



UNREAL
ENGINE

GAME DESIGN

A Breakdown of the Elements

Slides Courtesy of Chris Murphy of Epic Games

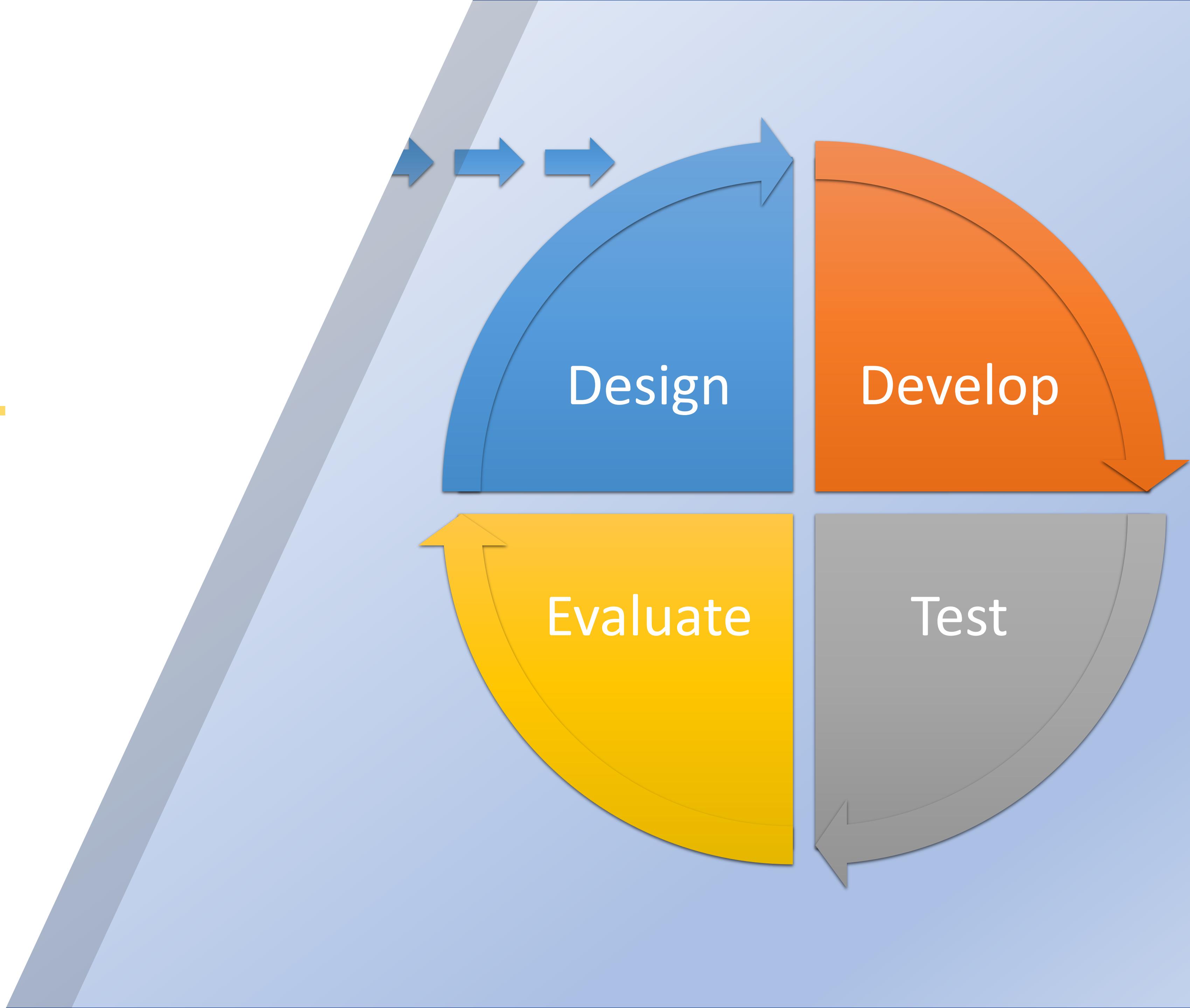
GAME DEVELOPMENT BASICS

Describing a Game Design Concept



GAME DEVELOPMENT LIFE CYCLE

While it's easy to think of game development as being a linear process where you have an idea for a game, you develop it, and you release it, the real process requires substantially more iteration. Each mechanic needs to be designed, developed, tested, evaluated, and then redeveloped based on feedback until it is effective within a given project.





Some examples of the game development lifecycle





HOW WOULD YOU DESCRIBE A GAME OF TAG?

If you were to describe a game of tag, you might do it like this:

In a game of tag, a collection of players run around a space, typically a schoolyard, avoiding a player that is considered “it.” Whenever a player that is “it” touches, or tags, another player, the tagged player becomes “it” while the original player is now no longer “it.” Players need to avoid being “it” for as long as possible. The game is over after a set amount of time.

While this description may be sufficient for describing the game to a friend, it fails to describe it in a **game design context**.





**It's possible to break
up the core elements
into categories.**

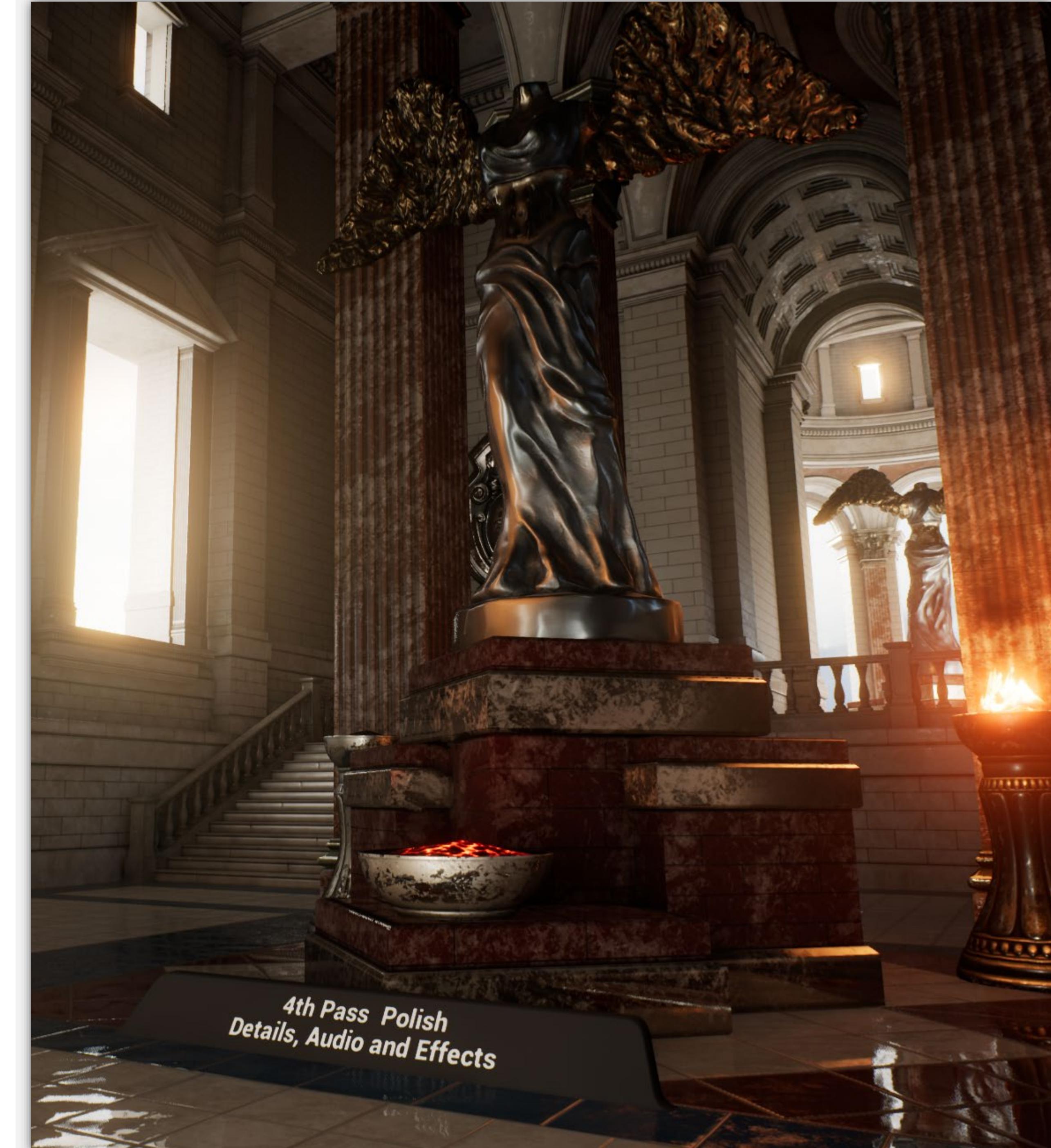
- Space
- Goals
- Actors
- Mechanics
- Rules



SPACE

The space is the environment in which the gameplay will take place. This description applies to both aesthetics and the design of the space.

- Will the space be 2D or 3D?
- Will the z axis matter to players?
- How will cover and other environmental factors alter other design elements?
- Will the gameplay take place in large open spaces or in tight corridors?





GOALS

The goals are what players must do to win or complete a game and represent the overall objectives to players. Should the player be completing a circuit? Knocking enemy players from the arena?

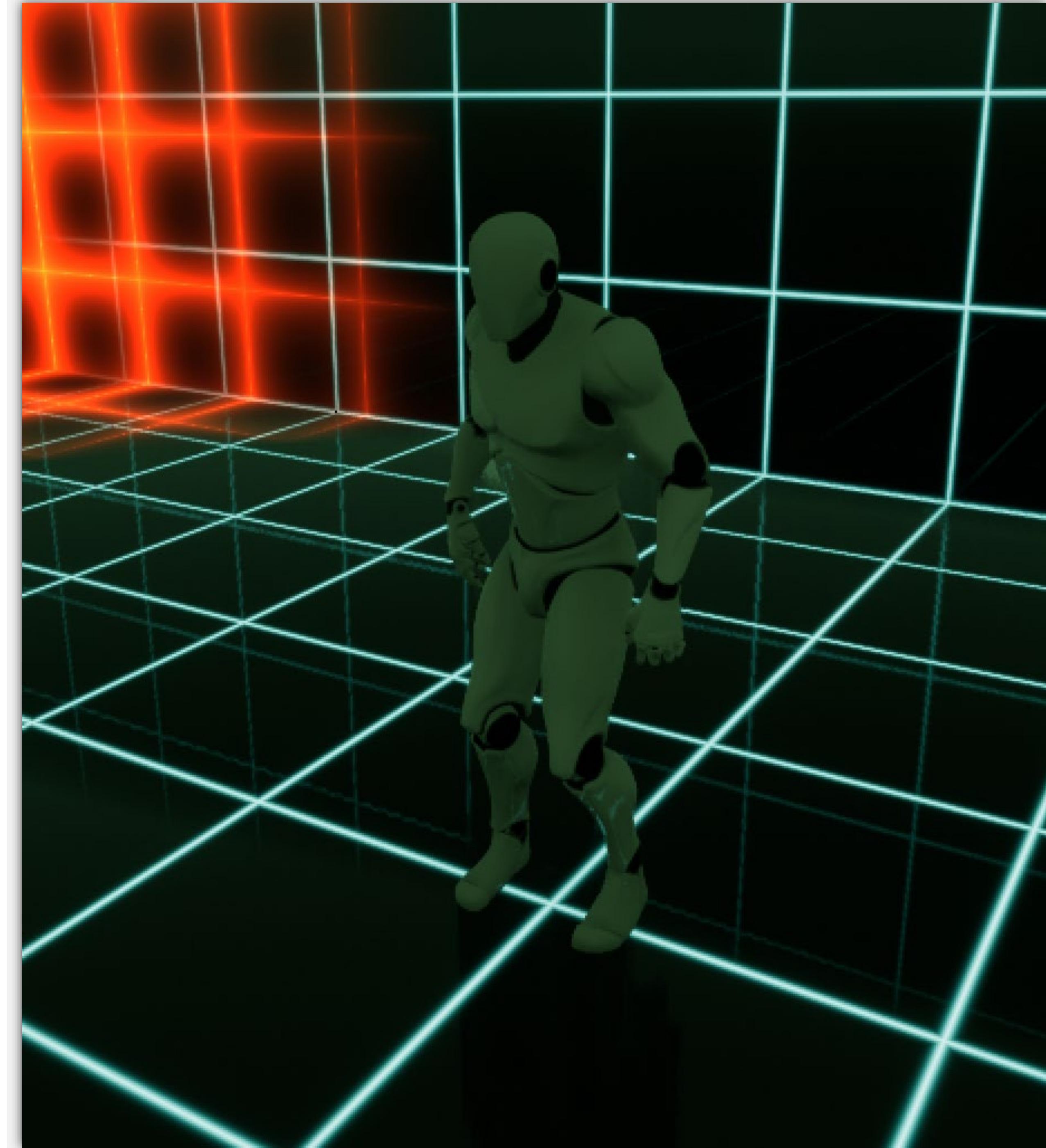




ACTORS

Actors are the main components within a game. They are the objects that are interacted with and controlled within the environment.

Players, weapons, and pickups are common types of actors.





MECHANICS

Mechanics detail the actions that a player or other actors can do during the game. Sometimes mechanics are designed for compatibility between one another. For instance, while a player may be able to jump and slide, a new mechanic may be borne from sliding when landing.

Jumping, sliding, diving, and firing projectiles are all considered as different mechanics.





RULES

The rules describe how to play the game and the constraints in the game world. What must the players do to achieve their goals? What should they be wary of? What happens when a rule is broken? What happens if a rule is consistently adhered to?





**Therefore, in a game
of tag . . .**

Actors

The actors in the world are the players in the game of tag.

Mechanics

The mechanics are that once tagged you become “it” and you change teams.

Goals

The goal is to avoid being tagged or to tag other players.

Space

The space is determined by the schoolyard play area.

Rules

The rules are that you cannot leave the space, tag back within x seconds, or climb trees.





BIRD OF PREY

This project has been assembled as a basis for understanding various game design elements within a sample project.

Can you identify the different elements of game design featured in the project?





BIRD OF PREY: ACTORS

The ships, pickups, and projectiles throughout the arena are the main actors in Bird of Prey. Different weapon pickups award the player with different types of weapon patterns/projectile types.





BIRD OF PREY: MECHANICS

The player ship is able to maneuver, fire weapons, and collect pickups. When enemies or the player is shot, they will receive damage. Ships will explode when they've taken too much damage.





BIRD OF PREY: GOALS

To complete the level, the player ship must reach the end of the map and defeat the boss. When the boss has been defeated, the player has won.



MISSION SUCCESS

RETRY

MAIN MENU



BIRD OF PREY: SPACE

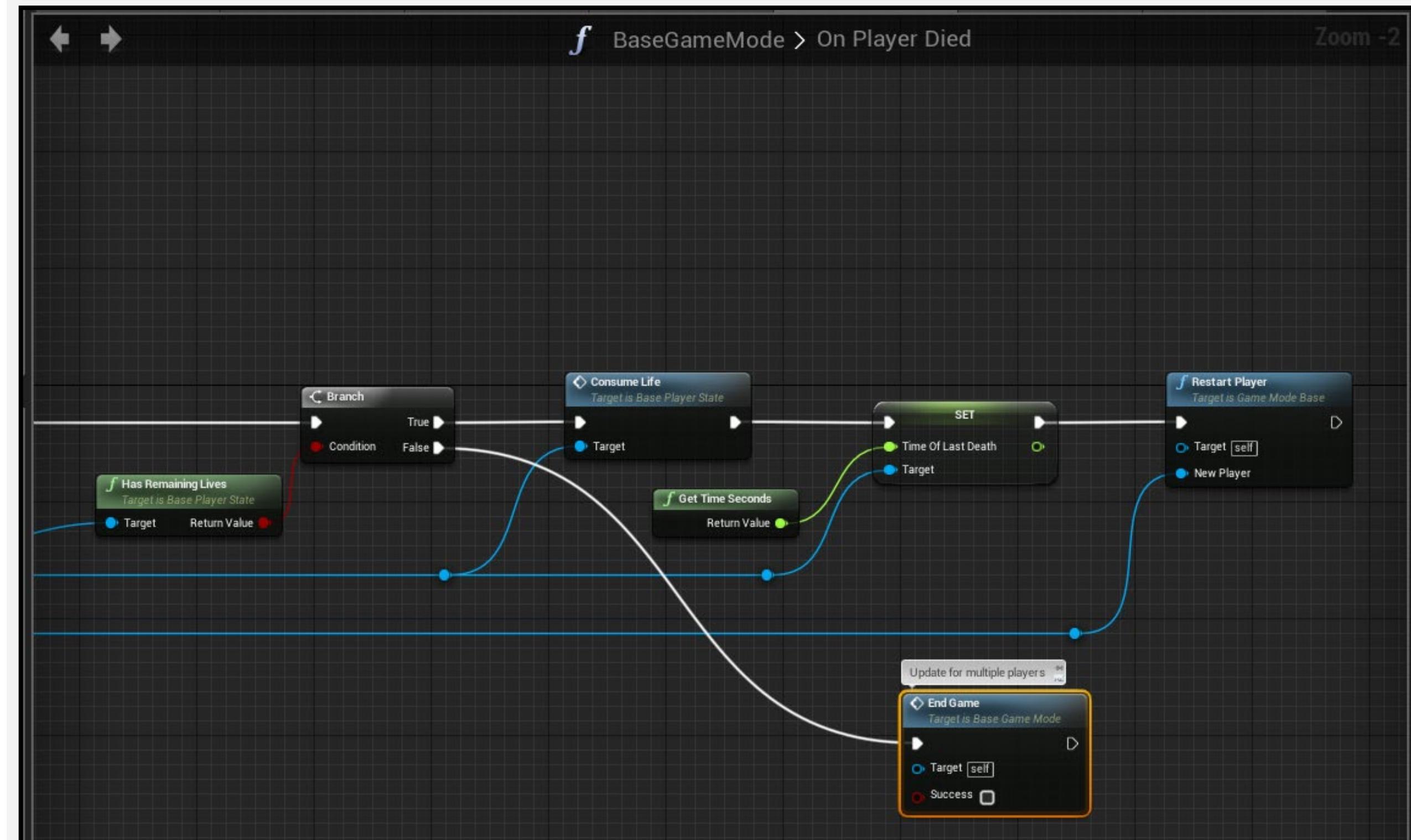
The space exists on a consistent xy plane. There are no obstacles; however, the player has limited mobility when moving away from the central camera position. Aesthetically, Bird of Prey takes place in a ruined city with smoke and debris limiting enemy visibility.





BIRD OF PREY: RULES

If the player is destroyed, they will respawn while they still have lives remaining. Enemies do not respawn. Enemies that pass through the screen will be automatically destroyed; however, no points will be awarded to the player.



PLAYER MOTIVATIONS

How to Make Players Do Something and
... Keep Doing It



What drives a player to keep playing?

Positive Reinforcement

Rewarding the player for performing behaviors that the designers would like to encourage

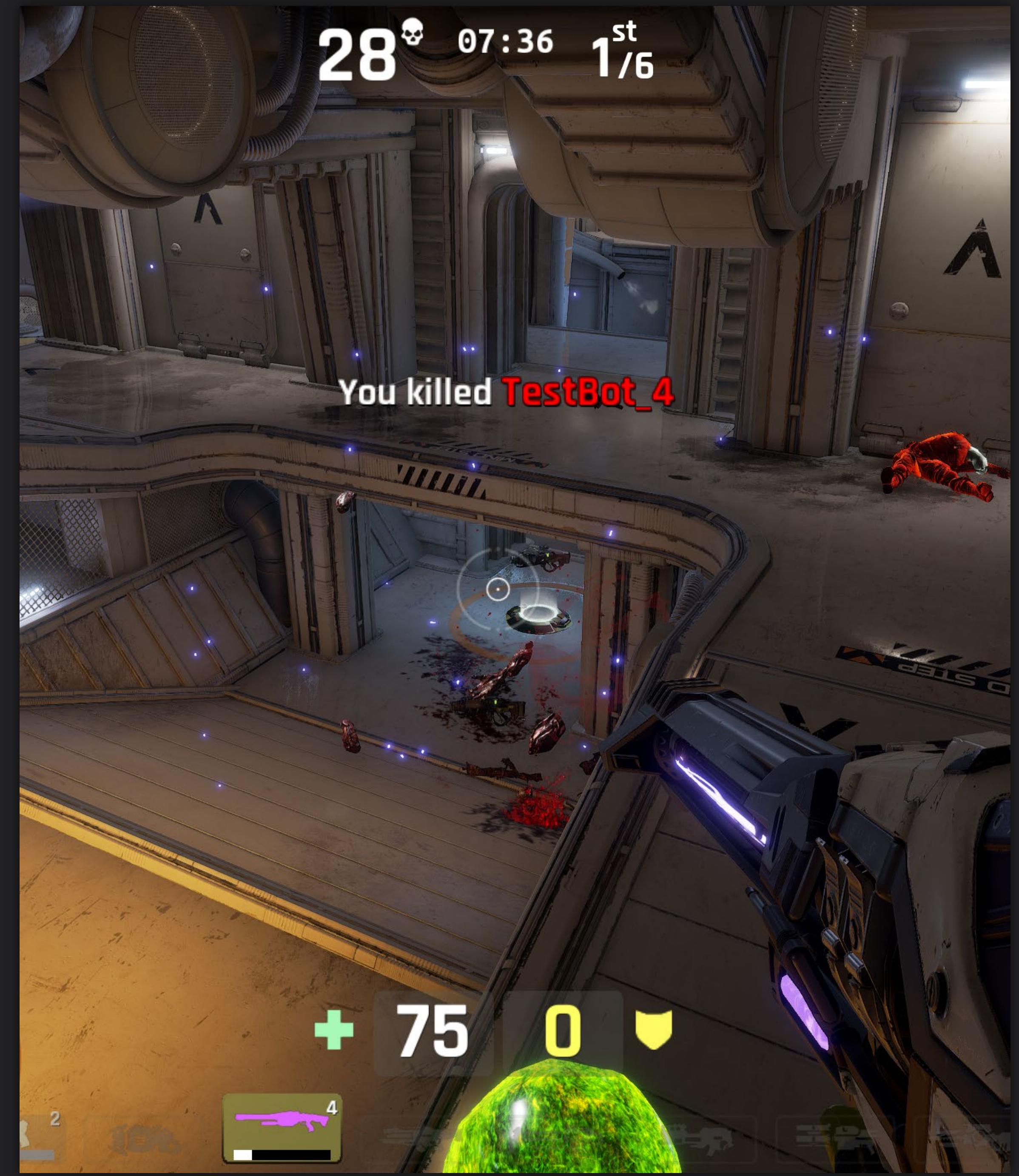
Negative Reinforcement

Taking away a negative stimulus when the player performs a desired action

Punishment

Applying a negative stimulus for performing an undesirable action

Studies have shown that while punishment is the most effective method of ensuring a player avoids performing a behavior, positive reinforcement at random intervals is the most effective for ensuring that a player continues to perform desirable actions, even in the absence of positive reinforcement.



Positive Reinforcement

- Armor
- New weapons
- New items

Negative Reinforcement

- Defeat of enemies
- Removal of tutorial prompts

Punishment

- Player death
- Loss of weapons
- Loss of items



DOCUMENTATION

Let's Just Get This out of the Way . . .



Documentation Types

During the development of a project, it's important that all stakeholders have a mutual understanding of the project.

Whether a team member is an artist, programmer, designer, marketer, or other type of professional, they need to know the goals and intent behind the decisions made by the team.

For this reason, the following pieces of documentation are typically developed by teams when going into full production of a project:

- Design document
- Pitch document
- Feature matrix
- Art bible
- Art budget
- Production budget



PITCH DOCUMENT

A pitch document is used to recruit team members, apply for publication or grants, and generally gather support for a project your team will develop.

This document is usually tailored to its intended audience; however, it typically focuses on the following:

- What are your project aims?
- What is unique about your project?
- Why is the project exciting or marketable?
- What skills/plans do you have to overcome any hurdles?

The pitch document typically needs the support of prototypes and concept art to fully illustrate the intent.

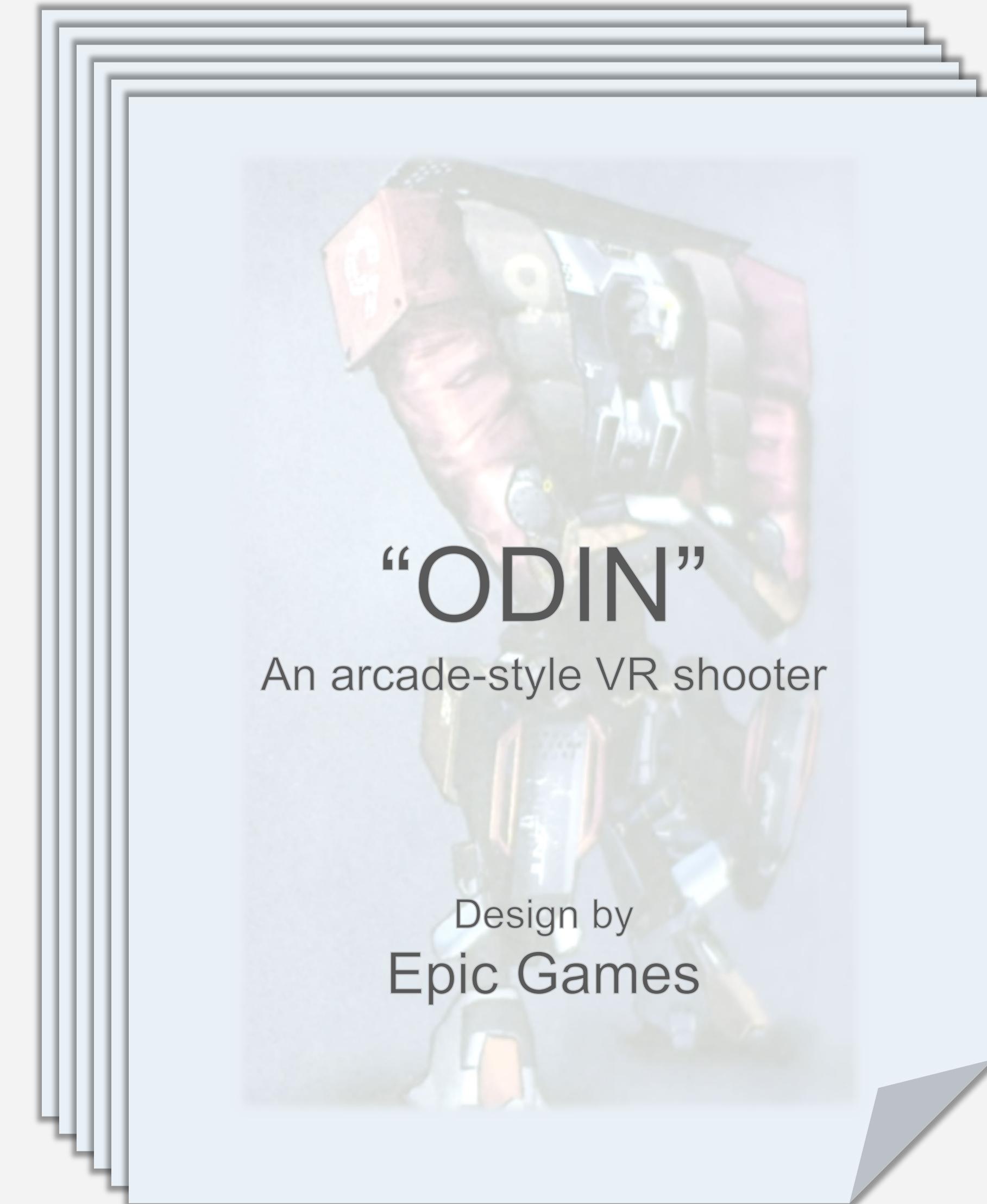




DESIGN DOCUMENT

A design document outlines all core mechanics, references, and conceptual development plans for a project.

It is a somewhat organic document that changes as production continues, but it is essentially a document that at all times can be referenced and examined by the team to better understand both mechanic implementation and the reasoning behind various mechanics.



FEATURE MATRIX

A feature matrix is a chart plotting every feature in the game against every other feature and what their interactions mean.

While creating a Feature Matrix may seem like an arduous task, its development often reveals many potential interactions that hadn't previously been considered.

	HUD	Post Process Effects	Material Effects	Particle Effects	Animation	Sound	Player	Attacking Player	Defending Player	Team Mate	Enemy	Has been spotted	Player spots	Jump
HUD										Shows player with blue text above their head			If a player spots a spottable actor it appears on the hud for their team.	
Post Process Effects							Post Process effects are played on the players screen.							
Material Effects							Slight variations to add diversity to players.							
Particle Effects														
Animation							Player movement animations.						Jumping animation. Airborne animation. Landing animation. Jump sounds for every physical material.	
Sound								General chat. Radio noise. Footstep sounds.				Notify sound.		
Player							Can chat to each other in game.			Can be killed by.	Position is placed on the spotting teams minimap and superimposed on their HUD.			Can jump.
Attacking Player								Can share plan information.	Can kill each other.		Will lose tag after 5 seconds of line-of-sight being broken.			
Defending Player									Can share planning information.		Will lose tag after 60 seconds of line-of-sight being broken.			
Team Mate										Can have private chat with each other.	Can be killed by.			
Enemy										Can have private chat with each other.	Appears on HUD and minimap.		Can be spotted.	
Has been spotted														
Player spots														
Jump														

Example Feature Matrix





ART BIBLE

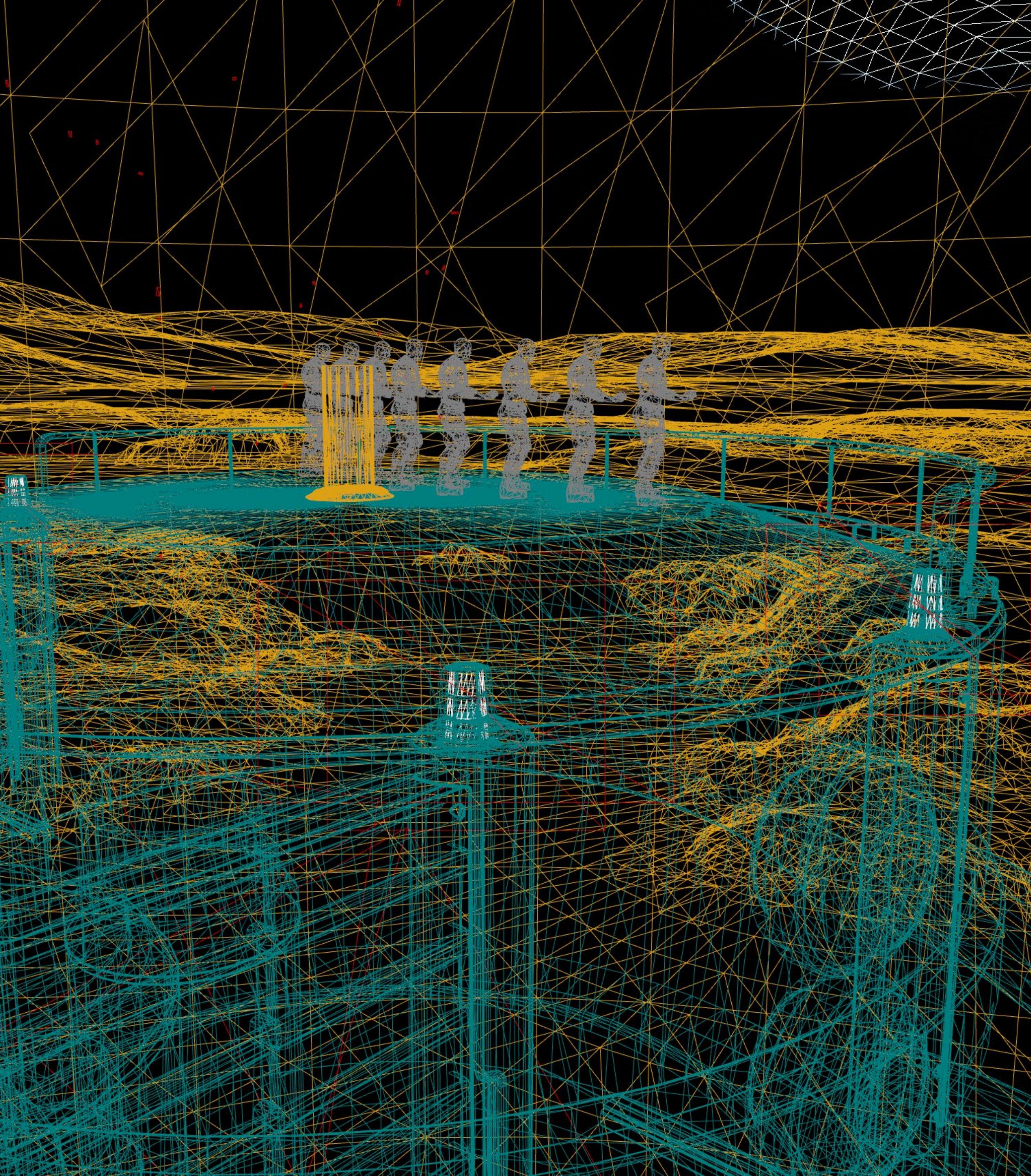
An art bible is a collection of reference materials, concept art, and proof of concepts. This document is used as a way of communicating the visual themes and concepts of a project to the art, audio, and visual effects teams.





ART BUDGET

Unlike an art bible, which focuses on final design and output, the art budget is a document exploring maximum threshold for various art pieces, such as vertex counts on meshes, number of UV sets, number of materials, number of LOD models, or instruction counts. This document is a technical reference for artists and tech artists to adhere to.





PRODUCTION BUDGET

The development of a game, even an indie or student project, will always have costs associated with it. Staff wages, rent, exhibiting costs, server costs, website costs, and equipment costs will almost always factor into development at some point, and these costs need to be determined ahead of time so that the team is never put into a position of financial insecurity. Remember to include slack time and contingency funding, as game development rarely goes according to plan!



CONCLUSION

Questions?