Game Design Heading South

1 Flocks

Flocks are either controlled by the player or AI driven.

Flocks have a formation.

Flocks have a number of boid agents assigned to them which are influenced by attritubes of it and its formation.

Boid agents can get assigned or removed from flocks on runtime. For example when a secondary flock is formed/resolved or some of the boid agents die. Boid agents can be added to the formation independent on their distance to the flock.

Flocks exist in the 2D space and move according to the values of its current formation. Boid Agents are not child objects of flocks, but move independently through the 2D space.

Flocks will not have a visual representation for the player. The movement of the boid agents should make position and current formation aswell as moving direction clear.

1.1 Boids

Boid Agent describes the individual bird.
Boid Agents are always assigned to a flock and know abouttheir target position in the formation of this flock. These target positions are determined by the shape of the formation and can change regularly even when the formation did not change.

Boid Agents move freely in the 2D space. They can accelerate and deaccelerate to certain max and min speed values. They can steer left and right to change direction.

Boid Agents are influenced by Rules which determine where it wants to go. The influence of these rules may vary based on situation the Boid Agent is in. These Rules are:

- Seperation (avoid collision)
- Allignment (steer in same direction as other)
- Cohesion (steer towards other)
- Reach/follow target position

The first three rules are mostly for visual feedback and the swarm feel. To reach the target position should always be the main objective.

In certain situations Boid Agents are moved by higher forces than their own movement. This happens when they are hit by an attack or in some cases through a unique aility. When knocked back by an attack they are stunned until the knockback ends and afterwards they rejoin their formation.

If the boid agent is not affected by a defend state of its assigned formation it will be affected by opposing attack state zones on collision. A knockback and damage is assigned as soon as the boid agent enters the opposing attack state zone. The knockback is relativ to the speed and direction of the opposing formation aswell as the position of the boid agent relative to the attack zone.

Boid agents remember the damage they get throughout a level until the level is over. The higher the damage the longer a vulnerable state lasts.

Boids have a normal movement state and an enhanced movement state. Enhanced movement states are granted during certain abilities and as a buff for an formation change after a successfull action.

1.1.1 Health System

Vulnerability approach:
Birds can be in three health states:

- Healthy

- Vulnerable
- And Dead...

Birds start in healthy state. When a healthy bird gets hit it enters vulnerable state for a certain duration. The duration of the vulnerable state is determiond by the strength of the attack/counter and how often and hard the bird already got hit during the level. When a vuilnerable bird gets hit again it dies and enters dead state. A dead bird plays a death routine and does not interact with other game objects anymore.

1.1.2 Enhanced State

Boids can be in an enhanced state. In this state the movement values like steer

1.2 Formations

Formations are either child objects or attributes of a flock. A flock may only have one (active) formation at a time.

A flocks formation can change on runtime. Some ways are:

- Player changes formation to another formation of the loadout.
- A triggered unique ability changes the formation
- A unique ability expires and changes the formation
- An AI changes the formation of its flock

Formations contain several attributes making them distinct from each other:

- Flock Maximum Speed
- Flock Minimum Speed
- Flock Acceleration Value
- Flock Deacceleration Value
- Flock Steearability
- Shape

1.2.1 Cooldown System

Triangle	Shooting star	Tornado
Cooldown: Medium long Successful action: Any amount of birds got hit Benefits: Medium reset on ability cd Big reset on formation cd	Cooldown: Very Short, each point has to wait for birds to return Successful action: Any amount of birds got hit Benefits: No reset on ability cd Medium reset on formation cd	Cooldown: Long Successful action: Each time a bird got hit (one ability trigger can cause multiple SA) Benefits: Small reset on ability cd Small reset on formation cd
Circle	Cross	
Cooldown: Medium long Successful action: An attack was countered Benefits: Full reset on ability cd Medium reset on formation cd	Cooldown: Short long Successful action: An attack was evaded Benefits: Small reset on ability cd Full reset on formation cd Buff for formation change	
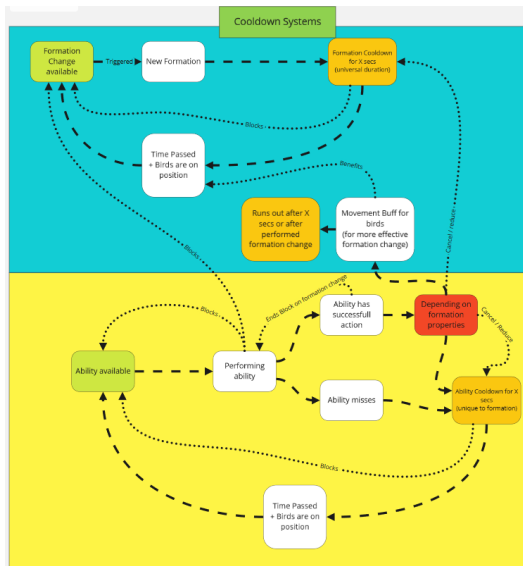
1.3 Flock zones

Flocks can only collide with each other if at least one is in an attack state.
Attack states can only achieved in some formations and only if certain conditions apply.
There are visual indicators when a formation reaches an attack state or defend state, which also emphasize which parts (zones) of the shape are involved.

The player can see when they have to strike or defend.

Shapes can contain muliple attack and defend zones and any mixture of them

1.3.1 Attack

Attack zones are used in all Offensive formations.
The triangle is made up of one attack zone with most of the front birds inside it
The shooting stars bullet birds are upon launching in an Attack zone filling the entire bullet.
The tornado has multiple small attack zones at the outer circle spinning with the birds inside it.

When an Attack zone hits an Bird in neutral State the bird gets knocked back and is given damage and is set in the vulnerable state.

Attack on Attack collision: Similar to the COUNTER of the defend zones when two attack zones collide with each other neither bird in the respectives zones collides directly with the opposing attack zone.
Instead both Attack zones get COUNTERED and each bird in their own attack zone is dealt damage, knockback and is put into vulnerable state.

1.3.2 Defend

Defend Zone are unique so far to the ability of the circle formation.
When an Attack zone collides with a defend zone the birds affected by the defend zone wont get hit by the attack zone.
Instead the attack zone gets COUNTERED

A countered Attack zone gets immediately inactive and all birds inside the attack zone get damage and knockback applied.
This does not Cancel the ability of the attacking formation.

1.3.3 Evade

Unique to the cross formation's ability. Upon scrambling the ability leaves behind a evade zone which is active for a set amount of time.

Enemy birds passing through the evade zone with an Attack zone trigger the Evade zone and the SUCCESSFULL ACTION of the cross ability.

Otherwise the Attacking birds are not affected.
-It should be tested to put the attacking birds into a vulnerable state without damage or knockback

1.4 AI

The AI is split into main Systems:

- Umbrella AI: The Umbrella AI decides what Goal the Agent wants to achieve. Therefore it has knowledge about many factors to decide upon.
- Formation AI: The formation AI tries to achieve the Goal set by the umbrella AI. It has actual knowledge about the aspects of the current formation and controls the movement etc. of the agent. For each formation there is an seperate AI prefab which has behaviour for each possible goal.

Umbrella AI
-Decides on rather global variables what goal the agent wants to achieve
-Goal is represented by Aggression state
-The goal is then passed to the formation AI which in turn has to try to reach the goal by actual taking action
-The umbrella AI has to communicate with other active Umbrella AIs -> for example they might be supposed to not attack while another Agent is currently attacking to leave the player breathing room
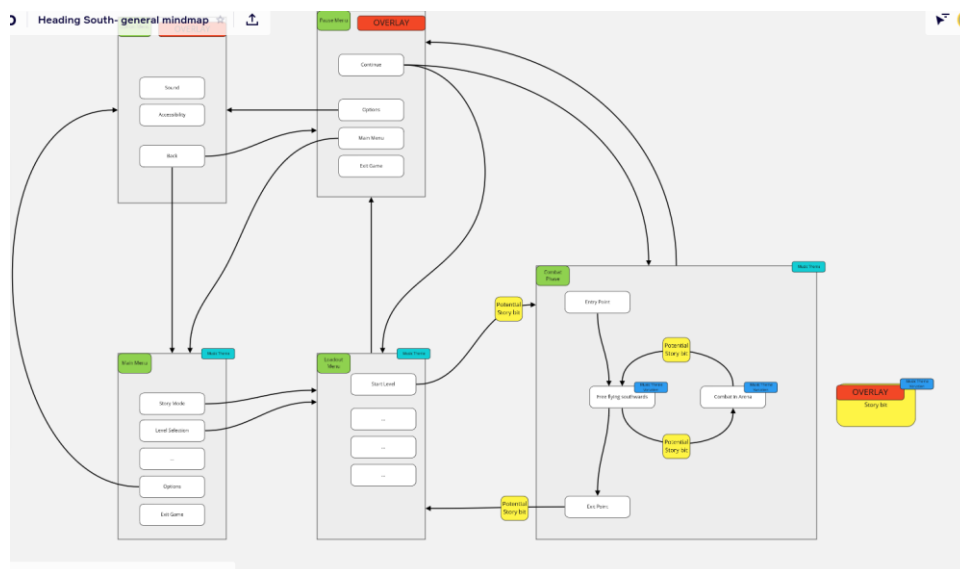-

Goal
-Goals are conditions tha gent wants to achieve and depending on the current goal the Formation AI will make decisions

-Attack -> The agent will try to damage the player
-Counter -> The Agent will try to counter the attacks of the player
-Evade -> The Agent will try to keep distance from the player
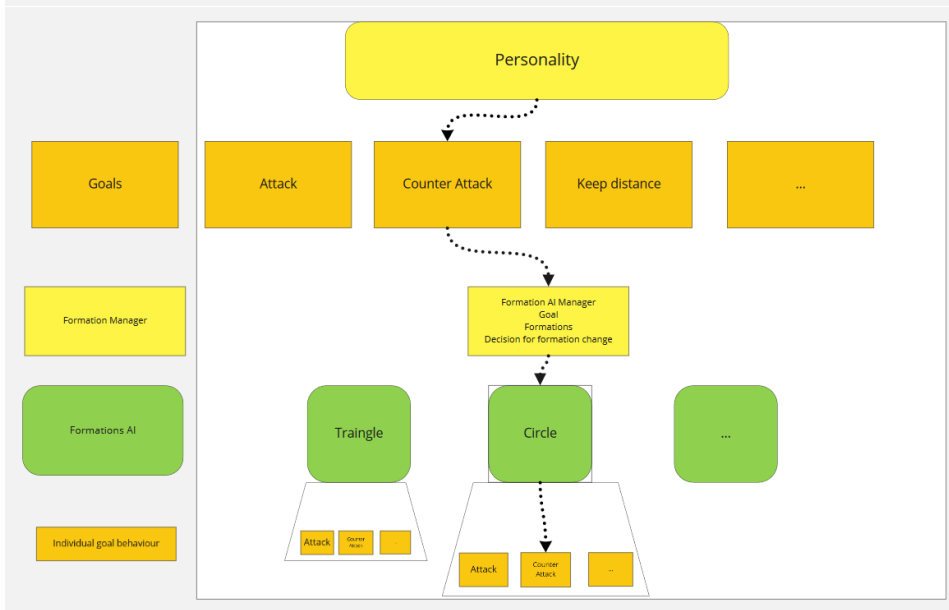
2 Main Game Loop

Planned Overarcing Loop

Detailed Flying Phase:

During the flying phase the player will go through a loop of flying rather freely through the (linear) environment and battling enemies in constraint arenas.

While flying freely the player should be able to move rather fast through the level to avoid a sluggish feel, but during combat the player needs to be able to fly precise and strategically to reactively fight the enemy.
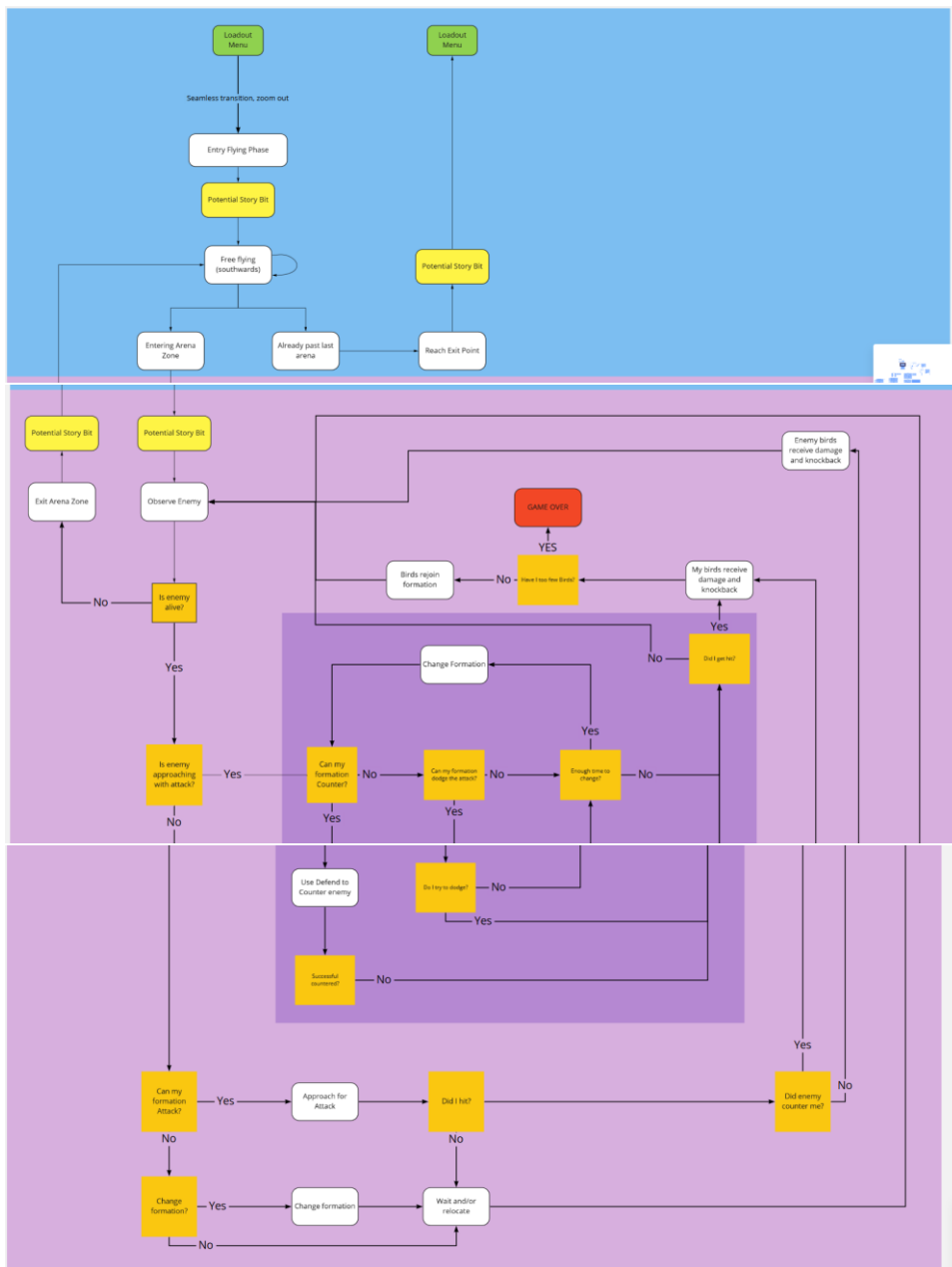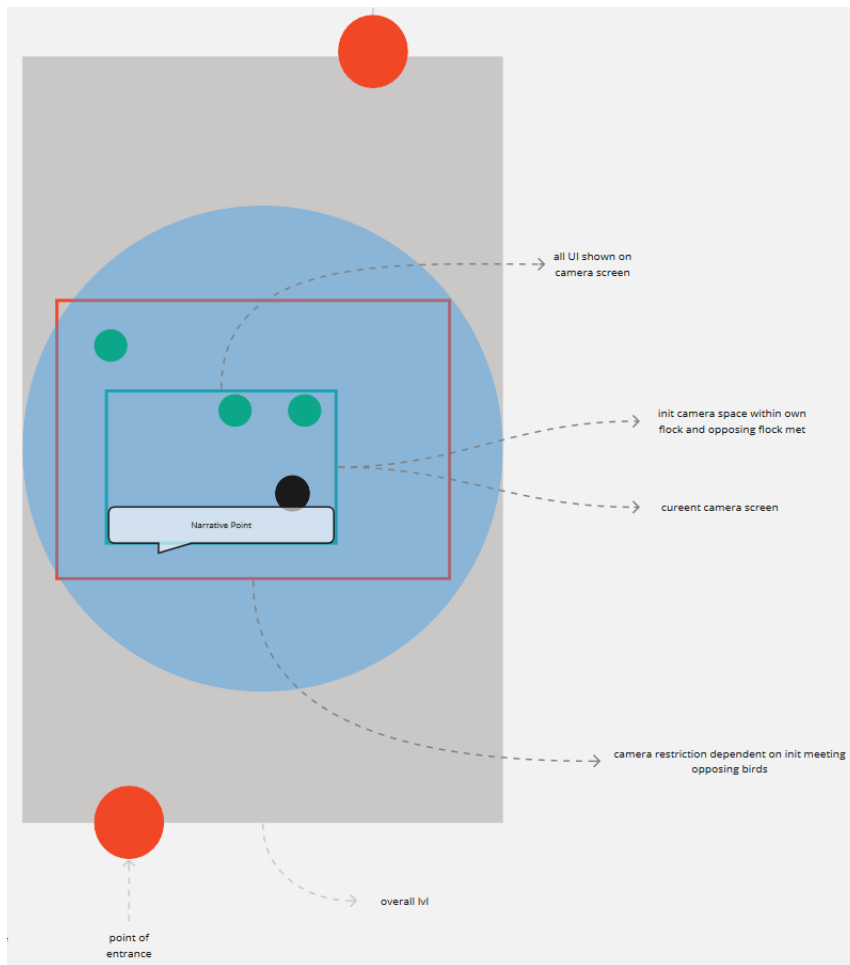

2.1 Arenas

Arenas are zones (probably rectangular) distributed in the level. Arenas limit the space for a fight between the player and the enemy connected to the arena.
So all battles and enemy encounters will happen in arenas

- Arenas get active as soon as the player enters the respective trigger zone (the borders of the zone are not visible until the arena is active)
- On activation a story bit involving the player flock and an enemy flock may play
- After the potential story bit the camera gets into "battle mode" focusing player and enemy and is then restricted to the borders of the arena
- As soon as all connected enemies are defeated the arena deactivation starts
- On deactivation another story bit might play
- Once all events connected to the deactivation are finished the player enters free flight and the borders of the arena disappear

- Arenas can also exist without an connected enemy, but with an story bit connected to the enter event. In that case the story bit plays and after the story bit is finished the arena will be deactivated

all UI shown on camera screen

init camera space within own flock and opposing flock met

cureent camera screen

camera restriction dependent on init meeting opposing birds

overall lvl

point of entrance

2.2 Story Bits

Story bits are short textbox based narrative interventions during the combat phase.
During a story bit the player does not have control over their flock. All visible enemy flocks aswell as the player flock are controlled by a story bit behaviour. For example all flocks fly in a circle around each other in the middle of the screen. The story bit behaviour might be unique to each story bit, but there should be a default fallback behaviour (the circle).

The player actively clicks through textboxes.
As soon as the storyx bit is finished the combat phase continues.

In the following time slots story bits may occur:

- On entering the combat phase (during the transition)
- On entering an Arena
- On exiting an Arena
- On reaching the exit point of a level

2.3 Boundaries

the outer borders of the level.
They can also be set by ARENAS. In that case they limit the space the player fights with their enemy and they are only temporarily set until the connected enemy is defeated.
Flocks should not be able to pass them.

- They might be visualized as the end of camera panning. ~~It functions as a soft barrier:~~ When passed by a flock the direction of the flock will ~~be reversed or~~ directed ~~into the level again and the control will be~~

~~given back to the player as soon as the flock is well back in the level.~~ along the flow of the barrier. The player can therefore only steer inside the ARENA or Level.

It is important that the player reamains with as much control as possible!

2.4 Environment

Environment describes all elements in a level apart of the moving flocks

All environmental obstacles should be designed that the AI does not need to be concerned about them.

Clouds: Not passable or vision impairing obstacle

Wind: Pushing birds in direction of wind

Mountains: Non passable Obstacle

Polluted Clouds: Damaging Obstacle

2.5 Loadout Menu

During thje loadout menu the player chooses two formations to take into the next level.
The formations are divided in offensive and defensive formations.

The formations cards are ordered in grid and display more information while hovering over them.

The player can start a test flight with the current selected loadout.
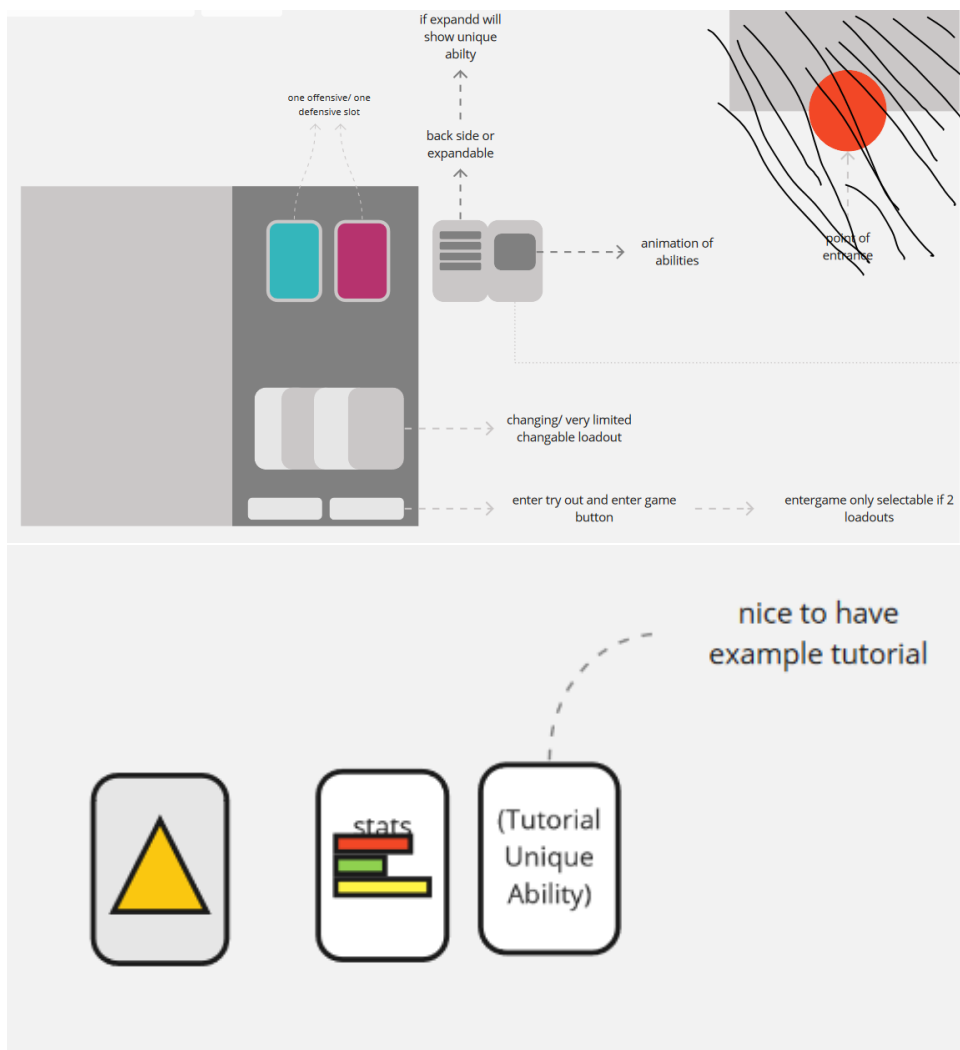
3 Game Modes

3.1 Story Mode

The player starts their journey southwards.
Storymode is seperated into levels. Each levels structure is as following:

1 Loadout menu
2 Level entry transition
 2.1 Potential Story bit
3 Playable Level
 3.1 Free flying through level
 3.2 Entering Arena
  3.2.1 Potential Story bit
  3.2.2 Combat
  3.2.3 Potential Story bit
 3.3 Free flying through level
... - Repeat Arena and flying multiple times
 3.x Free flying through level
4 Level exit transition
 4.1 Potential Story bit
5 Loadout menu of new Level

3.2 Pvp

A mode where two players can battle each other in an Arena

3.3 Endless Mode

A mode where the player would encounter an endless amount of Arenas to achieve a Highscore

4 UX

4.1 Camera

The camera is fixed to the cardinal directions.

It always shows the player flock.

During free flight: The camera will focus on the space ahead of the player flock (in moving direction). The camera may zoom out or move the focus further ahead of the player flock, when the moving speed increases to give the player more time to react to approaching obstacles.

During combat the camera tries to frame all enemies up to a maximum zoom

4.2 Controls

_____

Menues: (left stick does not work in main menu!!! only in loadout menu!)

Movement:

up -> w, arrow_up, gamepad_dpad_up, gamepad_left_stick

down -> s, arrow_down, gamepad_dpad_down, gamepad_left_stick

left -> a, arrow_left, gamepad_dpad_left, gamepad_left_stick

right -> d, arrow_right, gamepad_dpad_right, gamepad_left_stick

Actions:

submit -> q, space, enter, gamepad_south_face_button

_____

Flying and Combat:

Movement:

steer counter-clockwise -> a, arrow_left, gamepad_dpad_left

steer clockwise -> d, arrow_right, gamepad_dpad_right

steer towards direction -> gamepad_left_stick

Actions:

trigger ability -> q, w, arrow_up, gamepad_south_face_button, gamepad_left_shoulder_button_2, gamepad_right_shoulder_button_2

formation change -> s, e, arrow_down, gamepad_east_face_button, gamepad_left_shoulder_button_1, gamepad_right_shoulder_button_1

_____

Textbox:

proceed -> q, space, enter, gamepad_south_face_button

changing formation   changing formation

controlling the formation's vanguard bird (s)

4.3 UI
Flying Phase:

Potential Elements:

- Direction Indicators for Enemies
  -> Borders of screen flashing up indicating in which direction an enemy is offscreen
- Active and inactive formation card at the bottom of screen
  -> Ability and formation change cooldowns are displayed on respective formation cards

4.4 Accessibility
Remapability of Input bindings

Resizable Font

Option to toggle an outline for Birds

Option to change (general) background colouring