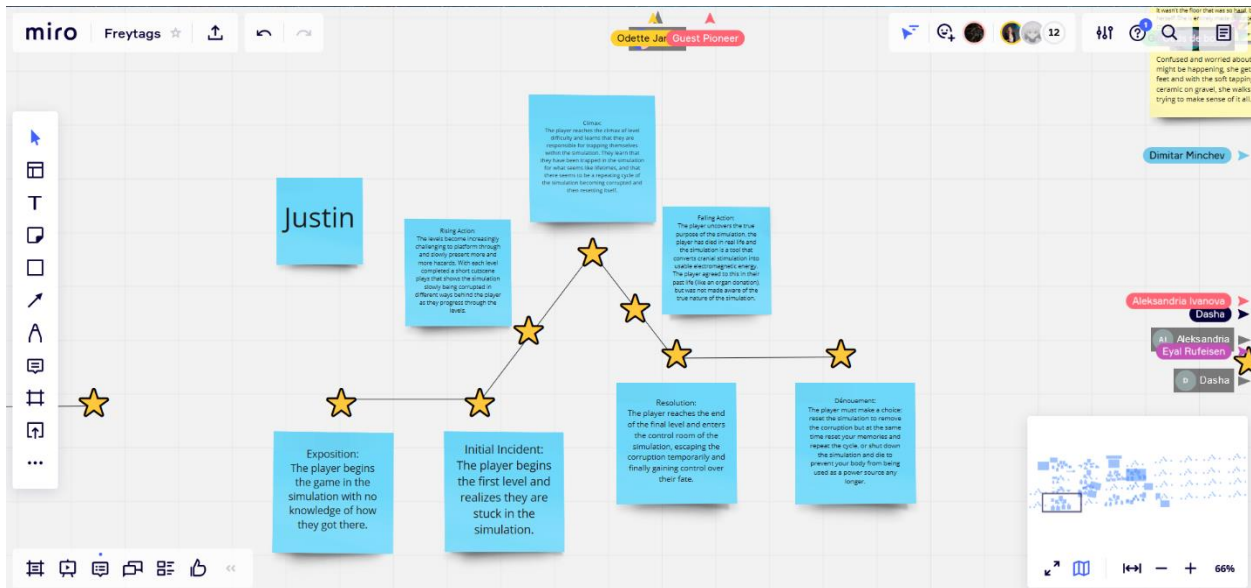
Figure 13 - Freytag's Pyramid Plot Structure

Pacing

Gameplay: Fast paced requiring quick reflexes and puzzle solving skills.

Story: Player learns this over the course of 20 levels, only major choice is present at the end of the game.

Difficulty: Game difficulty increases over time, levelling out in some areas and climbing more drastically in others. Difficulty is represented in an approximate scale of 1 being the easiest level of difficulty present in the game, and 10 being the highest level of difficulty present in the game. Higher levels of difficulty are realized in an increase in more extreme and exotic level themes, greater numbers of level hazards, more challenging platforming segments, more moving world geometry, and overall faster paced gameplay.
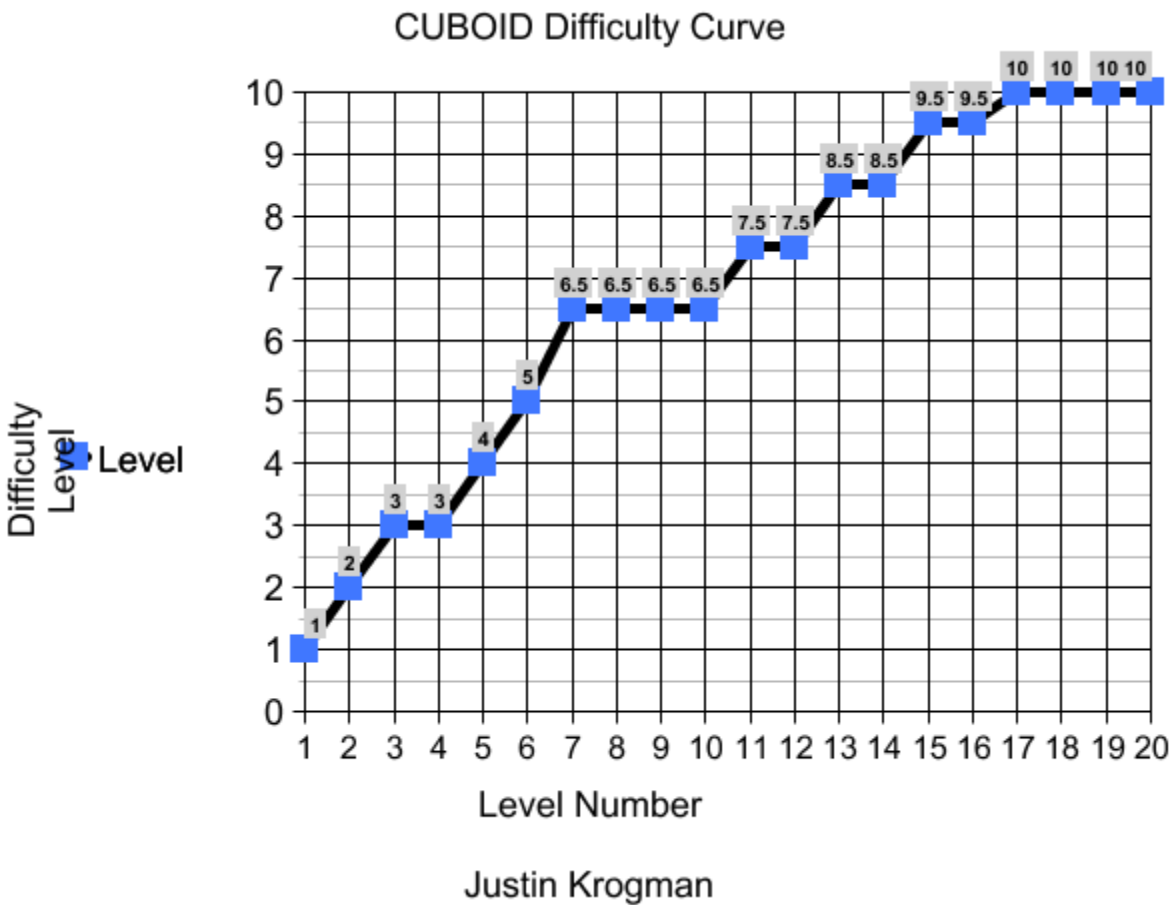
Figure 14 - CUBOID Difficulty Curve Graph

Visual Experience

Minimalist high contrast environment viewed from an isometric perspective inspired by cubism. Off-white background environment to contrast against solidly coloured geometry (red, blue, green, orange, purple, yellow) in default colour palette. Three additional colour palettes available to switch between in the central HUB world/ Main Menu of the game. Character and points collectables are black and white to further promote the high contrast visual style. All black and white world geometry does not change colour with the player, except for the starting block, the level portal blocks, and the level end zone block in order to promote visibility and value towards the player. All usable geometry is cubed with hard edges. The player, hazards, and collectables are all spheres or spherical with rounded edges.

Figure 15 - Colour Set 1 (Default)

Figure 16 - Colour Set 2

Switching Set 2	Switching Set 1	Switching Set 1	Switching Set 2	Rising Platforms	Sinking Platforms	Level Portal Level End Zone Gem Rings
World Geometry	World Geometry	World Geometry	World Geometry	World Geometry	World Geometry	Visual Effects
BF0426	213D40	D9D1A9	BF9341	731F1F	2E532B	191763
Upsdell Red	Dark Slate Gray	Dutch White	Satin Sheen Gold	Persian Plum	Hunter Green	Midnight Blue

Figure 17 - Colour Set 3

Switching Set 1	Switching Set 1	Switching Set 2	Switching Set 2	Rising Platforms	Sinking Platforms	Level Portal Level End Zone Gem Rings
World Geometry	World Geometry	World Geometry	World Geometry	World Geometry	World Geometry	Visual Effects
F25E6B	73363B	112226	0C3B40	A9BF5A	4E3267	E36A08
Fiery Rose	Wine	Dark Jungle Green	Rich Black	Middle Green Yellow	Cyber Grape	Spanish Orange

Figure 18 - Colour Set 4

Evaluation

Testing

User testing was done through peer feedback and evaluations throughout the school semester, as well as user testing by various Dreams community users and in person testing sessions.

Iterations
Iteration 1 – First Prototype

- Fully playable in the Dreams engine on PlayStation 4/ 5
- All primary gameplay elements implemented
- Test level created to test gameplay loops, visual design, and puzzle solving mechanics
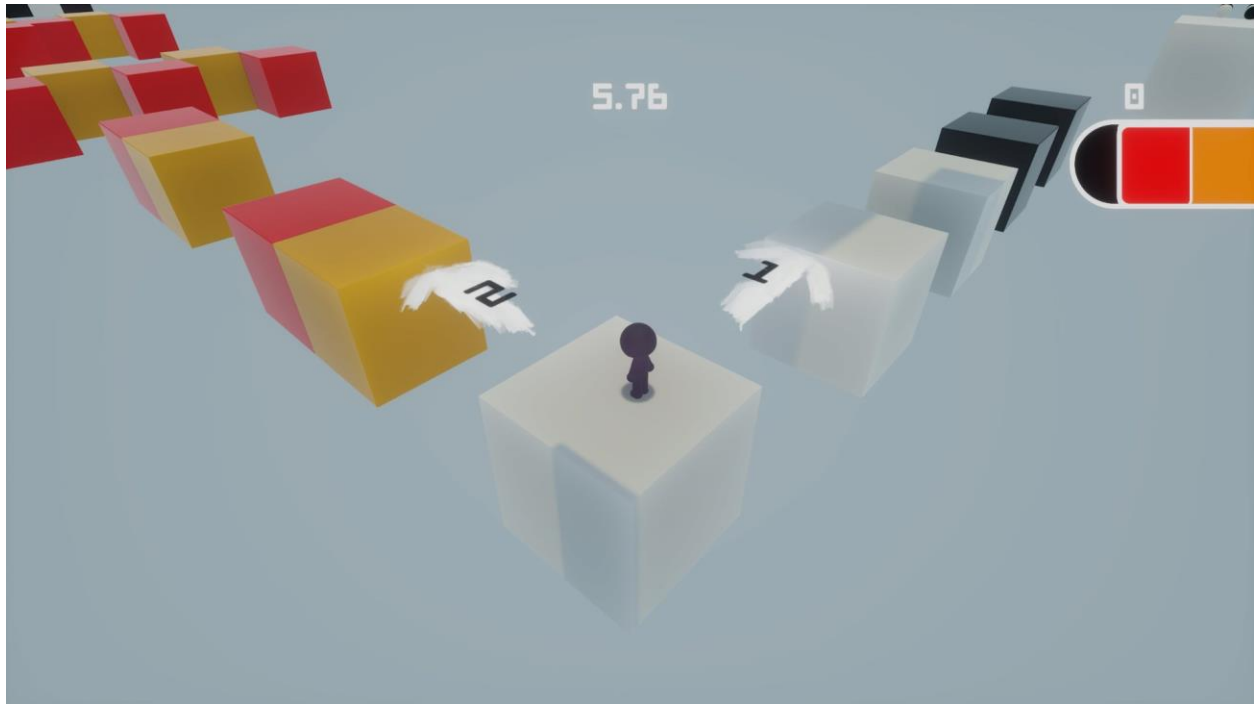
Figure 19 - Prototype Isometric Perspective With UI
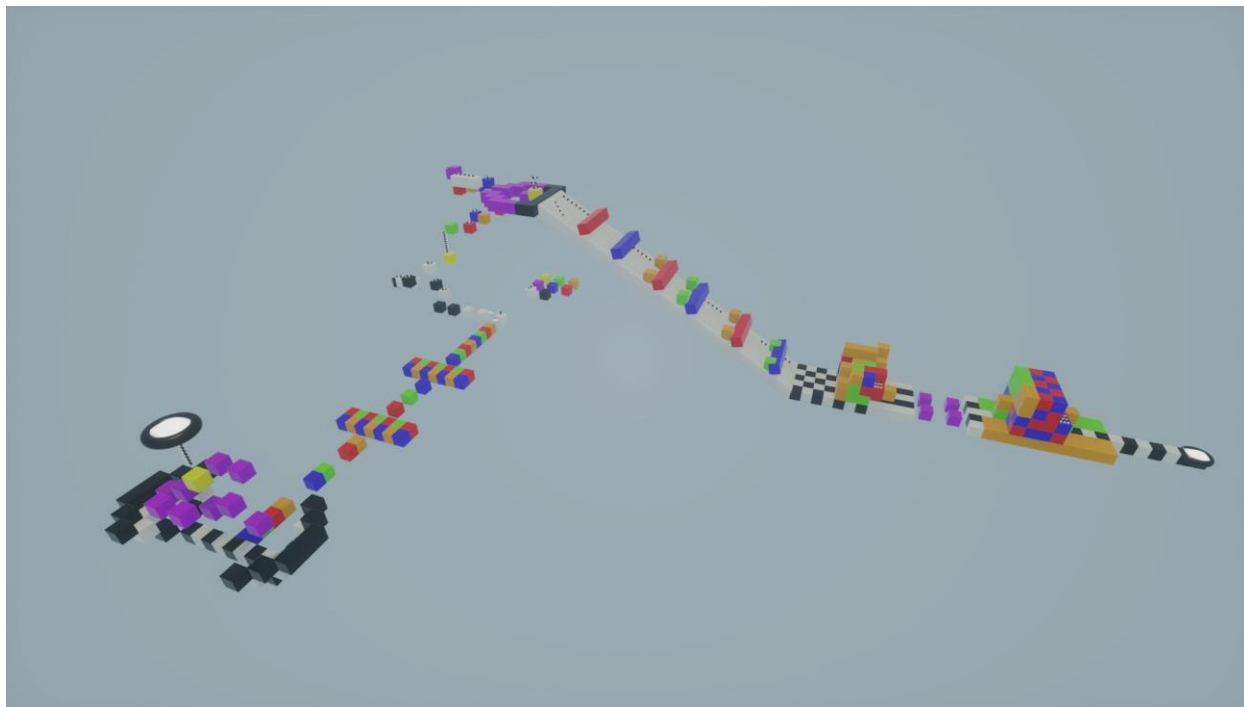
Figure 20 - Prototype Test Levels

Figure 21 – Prototype Test Level

Iteration 2 – Level Building Kit

- Prefabs finalized for world geometry and hazards
- Various assets combined into a single asset that can be placed in scenes allowing for a more streamlined level building experience.
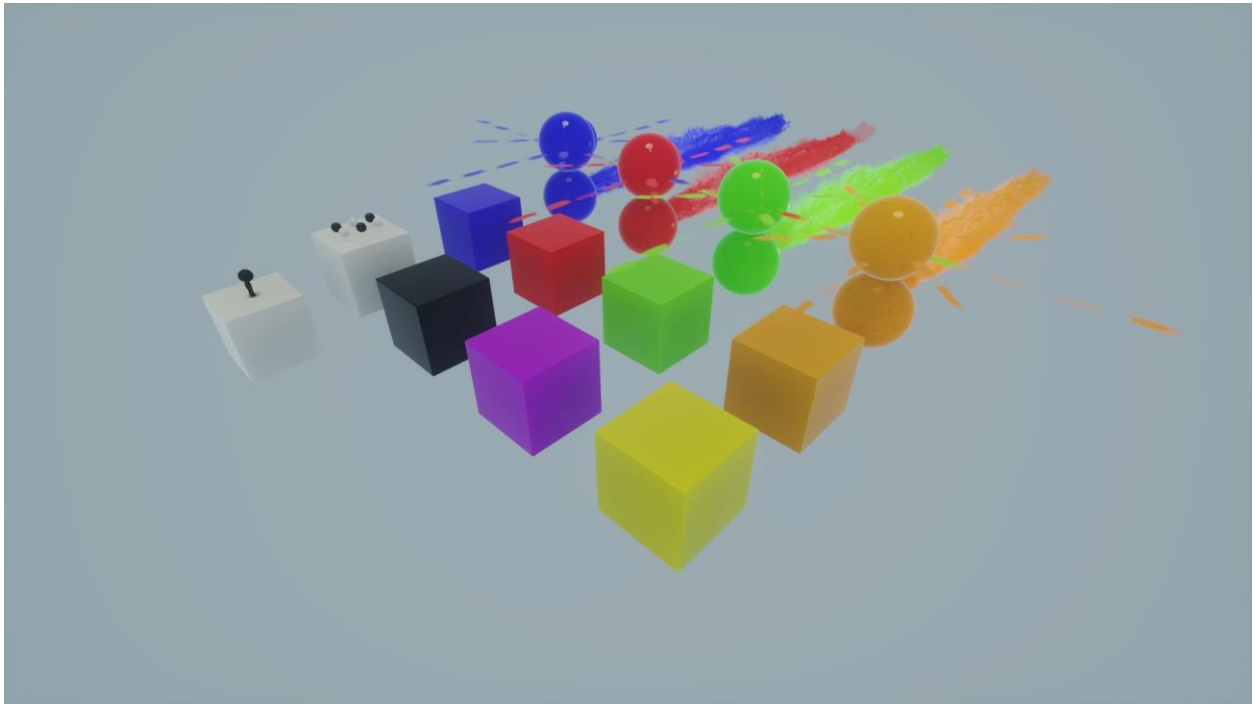
Figure 22 - Finalized Prefabs for World Geometry

Iteration 3 – Level Building Kit Improvements

- Level building pipeline established for efficient future level development
- Created a music randomizer with ten different songs that all feature a similar style and theme
- Added a cube to the players head and named main character CUBOID
- Collectable gems added and system added to require player to collect five gems before level completion

Level Building Pipeline:

1. Create new scene and stamp level kit in the center, allign to a 1 grid.

2. Wire completion node to current level number, and then wire nodes to time and level score variables in the "Global Variables" microchip.

3. Tweak level score and level time variable modifier gadgets in the "Global Variables" microchip to match current level number.

4. Tweak variable modifier in the "End Sequence" timeline to match current level number.

5. Build the level using clones of assets from the level kit, create additional floor kill zones or expand current one as needed. Place score collectables and five gems in the level.

6. Place end zone block group and trigger zone at the end of the built level.

7. Save, test level multiple times.

8. Save and upload scene. Stamp in dream and wire all doorways as needed to hub level, save dream.

9. Test all four levels in a region to post points and completion time scores.

10. Tweak scoreboard settings if needed.

Figure 23 - Level Building Pipeline
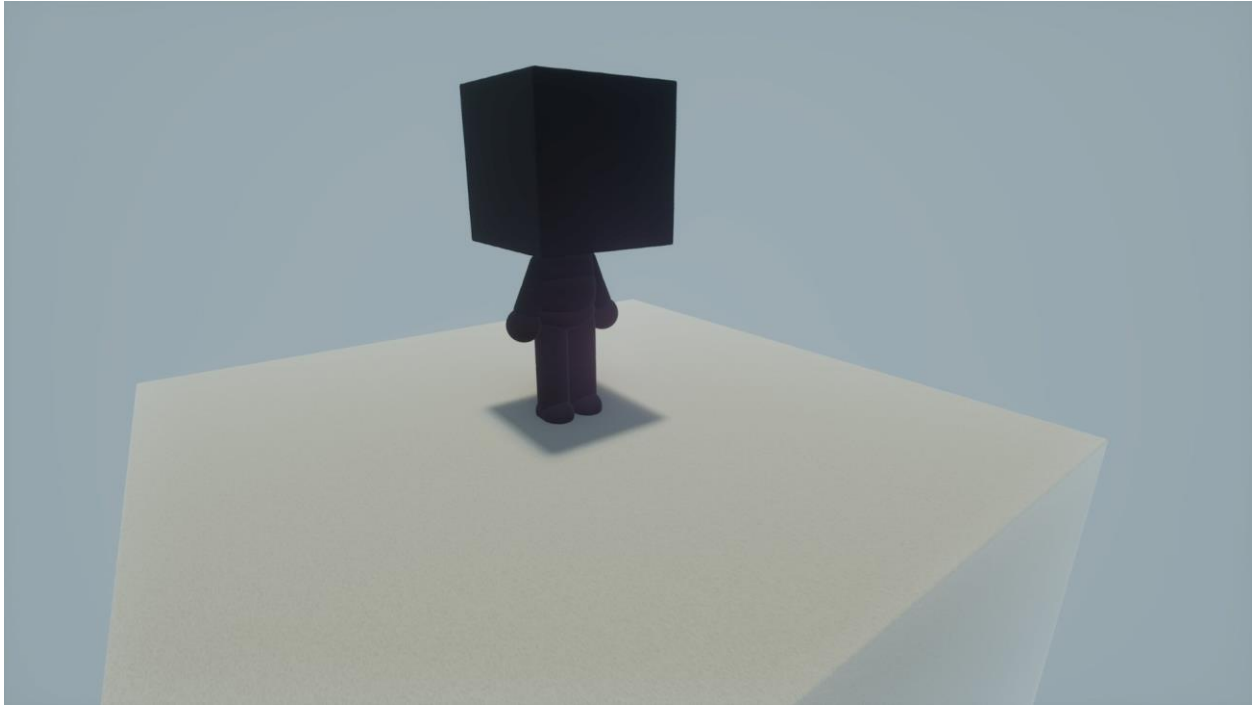
Figure 24 - CUBOID Character
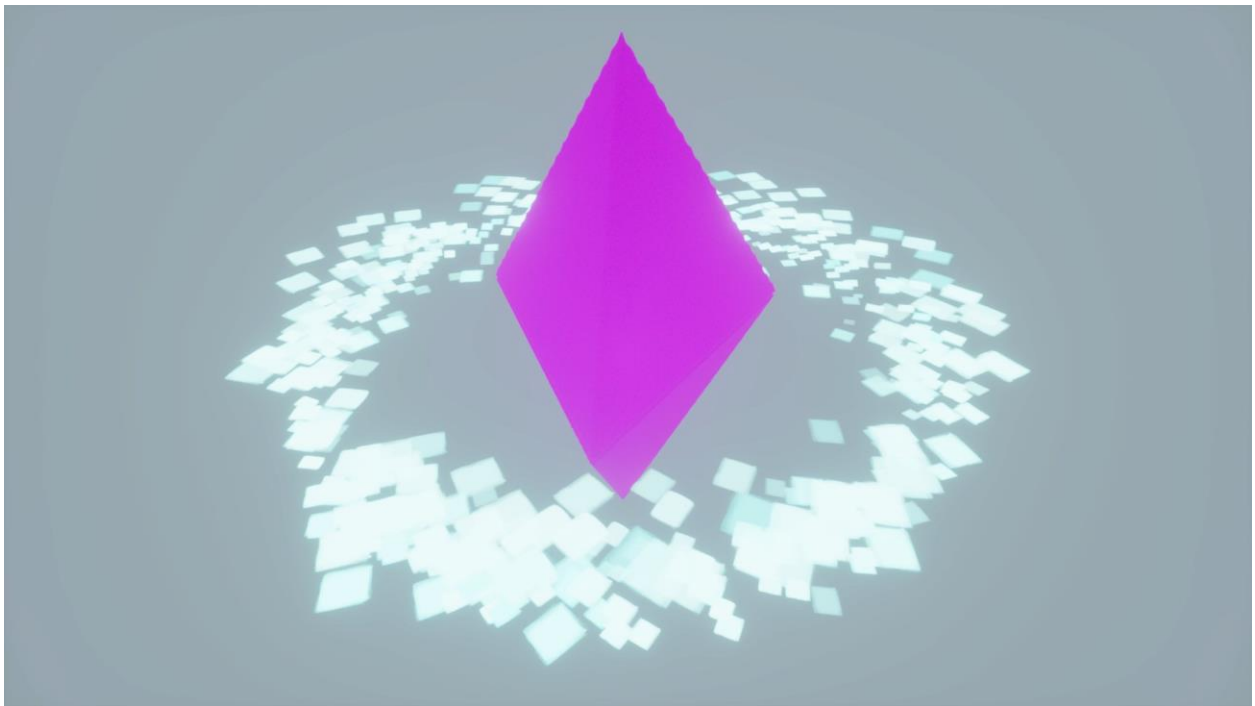
Figure 25 - Collectable Gem
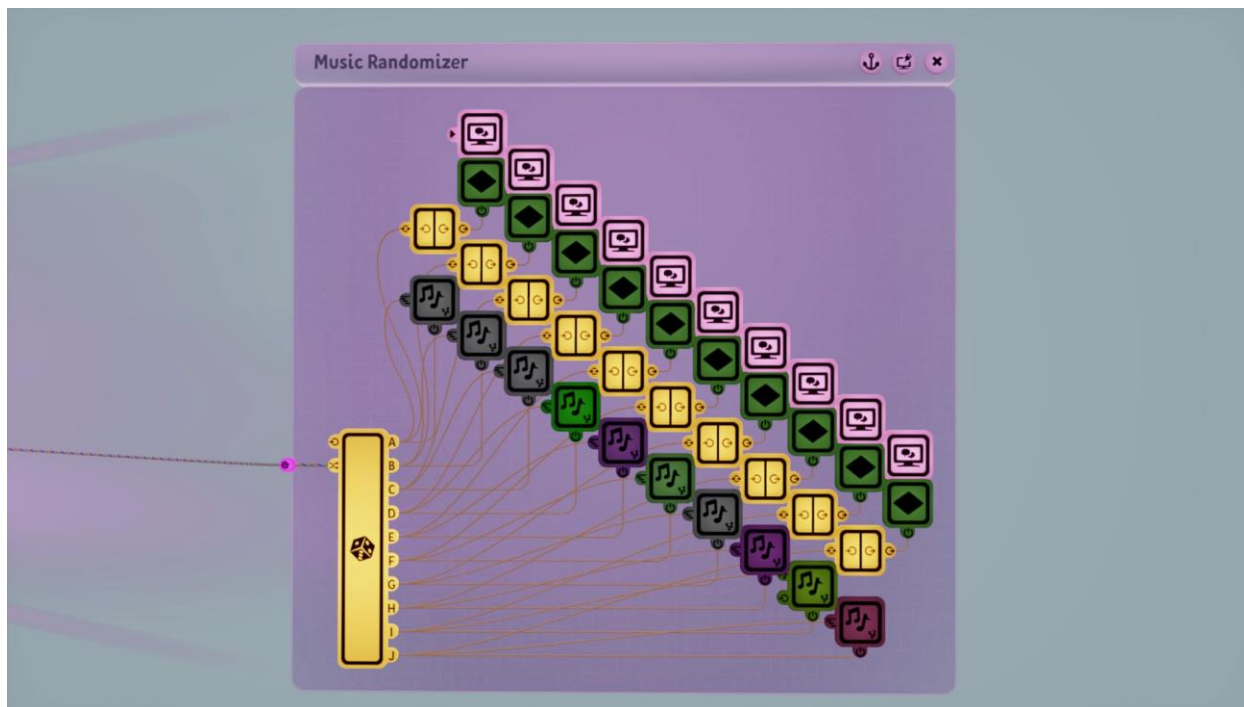
Figure 26 - Music Randomizer Logic

Iteration 4 – HUB World, Level 1 Built

- HUB World built
- Level 1 built with intention to teach basic mechanics one at a time and in a linear fashion. Inspiration for this level taken from level 1-1 of the Super Mario Bros SNES game, where the level is built to demonstrate and teach the core mechanics of the game in a relatively safe environment
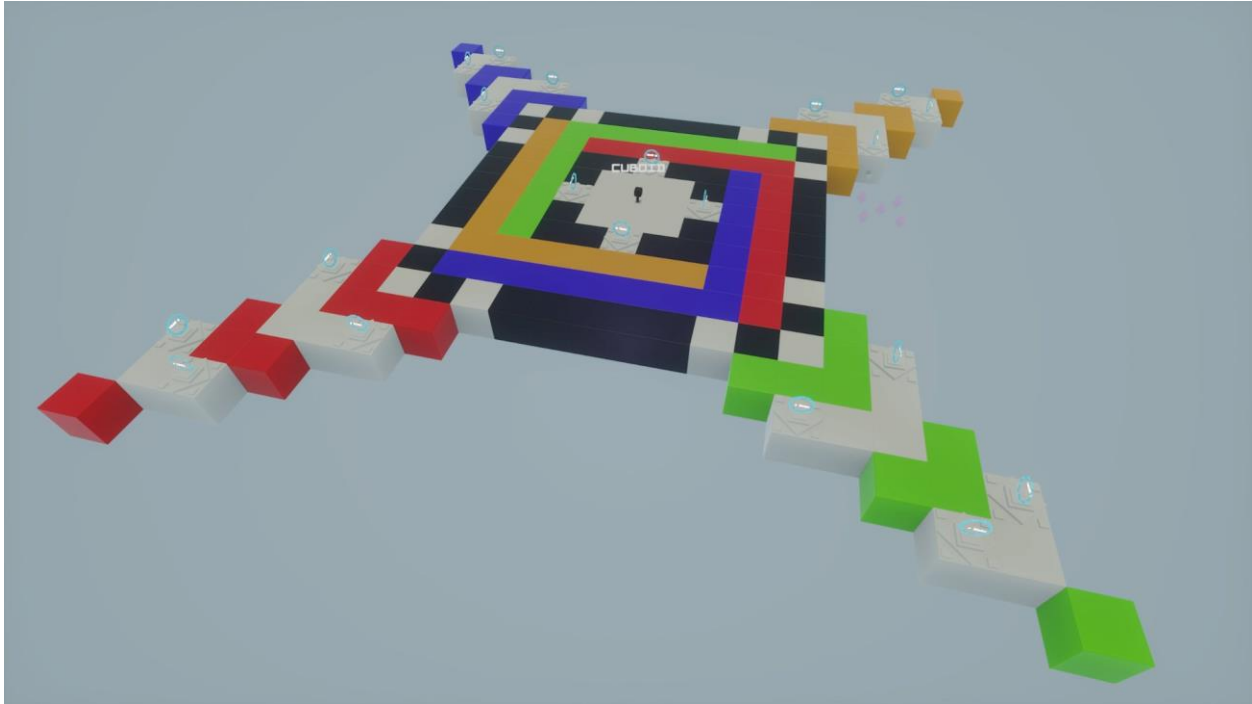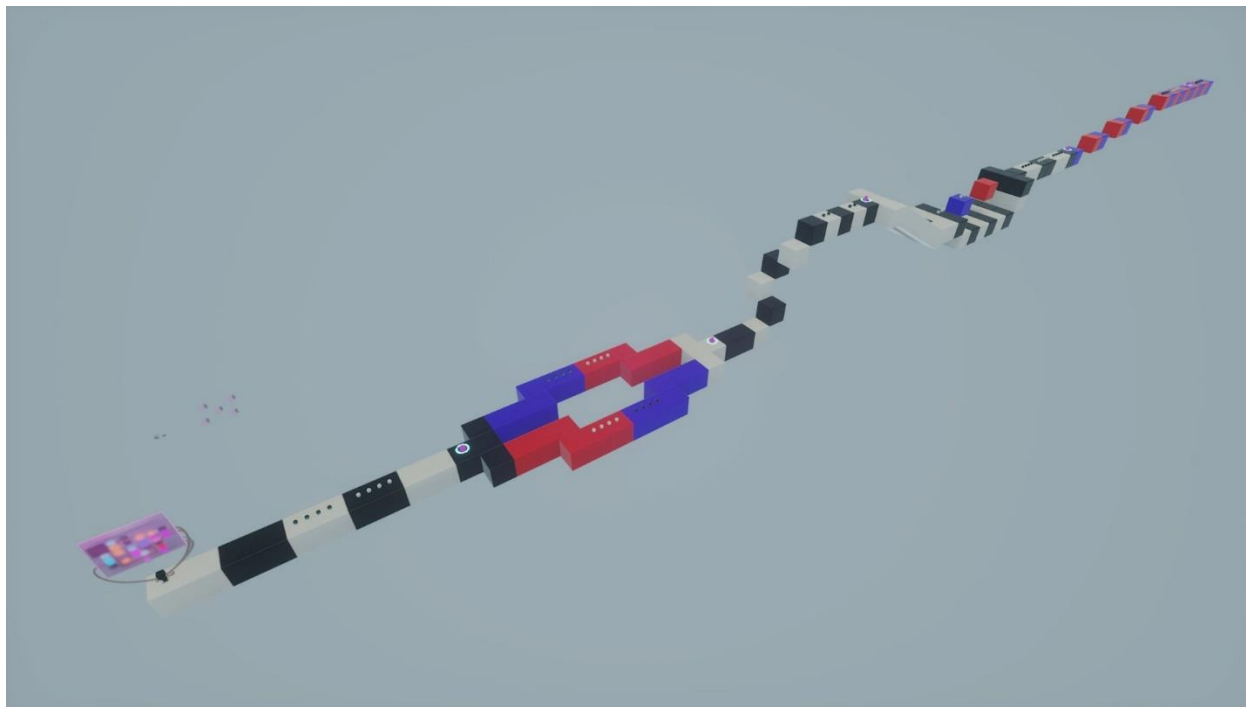

Figure 27 - HUB World With 20 Level Portals

Figure 28 - Level 1 Above View
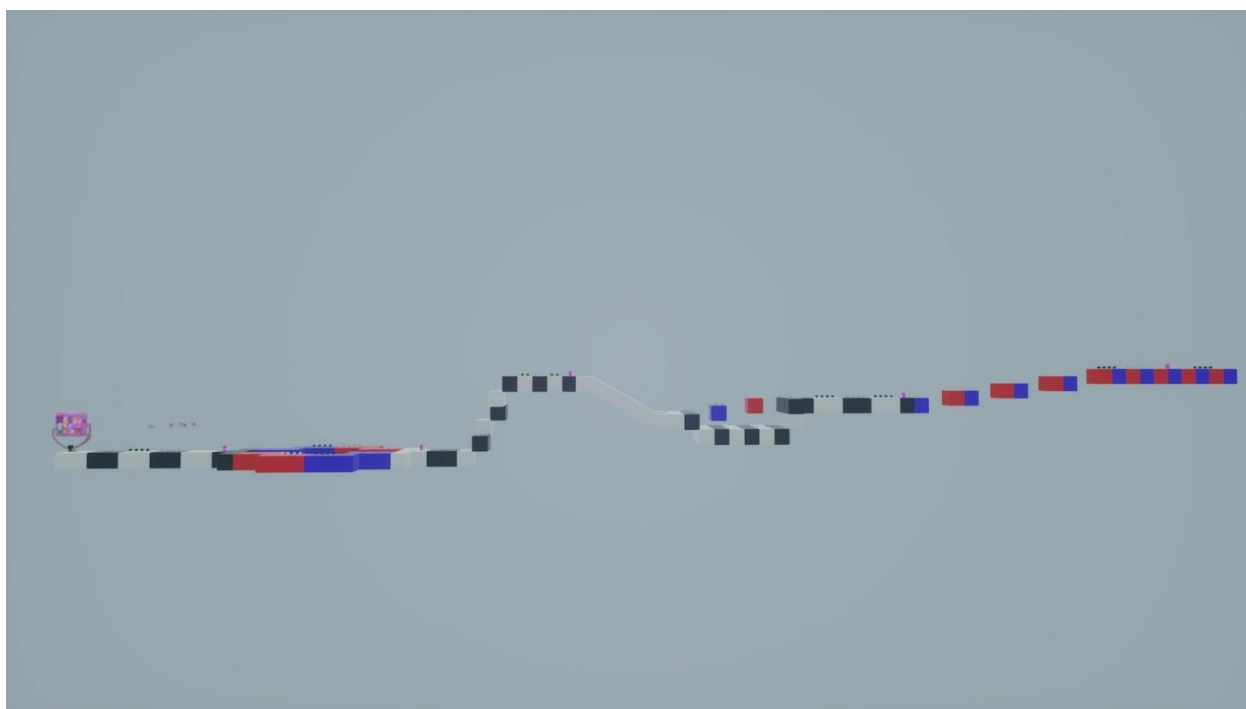
Figure 29 - Level 1 Side View

Iteration 5 – Level Building Kit Improvements

- Added all level progression variables, level saved score variables, and level saved time variables for full functionality of game progression system
- Restart level and return to main menu options added, also added restart level option in end of level selection screen
- Hide HUD/ UI button added with ability to hide HUD elements through layers starting with the button display, followed by the colour set display, and then finally the information display (level time, score, gem count) before returning to default settings
- Player analytics variables added that track ten player statistics (Total jumps, total deaths, total orbs collected, total gems collected, total triangle button switches (black-white), total square button switches (red-blue), total circle button switches (orange-green), total levels attempted, total levels completed, and total play time)
- Player analytics meta-game added. As the player analytics statistics increase, their rank will increase as well. If all ten statistics are at minimum bronze rank the overall player rank will increase to bronze rank and so forth through the continuing ranks (Ranks are Bronze, Silver, Gold, Platinum, and finally CUBOID Master). This is displayed in the HUB world/ main menu of the game for players to review as they progress.
- Region text added that is displayed above each region and displays the players saved total time and score for the four levels within that specific region. The region text will only display a score and time once all levels within the region are complete.
- Final game structure developed
- Level portal added. Levels appear one at a time in the HUB world/ main menu as the player progresses through the game. Level portals will display that specific levels saved time and score above it if already completed, otherwise they will display zero for both values
- Level end zone added with particle effects for triggering end of level when all five gems have been collected and the player enters the zone
- Created three additional colour palettes to be used in future development
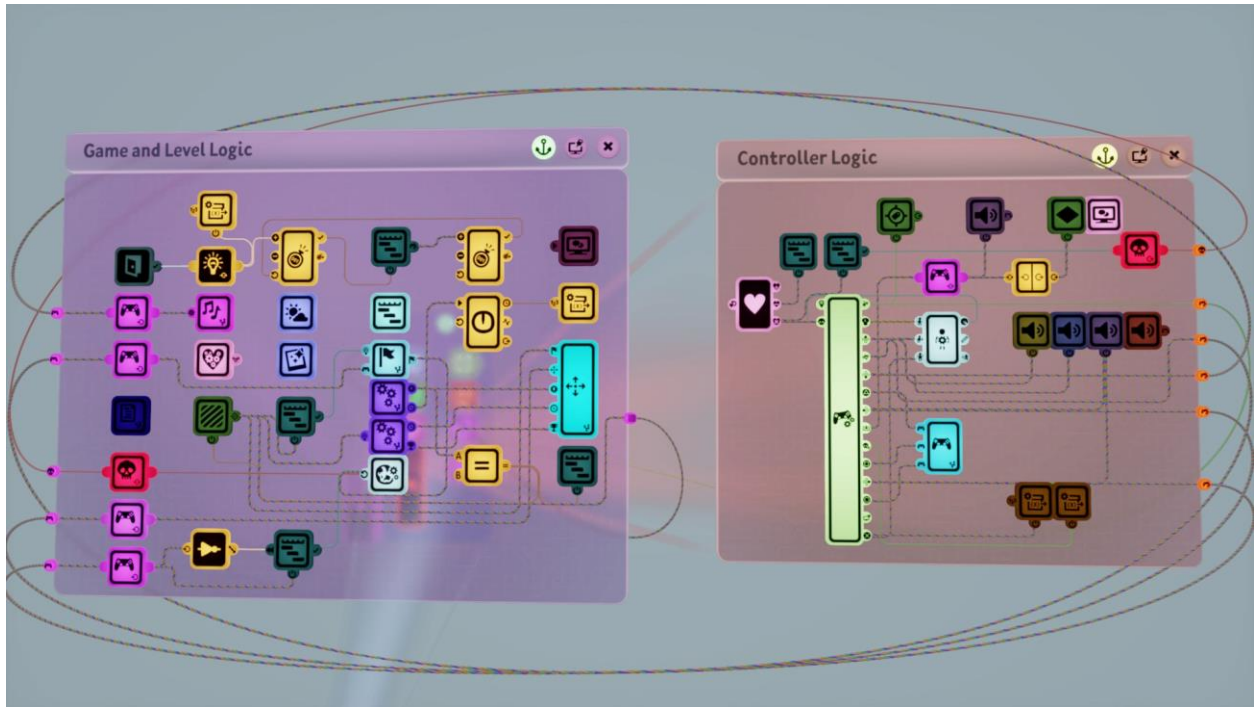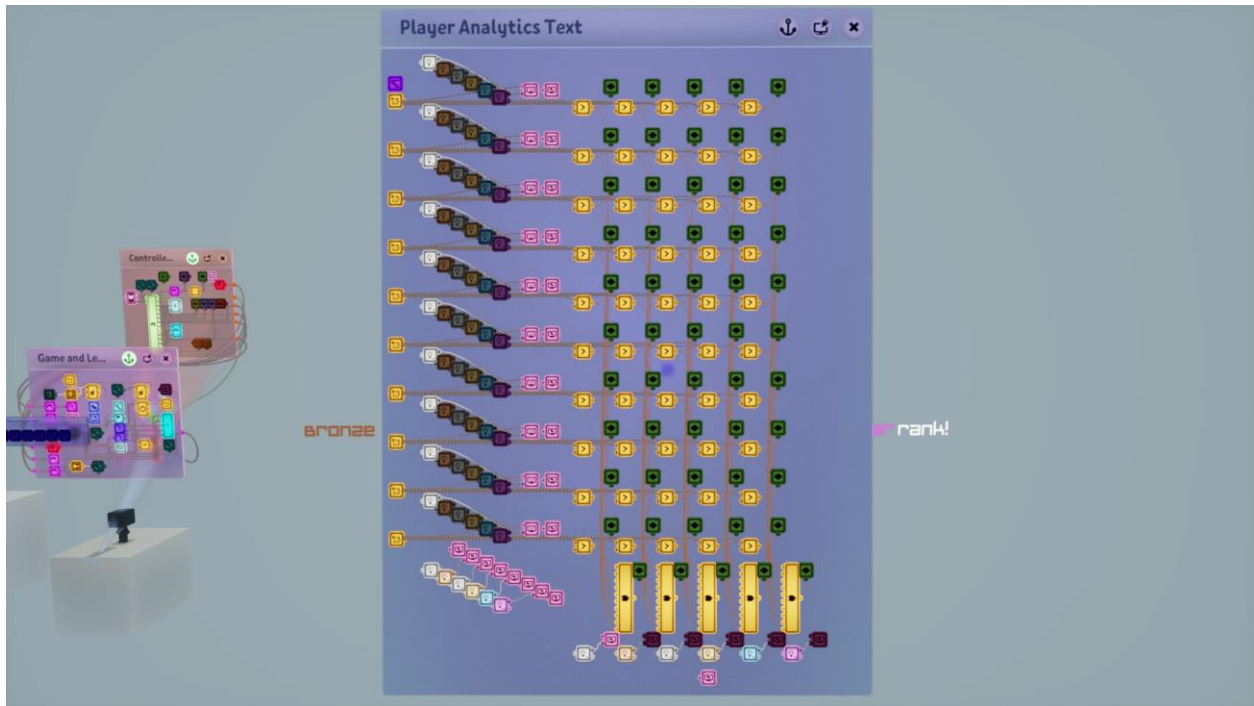
Figure 30 - Game Logic and Player Controller Logic

Figure 31 - Player Analytics Meta-Game Logic

Figure 32 - Player Analytics Meta-Game Text Display

Figure 33 - HUB World Region Score and Time Displays (Example Regions 1-3)
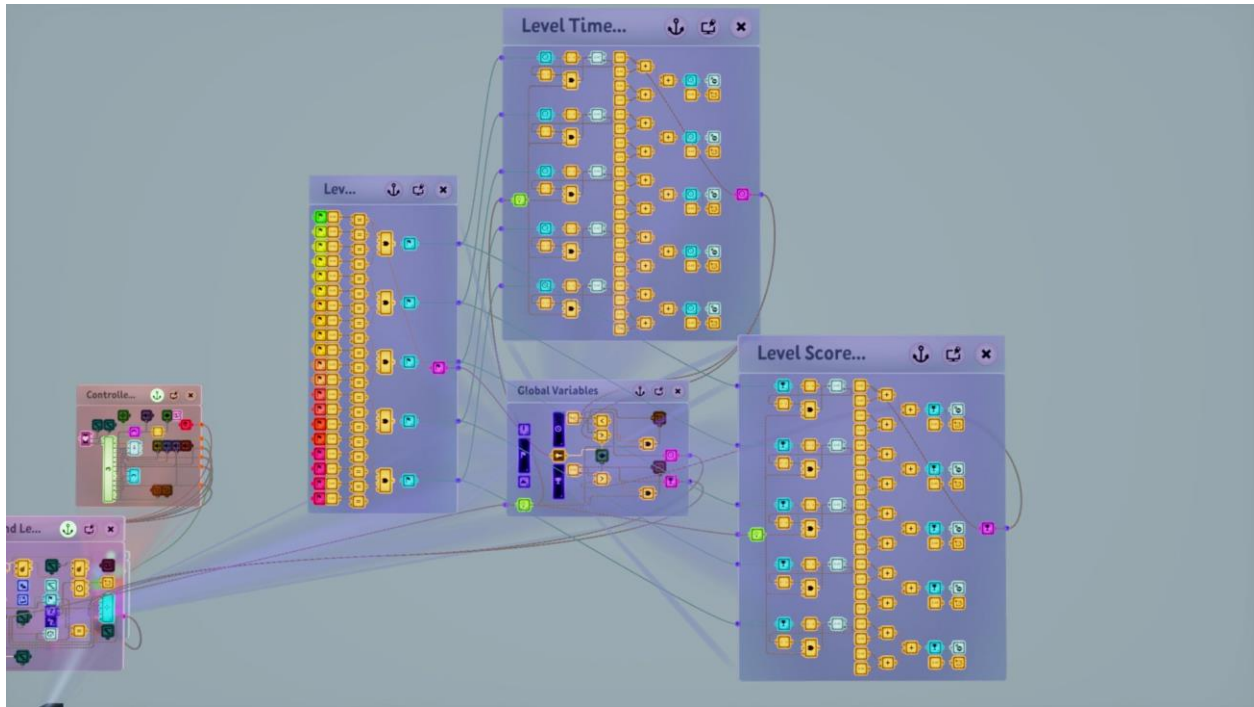
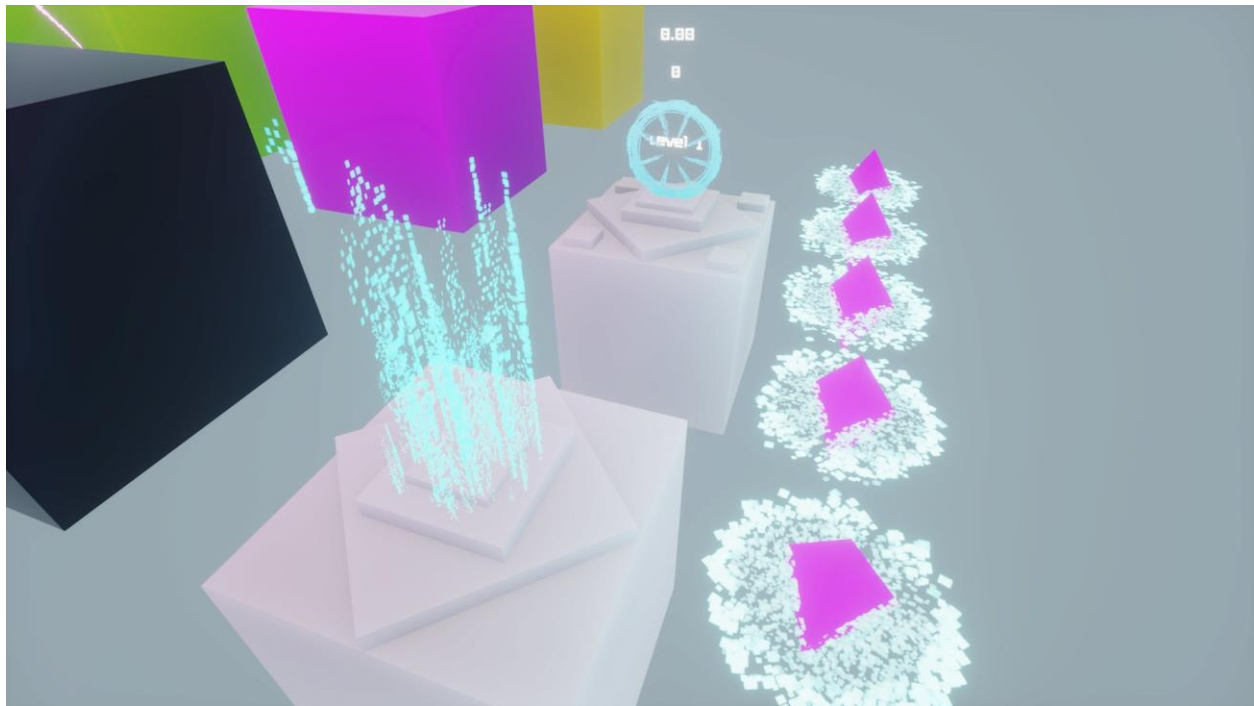*Figure 34 - Level Progression Variables (Left), Level Completion Time Variables (Top), Level Score Variables (Right)*

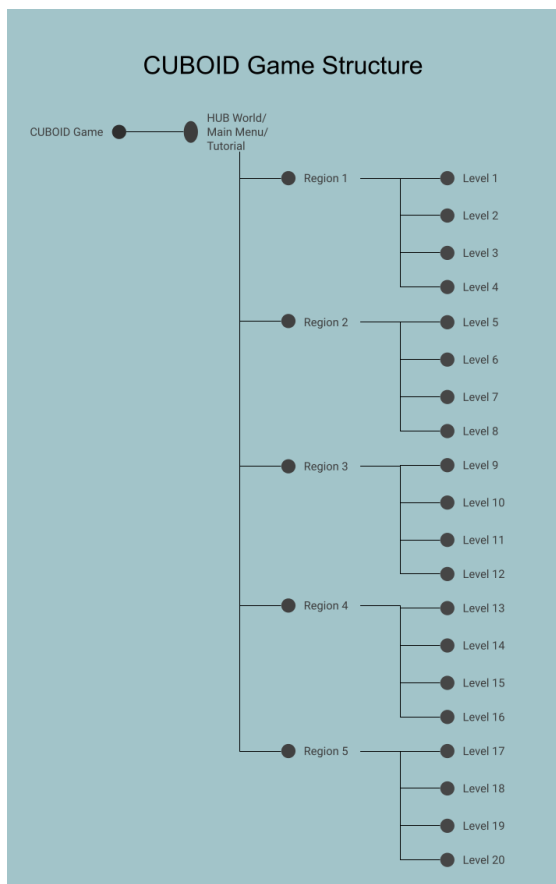*Figure 35 - Level End Zone (Bottom Left), Level Portal (Top), Collectable Gems (Right)*

Figure 36 - Game Structure Line Diagram

Iteration 6 – Level 10 Built

- Built level 10 (Region 2 – Level 2) for level design elective
- Mapped out previous and next levels based on established difficulty curve graph. Previous level (Level 9) will consist only of sliding segments in a branching but linear arrangement in a downwards slope, and the following level will consist of non-linear puzzle solving and minor platforming challenges in a symmetrical and looping environment.
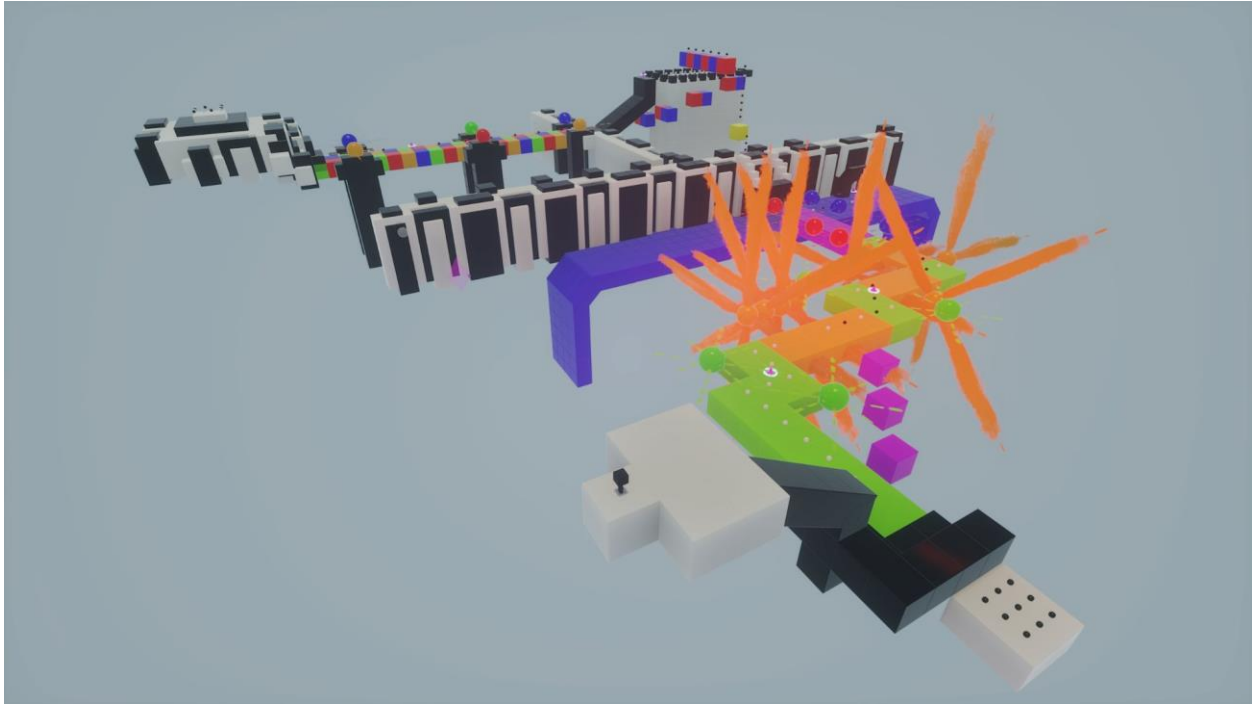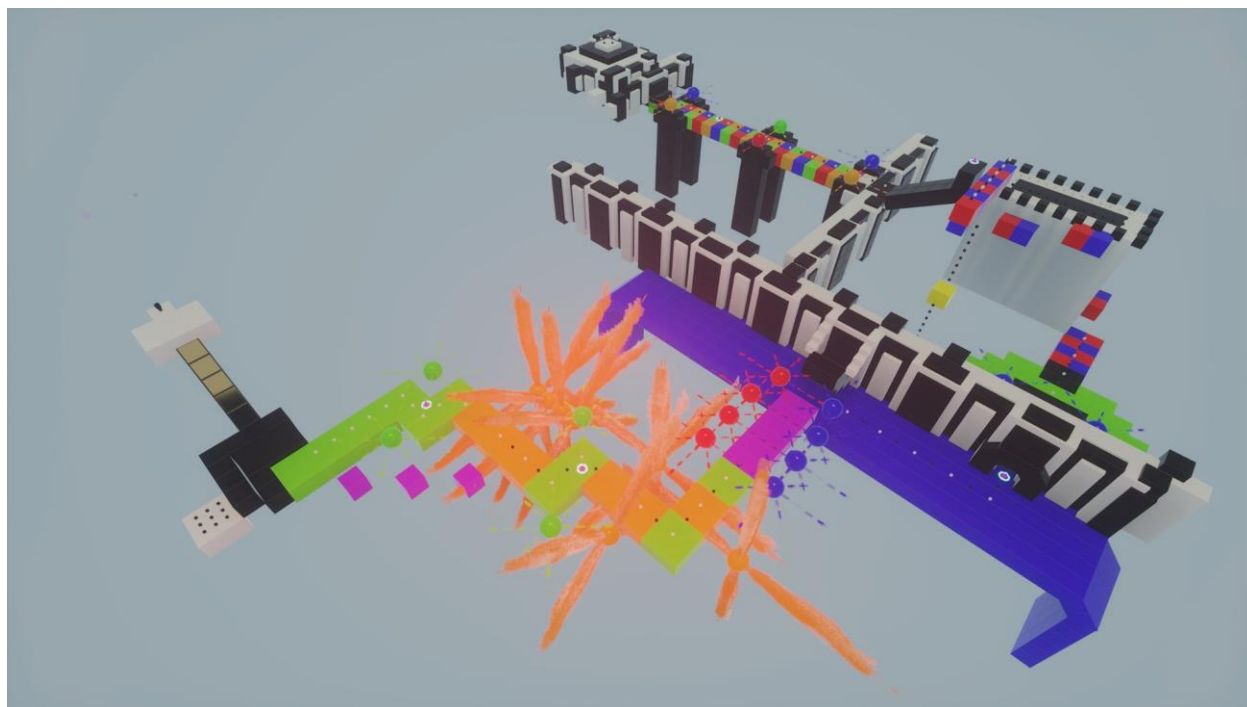

Figure 37 - Level 10 From Above
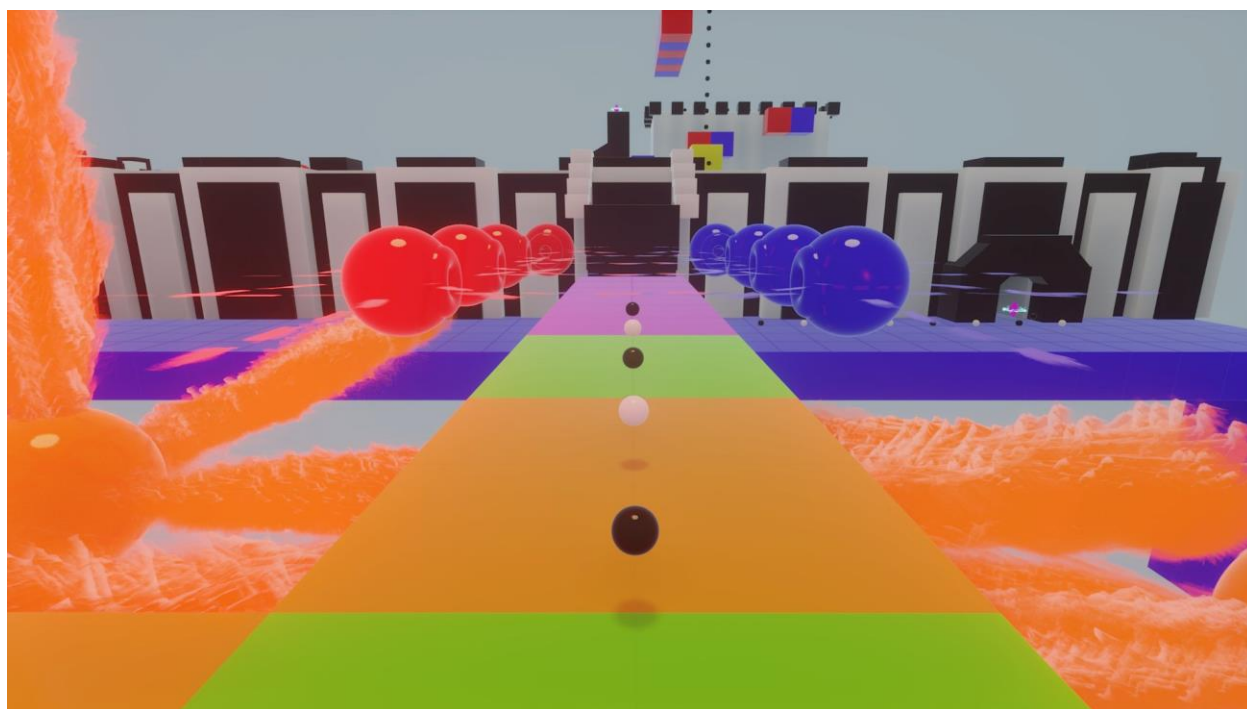
Figure 38 - Level 10 From Above

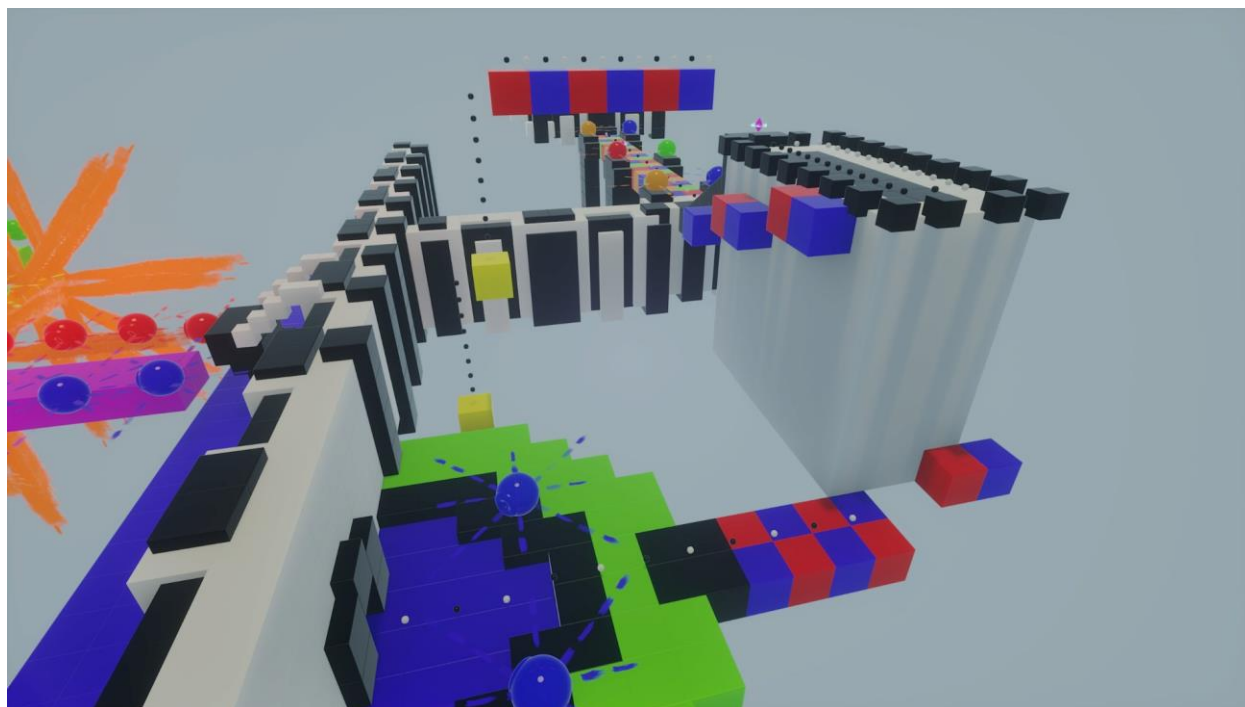*Figure 39 - Level 10 Drawbridge Close Up*

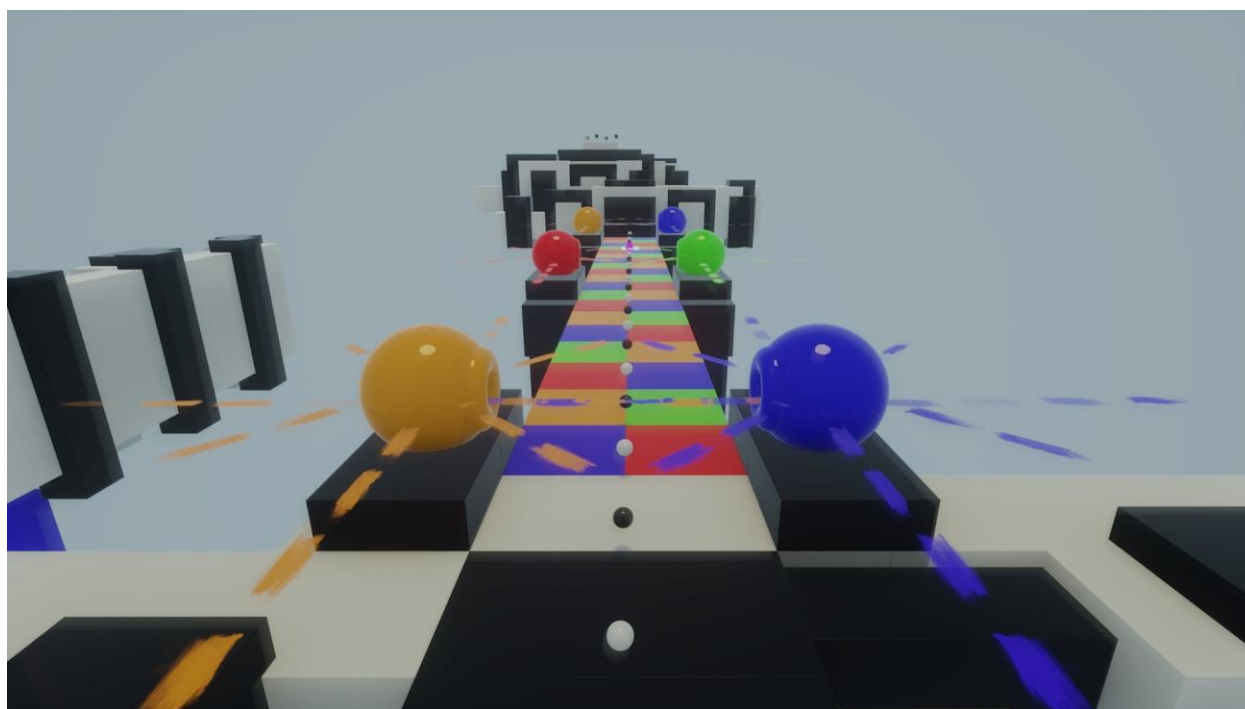*Figure 40 - Level 10 Branching Platforming Segments*

Figure 41 - Final Bridge Close Up

Iteration 7 – Future Developments

- Visual improvements to meta-game
- Refine values of meta-game based on further user testing
- Finish all 20 levels
- Incorporate written story (Freytags Pyramid) into the game, told over the course of twenty levels through short animated cutscenes that will play at the end of each completed region. Culminating at a final choice at the end of the twentieth level
- Scene background additions to levels
- Tutorial in HUB world to teach basic mechanics and controls
- HUB world region expansions to significantly expand on the four corners currently present in the HUB world and turn them into major explorable zones
- Add points combo system. Each time a points score orb is collected it will increase a multiplier that will increase subsequent score pickups value, unless a specific amount of time elapses (ten seconds) in which case the multiplier will reset back to zero. This will add a greater skill ceiling to the game and promote players to set even higher scores on the publicly visible scoreboards.
- Soundtrack edition release. CUBOID: Soundtrack Edition features all ten tracks in the CUBOID soundtrack, four different visualizations to switch between featuring cubes from the game, and light and dark modes
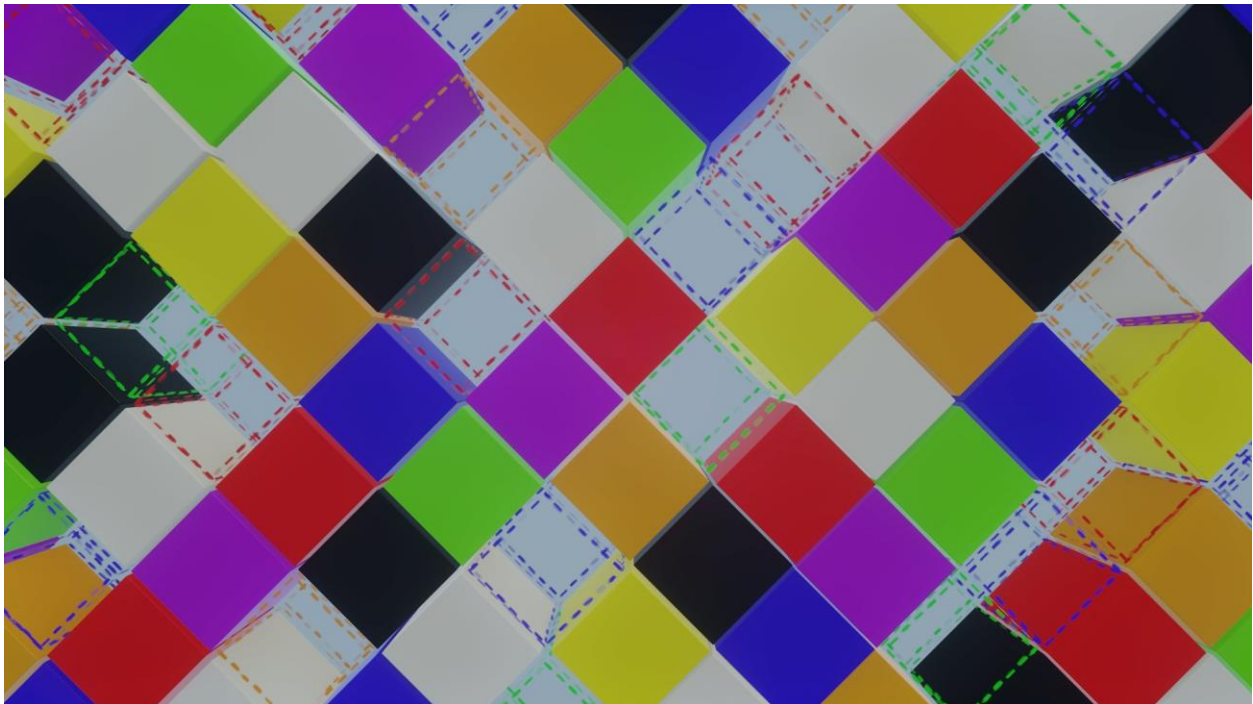

Figure 42 - CUBOID Game Cover Art, Soundtrack Edition View 1

Bibliography

Websites Used:

https://coolors.co/

https://nces.ed.gov/nceskids/createagraph/Default.aspx

Dreams Elements Used (Created by Dreams Community):

Isometric Camera Kit - Zodira

Dreams Elements Used (Created by Media Molecule):

Songs:

Oxismo Peron

House Party

Astro Party

Oh Buoy

Blob Bob

Sugar-Coated

Bite Size Bop

New High Score

Scram Kids

Lounging Lizard

Sound Effects:

Stamper

Digital Bubbs

Input Rejected

Tick Tock

Uprising

Click and Ploppers

Boop

Suck Up

Tractor Beam

Electricity Arcs

Downer

Hit The Darkness

Medium Positive Crown Reaction

Visual Effects:

Portal

Activation Effect

Electricity

Force Field

Pick Up