

# TD FPS: POLY DEFENSE

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Advanced Seminar

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## Intent Statement

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I intend to create a system which focuses on resource management by having the player spend between two different necessities, Towers and Guns which they can use to fight against the hordes. Towers provide reliable coverage in areas while guns allow for more firepower in separate places. Upgrading your gun will give you more firepower, but that money could have been used to place coverage in another area. This forces the strategic decision for whether the player should spend money on one resource or the other in circumstances which could affect the end result of the game.

## Research and Thesis

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This project experiments with how a resource management system in a hybrid FPS/Tower Defense game can create engaging decision-making through player choice between tower placement and weapon upgrades. When I first thought about creating my resource management system, the intention was to split the players' focus onto two different types of purchases, the towers and the guns. While very basic, I had to scope down from including making the player purchase ammo as they played as well. It still retains the core of what I want to do, but without having to implement as much since there is a short deadline on the project.

I decided to pursue this project following my deconstruction of *SUPERHOT*. Now, while *SUPERHOT* does not appear to be anything remotely similar, it actually still retains resource management, requiring the player to think about their actions as they pursue through the waves, or in SuperHot's case, levels. While I did not want to go down the route of *SUPERHOT* for the sake of doing the same concept which I had already played with previously, I wanted to keep the player agency while maneuvering to the Tower Defense genre, one of my personal favorites. So I created the idea of having an FPS/Tower Defense mix which brings the player into the first person to engage in rounds of oncoming enemies trying to defeat their core. Games that inspired, and unknowingly inspired this project include; *Dungeon Defenders*, *Bloons TD 6*, and *Sanctum 2*. These games are all Tower Defense games with a different take on the genre.

*Dungeon Defenders* is a Third Person Tower Defense game with classes, multiplayer, and varying objectives for each level. *Bloons TD 6* is a top down tower defense with monkeys popping balloons. Lastly, is *Sanctum 2*, a game I had forgotten about, but remembered following the concept of my system. *Sanctum 2* is an FPS/Tower Defense game where the player goes into the game with a loadout, and gains more walls to build their pathing for the enemies to follow. Upon taking inspiration from these games, I felt that I could create my own system which would be just as enjoyable as the other games I listed here.

The commonalities I noticed when researching included; waves, enemy variants, and most importantly, a currency which allows the player to build upon the level and evolve their defenses against the ever growing more difficult waves. While all having their varying takes on how those mechanics were implemented, they were always present within their games. So, naturally, I wanted to implement these things, but in my own way.

This brings us to the differences between what I intend to do versus what has already been done. The most comparable of the three is *Sanctum 2*, and that game is very different from the approach I intend to take with my system. Rather than having an ever evolving board for the enemies to take, I intend to have set maps within the demo, with branching possibilities for the enemies to take. This allows the player to think critically about where they station their towers since they need to have coverage for all potential places of access. In addition, the towers are up to the player to place on their own, rather than provided to the player to place and upgrade as *Sanctum 2* does. I also want to implement the ability for the player to upgrade their gun, so that they can do more damage to the enemies. *Sanctum 2* allows the players to load in with an intended loadout, but that doesn't require the player to split their resources between one place or another. Having that divide to pick between towers and upgrades is a decision that I want to be critical to the players' game, and act as something they have to think about and allocate properly for.

Next, knowing that I wanted to make the decisions engaging and have an impact, I found in my research an article titled, *Difficult decisions in your game*. This article was incredibly helpful in understanding what makes a decision matter. In a game such a tower defense, having a clear objective was important. Having the understanding of

where one needs to go, while attempting to get there. That then leads to their following point that the results of said decisions need to be engaging, or have a bigger impact. If a player is going to spend more, they should see better results. Meanwhile, if a player decides to save, they may be under-resourced on the map, and have enemies trickle through towards their Core. Through having the player decide between mobile defense and stationary defense, their gameplay can end up differently. Every decision, or lack of them has to matter and engage the player when doing so.

Following, I found an article titled, *Incorporating Resource Management Mechanics*. This piece was another part I wanted to look into heavily. Rather than just understanding what decisions matter, but how to make them feel good as well. It was this article which made me realize that resource management is a system which interacts with so many other game mechanics in varying ways, all ultimately affecting player progression. I want the player progression to feel good, and that each decision matters, and by balancing it with varying mechanics, this feeling can be created.

Ultimately, my research culminates into what I believed could go into creating a good resource management system for the players to actively engage with the game as it progresses, and think critically about each of their decisions. Through having a first person shooter/tower defense mixture, I believe that the experience would be greatly enhanced from having more interactivity from the player, rather than the idle state which can occur with most tower defense games.

## Systems and Mechanics

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### Explanation

My prototype is founded on the resource management system. This system is divided into two sections as the player has the option to spend between purchasing towers, a stationary form of attack, or guns, a mobile and risker method of attacking. This system was designed as a way to make the player think critically about their decisions since they may need the resources at a later point in time. In order to obtain currency in the game, the player has to defeat enemies whether that's from their weapon, or the towers they place.

As the waves ramp up, more difficult enemies and wave sizes will spawn, so having a good defense is very important. The enemy's goal is to reach the end of the path and destroy the core located at the end. The pathway branches into two sections to provide the enemies with the opportunity to take a different path that is less guarded. As the enemies increase their health in later rounds, their damage does as well, so getting to the core in later rounds does significantly more damage than in the early waves.

The towers currently have three different variants in the game with different stats and costs. The greater the cost, the more damage per shot. The towers all have a set range on them, so having ones that can do higher damage is really good for the stronger waves. In addition, towers can only be placed on the valid placement zones outlined in green when in the purchase menu. Valid placements will be outlined in blue, while invalid placements will be outlined in red and block the placement. If the player does not have enough money, it also will not place the tower and will appear as red as well. Towers are also stationary, so it is possible for enemies to sneak past. This is where having the gun comes in handy.

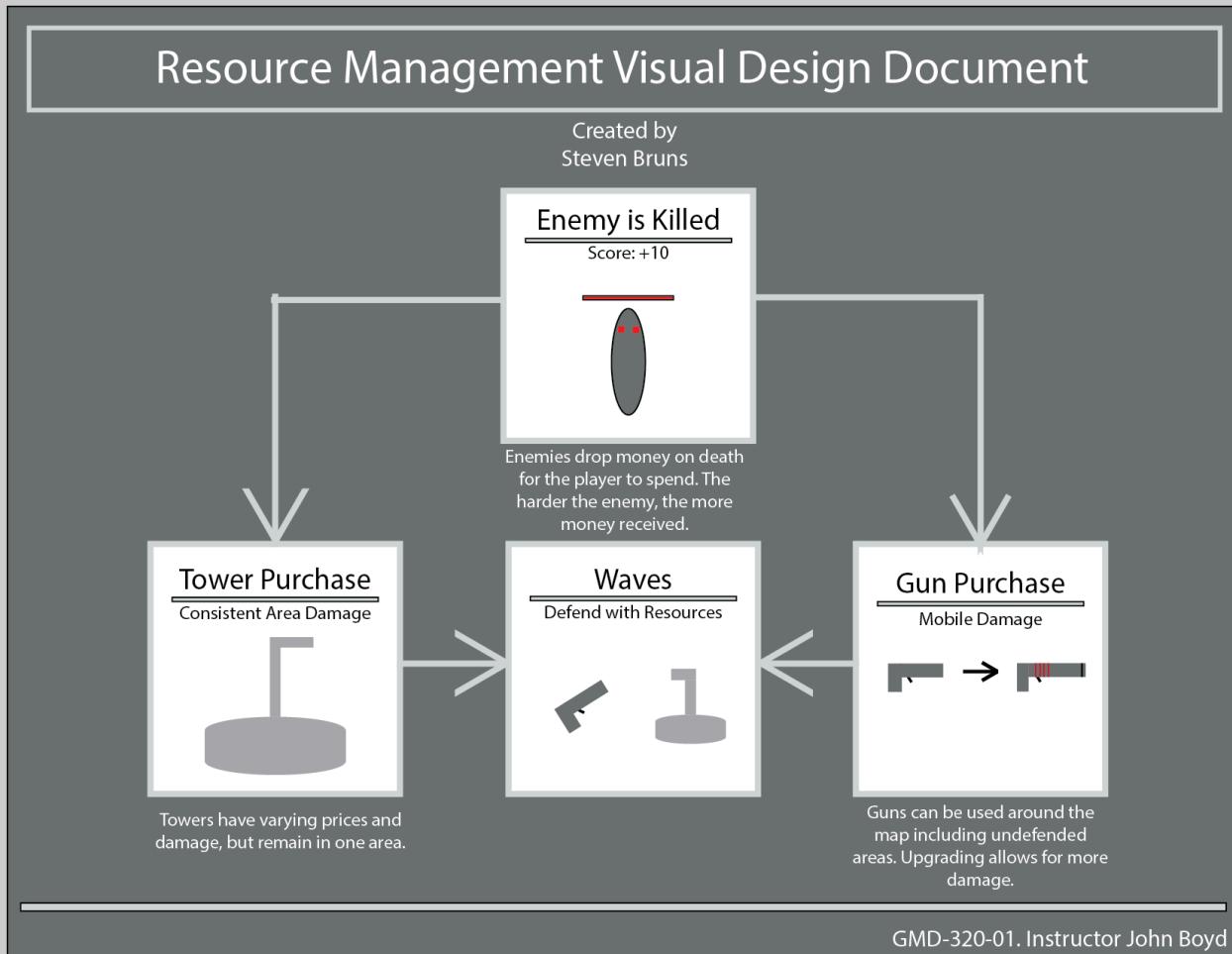
In the game, the player is given a pistol as the start, and is given the option of upgrading to a more powerful weapon for a price that's double what they start with. While the player could possibly save up all of their money immediately to get the gun, it will be difficult due to the waves of enemies coming through the level. The second weapon is much more powerful than the pistol making it worth upgrading. Having progressively stronger guns will be useful for engaging in the stronger waves of enemies without having the weapon entirely drop off.

Lastly, the waves mechanic works as a break in between each round, so the player can accordingly spend their money and adjust their placement in the map. By pressing F the player can begin the following wave. The demo currently ends once the player beats round 10 with the following round spawning only a single enemy which when killed brings the player to the win screen.

All of these mechanics were designed to support this system and encourage the player to think critically about their decisions while having fun engaging with the game, and surviving through massive waves of enemies.

Video Link: [Video Here!](#)

# Visual Design Document



## QA Testing

### Test Plan

#### Goal:

The goal of my QA testing was to see if the players enjoyed the split decision between deciding whether to put their resources towards getting towers, or towards upgrading their weapons. I wanted to know whether that decision felt like it mattered,

or if it needed to be revised. The most important part, I want to know if this was something they want to see going forward. The test will be considered a success if the players enjoy the system, and want to see more from it. The test is conducted through the use of Discord, and sending out links with the form on it. I had only gotten a few responses, but those few responses are incredibly valuable towards understanding the success of the system.

## Testing Setup and Procedure:

1. Explain the mechanics, controls, and purpose of the test to the tester.
2. Observe the player's gameplay.
3. Have the tester fill out the final form.
4. Thank them for their time and input.

## Questions:

1. How would you rate the experience?
2. Was the purchasing of weapons and towers easy to understand?
3. Did the upgrade on the Gun feel worth the cost?
4. Did you end up using all the tower types?
5. Do you think you would like to see the Tower/Weapon balance management in a full game?
6. Is there anything you would like to see improved in a future iteration of this system?
7. Did you lose?
8. Did you encounter any bugs?

**Survey Link: [Survey Here!](#)**

## Testing Results

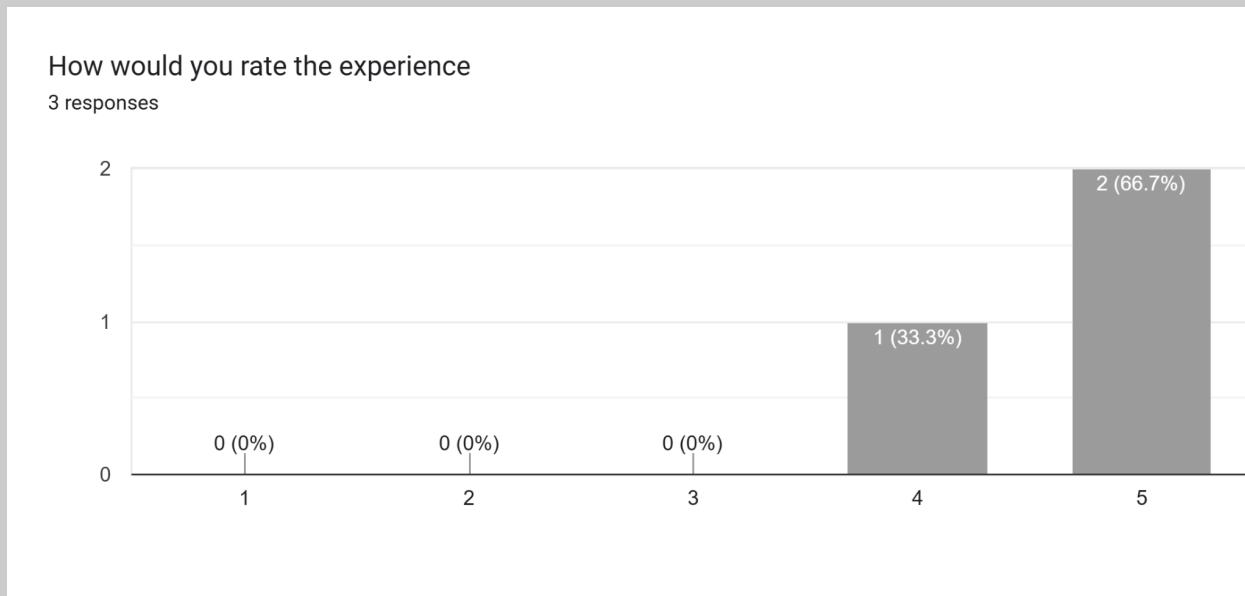
Overall the testing went well despite encountering many issues. My testers told me that my intent of the prototype was certainly prevalent in the project, and was something they want to see more from in a better state in the future. There were many issues coming into testing, some I had thought were fixed, but due to time constraints there was no time to redo the test. Players were able to stop enemies, get out of the map,

not finish the game, among other things it had issues. Despite the flaws present in the project, the players were very interested in the game and had fun playing it. Seeing such positive and critical feedback was really a great positive from this testing.

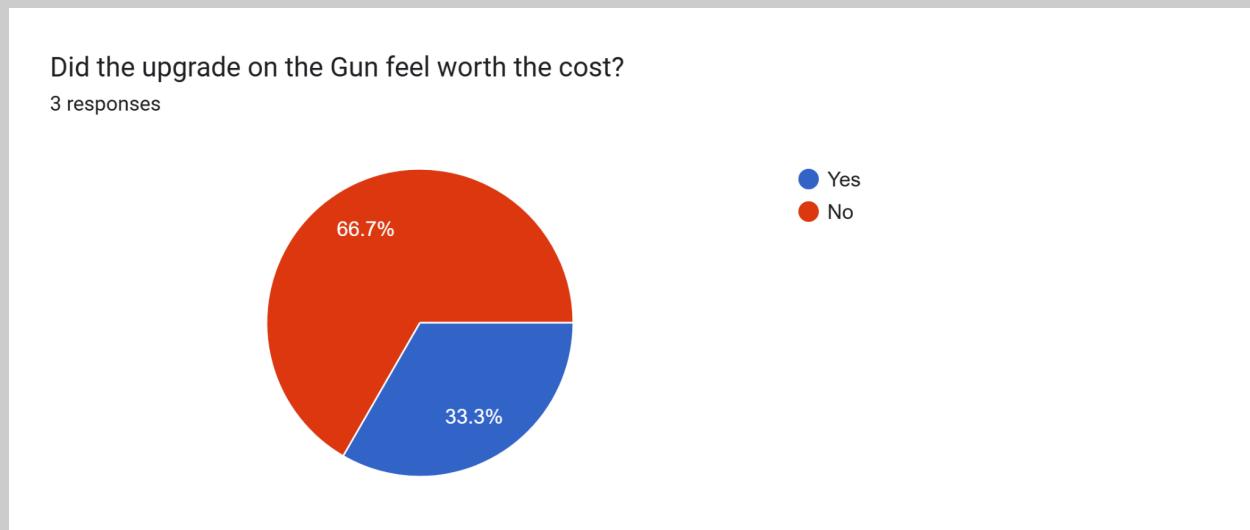
Upon looking at the data, the system was considered very enjoyable which achieves my goal. The issues present in the demo were noted, but did not detract from how the players felt about the possibility of the system's future iteration. Some players thought that things such as the esc functionality should be changed, and that's something I agree with having seen their performance in the game. Polish would seem to make this experience a very pleasurable experience according to the feedback received, so I would consider this test a success.

## Results

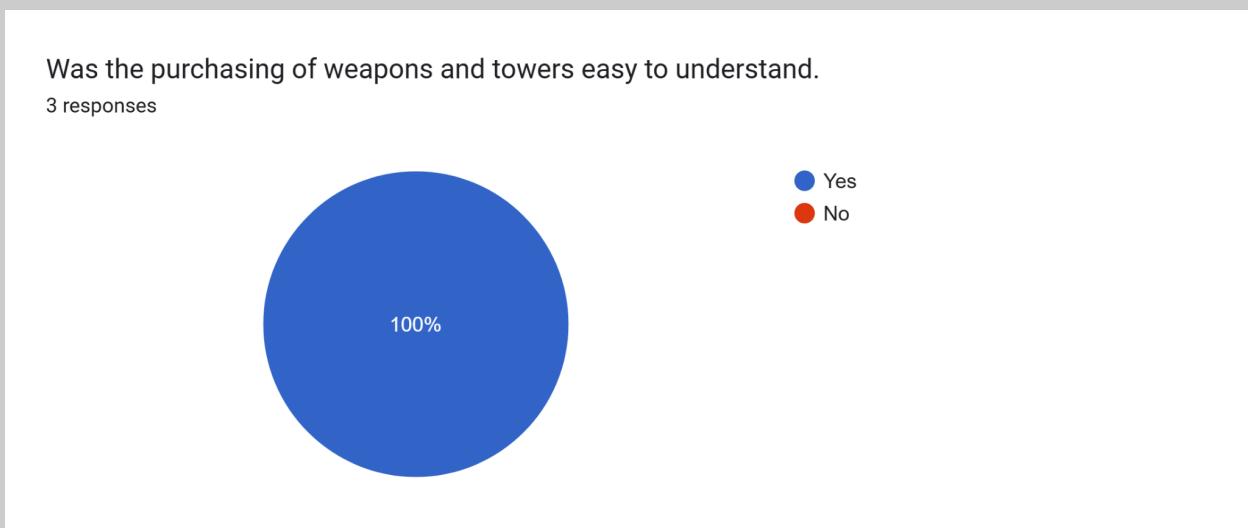
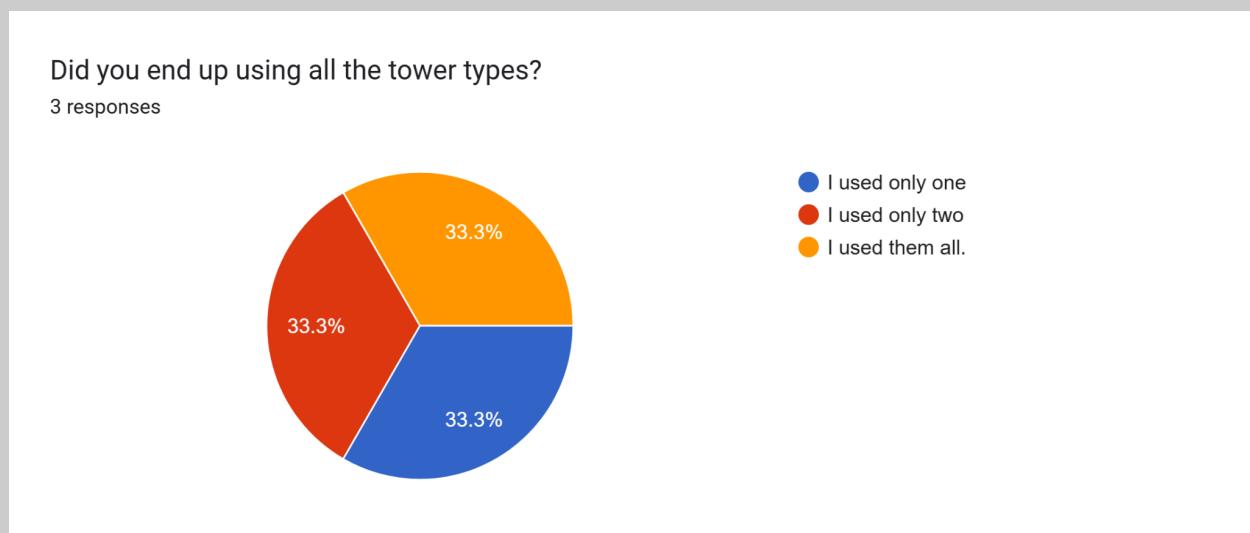
### 1. How would you rate the experience?



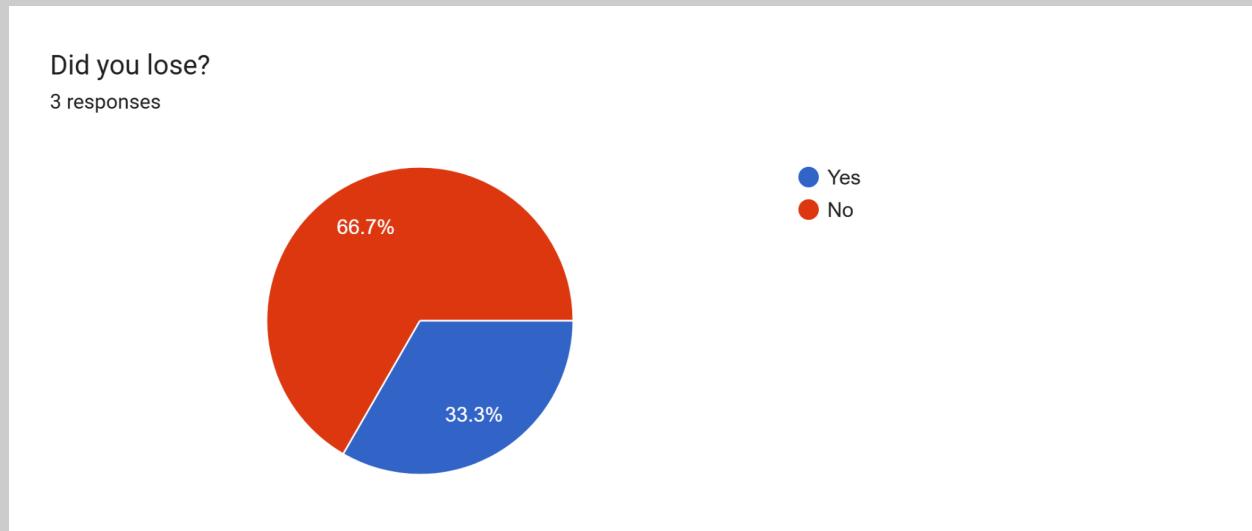
2. Was the purchasing of weapons and towers easy to understand?
3. Did the upgrade on the Gun feel worth the cost?



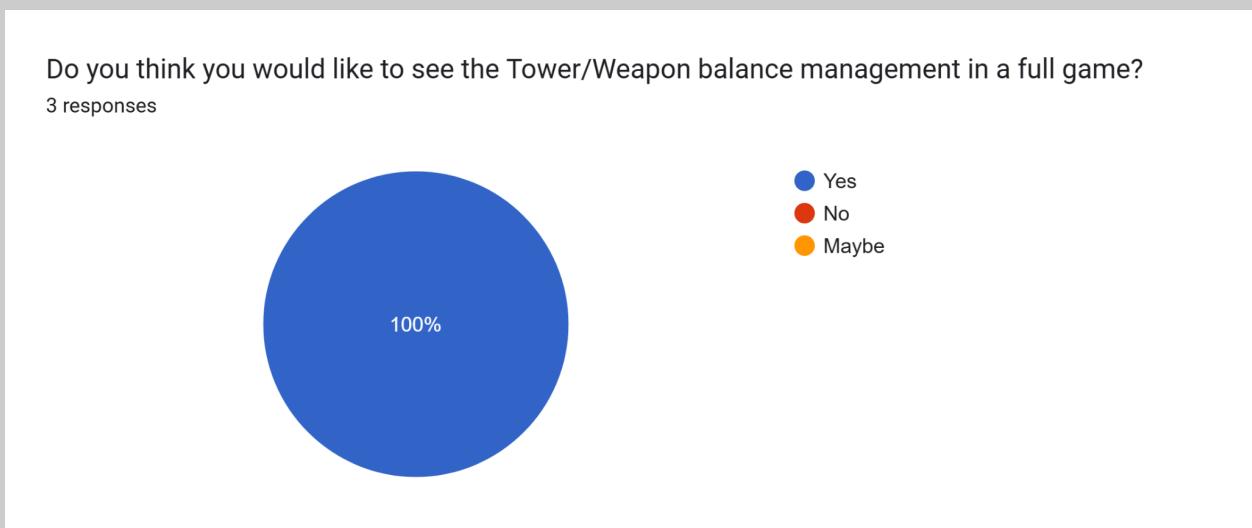
4. Did you end up using all the tower types?



5. Do you think you would like to see the Tower/Weapon balance management in a full game?
6. Is there anything you would like to see improved in a future iteration of this system?
  - a. Textures and more towers/weapons. Maybe also upgrades to the towers or weapons. PLEASE MAKE THE INSTA QUIT BUTTON NOT THE ESC KEY!!! Better yet, entirely remove that function and make a pause menu. I accidentally quit like 4 times.
  - b. I would like to see unique maps and varying enemies.
  - c. The weapon projectile fall off looks exceedingly strange.
7. Did you lose?



8. Did you encounter any bugs?
  - a. Two. One where the wave had like 12 left but nothing was there (like two of them got stuck in spawn and fell through the map). And another where I



was able to get out of the map and when I jumped off it crashed/froze my game.

- b. Yes, the game was easily breakable to win. And the enemy entities were phasing through the terrain.
- c. Tower Bridge™

## Observations

- **The system has a desired audience, despite the flaws in this demo, the players want more.**
- **The players want more unique maps, and varying enemies in further iterations of the game.**
- **Players got stuck on waves due to enemies spawning improperly. A good amount of runs never went to round 10.**
- **The first tower being used was broken in comparison to the other two. The value in damage and speed for the cost was significantly better than the others, so the players used a lot of them to get far in their runs.**
- **The gun upgrade did not feel significant enough for most players, so that's something that would have to be addressed not only for that weapon, but any other added weapon.**
- **Despite having the designated areas for placing towers, players were able to place towers connecting to their previous towers. This led to blocking pathways, and having more towers in an area than there should have been.**
- **Having ESC as only an exit button rather than an exit menu button, then an exit game button/pause menu was a really bad mistake. The players hated it.**

## Analysis

Upon reviewing the responses, gameplay, and overall state of the prototype, I can say that the game succeeded in demonstrating the system. While it may not have completely performed exactly as I had intended, the feedback from the vision proves that a game in which there is the resource management between weapons and towers is an enjoyable concept. My playtesters had fun with the game despite its flaws, and really want me to fix what I currently have, and evolve the concept into something greater. The intended experience is there, it simply needs more time to get it into a state where it can work without flaw.

## Post Mortem

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The resource management mechanic was a surprising success, not that I did not believe in the concept, I felt that despite putting in a tremendous amount of time into the project that it would fail expectations given the state it arrived in. I struggled with programming and tried to implement a ton of different functions and blueprints to get the vision working, and that still was not able to be in the state I would have liked to present it in. If I were to come back to this, I would adjust the area in which the enemies spawned in, change the values for the towers to make them feel worth their investment, and ensure that the area they are supposed to be placed on is the only place they can go. In addition, I need to show the hit area, change the projectiles of the second weapon, and add more enemy types. There are many more things such as adding the pause menu and removing esc as being the exit for the game. There is a lot of work needed to go into just fixing and adjusting everything to get it into a state I can be proud of. This is something I really enjoyed making, and would enjoy putting in the time and effort to see it polished into something great.

# Bibliography

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1. Linaugh, Senda. "Difficult Decisions in Your Game." *Gnome Stew*, 7 Feb. 2018,

[gnomestew.com/difficult-decisions-in-your-game](http://gnomestew.com/difficult-decisions-in-your-game).

In games, creating decisions in your game can allow the player to interact with the game differently, and try different approaches when tackling a situation. In a game where decisions matter, making them feel important revolves around knowing the goal, and the stakes at cost to get to them.

- Decisions add interest to the games as they can affect the player as they go forward.
- It forces the player to think critically about their decisions before proceeding.
- Having clear stakes in the game is important, so the player knows their situation and the potential risk in how they spend their time and resources.

2. The Scarlet Seeker. "Bloons TD 6 Gameplay Overview." *YouTube*, 16 Dec.

2022, [www.youtube.com/watch?v=fZD3gqMJrBE](https://www.youtube.com/watch?v=fZD3gqMJrBE).

This video shows an overview of the game Bloons TD 6, and how a player would go about playing the game. In the video, lots of the decisions and potential options for the player to use when playing the game are shown. The game features a variety of towers to choose from, along with upgrades for these towers to increase their damage. The players also have a second form of currency which

is not as easy to obtain, which they can use as a backup support for their game.

However, those are unnecessary and the main events which occur in a level are all that are needed.

- Players need to think about how many towers they should focus their resources on.
- Players need to account for different bloon types as not all monkeys can affect certain bloons.
- Players need to unlock later tiers of each tower, and need to know which they should unlock first.
- Players can invest in the future of their game, but they need to be able to allocate the resources without losing to do so.
- Towers differ in range, price, power, and cost.

### 3. CaptainSparklez. “Sanctum 2 W/ Nick: Tower Troubles.” *YouTube*, 27 May

2013, [www.youtube.com/watch?v=UXC\\_wAcv9q4](http://www.youtube.com/watch?v=UXC_wAcv9q4).

This is a video that I had remembered post creating the idea for my system. In the video the players choose their loadout and head into the game. In the game they build the course for the enemies to travel, and place towers where they can. Their weapons have no restrictions or upgrades, but they have options of different ones to choose outside of the game. This game more so focuses on the development of the pathing and damage of the enemies.

- Players have to focus on the layout of their map as they proceed in the waves.

- Players can get hurt by enemies, but also temporarily stall their movement during attack.
- Weapons reload, but the ammo is infinite.
- The players are given towers, and walls at the end of waves.
- Players have a currency which they can use to upgrade their towers.

#### 4. Miron, Nicholas. "Incorporating Resource Management Mechanics."

*Mahtgician Games, LLC, 19 Jan. 2024,*

[mahtgiciangames.com/blogs/the-creative-workshop-game-design-blueprints/incorporating-resource-management-mechanics?srsltid=AfmBOop5sy6KNZcjhXfli\\_pNaSMwMYx-bL5UdJP8scU4\\_xAPiYR4r433y](https://mahtgiciangames.com/blogs/the-creative-workshop-game-design-blueprints/incorporating-resource-management-mechanics?srsltid=AfmBOop5sy6KNZcjhXfli_pNaSMwMYx-bL5UdJP8scU4_xAPiYR4r433y).

This article is great for learning how to understand utilizing resource management in games. The article focuses on defining the resources, balancing, objectives, planning, and engaging with the player. This is important for understanding how to go about creating my game, and making the system.

Through reading this article, I know that I need to make the balancing good, so that the players' decisions feel like they matter. I want the decisions to affect the future outlook of the game, so that will be a good focus.

- There are a bunch of different factors to consider when setting up the tower and gun prices as well as their individual specifications.
- Managing the currency flow is important. Giving the player more than they need is too much, and can lead to things becoming too easy for the players.

- Having waves such as boss waves is an important factor to consider, so the player has those as additional objectives to consider as the game proceeds.