

## **Hypothesis**

This project investigates the development of a Cyclical Resource Management Game through the implementation of the following mechanics: Farming, Crafting, and Combat.

## **Note**

This document serves as a high level overview and discussion. Please refer to the Design Details Document for a detailed breakdown of all system components.

### Game Context

The thematic context of the game:

The player is placed in a dying world and must restore the health of the world. The nature of the world is dying and must be restored through the implementation of different biotechnologies that will heal the nature.

The player must develop and make use of skills in farming, crafting and combat to achieve this main goal.

The world is inhabited by dangerous creatures, that thrive in the current dead climate, and will attempt to damage and prohibit you from implementing restorations to the world. The player must set up defences to prevent enemy attacks and engage in melee combat when the defences fail.

### Design Goals

- The player must be able to collect, “plant”, and farm different resources.
  - Resources must be used to craft biotechnologies, weapons and defences.
- The player must explore different areas to obtain and farm different resources.
- The player must have a home base for which they must use to implement the biotechnologies and also use for safety during night time.
- The world should run on a day/night cycle
- Creatures must appear and attack at night in waves(groups of creatures that appear at different intervals)
- The game must be communicated through a 2D top-down perspective

## **Process**

### Core Game Design

The initial game design process to determine the design goals for the project was conducted in the following manner:

- Brainstorm
  - Group meetings and discussions were held to discuss ideas and interests
  - Initial ideas and concepts were determined - resource management and exploration
- Research
  - Research was conducted to gain insight on different implementations of the proposed concepts
  - Research was conducted by engaging with different media that explored the proposed concepts, such as movies, TV shows and video games.
- Inspirations
  - Based on the research, the team decided on the main inspirations and references to use to begin developing the game concepts.
  - Main Inspirations included:
    - Stardew Valley - Farming, Crafting, Resource Management, Time Cycles
    - Minecraft - Farming, Crafting, Enemy Mob System, Resource Management, Day/Night Cycles
    - Plants vs Zombies, Enemy Wave attacks, Resource Management, Farming
    - Bastion - The use of a home base location during exploration

## Game Systems

- Daily Cycle
- Farming
- Crafting
- Restoration System
- Weapons
- Enemy Waves
- Combat

## System Interactions

### Daily Cycle:

The game will run on a day cycle, with each day being split into 4 different phases.

- Phases 1-2: Morning - Afternoon
  - Player must explore, farm, craft and restore the world health in these phases
- Phase 3: Evening
  - Player should return to home base to prep defences for the night.
- Phase 4: Night
  - Creatures Attack
    - Player and Biotechnologies can be attacked and damaged
    - Creatures will only last in the night, they will die if they survive to Phase 1

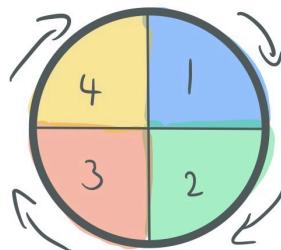


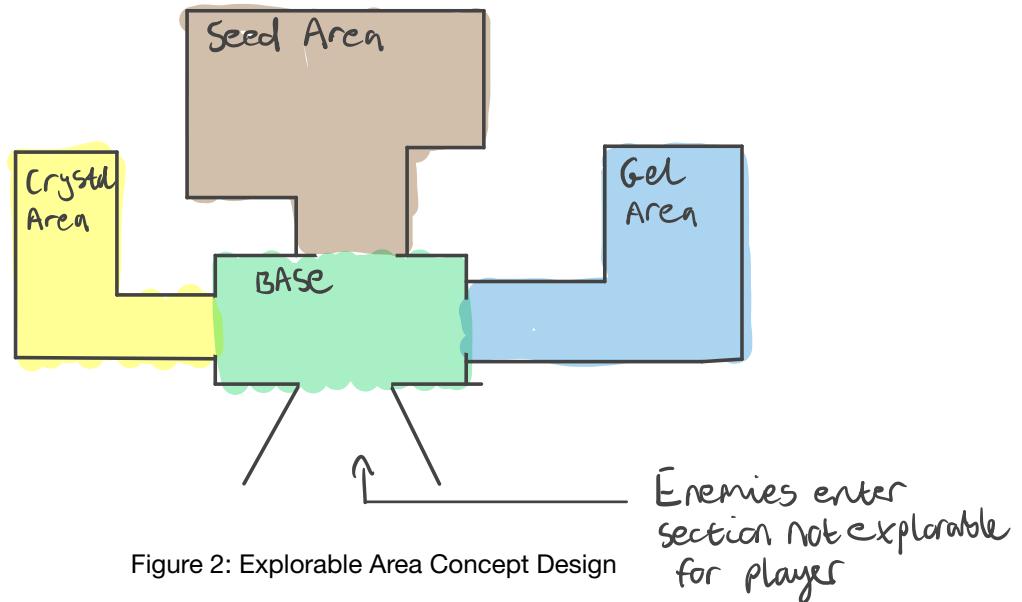
Figure 1: Daily Cycle and Phases

### Farming:

The player must explore 3 different environments, each containing 1 farmable resource. The resources must be farmed in their designated areas, and their growth rate will be affected by the Day Phase State.

### Farming process:

Explore an area -> Collect “wild” resources -> Plant “wild” resources -> Growth -> Collect grown resources



#### Crafting:

Collected Resources can be combined in different combinations to craft biotechnologies, weapons and defences.

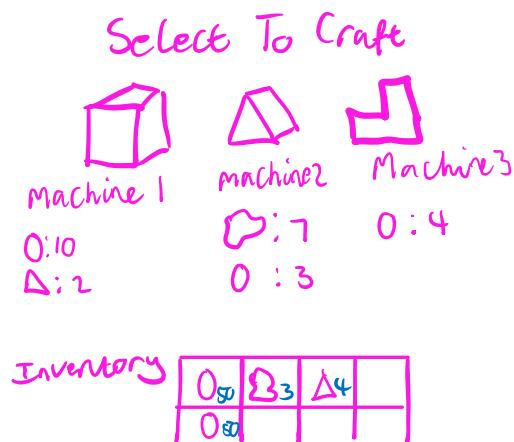


Figure 3: Crafting System Concept Design

#### Restoration System:

Crafted biotechnologies must be placed in required areas to restore world health.

For example, a Chlorophyll Machine must be placed next to dead plants to restore them.

#### Weapons and defences :

2 Weapons will be implemented, a Long Range Laser Turret and a Melee Staff. 1 defence item will be implemented, a force field fence that can be placed around the home base.

Note: The force field will break after it takes a certain amount of damage.

The laser turret will be used in conjunction with the force field. The laser will automatically shoot at enemies through the force field, however if the force field is broken by the enemies, then the player will also need to use the melee staff to fend against them.

### Gameplay Loop

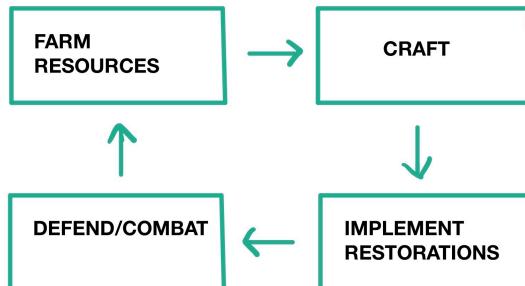


Figure 4: Gameplay Loop Diagram

The gameplay will follow the structure shown in the above diagram. This in conjunction with the progression loop will form the main gameplay.

### Progression Loop

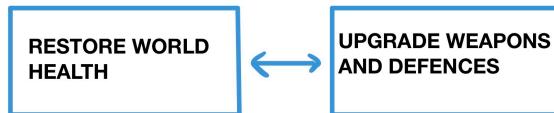


Figure 5: Progression Loop Diagram

Progression in the game will be based on the health restoration of the world. As the world health increases, the player's progression increases(as they are closer to achieving the main goal of full world health restoration).

Placement of biotechnology machines will increase progression, while damage to machines by enemies will decrease progression.

The game ends when the player has fully restored the world's health.

The progression will be represented through a progress bar.

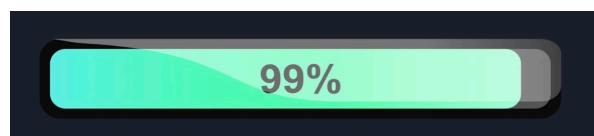
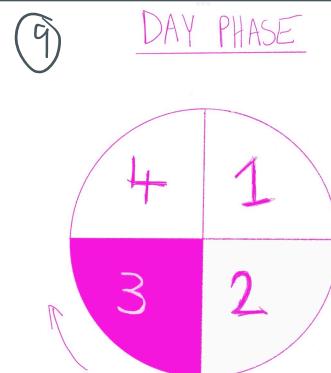
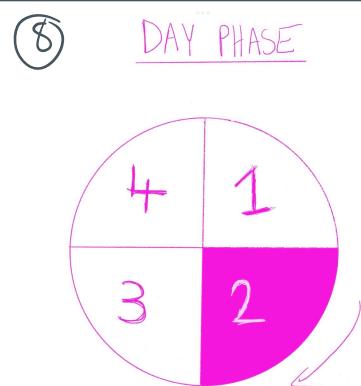
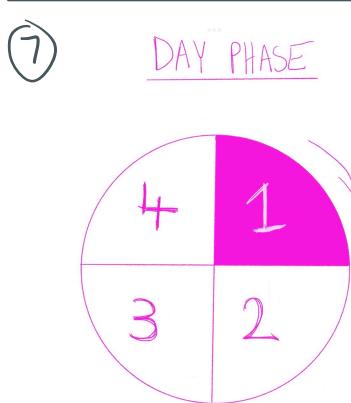
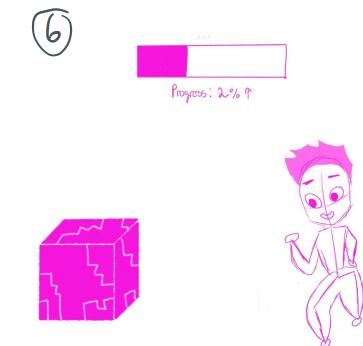
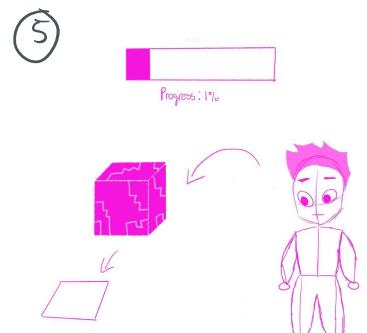
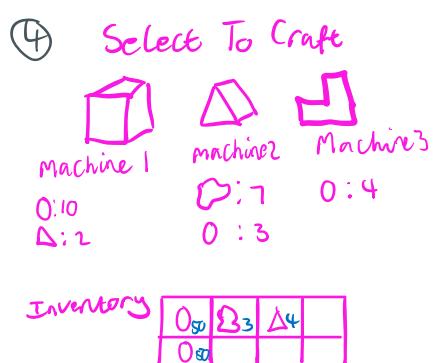
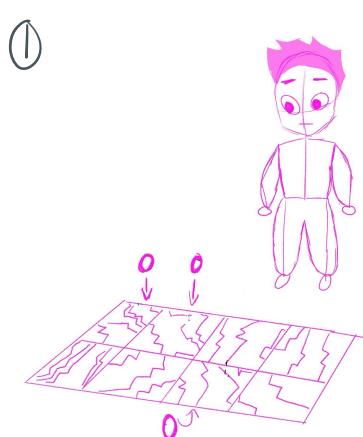


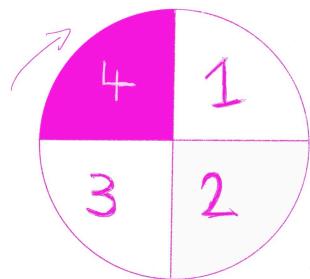
Figure 6: Progress Bar Diagram

## Gameplay Demonstration: Story Boards



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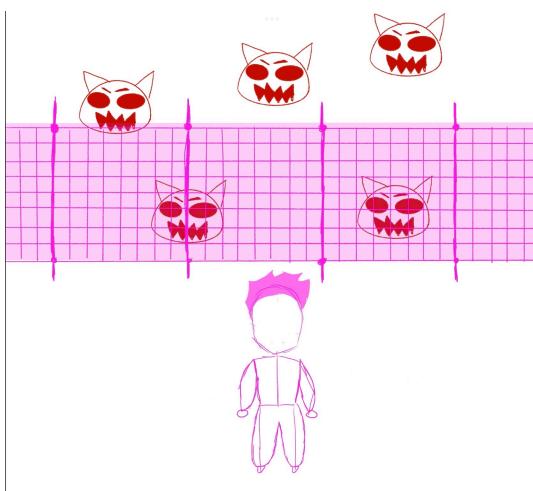
DAY PHASE



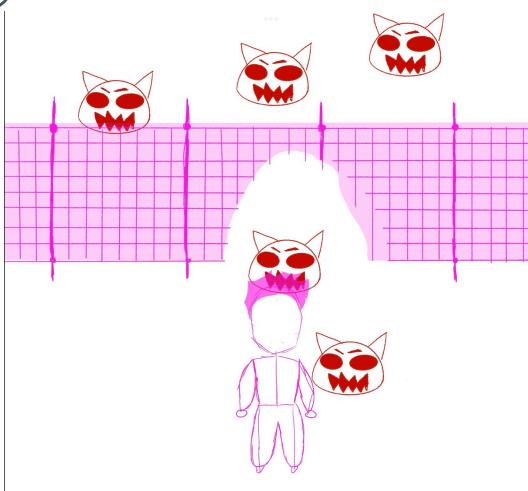
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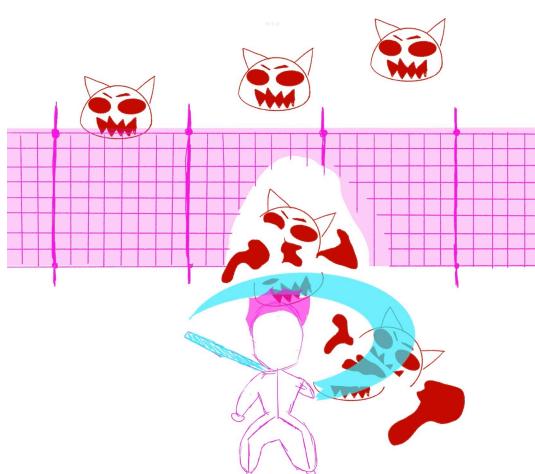
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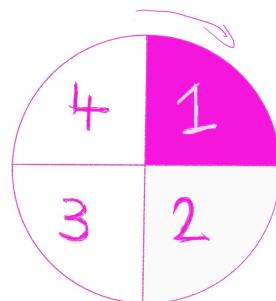


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DAY PHASE



## Initial Prototype

The initial prototype has been built to demonstrate a basic implementation of the following:

- Timer-based Resource Growth
- Inventory/Collection System
- Character Controller
  - Movement within the resource area

These systems and mechanics have been implemented to demonstrate a small scale version of the farming and daily cycle systems. Since all the systems in the game are reliant on these 2 systems, they need to be developed first.

The prototype allows the player to navigate the area, watch 2 resources grow, then collect the resources and add it to their inventory.

The prototype allows the player to choose which section of the game they wish to test, via the UI buttons. This allows the player to easily retest systems like the growth and inventory system to understand how it works.

This prototype, along with the story boards and concept art, act as a proof of concept for the game.

This prototype also acts as a starting point for the development of this project, and due to the small scope of mechanics implemented, it's effective in showcasing the large scale of development that will be required in order to achieve the set design goals. This also highlights the need for effective and realistic scoping as development continues so that the project can be completed within the allotted timeframe.

Prototype Play Instructions:

- In the Explore scene(the first scene), use WASD or the arrow keys to move around the environment.
  - This scene is meant to show a basic implementation of a Top-Down View for movement and navigation.
- Click the displayed UI buttons to go to the appropriate scene as desired.
- In the Farm scene(the second scene), use the mouse(left click) to collect the plants after they are grown.
  - The plant is grown when it reaches its 3rd size.
  - Plants cannot be collected until fully grown
  - Collected plants will be displayed in the inventory display
  - The timer indicates the time that has elapsed, to show the plants growth rate.
  - Only the 2 plants shown will grow, use the Reset button to watch them grow again
  - Use the Go Explore button to return to the Explore scene.

## **Initial Prototype Reflections**

The current prototype serves as an effective proof of concept for the project idea, however the development towards the project needs to increase in order to ensure that all systems can be developed and fully tested within the timeline goals established in the project roadmap in the project plan document.

Issues to be addressed:

The movement implementation makes it seem that the camera position is moving and not the player, even though the player is the moving object not the camera.

The gameplay is separated between scenes to demonstrate the different systems. This results in the prototype gameplay not feeling cohesive. The systems must be implemented in a manner so that the gameplay does feel like an abrupt change.

## Pre-Alpha Prototype

The Pre-Alpha Prototype has been developed to demonstrate the following systems and mechanics:

- Top down movement and navigation between 2 areas
- Collection and placement of seeds for growth in a farming grid
- 4 phase Daily Cycle where the environment background changes according the relative day phase
- Spawning of 3 static “dummy” enemies during the night phase, and the automatic destruction of these enemies in the morning phase.
- Navigation to a secondary scene from the initial prototype which showcases the growth of 2 plant resources over a time interval.

The aim of this implementation is to demonstrate a scaled-down version of the events that occur in the daily cycle and the collection and planting systems.

Prototype Play Instructions:

Same instructions as the Initial build with the following added:

- Click on brown seeds using the mouse pointer to collect them
- Click on the green block in the seed area to plant and grow the seeds
  - One click on the block will plant one seed
  - A second click on the block will collect the 3 seeds and place it in the inventory
  - The blue grid does not function yet
  - 3 static dummy enemies spawn during the night at the player’s original spawn area. They do not do anything. The enemies will be destroyed in the morning phase.

Pre-Alpha Prototype Reflections:

The current prototype is not reflective of the designed system discussed in the documentation. The production process has been slow due to a lack of efficient task tracking, which has resulted in this discrepancy between the design and the prototype.

The current prototype was developed to implement a scaled down version of the designed system. The following systems and scaled down versions are discussed below:

- Design: Three environment exploration
  - Prototype: 1 explorable environment
- Collection, planting and growth of 3 resources based on a timer. Resources must be planted in a grid. Enemies spawn at night and will attempt to attack the machines in the area.
  - Prototype: Collection, planting and growth of seed resource
    - Grid is implemented but does not function.
    - A single block is used to represent the grid system
    - Seeds can be clicked to be collected
    - Clicking on the block will plant a seed if the player has seeds in the inventory
    - Clicking on the block if the block contains seeds will add them to the inventory
    - The inventory is displayed as a text element
    - The grid count is displayed as a text element rather than a visual object being placed in the grid
    - The grid does not have time based growth, the seed is immediately grown once it is placed in the grid
    - The enemies are static and do not function
    - There are no machines that can be crafted or placed in the environment

The scaled down implementation does not convey the feeling of task management (where the player would strategically farm different resources at different times based on their needs at the time), instead the player simply moves objects from one place to another with no goal or intention other than moving the seeds to show that they can be moved.

The visual communication and feedback also does not convey the feeling of farming items in a farming environment since the player cannot see the seeds in the grid, as they instead counted as a text element on screen. This implementation can be confusing for players as they would expect to see the seed be planted rather than disappear from the game scene.

The previous build issues such as separation of scenes and camera movement have not been fixed in this build. These issues will need to be resolved during the next development phase.

The current issues will be addressed in the following manner during the continued development:

- Task management will switch from WhatsApp and Teams discussions to using a spreadsheet or management system such as Trello. The intention for this change is to have every single development task be tracked to ensure that tasks are being completed according to schedule.
- The visual communication must be changed so that it is not confusing for players. A potential solution will be to have the planted objects appear in the grid and also display the number of items on the actual grid instead of a text element.
- The inventory system is also a single text element on the screen, this implementation is not scalable and the designed inventory system must be attempted to be implemented.
- The planted seeds must have timer based growth implemented.
- The enemies need to interact with the environment so that they serve a purpose in the build other than just appearing at night.

#### **Game System Design Reflections:**

The new system design details are an improvement from the last iteration of the document and give greater structure for development to follow. However, the current system values are unbalanced and will need to be readjusted in order to allow logical gameplay to occur. The values will be balanced according to playtesting data and feedback.

The designed crafting system appears to function more as a shop where items can be purchased as opposed to being crafted by the player. This is not necessarily an issue, but internal design testing and playtesting feedback is required to determine if changing the naming convention fits the thematic concept of the game.

The current playtesting structure has not been useful. Playtests have occurred at random with testers being randomly selected, and this structure has not offered useful feedback for development. A new playtesting structure will be implemented and is discussed in the project plan documentation.

Overall the current state of development is not meeting the design goals that have been set and the process will need to change in order to achieve the goals that have been set.

#### **Appendix**

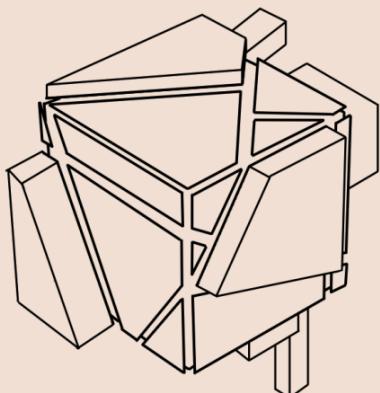
# Concept Design (Seeds and Plants)

- ① The aim is to design “biotechnology” seeds which players will harvest for various reasons.
- ② To do this, I will need to design the seeds and plants that contain them.
- ③ I thought about the concept of making the plants organic (biology) while making the seeds technological (technology).

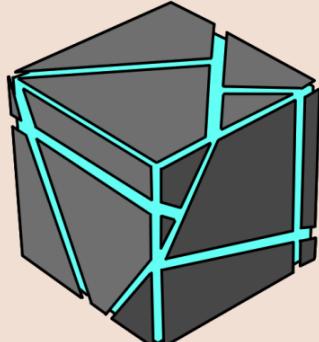
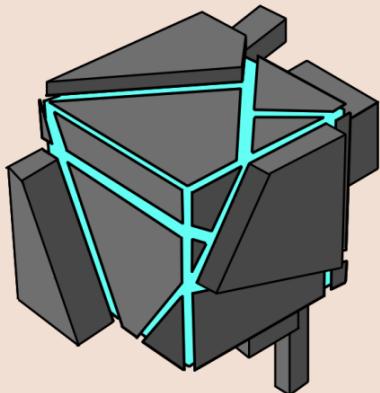
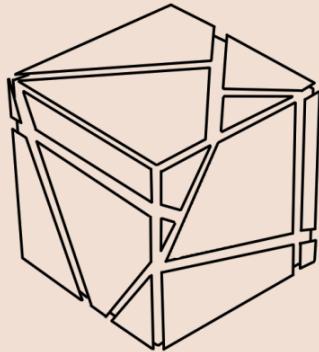
## 1. Seeds

- ④ For most of the seed concepts, I made two designs: a “bumpy” and a “flat” design.
- ⑤ **Bumpy** seeds have parts that are elevated above others, while **flat** seeds do not have any elevated parts.

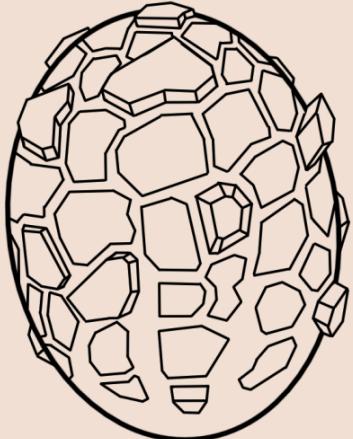
Concept #1 BUMPY



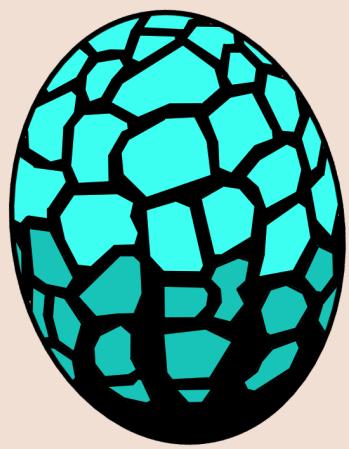
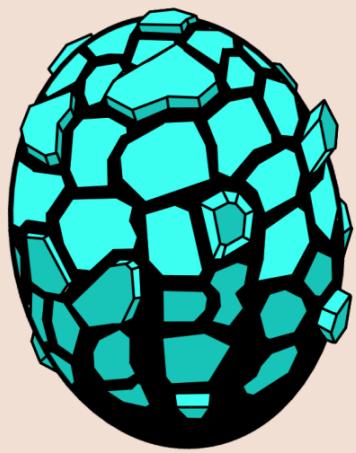
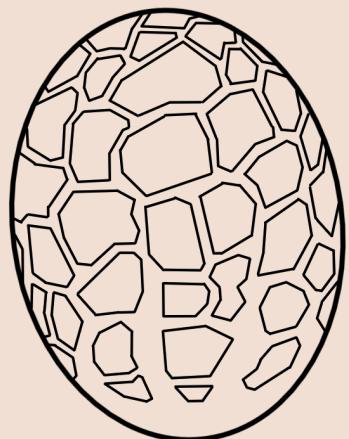
Concept #1 FLAT



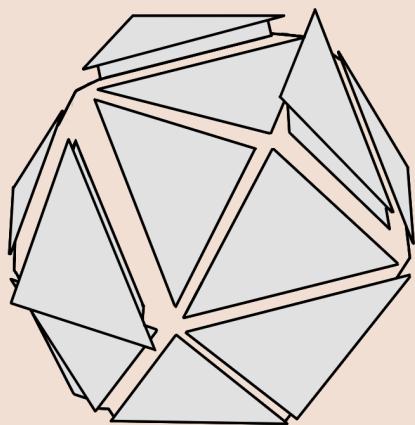
**Concept #2 BUMPY**



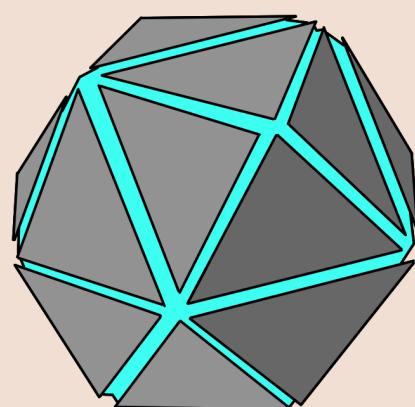
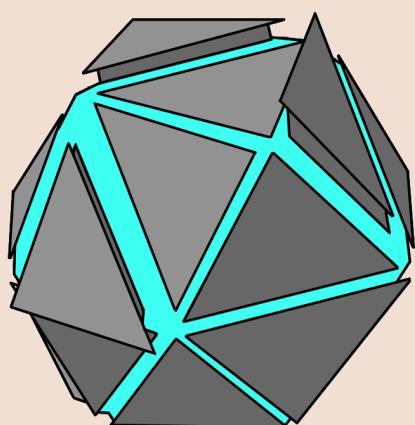
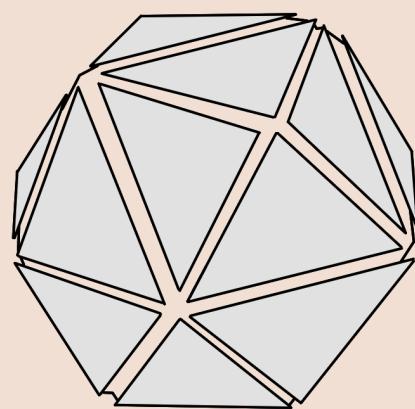
**Concept #2 FLAT**



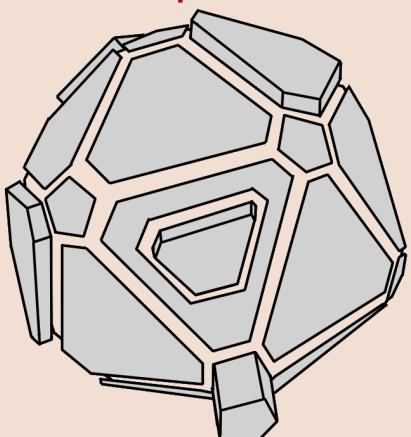
**Concept #3 BUMPY**



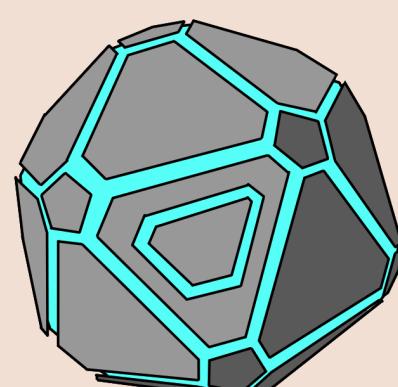
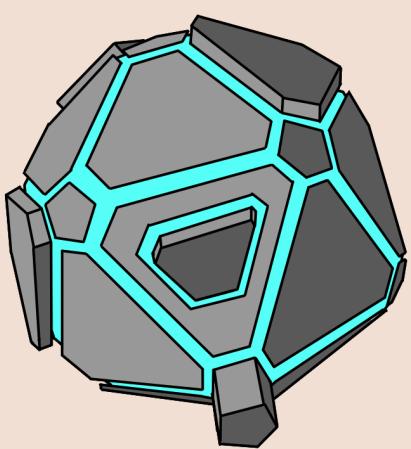
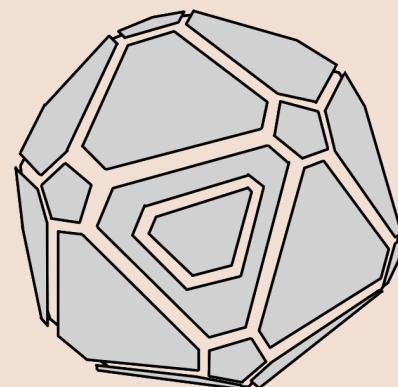
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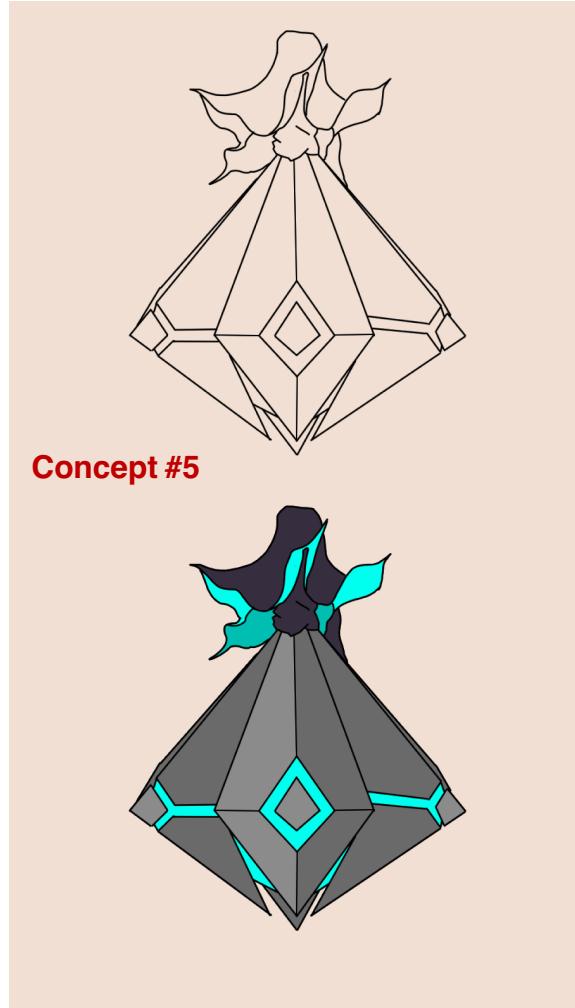


**Concept #4 BUMPY**



**Concept #4 FLAT**

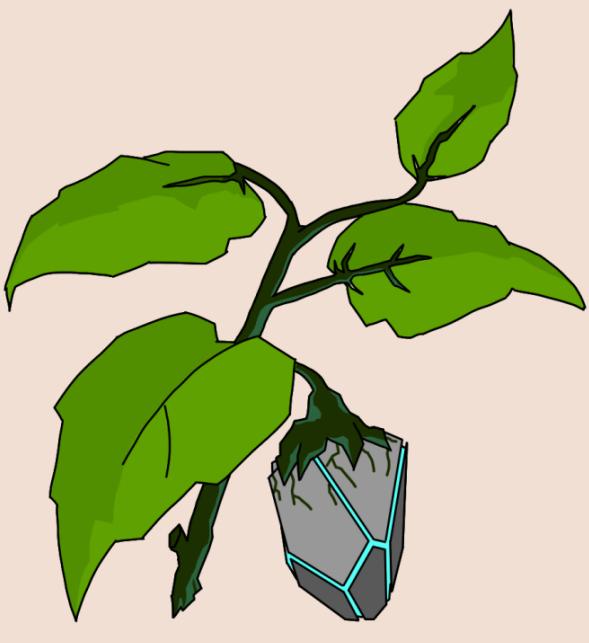




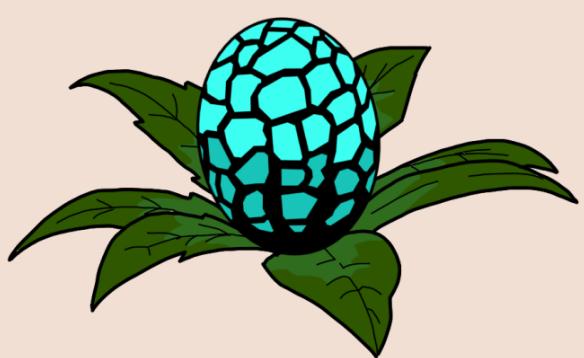
## 2. Plants

- For the plants, as mentioned earlier, I went for a more organic design.
- I added the seeds to see how the plants would look with the seeds in place.

**Concept #1**



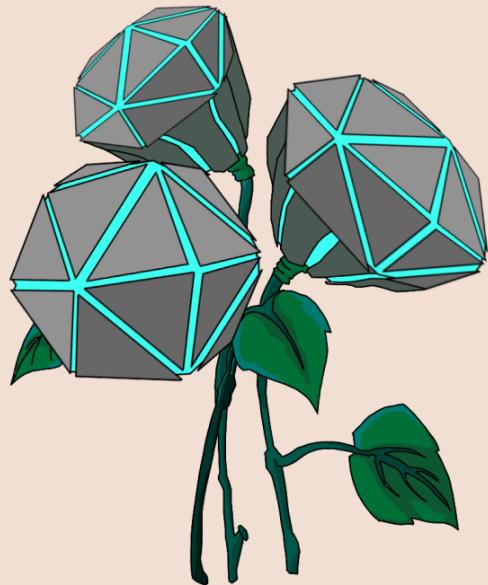
**Concept #2**



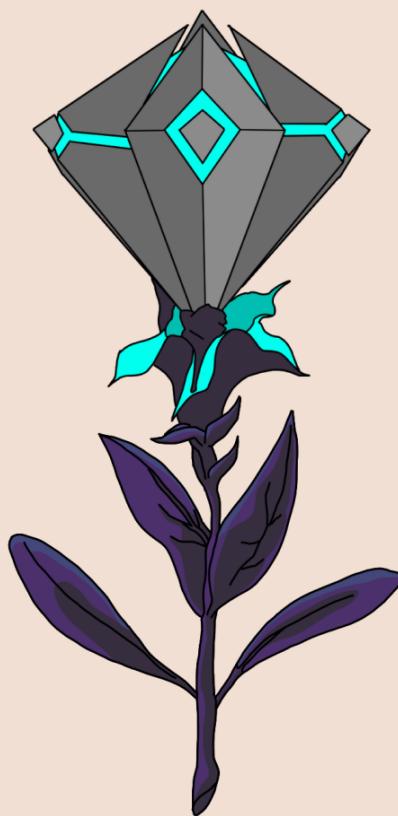
**Concept #3**



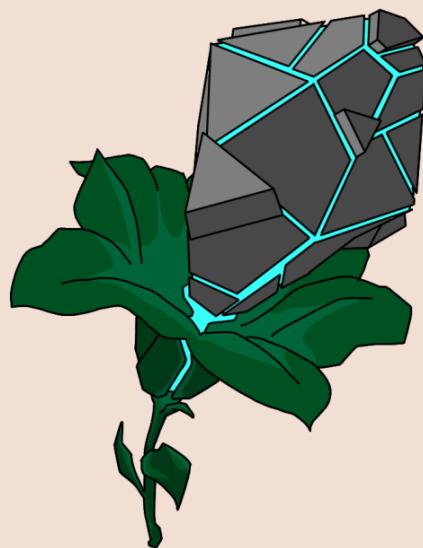
**Concept #4**



**Concept #5**

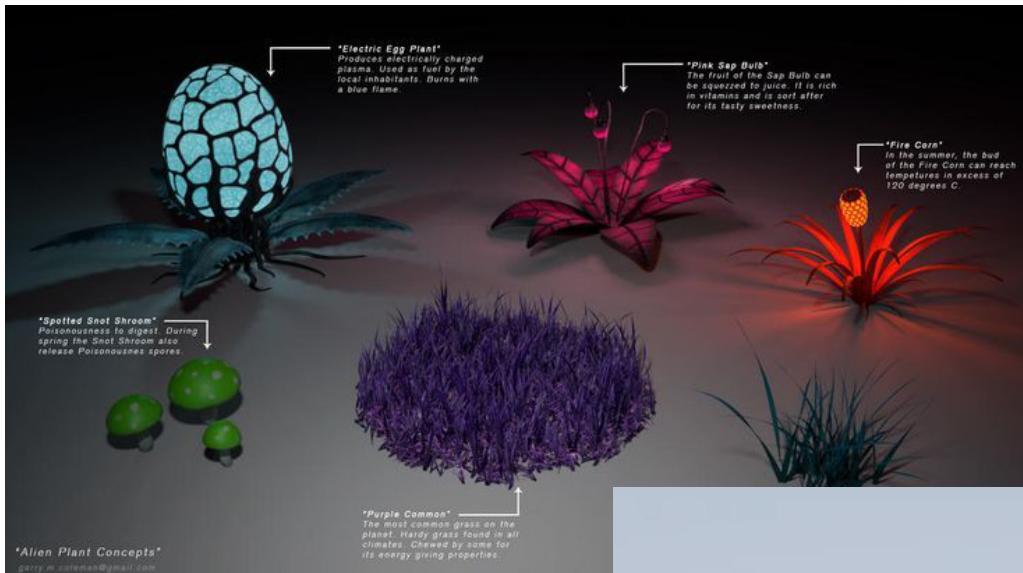


**Concept #6**



# 3. Reference

- ① References included three-dimensional shapes and plant designs.







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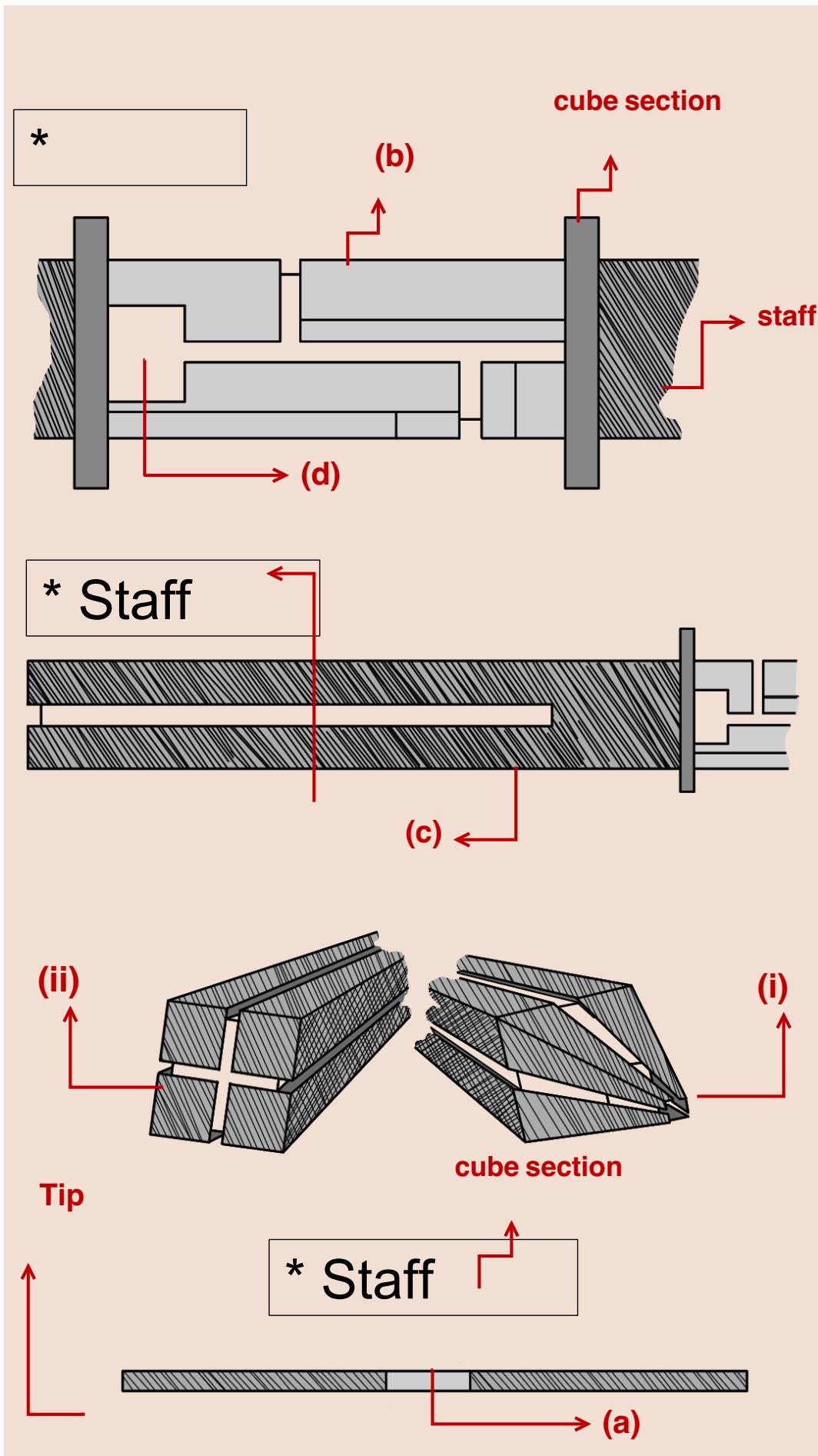
# Concept Design (Staff)

- The Staff is the melee weapon that the player will use to attack enemies.
- For the design, I attempted to design a staff with a futuristic aesthetic.
- To do this, I used geometric shapes to add the details.

## 1. Concept #1

- The staff has a slim design similar to those found in karate.
- The staff has the following properties:
  - a) The handle for this staff is in the center of the object.
  - b) The handle has the form of a cylinder.
  - c) The rest of the staff has the form of a rectangular prism.
  - d) Parts of the staff will glow with a yellow light source.
  - e) I have designs two “tips” for the staff. The staff could have a tip in:
    - i. The form of a triangular prism or,
    - ii. A flat tip

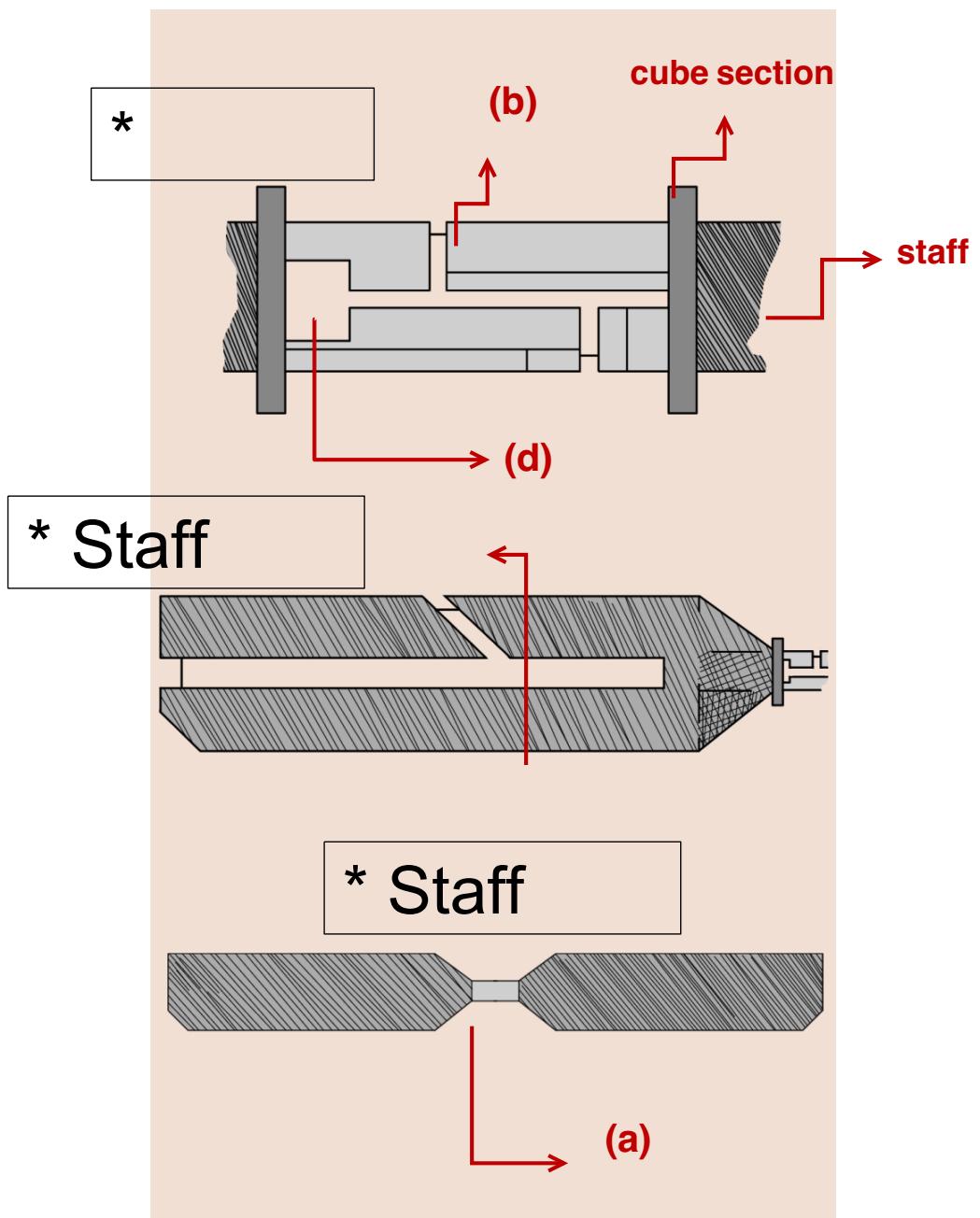
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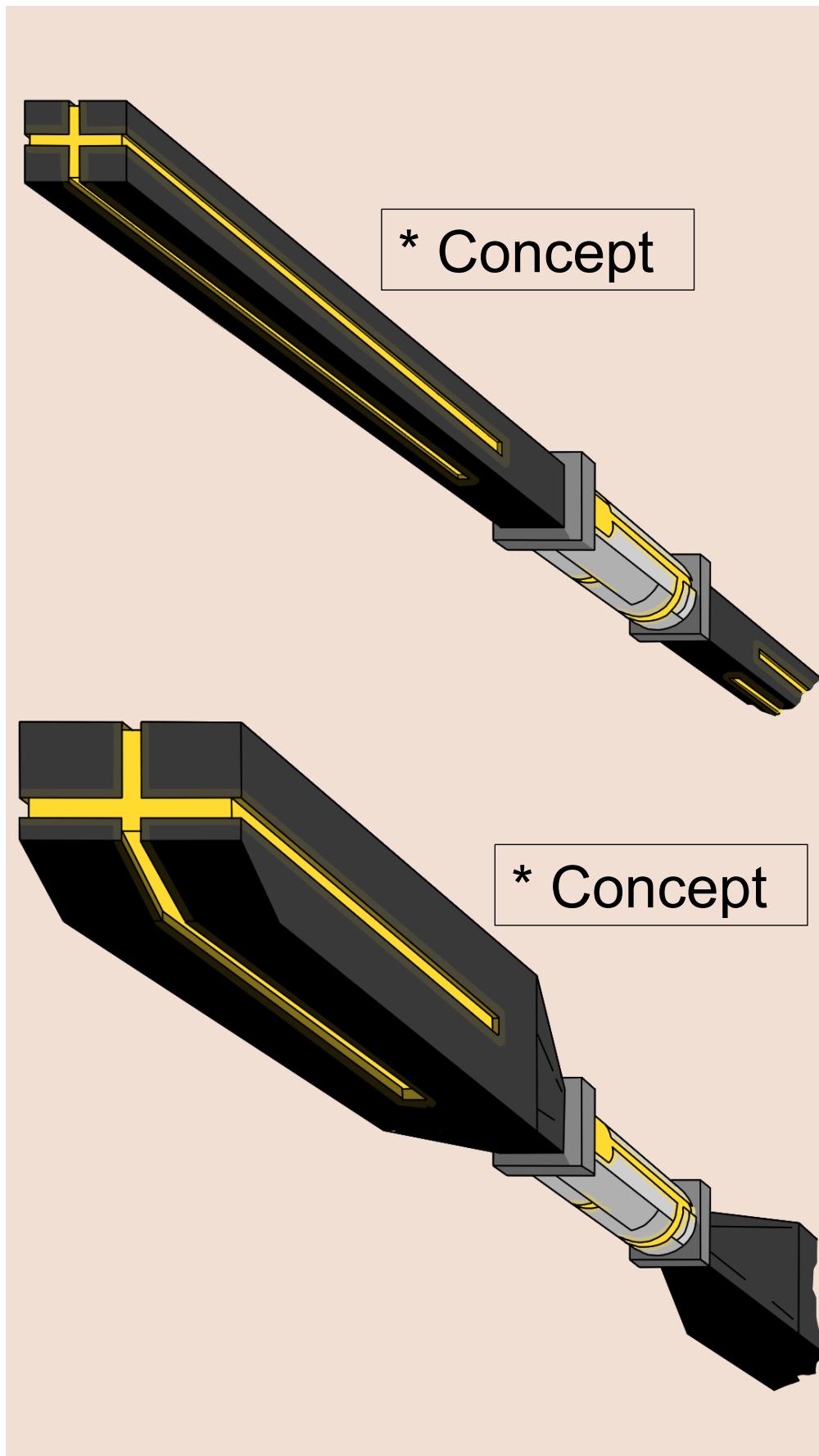
## 2. Concept #2

- The staff has a large, clucky design similar to the God Arc found in the *God Eater* anime.
- This staff has the following properties:
  - a) The handle for this staff is in the center of the object.
  - b) The handle has the form of a cylinder.
  - c) The rest of the staff has the form of a rectangular prism.
  - d) Parts of the staff will glow with a yellow light source.

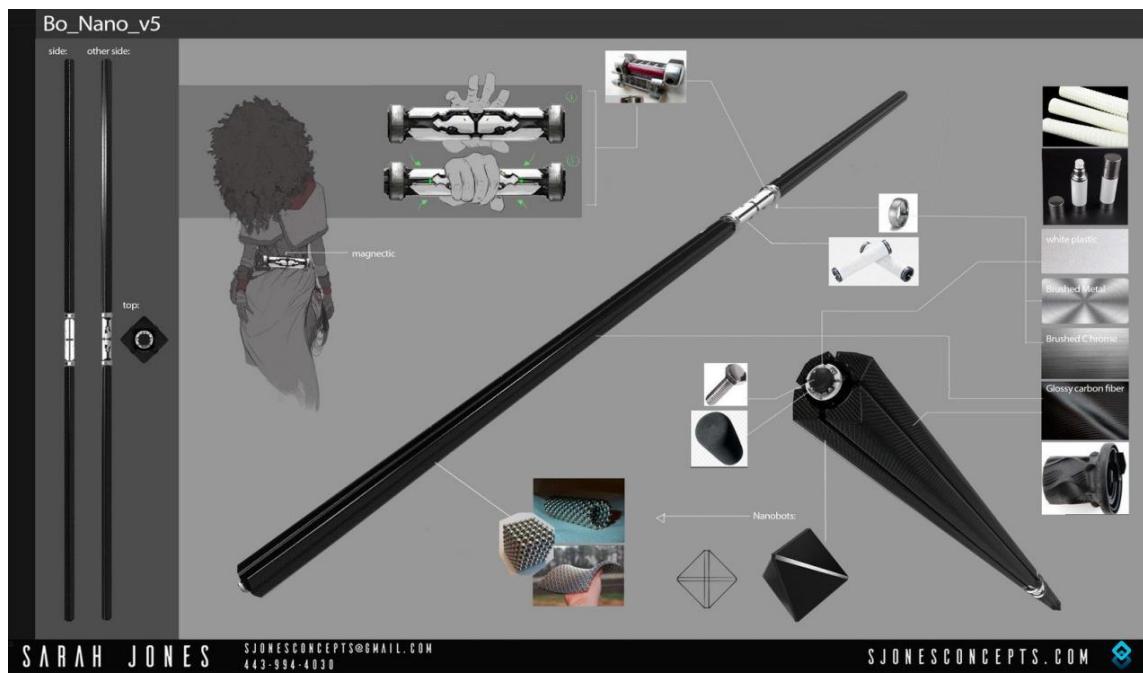
***See image below:***



### 3. Artwork



# 4. Reference



## UI Concept Discussion by Caleb

I want the game to have an animated background as I believe that it will be more aesthetically pleasing while adding some life to the background

The animations will form a perfect loop in the background so it will seem like it runs infinitely

The animations will show the same scene in different times of day (a representation of the daily cycle)

### 1. Daytime = Start Screen

This will be where the first screen that the player sees as they start the game

It'll display the game name and a prompt that enables the player to move onto the main menu

### 2. Sunset = Main Menu

This will display the main menu where players can choose to start the game or enter the other options on display

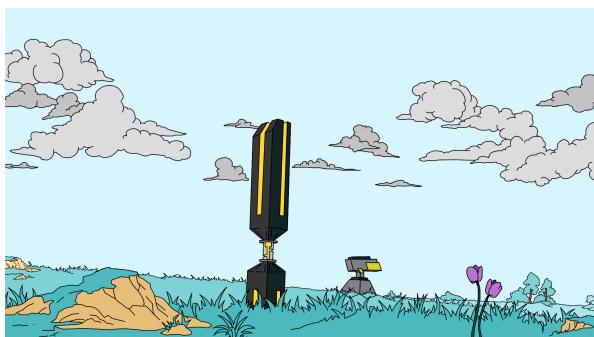
### 3. Night time = Pause Menu

This menu will allow players to pause the game, look at the controls or quit the game

This was simply a test to see how the animation would look so I may have to add some details to the colours of necessary

The simple design enables me to spend less time design the layout on unity (since most of it was done while planning the image)

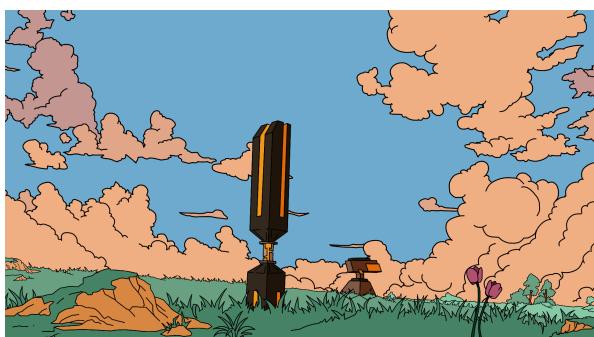
The only left to do is to find colours that will contrast those in the animation so that it will be clearly visible as players interact with the UI



Daytime Menu



Night Menu



Evening Menu