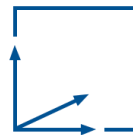


Towsif Zahin Khan, Levente Csik, Gabriele Princiotta

09/03/2023



Master Practical for Master's in Game Engineering

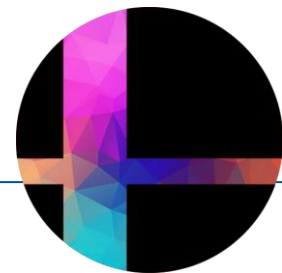
Advisor: Daniel Dyrda





Introduction / Motivation

Abstract - Developing a game through experimentation with **Level Engineering Concepts**, **Game Development Process Management** and **Development Methodologies**.



Problem Description: Issues

Master's Lab goal was to develop a game with the following characteristics:

- the theme is “Take Cover”
- the game must be 3D
- Level Engineering techniques should be used



Existing Solutions / Related Work

Cover Based Platformer



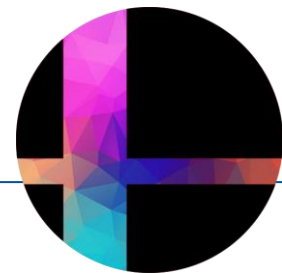
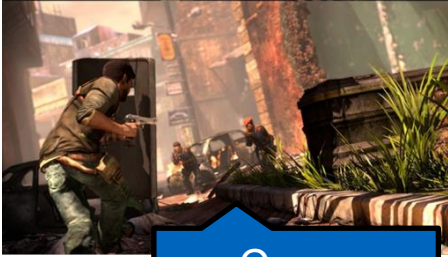
Cover Based Stealth



Cover Mechanics in Multiplayer Shooter

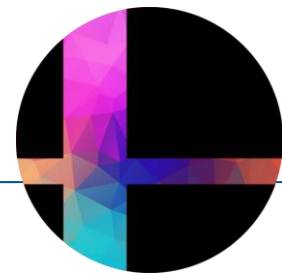


Cover Mechanics in Adventure



Goals of this Master's Lab Course

- Complete a game ready for 2023 Winter Demo Day.
- Experiment with and Learn Documentation Techniques.
- Iterate and Test the game over multiple passes.



Critical Research Issues

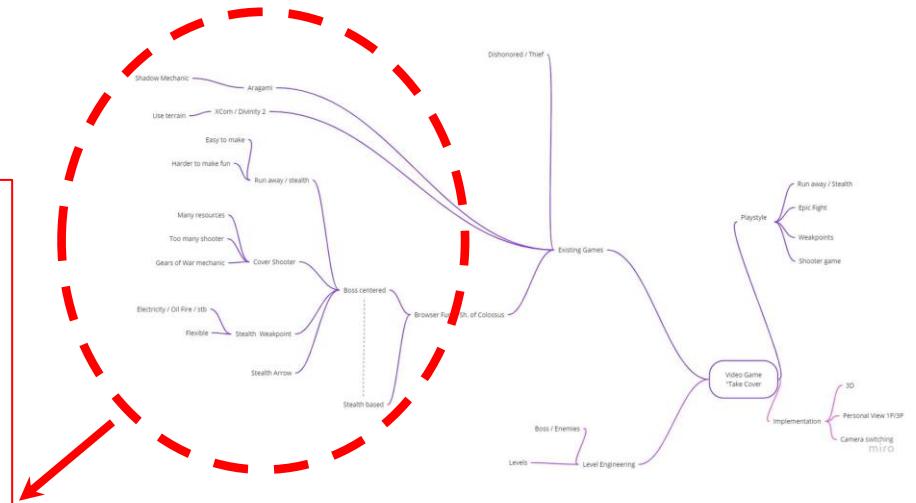
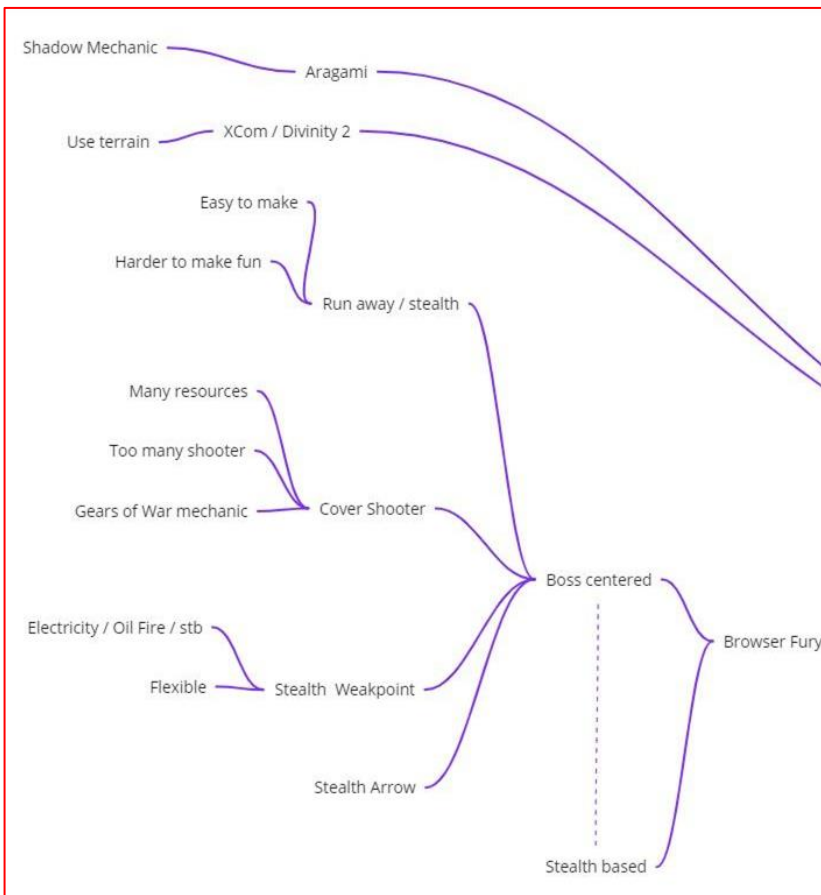
Issues we were aware off from Day One:

- We lack game development experience, specially in 3D.
- A complete game needs a wide variety of skill sets
 - We lack experience with 3D Modelling, Sound Design and tools such as Unity Pro Builder.
 - We cannot opt to hire for skills we do not have, since this is a class project.



Proposed Work / Approach

What kind of Game?



Stealth Archery Boss Battle



Proposed Work / Approach

Already decided?

External Constraints:

- Deadline = Demo Day
- Must be 3D
- Level Engineering concepts should be used

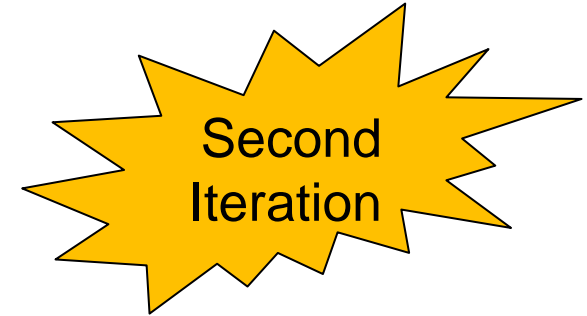
Core Mechanics

- Stealth Archery Boss Battle



Proposed Work / Approach

More defined Game Idea?



Design Pillars

Stealth is the most important mechanic: Used strategically to either get close to the boss and attack, or activate an environmental hazard to damage the boss, or to lure the boss into an environmental hazard or advantageous locations.

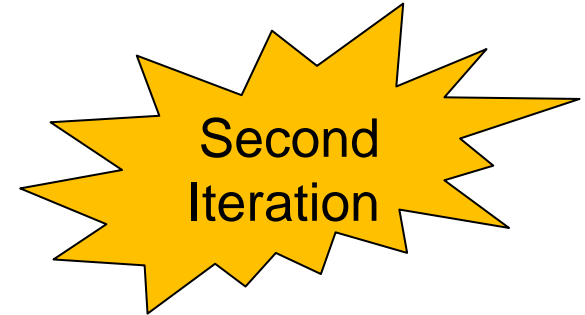
Boss Centered Level Design: The entire game map is designed on what interesting things the boss can do, and what interesting things can be done to the boss.

Environmental Interactions: Along the game, there are many environmental interactions that require players to be activated and can help to beat the boss. There are two types of interactables: repeatable and non repeatable. Multiple interactables can be stacked on top of each other.



Proposed Work / Approach

What is a game?



- Q1: Games are entered willfully. (True)
- Q2: Games have goals. (Defeat the Boss)
- Q3: Games have conflict. (The Boss itself is the Conflict)
- Q4: Games have rules. (True; Example: Fire Arrows can trigger Explosions)
- Q5: Games can be won and lost. (True)
- Q6: Games are interactive. (True)
- Q7: Games have challenges. (True)
- Q8: Games can create their own internal value. (True)

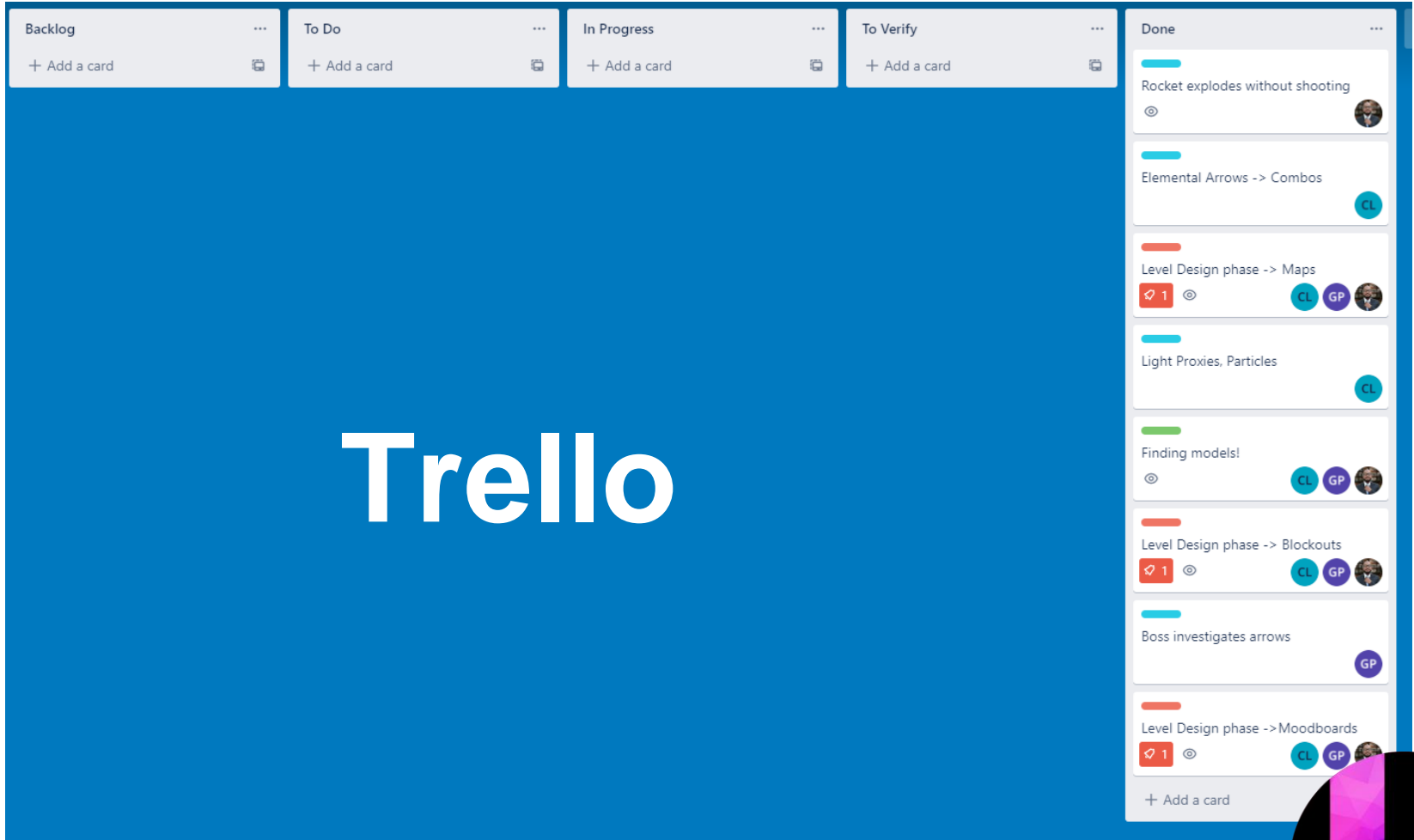


Proposed Work / Approach

How to Collaborate?

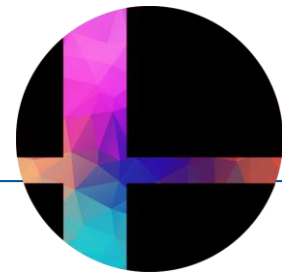
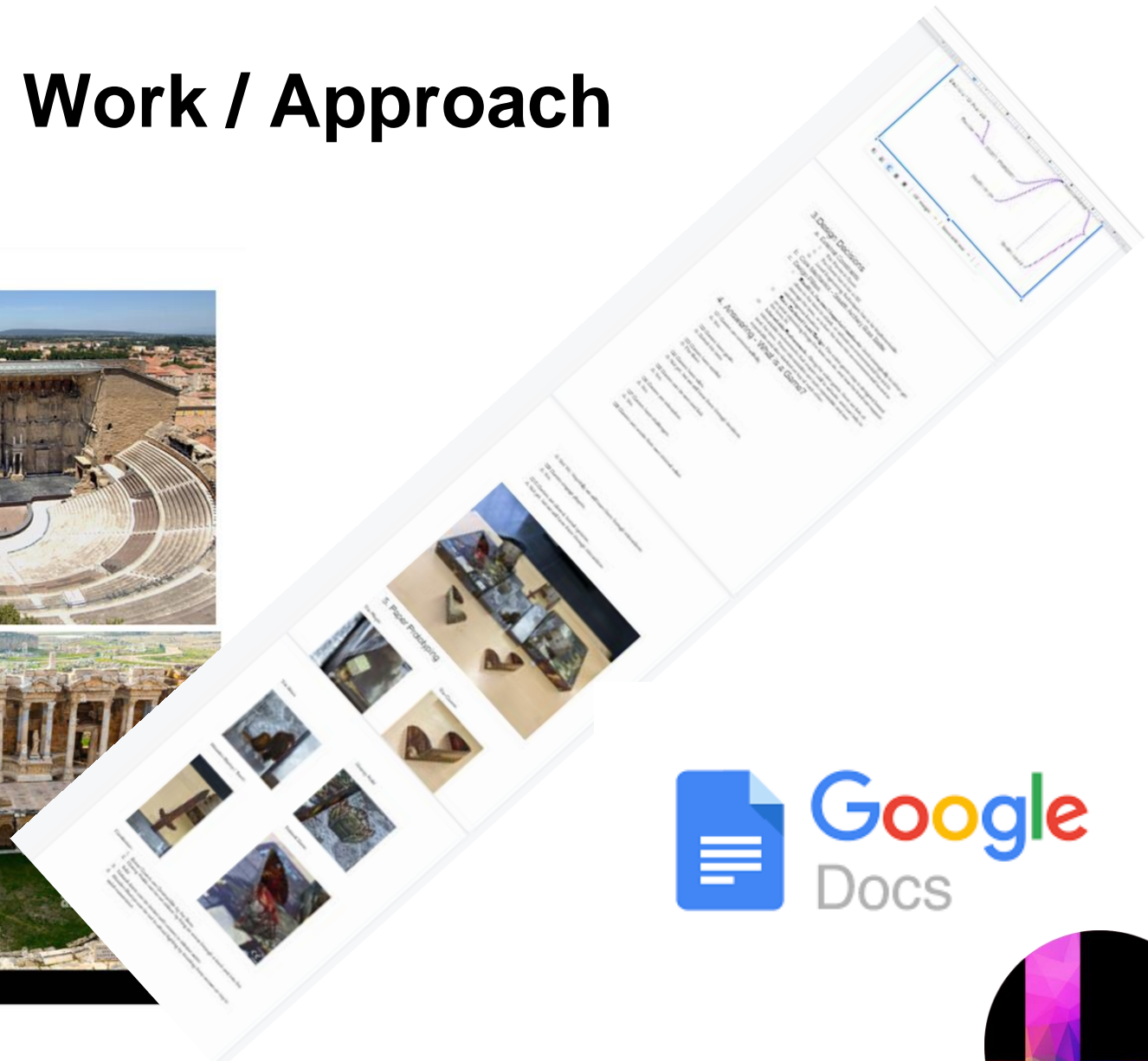
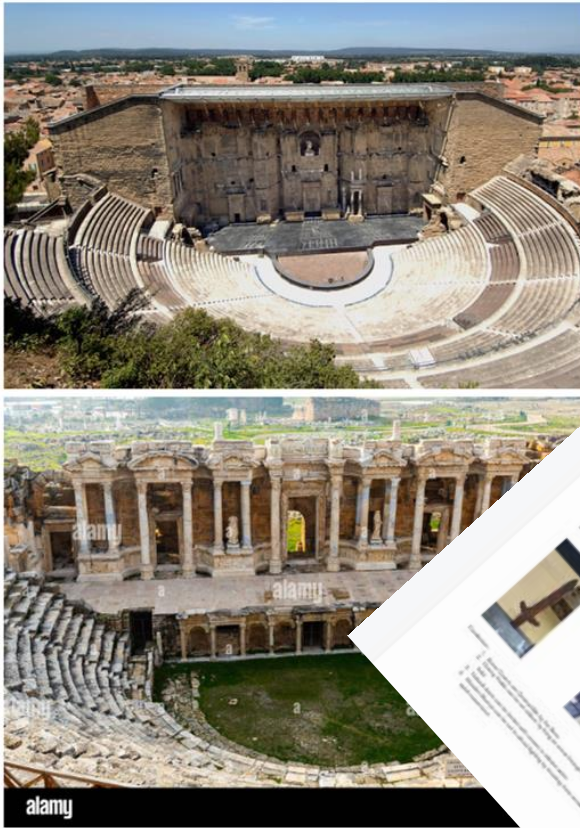


Proposed Work / Approach



Proposed Work / Approach

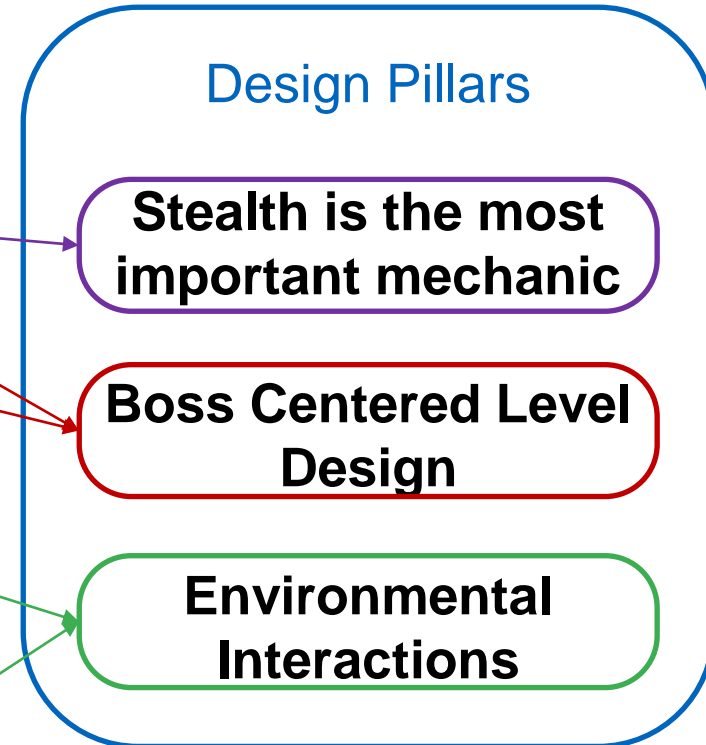
Layout Moodboard



Implementation - Game Development

- **Core mechanics:**

- Taking cover:
 - to hide from the boss
- Shooting:
 - to deal damage to the boss
 - to activate traps
 - to lure the boss where you want
- Collecting elemental power ups:
 - to deal more damage
 - to activate elemental traps

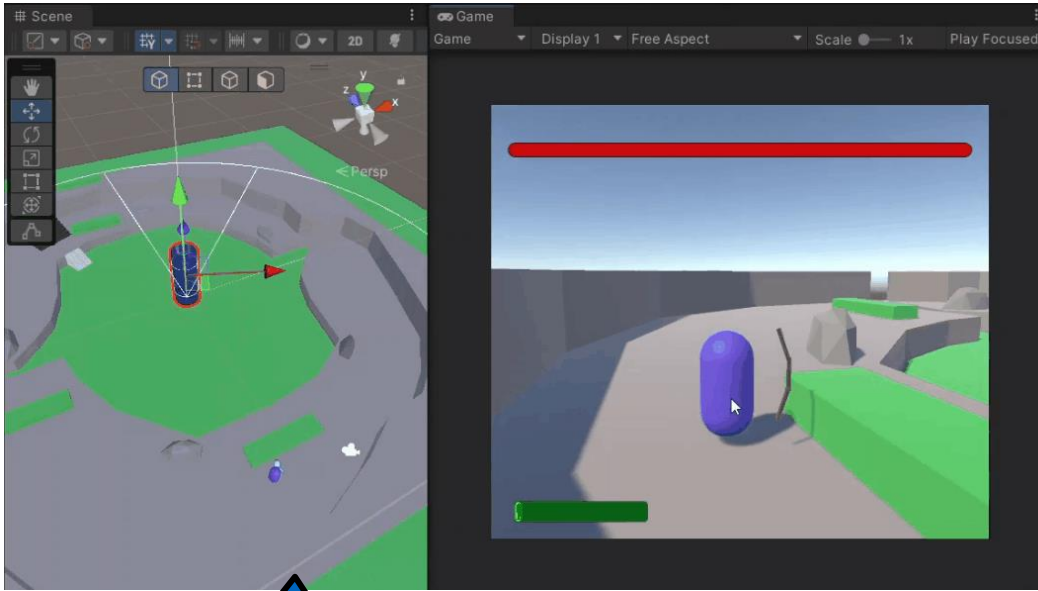


Implementation - Game Development

- **Player Controller**
 - Basic player controller
 - Camera controller
- **Boss AI**
 - Boss vision is done by ray-casting in a cone.
- **Stealth Controller**
 - When in shadow or bush, the player is not visible.



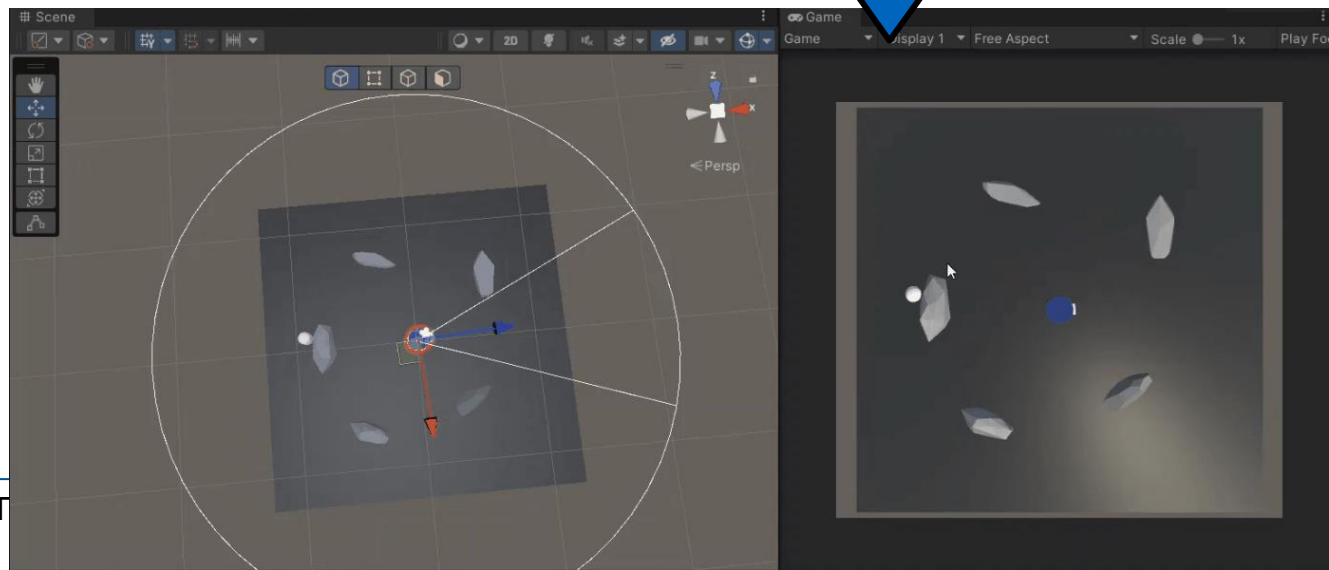
Implementation - Game Development



First Iteration

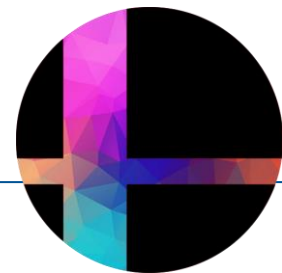
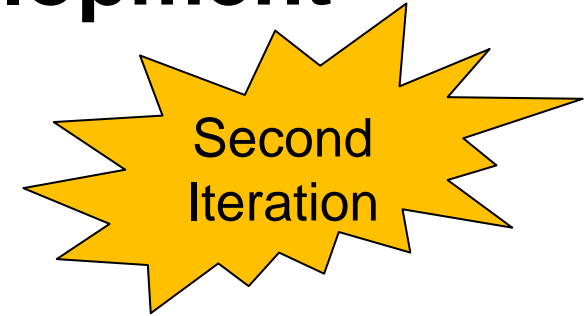
Boss Detection and basic AI

Player and Camera Controller + Stealth Controller



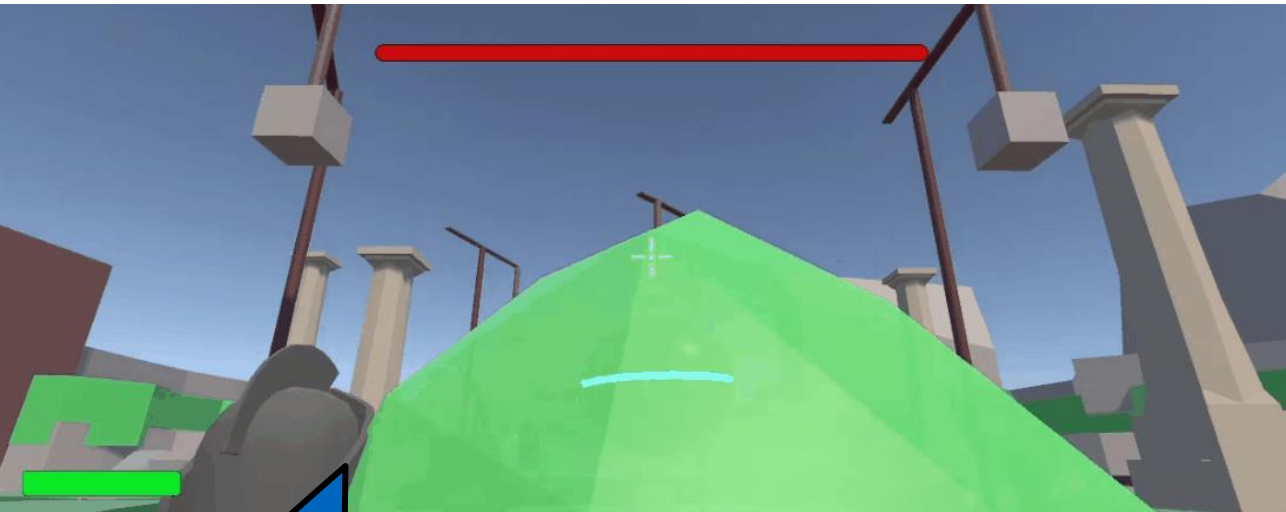
Implementation - Game Development

- **Player Controller**
 - Archery physics
 - Camera rotation fix
- **Boss AI**
 - Boss attacks the player
 - Boss has weak points
 - Boss moves also vertically
- **Environmental Interactions**
 - Fields the player can ignite
 - Pillars the player can push over the boss
 - Hung objects the player can shoot to make them fall



Implementation - Game Development

Second Iteration



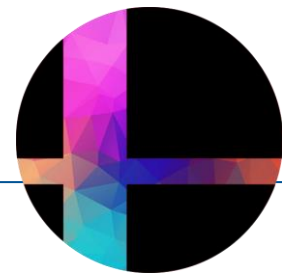
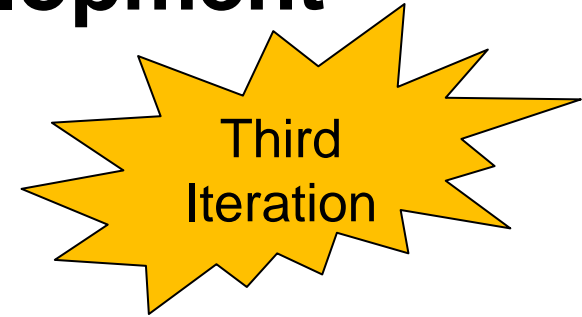
Shooting + Interactable example (falling stone)

Boss moves vertically and shoots detected player



Implementation - Game Development

- **Player Controller**
 - Camera rotation fix
 - Enchant arrows with elements:
 - fire, ice, lightning and water
- **Boss AI**
 - Minor bug fixes with the boss states
 - Elemental arrows set a condition on the boss
 - Elemental arrows deals additional damage in synergy with the boss' current condition
 - Conditions: burning, frozen, electrocuted, wet
- **Environmental Interactions**
 - Elemental arrows can change the game space
 - Freeze fire to create frozen cover
 - Electrocute water to deal massive damage to the boss



Implementation - Game Development



Third Iteration

Lure the boss into flames to deal damage over time

Lure the boss and shoot a falling object over the boss for a critical hit



Implementation - Game Development



Set oil on fire to create smoke and hide behind it

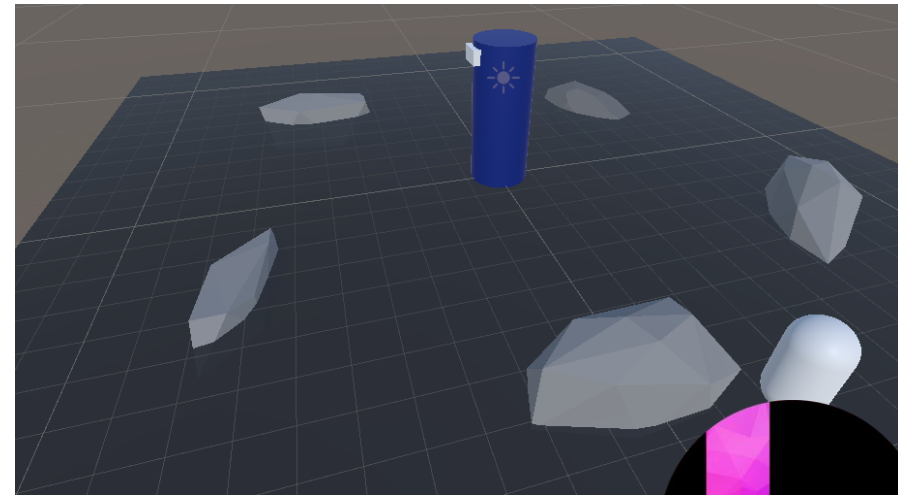
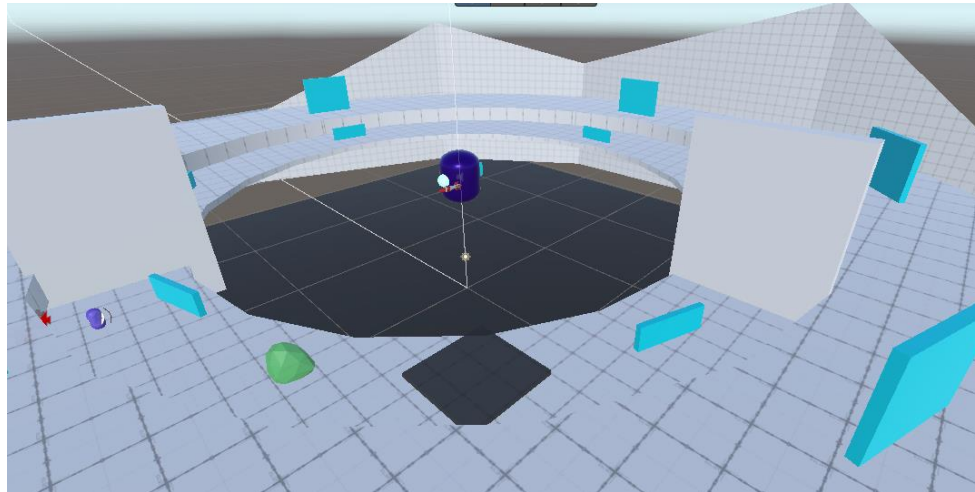
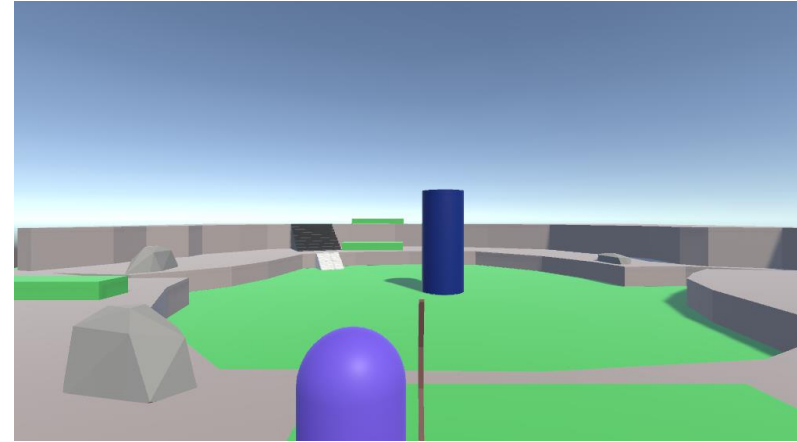


Use ice arrow to freeze flames and use them as cover



Implementation - Level Engineering

- Gym and Test levels
 - Test certain elements of the game
 - Stealth Test
 - Boss AI Test
 - Player Controller (Gym)



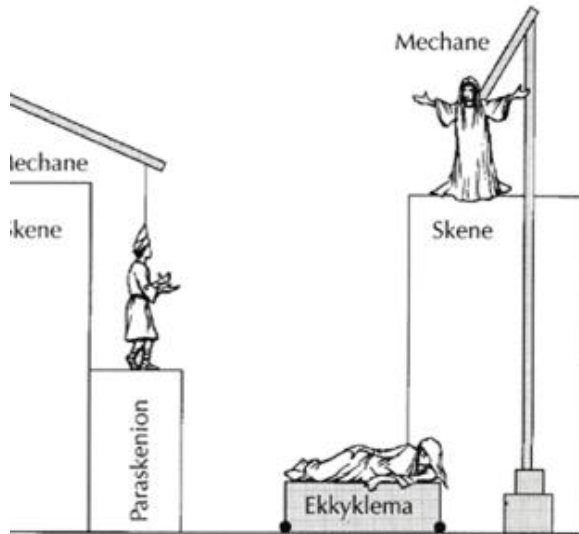
Implementation - Level Engineering

- Level Prototypes
 - Pacing: Single boss combat - pacing is linear
 - Three different levels per member
 - Iterate through the concepts using Level Engineering techniques
 - Genius Loci: Ancient Greek setting, open, lit



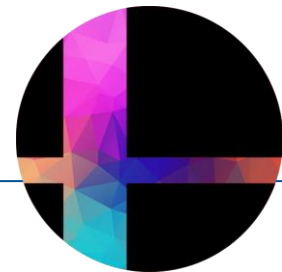
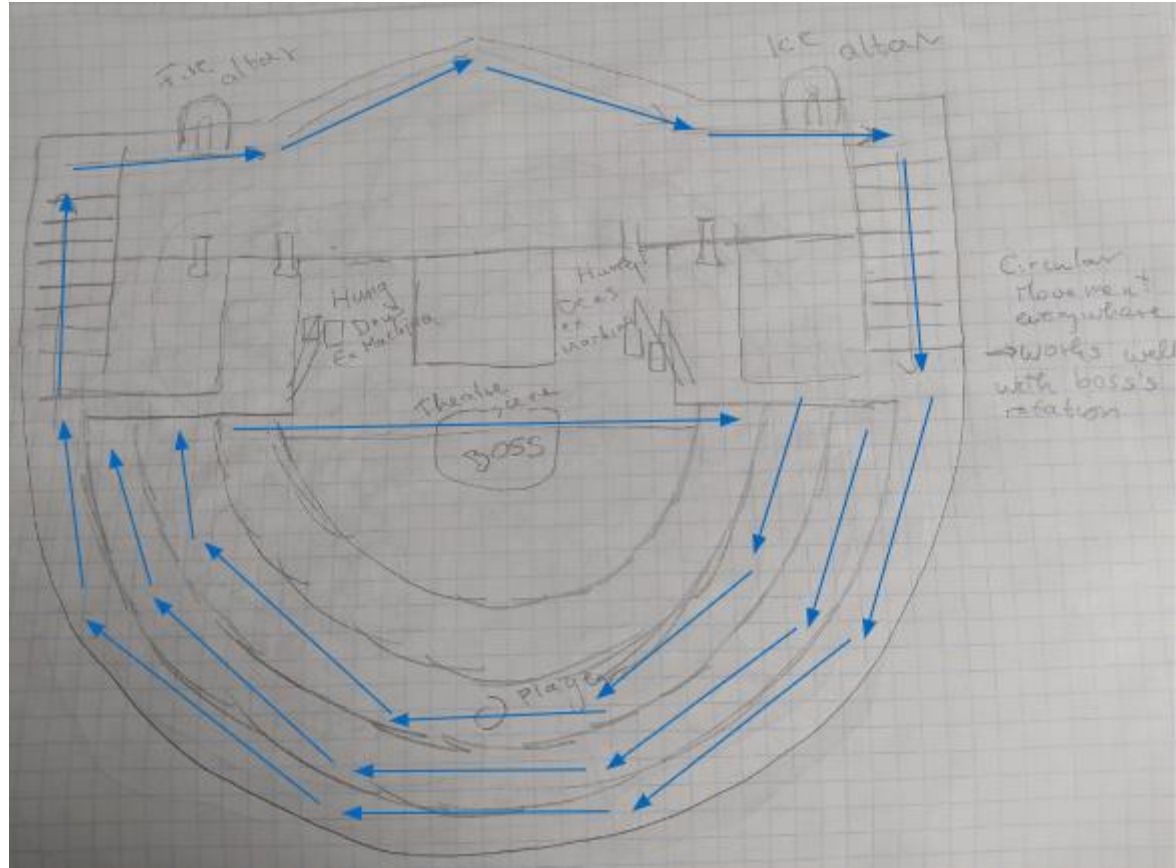
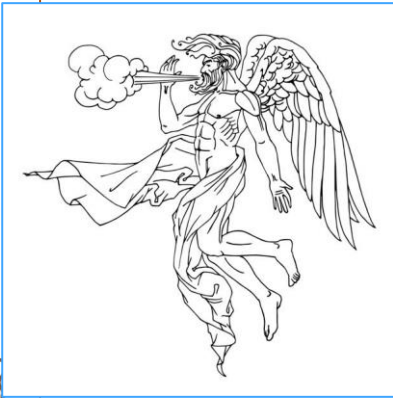
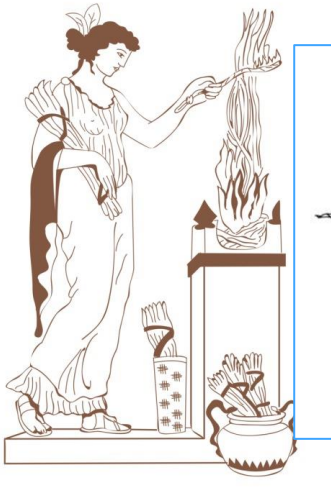
Implementation - Level Engineering

- Gabriele's level
 - Moodboard



Implementation - Level Engineering

- Gabriele's level
 - Map
 - Circular pattern
 - Theatre style
 - **Fire** and **Ice**

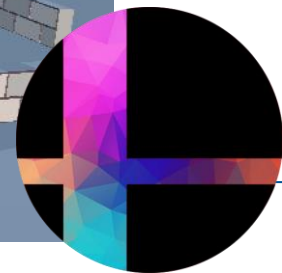


Implementation - Level Engineering

- Gabriele's Level
 - Focus on **aesthetics** and **verticality**
 - Aesthetics:
 - Greek amphitheater
 - Verticality:
 - Ramps and Stairs
 - Buffer zone where players can't go

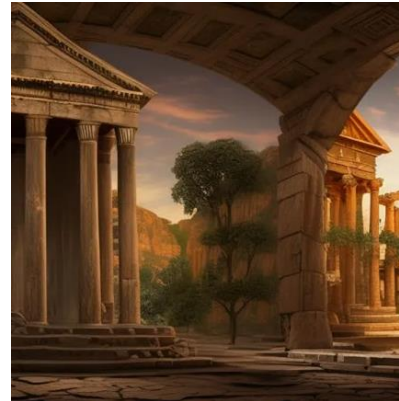


Arrow Ambush Adventure

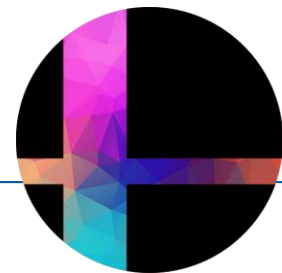


Implementation - Level Engineering

- Levente's Level
 - Moodboard of the **districts**:

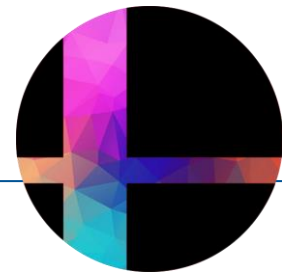
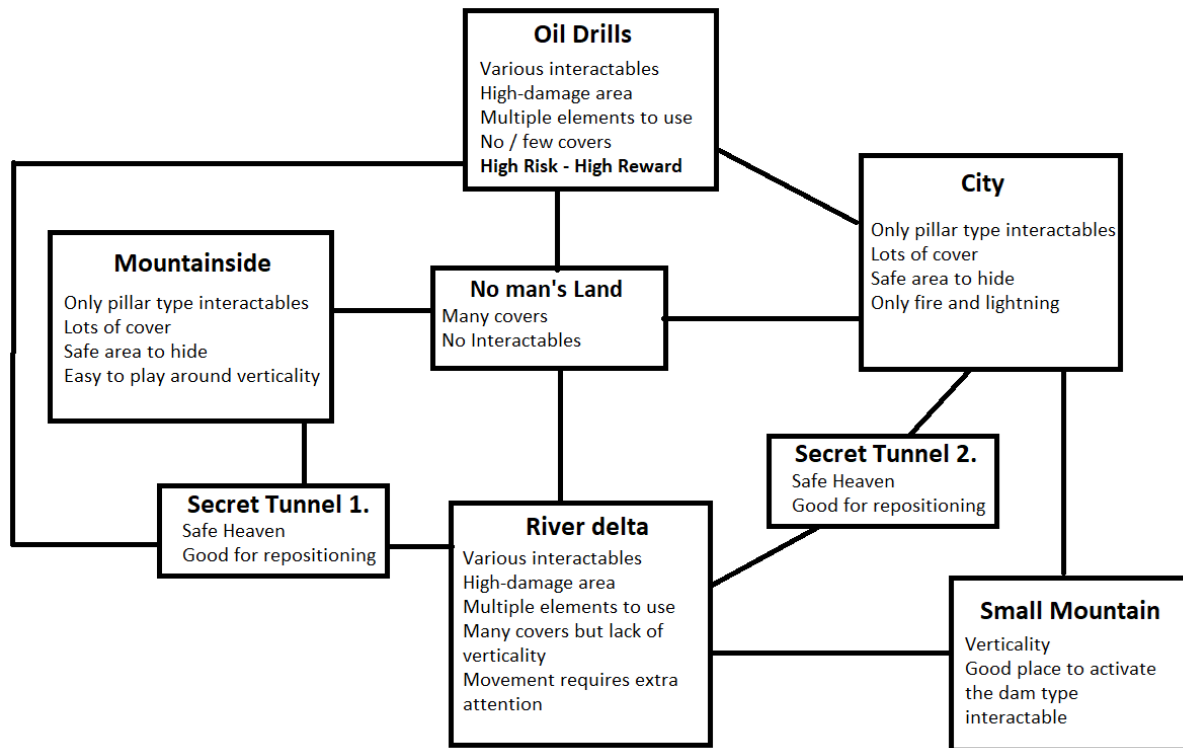
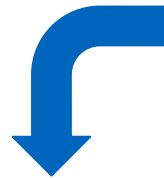
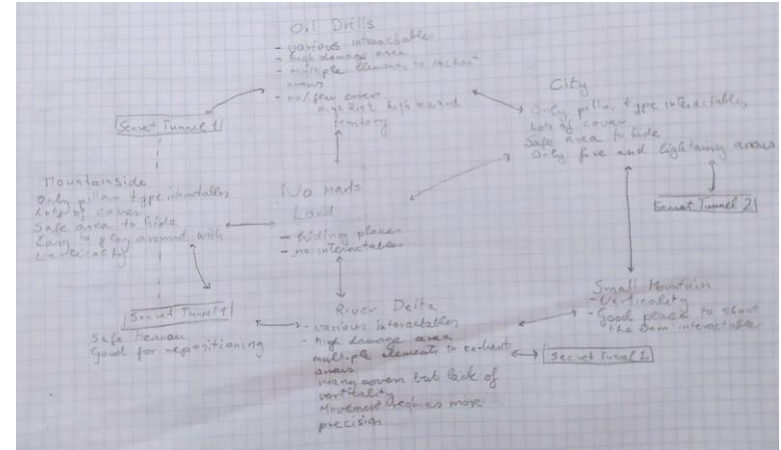


- Genius Loci:
 - Mountain and Village: safer place, lots of covers, less interactables
 - Oil field and River delta: unsafe place, fewer covers, many options
 - No man's land: intermediate place, only covers
 - Secret Tunnels: narrow place - safe but unnerving



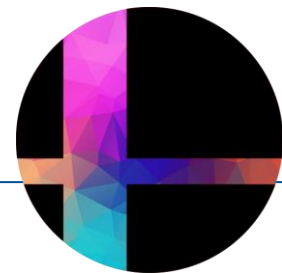
Implementation

- Levente's Level
 - Flow Diagram



Implementation

- Levente's Level
 - Map



Implementation

- Levente's Level
 - Game map



Towsif Zahin Khan, Levente Csik, Gabriele Princiotta:
Arrow Ambush Adventure



Implementation

- Towsif's Level
 - **Tutorial level** for the stealth and shooting mechanic in a small and simple map
 - Testing a Game Experience with multiple bosses
 - The multiple boss battle was too hard
 - We rejected this idea



Evaluation (User Studies, Test Runs)

- Playtesting
 - Playtesting at Pizza Playtest
 - Inverted-Y camera movement was ruining the experience
 - Audio Feedback on shooting, critical hit
 - Have more damage with overdrawn bow
 - Make aiming easier
 - Increasing colliders
 - Auto-aim
 - Snap to closest target
 - Playtesting with friends
 - Jumping would be great
 - Visual Feedback on currently active elemental arrows
- DemoDay
 - A tutorial level would be very helpful, or visual feedback on interactables



Discussion / Suggested Future Work

Future Additions

- Animation design
 - Animate the Boss and the Player
- Iterate again using level engineering concepts
 - Iterate on each level
- Improve audio feedback
 - Introduce audio feedback when the boss spots the player and when the player is detected

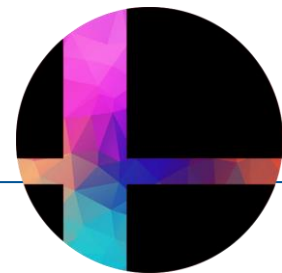


Conclusion

Although we realized the game, what we have completed is far from a market ready product, but we are quite proud of the progress we have made.

Thanks to all the feedback during every iteration, from Daniel, other Master Practical Students and Play Testers; we learnt more than we can quantify.

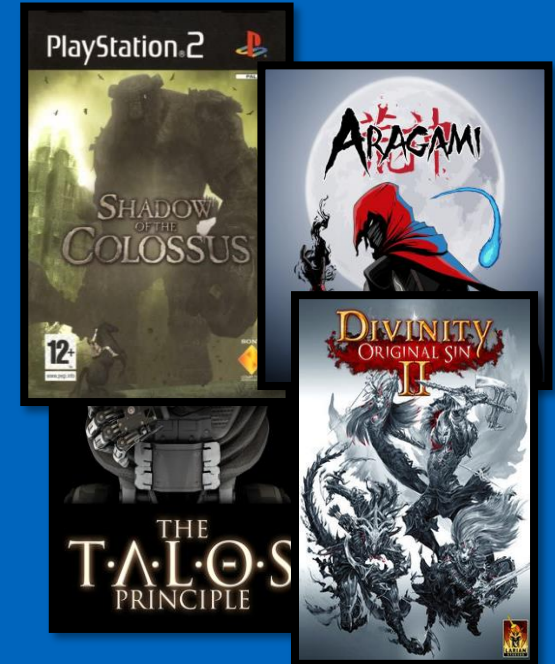
Thanks to Daniel Dyrda in particular, for giving us the opportunity to practice some of the skills relevant for Game Development and Level Design.



List of References

- Free third-party assets:
 - Greek Low-Poly Pack Lite [Terra Nova Creations]
 - Greek Temple: Vases [Nokobot]
 - Low-Poly Simple Nature Pack [JustCreate]
 - Sci fi Drones [Lukas Bobor]
 - Greek Statue [The New Way Museum]
 - Discobolus Statue [Chamferbox Studio]
 - Rockets, Missiles and Bombs [Aurynsky]
 - Low poly Spartan Armor for Roblox Character [ddggoorrdgg]
 - Low Poly Cliff Pack, Low Poly Rock Pack [Broken Vector]
 - Hand Painted Nature Kit Pack [Silver Cats]
 - Low Poly Styled Rock [Daniel Robnik]
 - Ancient Era Music Free [Tyler Cunningham]
 - Oil Tank [Pixel Games]
 - Sailing Ships [Quantum Nexus]
 - Bow and Hammer Sound [MGWSoundDesign]
 - RPG Essential Sound Effects [Leohpaz]
 - Simple UI Elements [MadFireOn]
- Tutorials and Content References:
 - Unity: Creating a Third Person Camera using Cinemachine in Unity! (Tutorial)
https://www.youtube.com/watch?v=537B1kJp9YQ&t=343s&ab_channel=Unity
 - Caleb Mantey: Third Person Archery / Bow and Arrow Unity Tutorial
https://www.youtube.com/playlist?list=PLLMGaKJ8ODghM_kq_L5Sf7t_uqoqLqvMG
 - Daniel Dyrda's slides from Level Engineering Bachelor class

Game inspirations





Thank you for your attention!

