CELLULAR

DESIGN DOCUMENT
VERSION 1.6
DECEMBER 13, 2019

Team Synapse
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Table of Contents

VERSION HISTORY

Version 0.1 - October 10, 2019

- This is the initial version of this document
- Template based on the DesignDocTemplat.doc provided by the professor in the CSS 385 source code GitHub page. That template, in turn, was based on two other templates from links that no longer lead anywhere, and some sections from a template in:

  Fullerton, Tracy. Game Design Workshop, 2nd Edition: Elesvier Inc, 2008.

Version 1.0 - October 21st, 2019

- Filled out various sections from the template examples.
- Filled out overall team goals table with more entries.

Version 1.1 - October 23rd, 2019

- Moved tasks around.
- Added more pictures.

Version 1.2 - October 27th, 2019

- Added images of the game.
- Updated individual goals table.
- Updated spelling mistakes and small detail changes in all sections
- Added digital prototype links

Version 1.3 October 31st, 2019

- Added some individual tasks.
- Added a new logo.
- Crossed out old sketches.
- Added to “Crazy Ideas”
- Organized some of the smaller information into tables

Version 1.4 November 4th, 2019

- Changed the team and individual goals to match our progress
- Update images of the game.

Version 1.5 November 12th, 2019

- Updated individual goals
- Updated the document to reflect the current game

Version 1.6 December 13th, 2019

- Updated various sections with newer images
- Updated specifics on items, weapons, and germs. Ie weapon damage.

GAME OVERVIEW

Game Logline

Cellular is a turn based strategy game where six sided germs equip weapons and attachments to destroy other germs and defeat the enemy opponent.

Gameplay Synopsis

Players control germs within a petri dish that will go to battle against other germs, armed with weapons and other attachments that can be modularly attached to their character. Gameplay will occur within a hex tile grid that germs will navigate, taking turns with their enemies, to find weapons and attachments, attack, and evade. Weapons are used for offensive purposes, while attachments can be used for perks like additional movement, defense, or other unique triggering behaviors.

The game is played against an AI (or another local player), which controls its own team of germs. The game ends when one of the players destroys all of their opponents germs on the map.

The game will be 2D with a single camera from an overhead orthographic perspective, with a small (5x5) hexagonal grid entirely in view at all times. The entire playing field is located inside of a petri dish. The players germs begin at the bottom of the screen, while the enemies germs begin at the top of the screen. A simple UI will be used to help players end their turn, to check the stats of their germs, and to interact with the menu system.

The art style for this game will be vectorized, with all game elements having a bubbly, cartoonish appearance. Color will be used to indicate to the player the owner of germs, the capabilities of weapons and attachments, and the navigation of germs. For instance, when a player selects a cell, that cell will begin to glow and animate to visually express feedback to the user that the cell was successfully selected. Furthermore, the enemy germs may appear red while the player's germs appear blue, indicating to the player the ownership of each cell on the screen. For further details about the looks of the game see the section "Art".

Although our game uses weapons as tools of battle, we strive to reduce the violence of combat by focusing on the theme of microbiology. This is done by creating non-conventional weapons that only exist in the fictional micro world, while also working with an art style that does not rely on spectacles of violence.

GAME DETAILS

Description

In this game you play as a germs within a petri dish. Each germ has six ports on it facing different directions (towards the edges of the neighboring hexagons). You begin the game with nothing on a germ, and you take turns with the enemies navigating the hex grid to pick up weapons and attachments. You can equip a different weapon or attachment to each slot on your germ. Equippables can be used for either offensive or defensive purposes, with the objective being that of all equippable items introduce a new strategy of play.

germs can also rotate, allowing them to aim their weapons or attachments at different neighboring hexagons. Players can tell their germs to attack by clicking an “Attack” button, causing all of the germs weapons to activate. The objective is to use whatever weapons and attachments you can find in the playing field to dispatch all enemy germs on the grid.

Table 1: Basic Information

Type	**Information**
Game Genre	Strategy/TBS (Turn Based Strategy)
Single-player or Multiplayer	Single Player / Multiplayer
Graphics	2D
Where does the game take place?	This game takes place within a petri dish in an alternate version of our world where germs are being armed for combat with nanotechnology.
What do I control? How many characters? Can I use vehicles?	The player controls germ units, navigating them across the map’s grid of hexagonal tiles.
What is the main focus?	The main focus will be strategizing and upgrading your germs to defeat the opponent.
How long the game lasts? Or how long game matches last?	We intend for game matches to last 2 - 5 minutes, but this can vary depending on how long the player spends to deliberate their turns.

Comparison

Three other games with similar elements are Civilization 5, Spore, and Fire Emblem. Though none of these are wholly similar to our game, they contain similar aspects to

what we are creating. Certain aspects of the style, setting, and modular combat mechanics are similar to the early stages of Spore, but that game was not turn based or contained to a grid in a petri dish. Civ 5 has a hex grid like the one we will employ and turn based mechanics like ours, but has a completely different style, setting, and theme, as well as being focused more around building aspects while ours if focused on combat. Fire Emblem is similar in that it is a combat only TBS (turn-based strategy) game that takes place on a grid, but it differs from our in that it uses a grid of squares instead of hexes, has a linear storyline, and takes place in a medieval fantasy setting, while ours has none of those elements.

What is unique?

What makes our game unique is the combination of elements that we will employ. A turn-based, combat only, strategy game with modular characters. The theme is also unique, being about combat armed modular germs collecting attachments and fighting each other. The modularity and customization of real time strategy (RTS) units is unprecedented in the current turn-based strategy game market.

Why create this game?

We are creating this game because our team believes there is a market for real time strategy games (RTS's) that include customizable units. Currently, the RTS game industry has a popular model of players interacting with units that are predefined and unchangeable. In this way, we believe that RTS games are limited because the creativity in a players strategy depends on these "cookie-cutter" units. By adding a modular component to our game, players are capable of customizing their RTS units for a unique game experience every round that they play.

In addition, our team loves strategy games, and we feel inspired to take what we think works best in our favorite RTS games, and try to improve it. Ultimately, our team agrees that RTS games have room for improvement, and *Cellular* is an attempt to find that improvement through character customization.

Audience, Platform, and Marketing

Target Audience

Two main audiences:

1. Individuals interested in strategy games, but are bored with standard turn-based gameplay where players manage resources, buildings, units, and economies. Cellular offers a unique take on the strategy game genre by lowering the barrier to entry with simplified mechanics and a fresh take on turn-based combat through our port attachment system.
2. The second most important audience for this game is the rest of our Fall 2019, CSS 385 class, in other words, our peers.

Platform

The two platforms for this game will be Windows and Google Chrome.

Games with similar audiences

The following is a list of games we think are similar enough to our game that players who like these games will like our game.

1. Civilization V
2. Spore (cell stage)
3. Fire Emblem

The Game World

Overview

The game takes place in a petri dish, which will be the game's only setting. All of the characters are germs. The area is also littered with nanomachines, which are the weapons and equipment used by the germs. The petri dish is indoors, so the time of day will not matter.

Scale

Due to the setting and the fact that the characters are microscopic germs, the overall setting is very small.

Objects

The game world will contain germs and items for the germs to pick up.

Story

Scientists are testing nanomachines (or equipment and weapons) on germs inside a petri dish. The story only serves as background information for the game. There is no storyline.

Camera

Overview

The camera is fixed and will give the players a view of the whole play-area at all times. There is only one camera.

Game Characters

Overview

The only characters in *Cellular* will be germs, which can pick up items to upgrade themselves. Germs have ports which can have tools and weapons attached to them. Only one weapon or tool can be attached to a port.

~~Levels (Difficulty)~~

~~Overview~~

~~Levels will be implemented as opponent difficulty and as item unlockables. For instance, the early difficulties of the game will have ai opponents with basic behaviors or a limited field of view. Furthermore, the tools and attachments available to the player will be limited. As the difficulty increases, so does the complexity of the opponents behavior and the degree of tools available to the player.~~

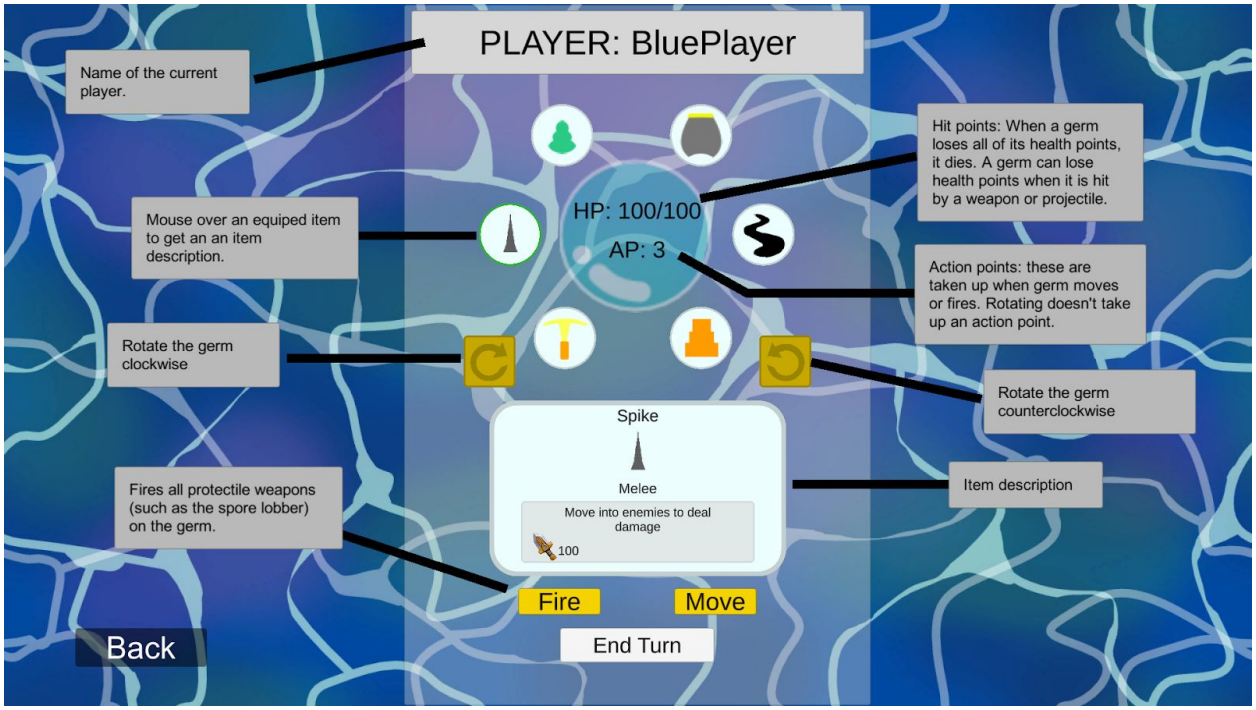
User Interface

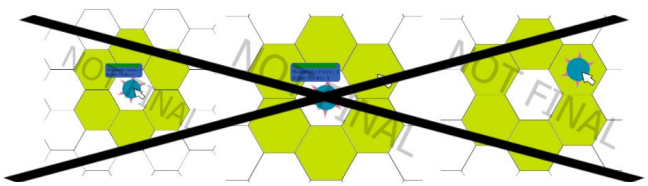
Overview

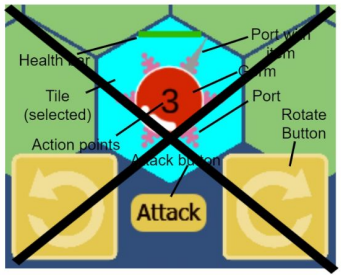
Click on a unit to select it, UI shows you the health, ~~movement points,~~ and actions you can take. Just click to select the tile you'd like to move to. The UI will also have buttons that give the player to attack or rotate a selected unit. There will be a turn timer somewhere on the screen. If the turn timer runs out the player's turn will be automatically ended. Item tooltip box in the top left.

User Interface ~~Sketches~~

This is from the tutorial section of the game.







Upgrades

Overview

These upgrades will be randomly placed on the map for germs to pick up and equip themselves with. They're all designed to improve a germs ability to destroy the enemy germs.

Weapons

Table 2: Basic Game Equipments

Name	Picture	Description
Spore Lobber	 *	*Shoots a projectile that moves at 4 tiles per turn, deals ~~25~~ 50 damage.*
Spore Cannon		*Shoots a project that moves at ~~8~~ 6 tiles per turn, deals 25 damage.*
~~*Big Spore Lobber*~~	 *	~~*Shoots a projectile that moves at 4 tiles per turn, deals 50 damage.*~~
Spike		*Attempt to move into an occupied tile, ~~deals 25 damage.~~ Instantly destroy the occupying germ.*
Rocket		*Firing pushes the germ up to ~~two~~ one tile in the opposite direction of where the Rocket is equipped.*
*Images with a black X indicate older, outdated sketches.		

Items

Table 3: Basic Game Upgrades:

Name	Picture	Description

Flagellum		*Gives +1 to action points.*
Shield Attachment		~~Reduces damage by ½ when hit from the equipped side.~~ Can block up to 100 hit points worth of damage

Music and Sound Effects

Overview

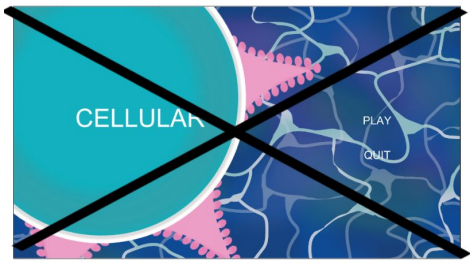
Music and sounds effects will be included if there is enough time to develop and test the systems for including them.

Art

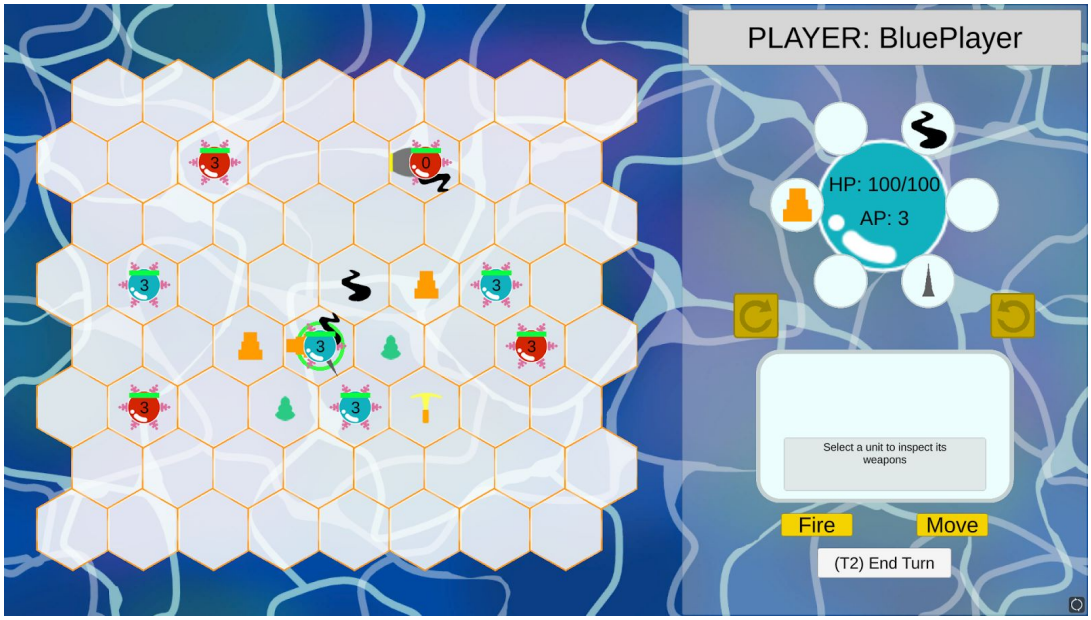
Art Style

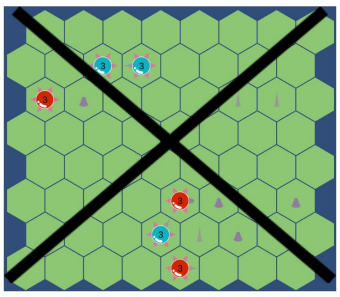
A basic art style similar to many web based games will be used. Here are some examples of how the game will look.

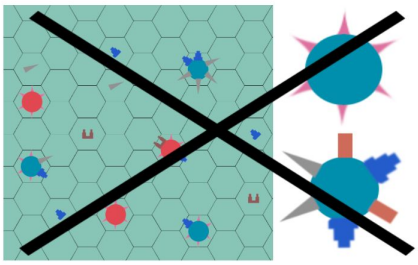
Main Menu

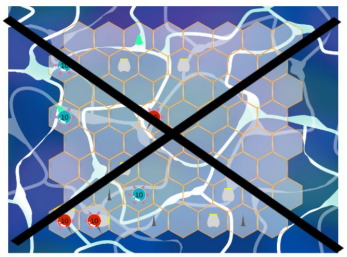


Game View









Unit design

A germ without any items:

A germ with all of its ports filled up with items:

The green bars above the germs are health bar. Each germ has 100 health.

Sound Design

Sounds have a sci-fi feel to them.

Game Mechanics

Overview

This is a two-sided game. Each side is controlled by a “player” who is either a human player or a basic form of artificial intelligence. Each “player” has 2-5 germs, all of which have health, action points (used for movement/turning/attacks), and ports. This is a turn-based game, where all germs (units) move at every turn. The units move on hexagon-based tiles with no wrapping. Each tile can only have one unit. Each germ is round and has six spiky ports. They are also capable of rotating, which can be used to aim equipment in specific directions. There is a variety of equipment on the map that is placed on the tiles (one tile can have one weapon). germs can collect this equipment, which will attach themselves to the germs’ ports (one weapon for each port). When a germ attacks, all of its equipment are used at once. See Table 2 for basic game equipment and Table 3 for upgrades that affect the germ. Using a weapon requires using all weapons on a germ at the same time.

Combat Mechanics

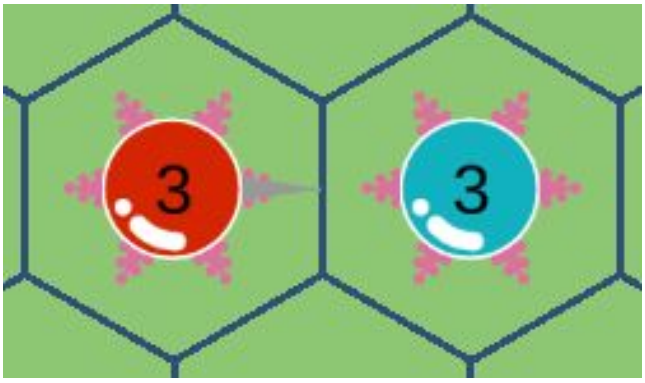
Melee Combat

One of the mechanics of combat involves melee. When a germ has a spike weapon on one of its ports, it can use it to destroy a nearby enemy unit and move into its space. See the images below for a visualization.

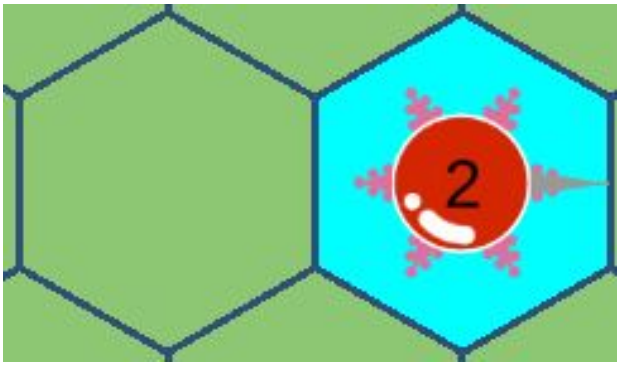
Ranged Combat

Ranged combat will work in two ways, one by a beam that damages the first enemy in a straight line from the firing germ, and the second which launches a projectile that damages the first enemy it comes into contact with.

A unit (red) is next to its enemy unit (blue). It has a spike that is facing the blue unit. This means that melee combat is possible.



The red unit successfully destroys the blue unit with its spike. It did this by moving onto the blue unit's space. Notice that the number of action points decreased.



Single Player Game

Overview

The single player aspect of *Cellular* will pit one human player against one AI player and the human player will win if they eliminate all of the AI's germs before theirs get eliminated.

Multiplayer Game

Overview

The multiplayer aspect of *Cellular* will be as similar as possible to the single player version but with no player being controlled by an AI.

Table 4: Basic Information

Type	Information
Max Players	Two
Is the World Persistent?	No
Servers	No servers will be necessary because players will directly connect to each other via ip address.
Saving and Loading	There will be no saving or loading.
Scores	A players can score by destroying their opponent's germs.
Victory Conditions	The first player to destroy all of their opponent's germs wins.

Prototypes

Map Generation and Movement

The first prototype of the project involves generating a hex-grid world, placing germs on the world, and then finding paths across the world. Click on a hex tile to place a unit. Click on a unit and then click on a new tile to move the clicked unit to the destination tile. Moving units occurs instantly, but a path to the destination was generated internally (try moving to an unreachable tile).

- https://conraddudziak.github.io/385GroupMapMovement/

Weapons and Combat

In this prototype germs can be created with weapons attached to their ports. Germs of opposing teams can be created by changing turns with the 'Space' key. When changing turns, the player can only control one or the other team.

The spike is the only kind of weapon that can be created in this prototype. If a germ with a spike tries to move into a neighboring tile with an enemy germ in it, then the spike will kill the enemy germ. The germ must be neighboring another germ to engage in combat with it, and the spike must be facing the appropriate direction.

- https://conraddudziak.github.io/CSS385EquippableItems/

Germ Rotation and Visualized Movement

Germ rotation allows germs to change the directions that their weapons and ports are facing. Select a germ, and then rotate the germ with the 'A' and 'D' keys. The 'A' key rotates the germ counter-clockwise, while the 'D' key rotates the germ clockwise.

Visual movement was also implemented in this prototype to show movement pathfinding visually, as the Germ lerps its position between the tiles in its path.

- https://conraddudziak.github.io/385GroupRotationVisualMove/

Action Points

Action points limit the things that Germs can do. Moving a germ costs one action point per tile it moves. Rotating a germ costs one action point per rotation. Each germ has its own action points, which are refreshed at the start of their turn (press space to pass turn to the other germ team).
If a germ tries to move to a tile that it does not have enough action points to reach, then no path is created and the germ does not move.
Action points are displayed as a UI text element on top of each individual germ.

- https://conraddudziak.github.io/385GroupActionPoints/

Item Spawning and Equipping

This prototype involved adding weapons to spawn on the map. Weapons have weight to effect their chance to spawn at the start of the game. Weapons can be equipped by navigating a germ into them. However, the port that collides with the weapon must be available, or else the weapon is not equipped.
There are two weapons that spawn, a spike and a spore lobber. The spore lobber cannot be used for combat yet.

- https://conraddudziak.github.io/385GroupItemSpawning/

Basic AI

The AI takes control of one of the players in the game. The AI will move one of its germs to a random location on the table, and will then end its turn after a short delay. The player then can make their turn, and is unable to control the AI's germs during their turn. The player can then pass the turn back to the AI with the 'Space' key.

- https://conraddudziak.github.io/385GroupBasicAI/

The architecture of our system relies on a logical / visual split of all game interactions. This means that the game has a logical state and a visual state, which are independent of each other. As a result, two AI's can play the game against each other. In addition, the match between the AI's is logically completed in a matter of seconds, where the visual occurrences are just a playback of enqueued visual commands.

- https://conraddudziak.github.io/385GroupAIvsAI/

Resources & Links

Udemy Courses

Learn to Code Trading Card Battle System with Unity 3D by Sandor Kiss

- https://www.udemy.com/course/learn-to-code-trading-card-game-battle-system-with-unity-3d/

Template Resources

Design document based on this template:

- http://forums.xna.com/forums/t/229.aspx
- http://indiepath.com/public/designdocumenttemplate01.doc
- A few sections of the document are based on the design template in this book: Fullerton, Tracy. Game Design Workshop, 2nd Edition: Elesvier Inc, 2008.

Game Resources

DoTween:

- http://dotween.demigiant.com

Sci-Fi Music Pack 1:

- https://assetstore.unity.com/packages/audio/music/sci-fi-music-pack-1-105576

Futuristic Gun SoundFX

- https://assetstore.unity.com/packages/audio/sound-fx/weapons/futuristic-gun-soundfx-100851

Minimal UI Sounds

- https://assetstore.unity.com/packages/audio/sound-fx/minimal-ui-sounds-78266

Stretch Goals

Crazy Ideas

The following is a list of ideas we have for new features to improve the game if we have the time and if they test well. They are in no particular order, the number is just to make reading and referring to them easier.

1. Pre-game unit placement
2. Base/queen germ
3. Germ store for new weapons
4. More weapons
5. Networking/connecting to another machine
    a. On-screen IP Address
    b. Maybe have a network / local select button at the beginning
6. Other attachable items besides weapons (such as something that increases movement)
7. Civilization Style Movement Highlighting (showing the path to the tile the mouse is over)
8. Nyan Cat Launcher
9. One time use item to undergo mitosis
10. Maybe they can steal items from killed enemies
11. Proboscis: steal health from a nearby enemy
12. Ice spore lobber: freeze a cell in place so it loses a turn

Development Plan

Overall Team Goals

The following table shows the goals and important events that the team as a whole is concerned with.

Table 5: Overall Team Goals

Week	Important Events	Team Goals (By the end of the week)
3: 10/6-10/12		List required technical details
4: 10/13-10/19		Create deadlines for required technical details
5: 10/20-10/26	Game Pitch (10/21)	Singleplayer with non-moving enemies and, assign individual goals.
6: 10/27-11/2	Digital Prototype (10/28)	Basic random generation for games,~~basic projectile~~ and melee equipment based combat
7: 11/3-11/9	Rough Demo (11/4)	Basic AI, Basic Projectile Weapons, Basic Ranged Weapons
8: 11/10-11/16		Basic Animations, Full set of basic items
9: 11/17-11/23	Alpha Playtest (11/18)	Incorporate play testing feedback, more items.
10: 11/24-11/30	Beta Playtest (11/25)	Multiplayer functionality,
11: 12/1-12/7		More items, incorporate playtesting feedback
12: 12/8-12/14	Final Game Test (12/9) Final Game Video (12/12)	Create game video, add sound effects

Individual Goals

The following table shows the goals for the individual members of our team.

Table 6: Individual Goals

Week	Aaron	Conrad	Mark	Rachel
3: 10/6-10/12				
4: 10/13-10/19		System		Prefabs

		architecture		
5: 10/20-10/26	~~Visual Select~~, Map Initialization, Tile.GetNeighbors(), Tile.GetNeighbor(direction)	Picking Up Items Logic and Visual, Turn-Based Logic	Moving Visual, Visual Select	UI
6: 10/27-11/2	~~Basic Networked Message Sending, Networked Map Initialization~~	Refactor movement. Update visual move, equip, and attack.	Smooth turning animation	Improved UI
7: 11/3-11/9	Projectile Weapon Firing, Basic Networked Message Sending	Added weapon effect architecture and rockets	Visual move/attack range display, smooth turning animation	Weapons, UI
8: 11/10-11/16	Networked Map Initialization, Networked turns	Shields and new melee logic	Directions list/or button toggle	Win/Lose state
9: 11/17-11/23		Integrate all weapons	Weapons, score	Weapons
10: 11/24-11/30		Improve animations	Bug Fixing and polishing	Tutorial
11: 12/1-12/7		Bug fixing	Bug fixing and polishing	Sounds
12: 12/8-12/14	Video	Video	Video	Video