Thales Internship Report

Alexis de Cazenove - 3rd year CMGT designer student - 521292

Company coach: Wiebe Huynh

THALES

NAVAL WARFARE GAME

Contents

Introduction

If one knows what Thales is about, one may wonder why they are developing a game. For those who don't know, Thales is a company specialising in the production of radar systems amongst other things. The French company has many locations around the world, however this internship is taking place specifically in Hengelo, Netherlands. Knowing this information may create more questions than it answers, so why is Thales developing a game?

Thales has an ongoing project named Naval Warfare Game, which as the name implies is a game centred around naval warfare. The game's purpose is to introduce students at career fairs and new employees to the products that Thales produces in the field of Defence, through an interactive naval warfare tactical game which highlights the importance of the Thales equipment navies around the world rely on.

The game is a student lead project and has been in development for the past 5 years, with a small team of 3 students changing every semester. Due to this, the game already has functional mechanics and visuals which allows one to play the 2 mission scenarios and multiplayer games after having completed the tutorial. While the game is functional outside of the other incomplete mission scenarios, there were a lot of problems in terms of the gameplay which lacked direction and purpose.

This report will go over the details of my contribution to the Naval Warfare game project as the game designer on my team. My role was to identify the problems with the gameplay loops and redesign the existing mechanics or design new ones to attempt at resolving these issues with the overall goal of making the game more enjoyable.

As a 3rd year Creative Media & Game Technologies student, I have made the decision to do a second internship over doing a minor. My first internship this year was at Vertigo Games in Amsterdam as a quality assurance intern. While both internships have me working on a game, I felt like they would both provide me with unique experiences. My internship at Vertigo Games gave me an introduction to the game industry but left me looking for game design knowledge which my internship at Thales will complement. Ultimately, both internships provide me with crucial experiences which build off of each other.

Throughout this internship, I will be aiming to develop my competencies as a game designer to complement my previous internship at Vertigo Games. These competencies will be centred around 3 learning goals which based on my research and understanding of the field are important skills for a game designer: Documentation and Communication Skills, Iterative Design and Prototyping, Collaborating within a Team Environment. These learning goals will be detailed further in the report.

Thales Hengelo

Thales Group is a global technology leader specialising in defence, aerospace, transportation, and security. With a presence in over 68 countries, Thales Group develops cutting-edge solutions to make the world safer and more secure. Their technologies range from avionics and space systems to cybersecurity and transportation management, serving both civilian and military sectors.

Thales Hengelo, a key branch of Thales Group located in the Netherlands, focuses on advanced radar systems and defence electronics. It plays a critical role in designing and manufacturing sophisticated radar systems used in naval and air defence. These systems are essential for detecting aircraft, ships, and missiles, providing vital information for national and international security efforts. Combining innovation and expertise, Thales Hengelo contributes significantly to global defence projects, enhancing safety and security worldwide.

The Naval Warfare Game project doesn't fit a particular department as it is rather detached from the rest of the company, but it is connected through the product owner Wiebe Huynh who is a Software Engineer at Thales.
The project has been ongoing for 5 years involving only students/interns on its development, rotating teams every semester. The teams remain relatively small, around 3 students, each looking to fulfil a role in game development such as engineer, designer or artist.

Team Workflow

Due to the nature of the project, there was no pre-established workflow. The product owner gave the team a lot of freedom to work in the way that suited it best. The preference in the team was to work on Thursday and Tuesday at the office and the other days online. This seemed to work best since it didn't feel necessary to be together as a team everyday.
To make sure that communication was maintained we decided to have stand up meetings at 10 and at 4 everyday to communicate on our progress and get feedback. This also allowed us to have flexing starting ours based on each of our preferences.
As a team we decided to work on a 2 week sprint basis. The 2 week sprints gave us enough time to make good progress before showing it off to our product owner.
Each sprint started with a planning session and ended with a sprint review. During the planning sessions, we discussed our goals for the sprint as a team and created tasks in Jira. An important aspect of the planning session was to attribute point estimates to our tasks to keep track of the workload throughout the sprint.
The sprint review session was held on Thursdays with our product owner and sometimes other stakeholders. During the review, the team presented their work and contributions and communicated the plans for the next sprint.

Personal learning goals

This section lists the learning goals that were established at the beginning of this internship using the SMART method.

Documentation and Communication Skills:

Specific: Enhance documentation and communication skills by maintaining thorough design documents tailored to the needs of a small, dynamic team, and effectively communicating design decisions to team members and stakeholders.
Measurable: Create and maintain concise yet comprehensive design documents that outline gameplay mechanics, player experiences, and design rationale. Seek feedback from team members and stakeholders to ensure clarity and alignment.
Achievable: Dedicate time each week to update design documents, ensuring they reflect the evolving needs of the project and effectively communicate design decisions to the team. Practice articulating design concepts in team meetings and presentations.
Relevant: Clear documentation and communication are crucial for coordinating efforts within a small team and ensuring alignment on project goals, especially in a context where team composition changes every semester.
Time-bound: Set regular intervals for updating design documents and presenting design decisions to the team, aiming to maintain transparency and foster collaboration throughout the development process.

Iterative Design and Prototyping:

Specific: Embrace an iterative design approach by rapidly prototyping gameplay mechanics and organising playtests to gather feedback for refining player experiences in the naval combat game.
Measurable: Develop a systematic process for prototyping gameplay mechanics, conducting playtests, and analysing feedback to iteratively improve moment-to-moment gameplay and overall player experience.
Achievable: Allocate dedicated time for prototyping and playtesting sessions, ensuring that feedback is systematically collected, analysed, and integrated into design iterations. Collaborate closely with team members to implement changes based on playtest results.
Relevant: Iterative design and prototyping are essential for refining gameplay mechanics and ensuring that the naval combat game effectively conveys concepts of naval warfare and the significance of Thales' products to its target audience.
Time-bound: For each specific undertaking during the project I want to establish a schedule for regular playtesting sessions and design iterations in advance, aiming to iteratively refine gameplay mechanics and enhance player engagement over the course of the project development cycle.

Collaborating within a Team Environment:

Specific: Learn to effectively collaborate with a small team of student interns, including artists, programmers, and other team members, to integrate design elements and ensure cohesive and engaging gameplay experiences.
Measurable: Actively participate in team meetings and design discussions, contributing ideas and insights to enhance the overall player experience and aligning design decisions with project goals. Solicit feedback from team members on collaboration effectiveness.
Achievable: Foster a collaborative atmosphere within the team by actively listening to and valuing input from diverse perspectives, and actively contributing to discussions on gameplay mechanics and player experiences.
Relevant: Collaboration is critical for the success of the project, as it enables the integration of diverse skill sets and perspectives to create a cohesive and engaging naval combat game that effectively conveys key concepts to its target audience.
Time-bound: Set short-term goals for collaborating effectively with team members on specific tasks or design iterations, aiming to foster strong working relationships and maximise productivity within the constraints of the project timeline.

Competences

This section consists of the justification for the four competences that need to be practised during the internship.

Communication

An important aspect in communication during this internship was presenting my contributions to the game. This was done during our bi-weekly sprint reviews involving the team, the product owner and sometimes other stakeholders.

To maintain constant communication with my teammates, I proposed the idea of having standups at the beginning and end of the day. This has allowed us to keep track of each other's progress and communicate feedback when necessary especially during online days.
Furthermore, due to the multidisciplinary nature of our team, I always tried to best communicate my ideas so that they can develop these ideas as effectively as possible.
Lastly, I planned retrospective meetings where the team is able to share what went well and what didn't go well during the sprint. This allowed us to find ways to improve our collaboration.

Technical Knowledge & Analysis

During this internship, I made extensive use of Figma to prototype various features as a way to test them and communicate them to my team. A good example of this is the tutorial prototype. I made use of Figma features I had not used before to make the prototype as high fidelity as possible, by using the key transitions or masks for example.

For the tutorial, I learned how to use Unity Timeline and Cinemachine to create cutscenes. Having never used either of these extensively, it was more challenging than I thought. However once I got the hang of the system I was able to create and implement cinematics with different shots and transitions, using a dolly track and cart.

Ability to Learn and Reflect

A concept I learned for game development is the importance of design guidelines for a game. These make sure that the design of a game remains consistent as new features are added. In this project, I created new design pillars and core gameplay loops to keep in mind when working on game design. They have helped me tremendously in keeping track of the game's vision when evaluating the user experience throughout the game.

One of the main things I wanted to improve on during this internship is my ability to document my process and contributions. This is something I hadn't practised enough in previous years until I realised how important it was as a designer. While I have gotten better at it, I still want to polish my documents in the last week of my internship.

Lastly, this internship has really highlighted the value of the design thinking method as a way to approach any design challenge. Over this internship, I have slowly started using this method more seriously to have the best outcomes for the project. I found it particularly helpful when designing the tutorial.

Enterprising Attitude

I believe that one of my greatest contributions to this team has been my initiative in planning and organisation. Throughout the internship, I made sure we planned diligently during our bi-weekly planning sessions. Thanks to this, our product owner has praised our team as being one of the most consistent and professional teams he's had.
Another example of my enterprising attitude is my initiative in setting up an interview with a naval warfare expert. This has given me and the team crucial insights in naval warfare dynamics which allowed us to tackled important gameplay issues in the project which our product owner also approved of.

Projects

This section summarises the various projects I work on during this internship. Process documents can be found in the appendices section. However, some of them need polishing and adjusting for which time has been reserved during the last week of the internship.

Project management using Jira

On the side of being the game designer in the team, I also took on the role of producer. As a producer, I was responsible for leading the scrum planning sessions, keeping the Jira project organised and keeping a general overview of the sprint's progress.

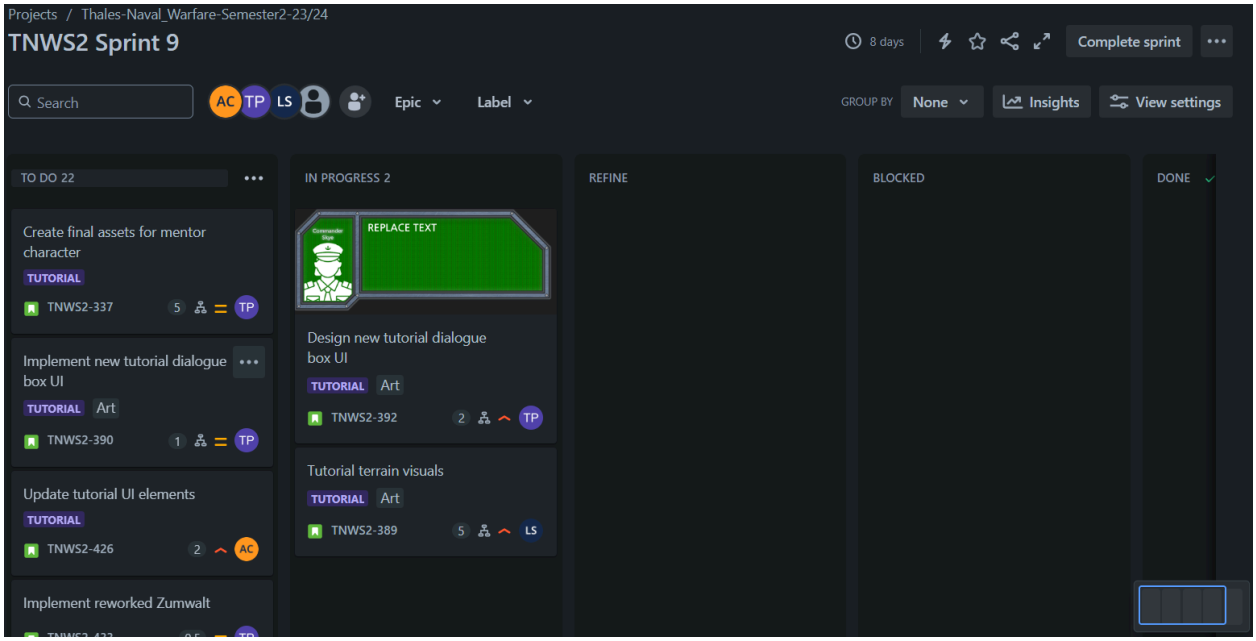


Figure 1. Jira board for Sprint 9

Documenting Research on Naval Warfare

Since naval warfare (and warfare in general) is a concept my team and I were not familiar with at all, we had to dedicate some time at the beginning of the project to understand the unwritten rules and the tactics currently used at sea. My contribution involved reading and compiling online articles into a shared document and writing short summaries of the key points from those articles.

To further develop my understanding of the subject, I organised an interview with a navy engineer who has worked in the navy and on ships for many years. While naval warfare tactics and strategies were not his specialty, his understanding of the subject was more than enough for the level of detail we required.

Although this task was to the benefit of the whole team, it was particularly important for me as the designer due to my involvement in the player experience. While the game remains a game, it was a requirement from our product owner (Wiebe Huynh) for it to be as close as possible to

real naval combat while accounting for the other requirements of the project such as the audience and fun factor. Therefore, my goal with the research was to get a basic understanding of the dynamic and key aspects of naval warfare which shape the tactics of today's navy.

Documentation of core game design document sections

When I joined the project, the only game design documentation that I could find in the files was outdated and not relevant anymore. One of my first main tasks was to start a new game design document which would allow my team and future teams to keep track of the game's.
Using a game design document template made by Rosa Carbo-Mascarell, I documented the most important information to consider as a designer and as a team when working on the game. This includes: a summary of the game's concept, design pillars and values, primary and secondary game loops, and finally the player motivations. These documents were made and adjusted with the help of the team and the product owner as well as a questionnaire that was sent out to the target audience.

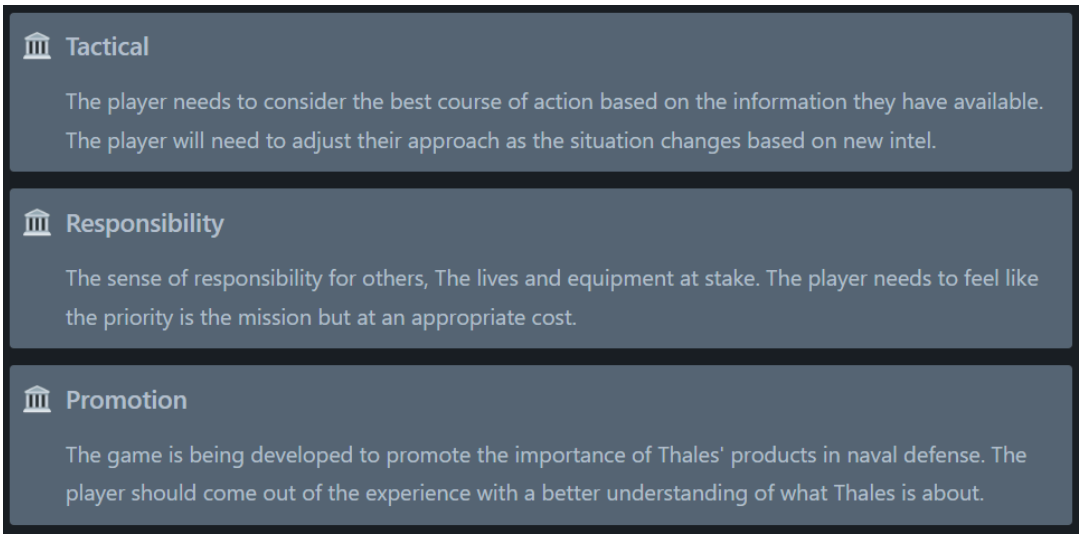


Figure 2. Design Pillars

Creating questionnaires for playtests and research

My team and I conducted multiple play tests of the game and other prototypes with Thales employees and Saxion students. For these playtests, I was responsible for creating questionnaires which would allow us to gather more quantitative data/feedback to help us in improving the tested features. My general goals for these questionnaires were to keep them short and to the point as they were mainly used as additional sources of information on top of direct discussions with the testers.

Gameplay UI adjustments

While the graphical user interface (GUI) had been completely updated by the previous group, it still needed some final adjustments. The old GUI for the mission objectives was still present in the coop scenarios and was overlapping with the new GUI.

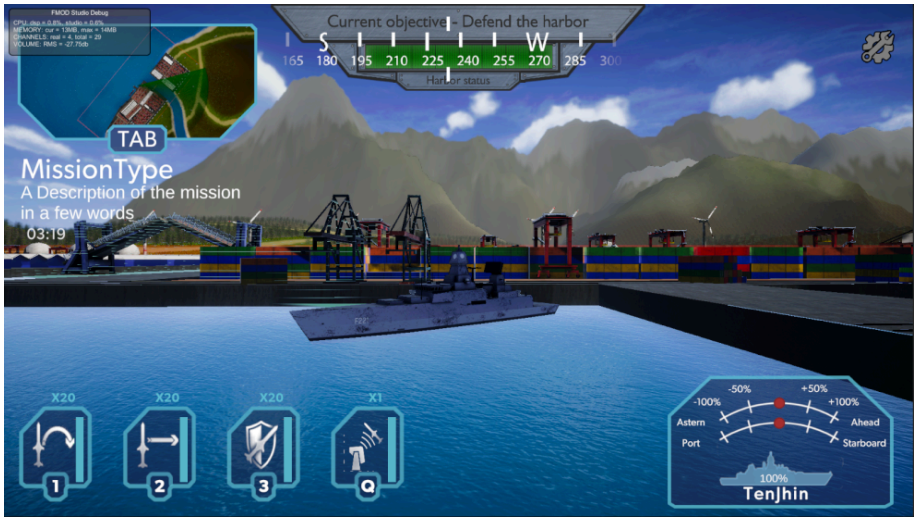


Figure 3. In-game screenshot before UI adjustments

One of my projects was to design a new mission objective panel that matched the new GUI. There was already a simple mission objective panel but it was only text and lacked formatting. My process involved ideating on different looks for the mission objective panel as well as its position on the screen. Finding the right spot for the UI on the screen was difficult because it felt like there was very little space, and the space that was available was not very intuitive for mission objectives.

Figure 4. Mission Objectives Panel Variations

After having decided on the look of the new mission UI, I started looking at how I could free up some space on the screen by moving the existing UI around. I used existing games with similar information being displayed on their UI as examples to find more intuitive locations and sizes for the respective UI.

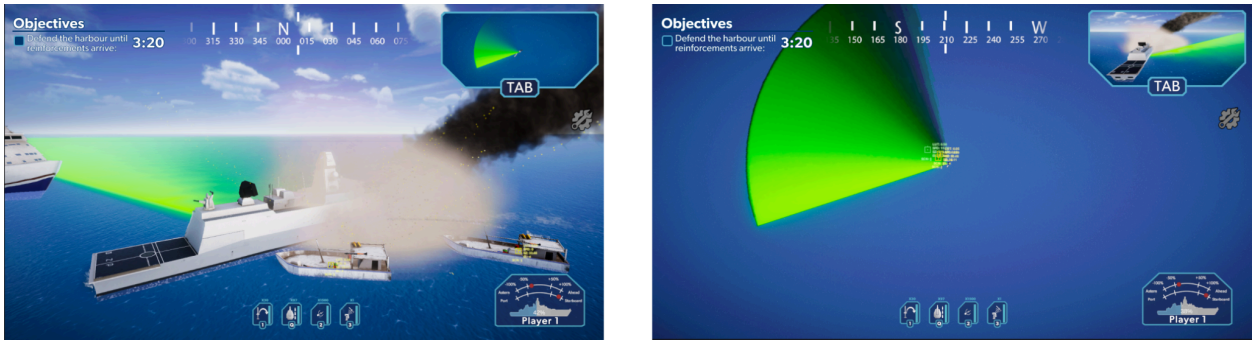


Figure 5. In-game screenshots after UI Adjustments

The outcome of this project resulted in a more intuitive GUI and more space on the screen for the game. Based on the playtests that were conducted later on, the changes had a positive impact on the user experience.

Redesigning and documenting core gameplay mechanics

Based on the team's playing experience and playtests at the start of the project, it was clear that the game didn't fulfil the "tactics" game pillar that had been established early on the project. The game was encouraging players to rush at their targets without consideration and shoot them down. While there were multiple factors at play, I deduced that a large contribution to this was that the radar wasn't useful enough. The player could see their targets from very far away and therefore didn't have to rely on the radar's detection abilities to navigate the unknowns beyond their line of sight. This meant that the main purpose of the radar, being to detect potential threats beyond sight, was effectively not necessary.

Furthermore, the radar's functionalities were very simplistic and not representative of their real life capabilities. The radar had very short range and could detect anything as long as it was within range meaning there was no way of avoiding detection once within range.
Based on the research I conducted I reworked the radar to reflect the key characteristics of a radar. Radars are very powerful devices that allow for the detection of objects at very long distances but because of the way they function, they have their limitations and weaknesses that can be exploited. This was an important aspect of the radar rework because it's these flaws and limitations that create tactica opportunities and decision making within the game.

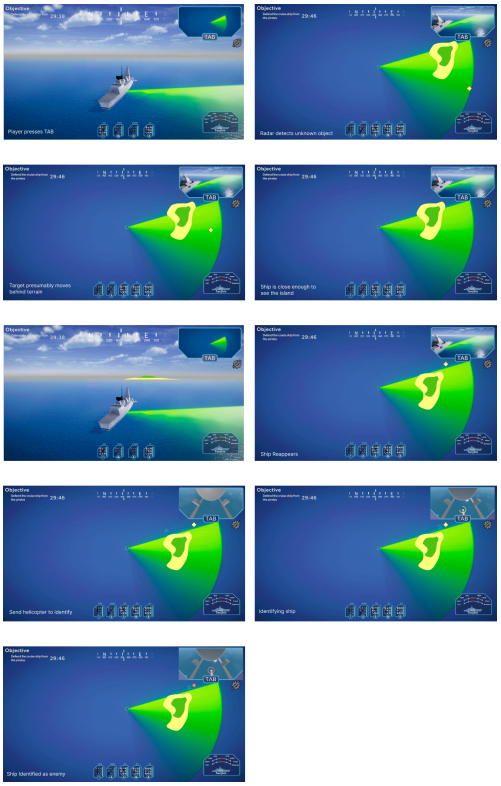


Figure 6. User Journey Mockup of With Radar Adjustments

Most of the ideas in the process document were not implemented. However, having increased the range of the radar and removed the player's ability to see targets beyond a certain range has greatly increased the usefulness of the radar. This lays out a foundation for future teams to work on to refine the feature.

Another important feature that needed to be reworked was the identification mechanic. While radars can detect objects at very long distances they generally cannot determine what the object is and whether it is friend, neutral or foe. This is why identifying suspicious radar targets is very important in naval warfare: to prevent attacking targets that are not a threat. The identification of objects can be done in many ways such as helicopters, drones, satellites, intel, visual and more.
Identifying objects in the game used to happen automatically when the radar scanned over objects 2-3 times or if the player simply knew a ship was an enemy. This also contributed to the less tactical gameplay described before as the player didn't really need to scout their targets before engaging.
To further encourage the player to be more tactical in their approach, I determined that the game could use a more interactive identification system. I looked at real life ways of identifying radar activity and picked some that I felt were feasible and made the game more tactical and fun. The options I went for were the optical radar, the helicopter and the Automatic Identification System (AIS); each with strengths and weaknesses which players need to take into consideration when using them.

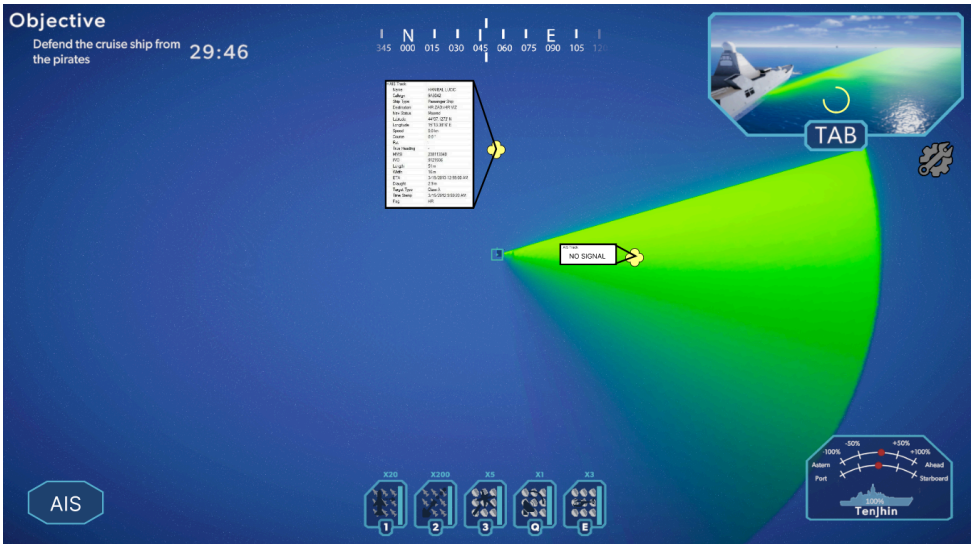


Figure 7. Interactive Mockup of AIS Feature in Figma

The outcome of the tests with the identification feature implemented is hard to determine. Players typically rushed to the nearest radar blips (icon indicating an object detected by the radar) with the assumption that their mission objective was there. However, this was more of an indication that the coop missions needed work rather than the identification mechanics not working as expected. The assumption is that players did not feel threatened enough by the unidentified enemies but also that the lack of other blips on the radar made it obvious where the enemy ships were.

Player feedback overhaul of core gameplay mechanics

During a playtest, Saxion students who had never played the game before expressed dissatisfaction when playing the game due to confusion when interacting with various features. The students didn't know when an ability was used properly or if a missile was sent to the target they wanted for example.

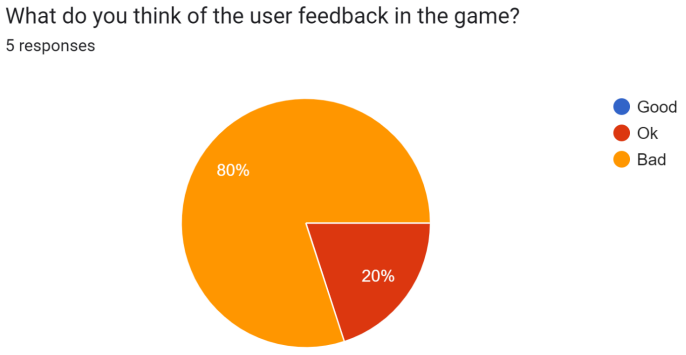


Figure 8. Data from a Questionnaire for the Game

A lot of interactions between the game systems and the player were not properly communicated back to the player. User feedback is an important aspect of any game as it makes the player feel in control when interacting with the game.
To resolve these issues I started off by identifying and documenting all the interactions the player can have during gameplay.
The list allowed me to identify which interactions were lacking user feedback. For the interactions lacking user feedback, I established what the game needed to communicate back to the player based on the interaction. For some of the more visual user feedback I created Figma prototypes to better convey the ideas.

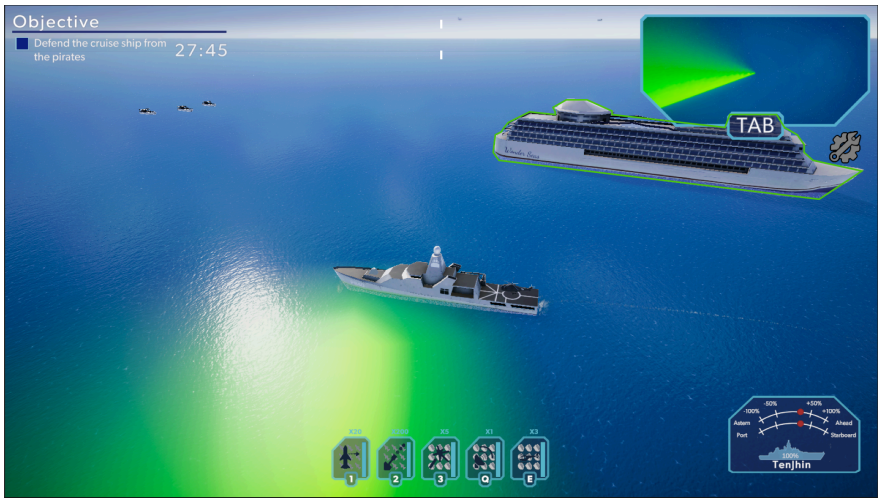


Figure 9. Interactive Mockup of Ships Highlighting on Hover

While not all of the improvements were implemented, the ones that were had a positive impact on the game. Testers felt less confused as the game responded more clearly to their inputs.

In-game tutorial design

The last project we decided to tackle as a team was the implementation of a new playable tutorial.
The previous tutorial was in video format and while it did explain the basics, it looked outdated and was not engaging for players. This was most apparent when introducing various playtesters to the game since some of them outright chose to skip the tutorial or were confused due to the visual differences between the tutorial video and the actual game.

Figure 10. Screenshot of Video Tutorial

My task for this project was to design a new tutorial that would be more engaging to the player. The first idea that came to mind was to combine the tutorial with a narrative mission. The idea was that by making the tutorial more interactive through gameplay and narrative, the player would be engaged throughout the learning experience.
For the narrative of the mission, I decided to repurpose the first co-op mission in the game called “Pirates!” for the tutorial.
This was done for multiple reasons: firstly, the goal with the co-op missions was to have increasing scopes and difficulties as the player progressed to the next mission. With the “Pirates!” mission being the first this would have meant that somehow the tutorial’s narrative would have to be smaller in scope than small pirate ships attacking a cruise ship. It therefore seemed logical to simply adapt the “Pirates!” mission narrative into the tutorial.
Secondly, this allowed us to use existing assets and save time on making new ones.
The next step in my design process was to identify the concepts that the tutorial should teach and in which order to introduce them.
To identify what to teach the player, I listed out all the mechanics the player would need to interact with to complete the mission.
As for the order, the first concepts to teach the player are how to control the ship. After that, the player is introduced to the other concepts as they move through the different stages of the tutorial.
Finally, I created a Figma prototype of how I imagined the tutorial to look like for the user.
The prototype was crucial in communicating my vision with the tutorial both to my team, our product owner, but also our target audience. Throughout the process, I tested my prototype with Saxion students and iterated on their feedback. This allowed me to iron out the details of the prototype before its implementation.

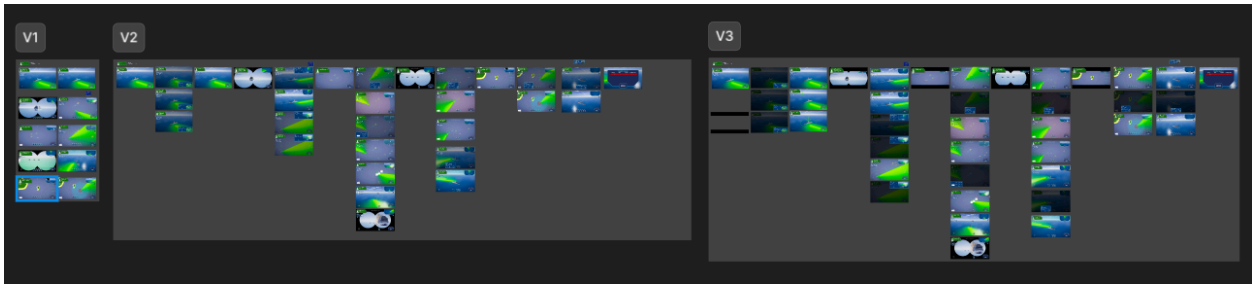


Figure 11. 3 Iterations of the Tutorial Prototype in Figma

Reflection

During my internship, I learned a lot about the importance of having structured processes and detailed planning in game design. One big takeaway was how useful it is to have a general plan written down, even if it's not super detailed at first. Having this big-picture approach helps everyone stay on the same page and work more efficiently.

Interaction Design and Player Experience

Game design is all about how players interact with the game mechanics and whether these interactions create the right effects. It's crucial to understand how players engage with the game and to constantly check if the mechanics are delivering the intended experience. This means always looking at and tweaking the mechanics to make sure the game is fun and works as planned.

Task Planning and Execution

Planning tasks within bigger projects, or epics, is really important. Focusing on one epic at a time helps make a bigger impact on the project. This way, we can dive deep into specific parts of the project and make real progress. Using Jira as our planning tool was super helpful for organizing and prioritizing tasks within these epics.

User Feedback Overhaul

When we overhauled the user feedback system, it became clear that we should have tackled it feature by feature. Trying to fix everything at once meant that each problem didn't get the attention it needed. By focusing on one feature at a time, we could have done a better job of identifying and fixing issues, resulting in a more polished final product.

Prototype and Flowchart for Tutorial Development

Looking back at the tutorial development, while the prototype I made was good for showing the user journey, it didn't detail the sequence of events well enough. A flowchart that showed the

order of events, like when enemies should spawn and what triggers other events, would have been really helpful. The Figma prototype gave an overall view, but it didn't explain the exact timing and dependencies of events. Having a detailed flowchart would have made development smoother and ensured everything happened as it should.

In conclusion, this internship showed me how crucial structured planning, detailed documentation, and focused execution are in game design. Using tools like Jira for task management, improving user feedback methodically, and combining prototypes with detailed flowcharts are practices I want to use in future projects. These experiences have given me valuable skills and insights that will make me a better game designer.

Conclusion

This internship at Thales was an amazing experience that really helped me grow as a game designer. Working on the Naval Warfare Game taught me a lot about iterative design, prototyping, and getting feedback from users, which are all super important in game development. Using tools like Jira for managing tasks and applying design thinking methods gave me a solid way to handle the complex challenges we faced.

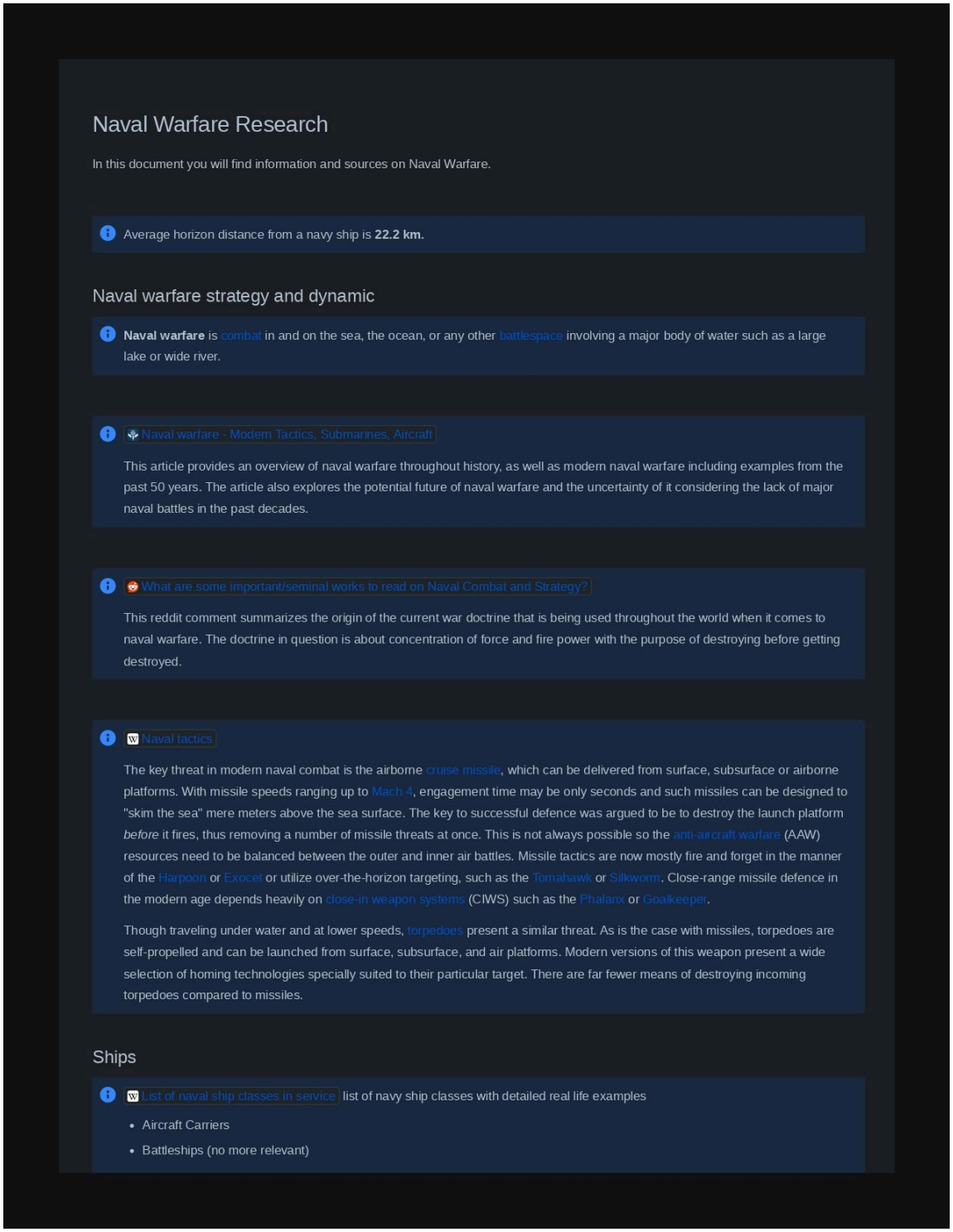
I learned a lot about naval warfare, which was key for creating realistic and fun gameplay. Collaborating with my team and getting input from stakeholders and playtesters was incredibly helpful for tweaking the game mechanics and making sure we hit our targets.

One big lesson from this internship was the importance of good documentation and clear communication. By keeping detailed design documents and making sure we all stayed on the same page, we were able to work smoothly and reach our goals. The process of prototyping and testing helped us improve the game and gave me a better understanding of how players interact with our designs.

Overall, this internship gave me practical skills and valuable insights that I'll definitely use in future projects. It showed me how important it is to plan well, document everything, and work well with a team. I'm excited to take these lessons forward and apply them to my career in game design.

Appendices

Appendix A. Naval warfare research



Naval Warfare Research

In this document you will find information and sources on Naval Warfare.

Average horizon distance from a navy ship is **22.2 km.**

Naval warfare strategy and dynamic

Naval warfare is combat in and on the sea, the ocean, or any other battlespace involving a major body of water such as a large lake or wide river.

Naval warfare - Modern Tactics, Submarines, Aircraft

This article provides an overview of naval warfare throughout history, as well as modern naval warfare including examples from the past 50 years. The article also explores the potential future of naval warfare and the uncertainty of it considering the lack of major naval battles in the past decades.

What are some important/seminal works to read on Naval Combat and Strategy?

This reddit comment summarizes the origin of the current war doctrine that is being used throughout the world when it comes to naval warfare. The doctrine in question is about concentration of force and fire power with the purpose of destroying before getting destroyed.

Naval tactics

The key threat in modern naval combat is the airborne cruise missile, which can be delivered from surface, subsurface or airborne platforms. With missile speeds ranging up to Mach 4, engagement time may be only seconds and such missiles can be designed to "skim the sea" mere meters above the sea surface. The key to successful defence was argued to be to destroy the launch platform *before* it fires, thus removing a number of missile threats at once. This is not always possible so the anti-aircraft warfare (AAW) resources need to be balanced between the outer and inner air battles. Missile tactics are now mostly fire and forget in the manner of the Harpoon or Exocet or utilize over-the-horizon targeting, such as the Tomahawk or Silkworm. Close-range missile defence in the modern age depends heavily on close-in weapon systems (CIWS) such as the Phalanx or Goalkeeper.

Though traveling under water and at lower speeds, torpedoes present a similar threat. As is the case with missiles, torpedoes are self-propelled and can be launched from surface, subsurface, and air platforms. Modern versions of this weapon present a wide selection of homing technologies specially suited to their particular target. There are far fewer means of destroying incoming torpedoes compared to missiles.

Ships

List of naval ship classes in service list of navy ship classes with detailed real life examples

- Aircraft Carriers
- Battleships (no more relevant)

- Cruisers
- Destroyers
- Frigates
- Corvettes
- Submarines

https://defensetalks.com/types-of-naval-warships-in-21st-century-and-their-functions/ explanation of navy ship class roles

- Aircraft Carriers
  - Aircraft carriers **provide a major advantage in terms of air support**. Aircraft carriers can easily launch and recover aircraft at sea, allowing them to provide air support anywhere in the world. This is invaluable for both offensive and defensive operations.
- Cruisers (not used much anymore as they have been combined with destroyers)
  - Cruisers are primarily guided missile warships ranging in size anywhere from 7000 to 10,000 tons. Only the world's largest navies can afford to build and operate modern cruisers.

    In today's world, the role of the cruiser depends on the navy that it's employed in. For example, in the U.S navy cruisers are primarily anti-air defense vessels while in the Russian navy they are anti-ship platforms. Cruisers' other missions include commerce raids and shore bombardments. U.S navy decommissioned cruisers in the 90s since they were deemed too expensive to build and maintain.
- Destroyers (most navies use them as their all around combat ships with defensive and offensive capabilities)
  - Multi purpose destroyers are very expensive to produce and maintain which is why only a select few countries who can afford them make use of them. Other countries have more specialised ships for specific purposes in which case the destinctions between ship classes matters a lot more.
  - A ship's capabilities and tools is largely dependent on the power that is available on the ship.
  - Destroyers are the largest surface combatant operated by most navies ranging in size up to 6 000 tons. Destroyers are fast ships generally capable of speeds in excess of 30 knots in calm seas but with the destroyers getting larger and more heavily armed the difference between the cruisers and destroyers have greatly diminished.

    While a cruiser should nominally be bigger this is not always the case but a cruiser is generally considered to have greater facilities for command and control which means cruisers have more space and spare energy to power the additional communication equipment and a command-and-control room to coordinate the defense of the fleet.
- Frigates
  - Similar to destroyers' frigates are quite common ships in the navy's fleet they're quick to maneuver and their role is to escort and protect larger vehicles from air surface and underwater threats. Frigates are one of the smallest blue water surface combatants. Frigates are traditionally slower than destroyers although, in modern times there's not a significant difference in their speed. Today's frigates often displace up to 3000 tons and are usually capable of top speeds of 27 to 30 knots.
- Corvettes
  - Vessels that are smaller than frigates are typically identified as corvettes or missile boats which are not big enough to have a full air defense radar and therefore are not used to escort other vessels or defend large areas, they play more of an offense rule given that they can use their anti-ship missiles to attack and are small and maneuverable enough to avoid being hit. They're also typically not suited or capable of operating in blue waters so they typically stay closer to the shores.
- Submarines
  - There are three major types of submarines, especially in the US navy. It includes attack submarines, cruise missile submarines, and ballistic missile submarines.

    Attack submarines use torpedoes as their main armament and have more of a multi-role mission. They are smaller in size making them faster and more maneuverable.

    Cruise missile submarines are typically larger and slower focused on long-distance strikes using guided missiles

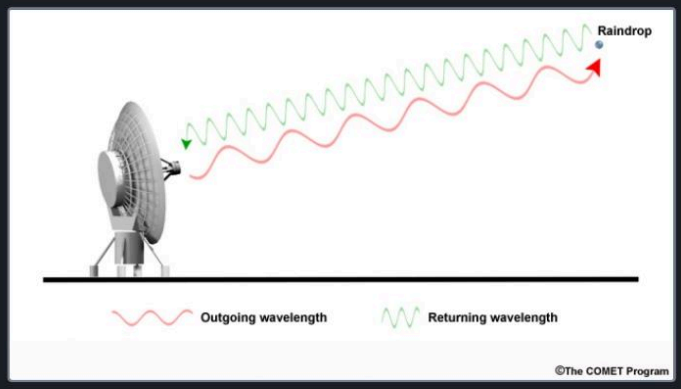
Ballistic missile submarines as the name suggests can carry and launch nuclear ballistic missiles.

Radars

Naval vessels use their radars to detect incoming missiles or any other objects by bouncing electromagnetic waves off of the missile and analyzing the reflection. This process is known as radar detection.

In order to identify the missile, the radar system's processor uses algorithms to distinguish the reflection from the missile from other reflections that might be in the area, such as reflections from other ships, buildings, or other sources.

In addition to the radar, naval vessels may also use external vessels such as helicopters, planes as well as drones. It can also use internal infrared sensors, electro-optical systems, and other sensors to detect incoming missiles. These systems can provide complementary information to the radar, helping to increase the accuracy and reliability of the threat detection and engagement capabilities of the ship.



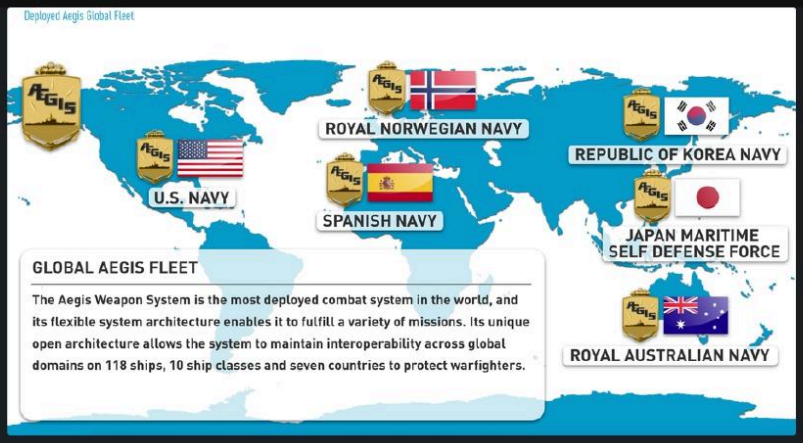
Q How do military surface ships "see" other ships during operations? Do they use radar like aircraft, some other method, etc.?

this Quora question isn't particularly related to naval warfare, but the main answer gives very nice insights on the limitations of modern radar technology.

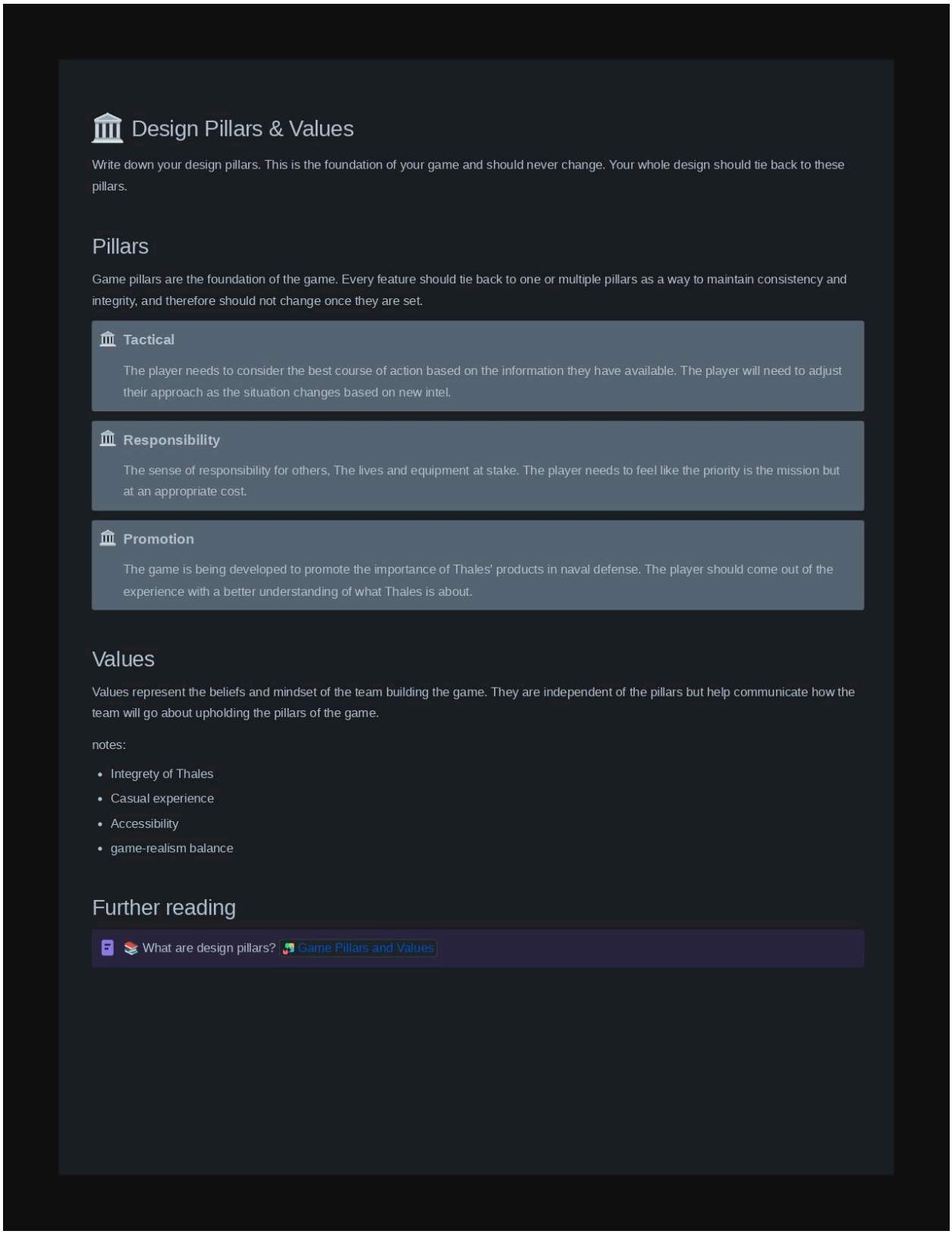
Combat Systems

A combat system provides a warship with its offensive and defensive capability through weapons (guns, missiles, and torpedoes). Apart from self-defense guns and missiles, warships are also equipped with decoys and other means to deflect incoming weapons.

The **Aegis Combat System** is an American integrated naval weapons system, which uses computers and radars to track and guide weapons to destroy enemy targets. It was developed by the Missile and Surface Radar Division of RCA, and it is now produced by Lockheed Martin. Aegis equipped ships provide air protection to themselves and other ships nearby. Aegis is designed to network multiple ships and sensor platforms and provide an overall command and control function.


Deployed Aegis Global Fleet
ROYAL NORWEGIAN NAVY
REPUBLIC OF KOREA NAVY
U.S. NAVY
SPANISH NAVY
JAPAN MARITIME SELF DEFENSE FORCE
ROYAL AUSTRALIAN NAVY
GLOBAL AEGIS FLEET
The Aegis Weapon System is the most deployed combat system in the world, and its flexible system architecture enables it to fulfill a variety of missions. Its unique open architecture allows the system to maintain interoperability across global domains on 118 ships, 10 ship classes and seven countries to protect warfighters.

Appendix B. Core Game Design Documents



🏛️ Design Pillars & Values

Write down your design pillars. This is the foundation of your game and should never change. Your whole design should tie back to these pillars.

Pillars

Game pillars are the foundation of the game. Every feature should tie back to one or multiple pillars as a way to maintain consistency and integrity, and therefore should not change once they are set.

🏛️ Tactical

The player needs to consider the best course of action based on the information they have available. The player will need to adjust their approach as the situation changes based on new intel.

🏛️ Responsibility

The sense of responsibility for others, The lives and equipment at stake. The player needs to feel like the priority is the mission but at an appropriate cost.

🏛️ Promotion

The game is being developed to promote the importance of Thales' products in naval defense. The player should come out of the experience with a better understanding of what Thales is about.

Values

Values represent the beliefs and mindset of the team building the game. They are independent of the pillars but help communicate how the team will go about upholding the pillars of the game.

notes:

- Integrety of Thales
- Casual experience
- Accessibility
- game-realism balance

Further reading

📚 What are design pillars? Game Pillars and Values

Game Loops

This page identifies the game loops and provides a short explanation of each step of the loops in the order of challenge, action and reward.

Core game loop

This is the moment-to-moment loop, which encompasses the player's main experience throughout the game.

Identify potential threats

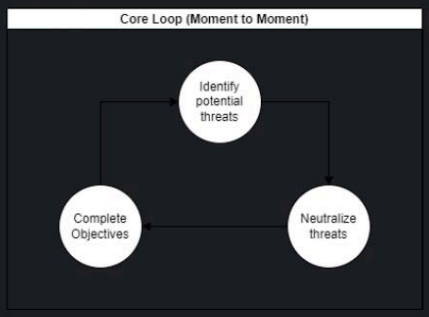
Using identification tools such as radars and helicopters, the player must find and identify the threats by scouting with a search radar for entities and identifying them as hostile, friendly or neutral.

Neutralize Threats

Once a hostile threat has been identified, the player can engage using the appropriate weaponry at their disposal to neutralize the target.

Complete Objectives

While neutralizing a target won't always be an objective, it will almost always play a part in completing one. Completing all the objectives will lead to the mission's completion.



Secondary loops

This is the minute-to-minute loop, which encompasses the player's experience outside of missions.

Select Mission

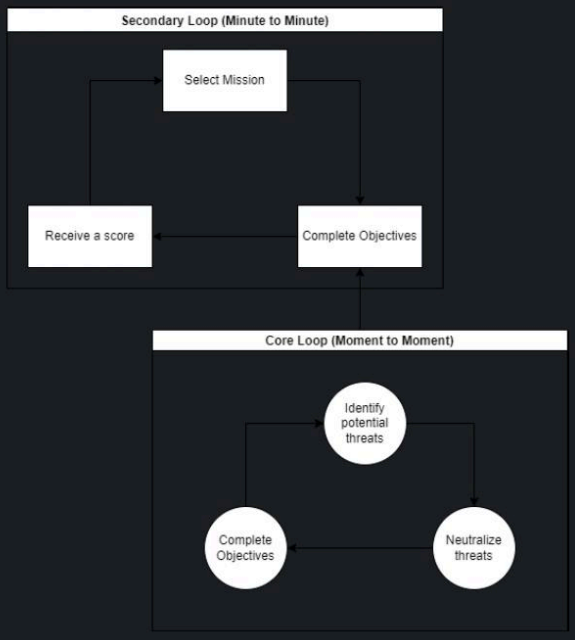
The player will need to select a mission that is appropriate to their level of skill. In this process, they will also need to select a ship and equip it appropriately for the type of mission.

Complete Objectives

The player will need to complete objectives to complete the mission successfully. These objectives will vary depending on the mission.

Receive Score

The player will receive a score based on a variety of factors to determine how well they completed the mission.



Further reading

- 📚 What are game loops?
  - Core Loops
  - Designing The Core Gameplay Loop: A Beginner's Guide

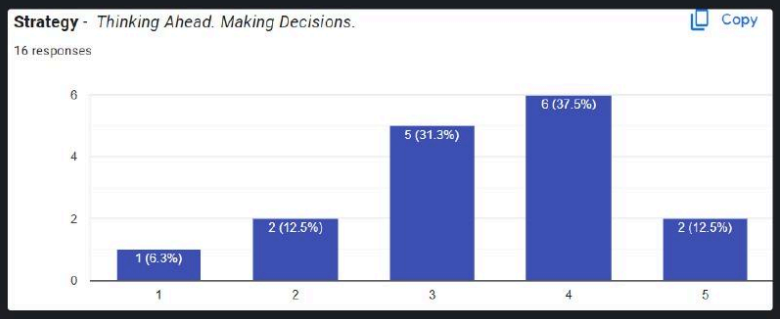
Player motivation and progression

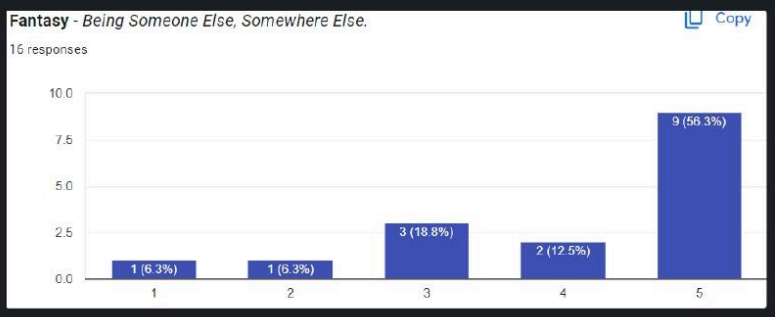
This page will highlight what our target audience's core motivation is and how the players progress.

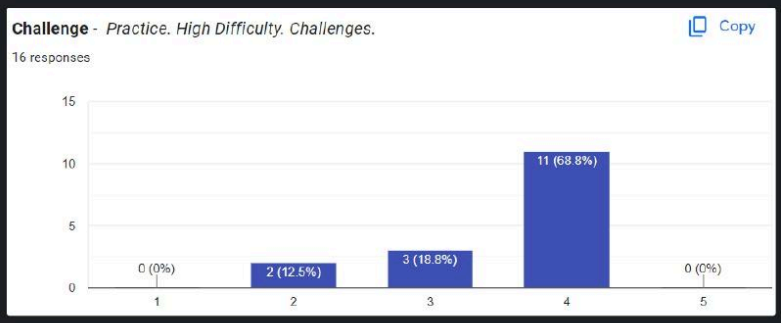
You can find the process of getting to these findings in the following page: https://alexisdecazenove.atlassian.net/wiki/spaces/98309/pages/10387460/ Can't find link

Motivations

Primary motivations







Progression

Detect and identify targets

...Using the radar and the identification abilities

Use abilities and control the ship

Eliminate hostile targets with missiles and cannons and defend allies with CIWS and counter missiles

Complete mission objective as efficiently as possible

Use appropriate resources for the task and make sure you survive

Strategize approach

...by using the best tool or approach based on the intel the player has

Further reading

📚 What are the main player motivations?

GDC A Deep Dive into the 12 Motivations: Findings from 400,000+ Gamers

Gamer Motivation Model Reference

Appendix C. Documentation for Radar Adjustments

Radar Mechanic Adjustments

🎲 **Design owner** Alexis 🔧 **Tech owner** Edwin ⏳ **Status** DONE

Context

The current radar system has good basic mechanics but provides the player too much information which takes away from the strategic and tense elements of naval warfare. The radar system also identifies objects on its own which deprives the player of an essential step in the process. Adding identification mechanics would also create more strategic depth for the game which fits with our strategy pillar 🏛 Design Pillars & Values .

The current issues with the radar system are:

1. The player can see all objects (ships, planes, missiles, etc.) from a top down view even before being in radar view, which almost completely negates the purpose of the radar (appart from targeting missiles).
2. The radar range is too short which means that the player can see objects in ship view before being in radar range, further undermining the utility of the radar and working against our Promotion pillar in 🏛 Design Pillars & Values .
3. The player can see very far due to the flat tendency of the map which has no horizon
4. The radar detects objects perfectly, even though certain situation allow for higher or lower detection.
5. The radar system identifies objects on its own, which is not very realistic and deprives a player of a key strategic step before engaging an enemy.
    a. This issue highlights the need to create a more meaningful identification system to substitute the removal of automatic identification.

The current implementation doesn't reflect the purpose and importance of radars in real life which is an important goal of this project.

Hypothesis

Updating the radar system by fixing the problems highlighted above will create a slightly slower paced game but will create more strategic tension, which is more in line with our design pillars.

Measuring success

I'm expecting the player to be more cautious before identifying a ship as hostile and spend more time outside of combat since the radar system won't be able to tell the player easily what has been detected.

Design

Summary

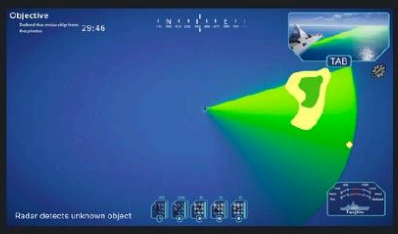
Here below are the solution for the individual points highlighted above:

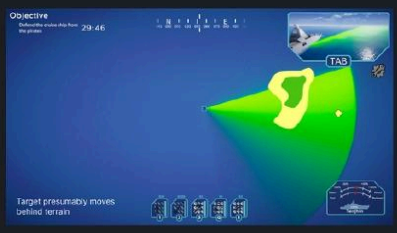
1. Make the radar view into a canvas rather than a camera from above, where the background will be a solid color that matches the look on radar operating systems such as Tacticos.
2. Drastically increase the range of the radar.
3. Add fog of war system which prevents the player from seeing beyond a certain point
4. Add a detection chance mechanic which helps determine the detection chance of different ships in different situation.
5. Add a seperate mechanic for identifying objects as neutral, allied or hostile.

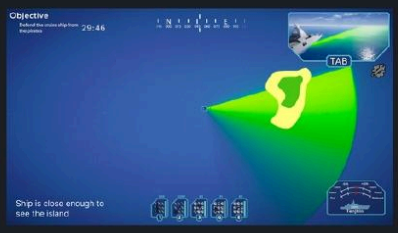
Some of these solutions will be expanded on in further detail in their seperate pages.

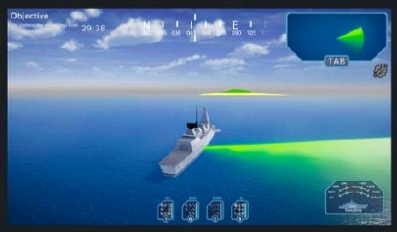
User Journey

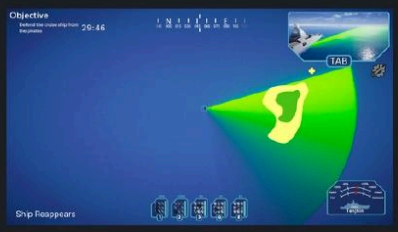
Early user journey concept:

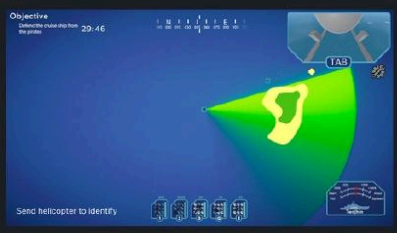


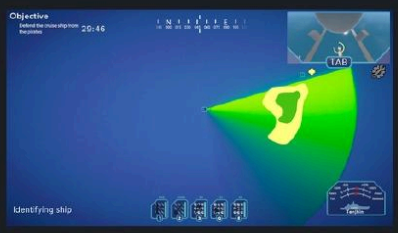


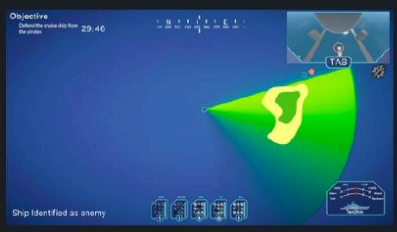






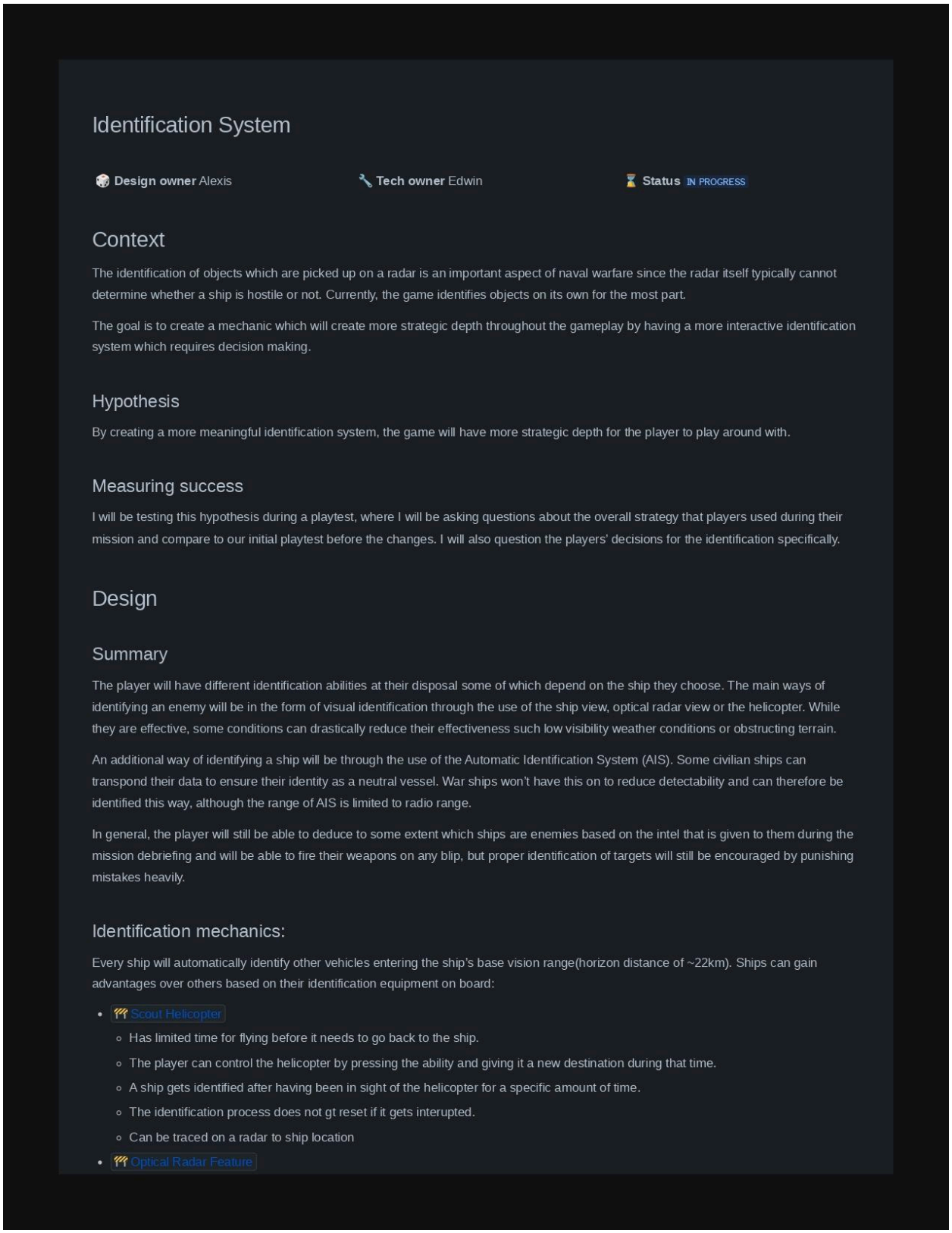






Outcomes

Appendix D. Documentation for Identification Mechanic



Identification System

🎲 **Design owner** Alexis 🔧 **Tech owner** Edwin ⏳ **Status** IN PROGRESS

Context

The identification of objects which are picked up on a radar is an important aspect of naval warfare since the radar itself typically cannot determine whether a ship is hostile or not. Currently, the game identifies objects on its own for the most part.

The goal is to create a mechanic which will create more strategic depth throughout the gameplay by having a more interactive identification system which requires decision making.

Hypothesis

By creating a more meaningful identification system, the game will have more strategic depth for the player to play around with.

Measuring success

I will be testing this hypothesis during a playtest, where I will be asking questions about the overall strategy that players used during their mission and compare to our initial playtest before the changes. I will also question the players' decisions for the identification specifically.

Design

Summary

The player will have different identification abilities at their disposal some of which depend on the ship they choose. The main ways of identifying an enemy will be in the form of visual identification through the use of the ship view, optical radar view or the helicopter. While they are effective, some conditions can drastically reduce their effectiveness such low visibility weather conditions or obstructing terrain.

An additional way of identifying a ship will be through the use of the Automatic Identification System (AIS). Some civilian ships can transpond their data to ensure their identity as a neutral vessel. War ships won't have this on to reduce detectability and can therefore be identified this way, although the range of AIS is limited to radio range.

In general, the player will still be able to deduce to some extent which ships are enemies based on the intel that is given to them during the mission debriefing and will be able to fire their weapons on any blip, but proper identification of targets will still be encouraged by punishing mistakes heavily.

Identification mechanics:

Every ship will automatically identify other vehicles entering the ship's base vision range(horizon distance of ~22km). Ships can gain advantages over others based on their identification equipment on board:

- 🚧 Scout Helicopter
  - Has limited time for flying before it needs to go back to the ship.
  - The player can control the helicopter by pressing the ability and giving it a new destination during that time.
  - A ship gets identified after having been in sight of the helicopter for a specific amount of time.
  - The identification process does not gt reset if it gets interupted.
  - Can be traced on a radar to ship location
- 🚧 Optical Radar Feature

- The optical radar allows identification of objects by zooming in drastically
- Optical radar is limited by its own horizon distance and line of sight
- To identify a ship with the radar, the player needs to zoom in enough so that the ship fills up a enough of an area on the screen to see the details
- The ship needs to be in sight for a certain time before being identified, similarly to the helicopter

- Automatic Identification System (AIS)
  - Every ship is equiped with AIS
  - AIS shows information about ships within a small range

Real life identification ability ranges to scale of radar (ship scale not accurate)

Research and testing

How are you going to test this feature at different stages of development?

Stage of Development	Type of testing	Comments
Prototype	Internal Playtesting	
Build	External Playtesting	

Appendix E. Gameplay UI Adjustments Documentation

UI Adjustments Documentation

Introduction

Problem:

The current mission objective still has old UI and overlaps with the compass.

Goals:

Redesign the mission objective UI to fit with the updated theme

Change the placement of the mission objective to not overlap other UI elements and still provide visibility and clarity in the game

Ideation

Placement Ideation

Idea 1 made the most sense based on other game's placements of objectives UI elements, which is generally top left or underneath the map. This makes sure the player can rely on familiarity if they have played video games before which involved objectives.

Mission UI Ideation

This is the design I have chosen to go for. It's simple, readable and can be expanded without taking up too much space on the screen. The reason it doesn't feature a health bar or the enemy ships is because these will be indicated in more immersive ways through the gameplay.

Overall UI Adjustments

During the process of finding a new design and placement for the Mission Brief, I realized that adjusting the UI in general could both facilitate this task and improve the user experience.

Problem:
The current UI Takes up too much space on the screen which makes it hard to add new elements and and the game visibility poor.

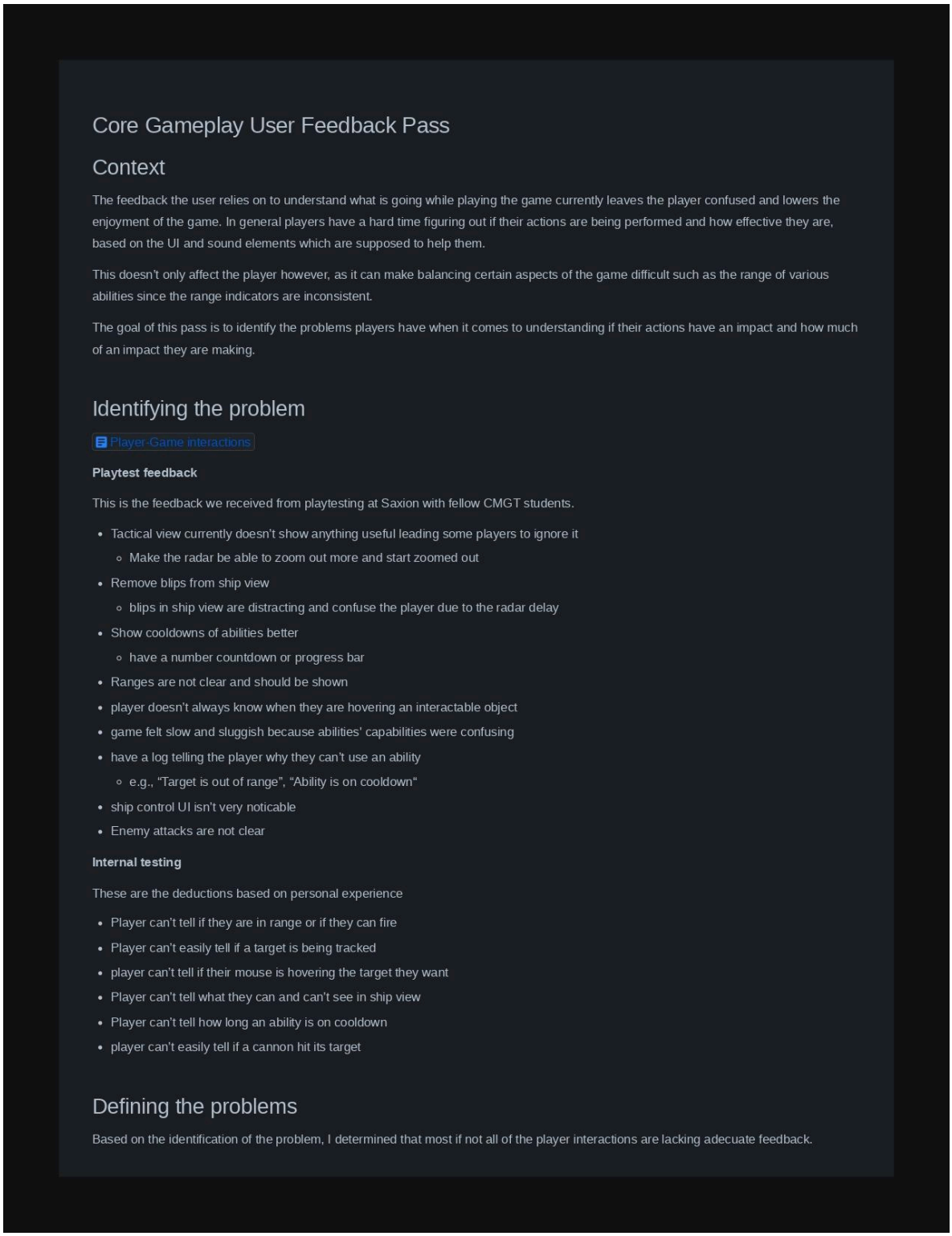
Goals:
Decrease the amount of screen the UI covers to create more visibility

Final Outcome

UI adjustments and reasoning:

- Reduced the size of the abilities and control panel to take up less space
  - The abilities and control panel were very large and taking up a lot of space even though it wasn't necessary for usability
- Changed the position of the abilities to the bottom center of the screen
  - This change doesn't affect players who do not play games, however players who play MOBA's for example will find this much more intuitive as this is the usual placement for the player's abilities.
- Changed the position of the upper camera view/radar minimap to top right
  - A lot of games which feature a minimap have it at the top right of the screen. This also spreads the UI more evenly throughout the top of the screen

Appendix F. User Feedback Overhaul Documentation



Core Gameplay User Feedback Pass

Context

The feedback the user relies on to understand what is going while playing the game currently leaves the player confused and lowers the enjoyment of the game. In general players have a hard time figuring out if their actions are being performed and how effective they are, based on the UI and sound elements which are supposed to help them.

This doesn't only affect the player however, as it can make balancing certain aspects of the game difficult such as the range of various abilities since the range indicators are inconsistent.

The goal of this pass is to identify the problems players have when it comes to understanding if their actions have an impact and how much of an impact they are making.

Identifying the problem

Player-Game interactions

Playtest feedback

This is the feedback we received from playtesting at Saxion with fellow CMGT students.

- Tactical view currently doesn't show anything useful leading some players to ignore it
  - Make the radar be able to zoom out more and start zoomed out
- Remove blips from ship view
  - blips in ship view are distracting and confuse the player due to the radar delay
- Show cooldowns of abilities better
  - have a number countdown or progress bar
- Ranges are not clear and should be shown
- player doesn't always know when they are hovering an interactable object
- game felt slow and sluggish because abilities' capabilities were confusing
- have a log telling the player why they can't use an ability
  - e.g., "Target is out of range", "Ability is on cooldown"
- ship control UI isn't very noticable
- Enemy attacks are not clear

Internal testing

These are the deductions based on personal experience

- Player can't tell if they are in range or if they can fire
- Player can't easily tell if a target is being tracked
- player can't tell if their mouse is hovering the target they want
- Player can't tell what they can and can't see in ship view
- Player can't tell how long an ability is on cooldown
- player can't easily tell if a cannon hit its target

Defining the problems

Based on the identification of the problem, I determined that most if not all of the player interactions are lacking adecuate feedback.

Player actions

- Use abilities
  - all abilities need a range indicator
  - all abilities need a clear cooldown indicator
  - better mouse targeting feedback
  - Clear feedback when ability is fired/used
  - Clear feedback when ability didn't work/cannot be used
- Abilities effects
  - clear feedback when an ability had a positive/desired effect
  - clear feedback when an ability missed/didn't work
- Controlling the ship
  - feedback when player is hit
  - feedback based on health
  - feedback based on speed
- Tactical view
  - More relevant information needs to be shown
  - blip colours and shapes need explanation
- Ship view
  - less clutter needs to be shown
  - FOW needs to be shown
- NPC ships
  - NPC ships health needs to be communicated
  - NPC ship elimination needs to be communicated
  - NPC ship attacks need to be communicated

Ideation & Solutions

Abilities

Range indicators:

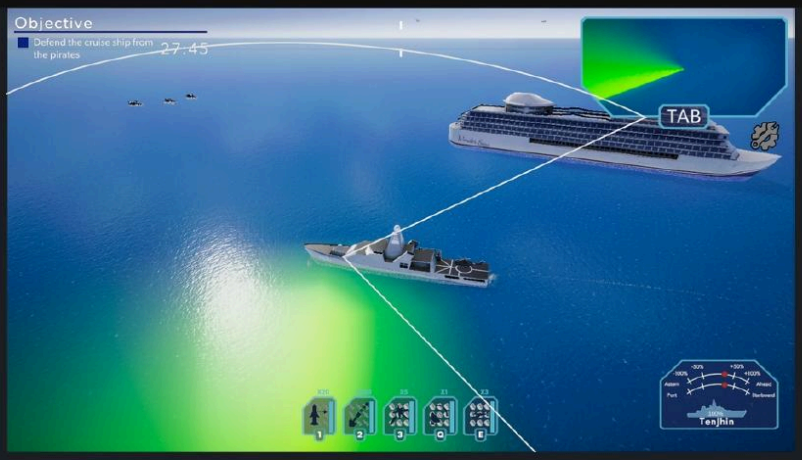
Range indicators will be 2D and only visible depending on if the ability is used in *tactical view* or in *ship view*. (Range indicator system is already in the game.)

> Ranges should also show when hovering an ability icon.

Ability ranges for *ship view* only (2D circle around ship):

> These abilities have "dead angles" where they cannot shoot

- Cannons
- CIWS



Ability ranges for *Tactical view* only (2D circle around origin of ability range):

- Missiles
- Tracking radar
- Helicopter
- Counter Missiles

> Flares don't need range as they are not aimable.

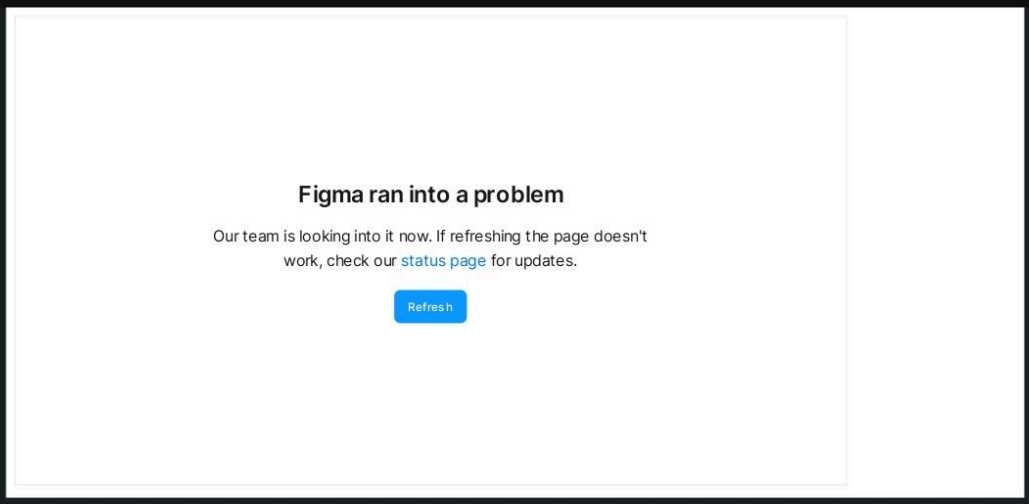
Cooldown indicators:

- progress circle/bar

Cooldown indicator going down after being used (left to right)

Mouse targeting:

- In tactical view, blip changes background colour if hovered by the cursor
- in ship view, object gets highlighted when hovered by cursor
  - Quick Outline



Ability is used/fired:

On ability *select:*

- Highlight ability icon on use
- show range of ability
- highlight potential targets (already in game with the green circles around blips)

On ability *confirm*:

- sound effect
- icon briefly flashes before going into cooldown

Ability failed to be used:

- sound effect when ability is canceled/could not be used
- message shows in the event log based on why it didn't use e.g. "out of range", "no ammo", "ability on cooldown"
- ability icon flashes red briefly

Player Ship

On damage taken:

- sound effect on getting hit
- healthbar flashes red

Health indicator (outside of healthbar):

- Ship starts smoking progressively more and darker as health gets lower

Speed indicator:

- engine sound pitch changes based on speed

NPC ships

NPC ship health:

- Ship starts smoking progressively more and darker as health gets lower (see player ship example)

Enemy ship elimination:

- voiceline saying “target eliminated“

NPC ship attacks:

Only in ship view

- sound effect/ voiceline when being targeted
- muzzle flash

Tactical view

More relevant information needs to be shown:

- distances
- AIS
- direction of player ship

Blip legend:

Ship view

Remove less useful information from ship view:

- Remove blips in ship view
- Remove ranges for long range abilities

FOW visual:

Appendix G. Tutorial Process Document & Prototype

[Final version of Figma prototype for tutorial]

Playable Tutorial Process Document

Empathize & Define

Old tutorial for reference:

Draft list of features and mechanics to teach the player:

- Ship Movement
  - UI elements
  - forwards/backwards
  - left/right
  - Camera movement
- Tactical view (press tab)
  - camera movement
  - How radar works
  - Showcase blip legend
- Identification
  - helicopter
  - optical radar
- Ability usage and target selection
  - Ship view abilities vs tactical view abilities
  - Using an ability
    - ammo
    - cooldown
    - range
  - tracking radar purpose
  - showcase mini camera when firing missile or using helicopter
    - also show slideshow feature

Ideate

Ideation process was done in a meeting Meeting 23/05 Playable Tutorial & Tactical Overview.

The outcoming idea of this meeting was to combine the Pirates! scenario and the playable tutorial. The reasons for this include:

- Teaching the player how to play the game while also giving them an enjoyable experience would fit with the short time available for students at fairs
- in terms of development, combining the two allows us to tackle both in a shorter time.
- the pirates! scenario already fits the tutorial theme since the player will challenge small pirate boats

Tutorial timeline

Narrative introduction to the player and their situation

- Ship Movement
  - UI elements
  - forwards/backwards
  - left/right
  - Camera movement

Commander sky informs of cruise ship informing of suspicious activity

- Tactical view (press tab)
  - camera movement
  - How radar works
  - Showcase blip legend

Suspicious blips are detected and commander sky suggests you identify the blips

- Identification
  - helicopter
  - optical radar
  - AIS

Pirates have been identified and commander Sky instructs player to engage and protect the

- Ability usage and target selection
  - Ship view abilities vs tactical view abilities
  - Using an ability
    - ammo
    - cooldown
    - range
  - tracking radar purpose
  - showcase mini camera when firing missile or using helicopter
    - also show slideshow feature

player is asked to fire a missile at pirate base that was located on the shore

mission ends

Prototypes

Prototype V1

Naval Warfare

Feedback:

- Current tutorial doesn't explain UI elements
- The information boxes on the abilities are not explained to the player

Prototype V2

Naval Warfare

UI explanation process: Naval Warfare

Feedback:

Questionnaire for feedback from fellow game designers:

Naval Warfare Tutorial Prototype Feedback Form

Feedback from test with game designers:

- Darken objectives and dialogue box during popups
- Give more straight forward direction in objectives (tab instead of ship view)
- Let the player be able to select the abilities
- Darkening should be darker
- Health description should be reworded
- Refer to player directly (your ship)
- Make it obvious when there's a cutscenes (cinematic black bars top and bottom)
- Introduce the dialogue and objectives before popups in the prototype
    - Break up the text between popups

Prototype V3

Naval Warfare