Creating a Dynamic UI System to enhance player experience

GDEV60001 Games Development Project

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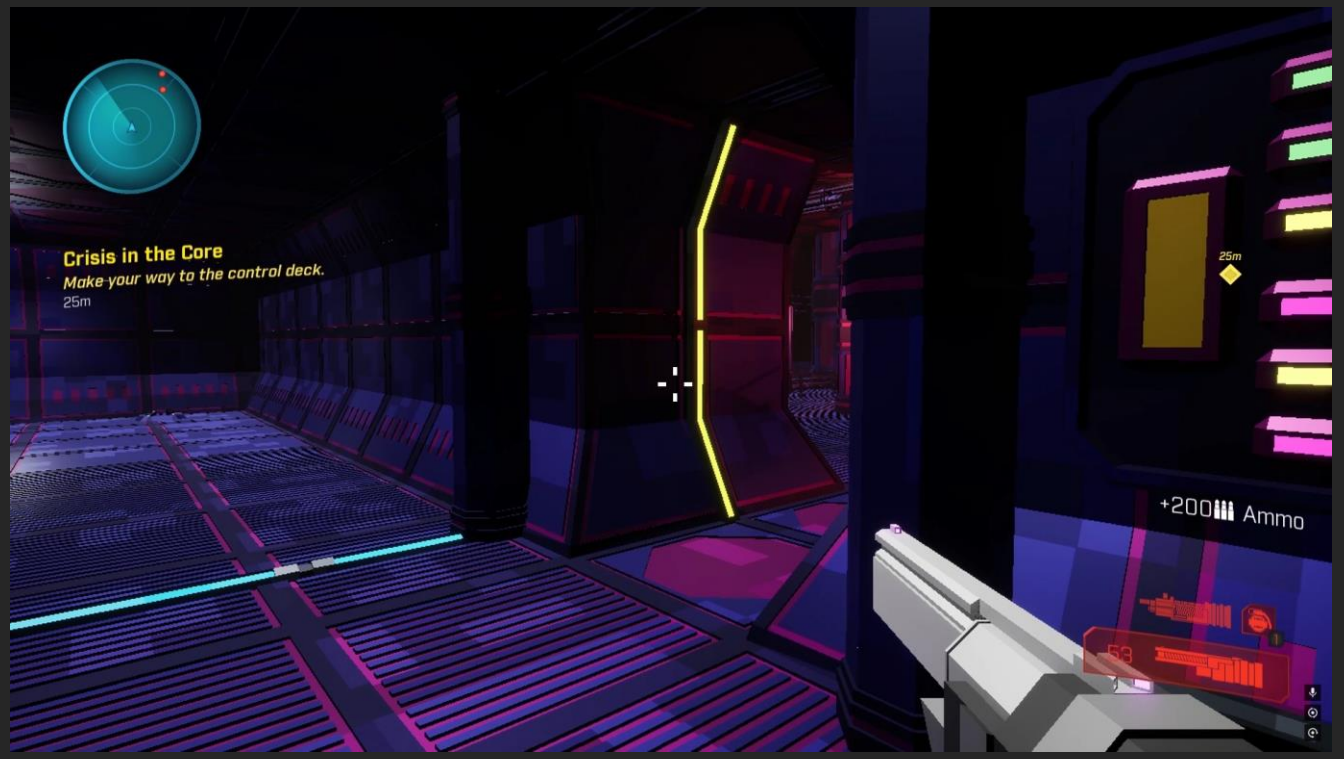
Introduction

Static UIs can often overwhelm players and disrupt the gameplay experience because of excessive information.

This project aims to address this problem with a dynamic UI design that adapts to player actions and in-game context. By displaying essential information only when it's required, this should minimise visual clutter and enhance the player's focus during gameplay.



Preview of Final Artefact

Aims, objectives and deliverables

Aim:

Develop a dynamic, context-sensitive UI in Unreal Engine that adapts to player actions and the environment.

Objectives:

- Research and analyse UI/UX design principles
- Design and develop a UI in Unreal Engine based on research
- Test and refine based on feedback

Deliverables:

- Custom UI assets, such as icons, buttons, and borders
- Using the *Lancer* framework from my Level 5 module as the base for its mechanics, integrate a new dynamic UI system with animations

Research Methodologies

Industry Research and Analysis

- Analysis of existing UI/UX principles and their application in successful games

Research Method:

- User testing: Qualitative research through playtesting and feedback forms
- Observation-based testing
- A/B Testing: Variations of the UI (HUD layout specifically) are tested to determine which design is most effective

Findings will be used to refine UI design iterations, ensuring alignment with the project's goals

Development Pipeline Overview

Research and Planning – Analyse industry best practices to define UI/UX principles

Design and Animations – Create wireframes to visualise the UI

Asset Creation and Mock-ups – Develop UI assets and integrate them into Unreal Engine for initial testing

Engine Implementation – Fully integrate the UI into the game

User testing – Test the UI and iterate designs based on feedback

Planning

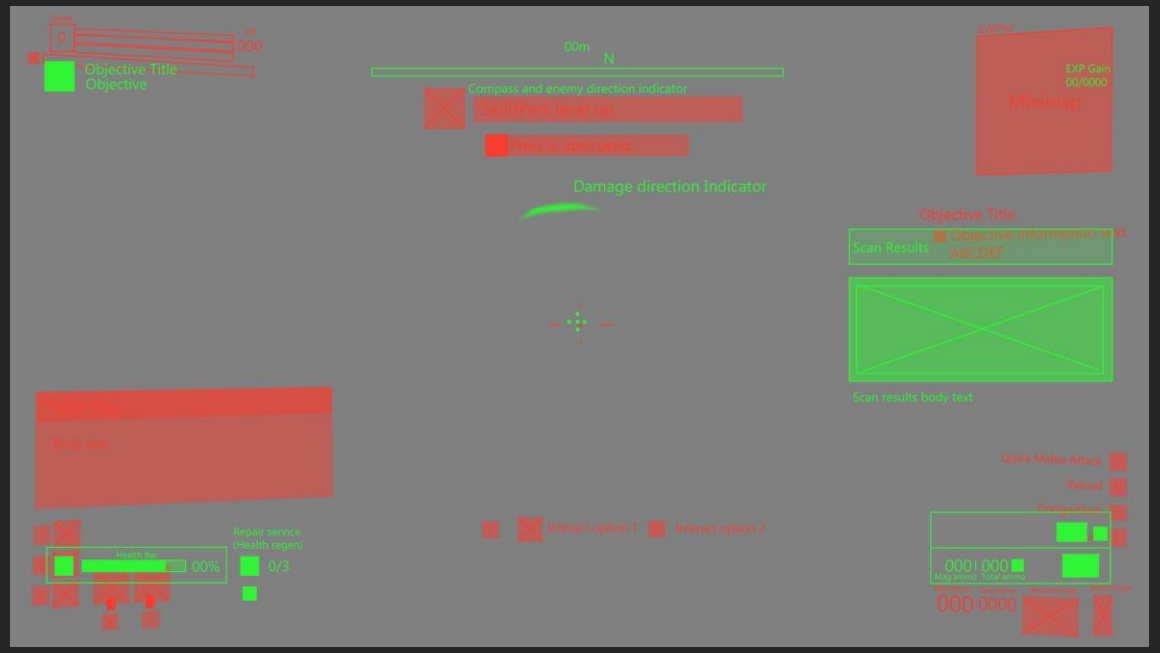
- Gantt Chart – Used to schedule and track development milestones, ensuring timely progress
- IA (Information Architecture) Diagram – Mapped out UI structure and navigation flow for a user-friendly experience
- The MoSCoW method prioritises key tasks for the UI development process:

Must Have	Should Have	Could Have	Won't Have
HUD elements (Player vitals, weapon information etc.)	Quest bjectives and Objective markers	Immersive main menu UI	Skill trees
Death screen	Damage direction indicators	Toggleable dynamic UI	Multiplayer UI
Minimap	Pause and settings screen	Full Shop or Inventory interface	Multi-language support
Animated UI elements	Environment & Enemy alert indicator	Enlarged map screen	
Pick-up widgets	Objectives List	Inventory UI	

Research - Layouts

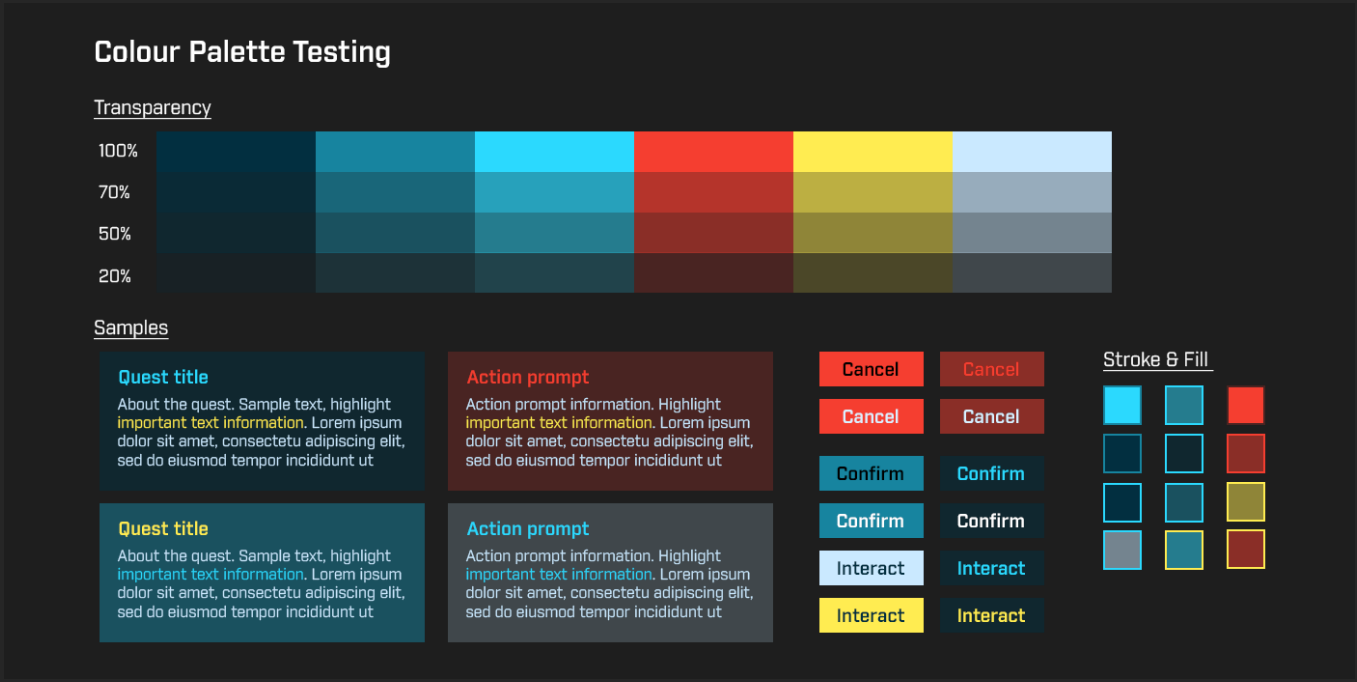
- HUDs from existing games were analysed to identify common patterns and layouts
- Examined the application of Gestalt theory, focusing on grouping and hierarchy to enhance usability
- Insights from this analysis informed design decisions to improve clarity and player experience

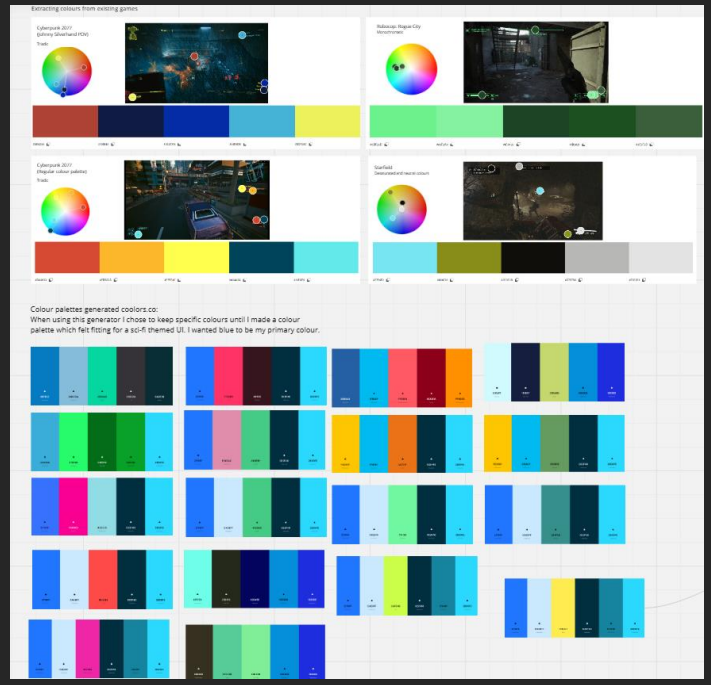
Cyberpunk 2077 UI breakdown



Cyberpunk 2077 vs. Robocop UI comparisons

Colour Palette





- This colour palette was selected to align with the sci-fi theme
- Hierarchical colours
- Light and dark variants of the chosen colours were incorporated to maintain consistency while providing flexibility for different UI element state.

Fonts

- The *Designing Text UX for Effortless Reading (GDC)* talk highlights the key considerations for font and text in UI. This research informed my font choices.
- *Industry* balances a futuristic appearance with strong readability
- *Future n0t Found* was chosen as the title font because stylized fonts can be used effectively for short text elements without compromising readability.

Industry
Industry Bold

Industry
Industry Book (regular)

Font weights and preview

Industry-Bold
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

Industry-Medium
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

Industry-Demi
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

Industry-Book
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

Example use

Character Name: Subtitle text Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat

Quest Name: Objective
0%

About the quest Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Item Name: [???]
[000 / **100**]

About the item Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

Future n0t Found
Future n0t Found (Bold)

Future n0t Found
Future n0t Found (Regular)

Font weights and preview

Future n0t Found Bold
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

Future n0t Found
ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789#£$-=+<>&%

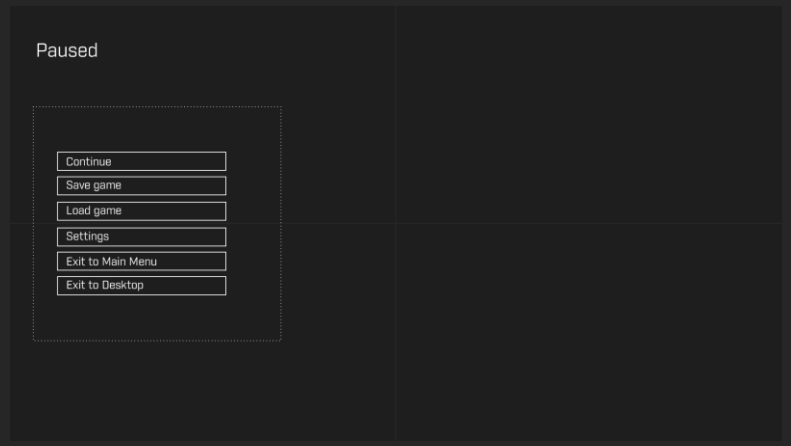
Wireframes

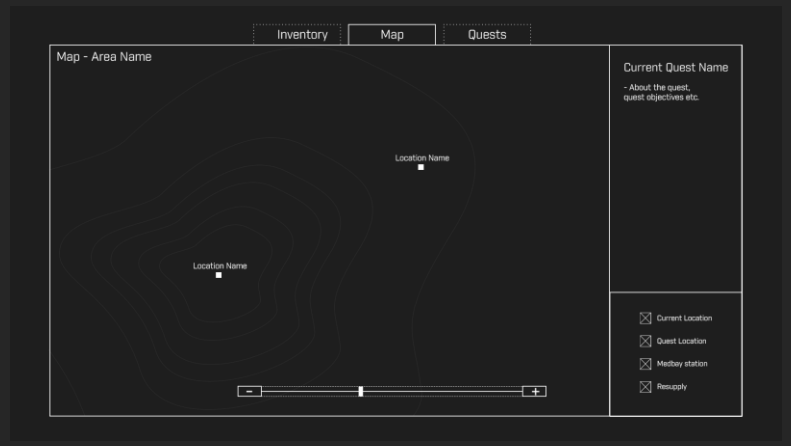
- Wireframes were created in photoshop to plan UI layouts
- Focused on adaptive design elements that show relevant information based on player context.
- Design decisions prioritised minimalism, influenced by research on HUD efficiency.

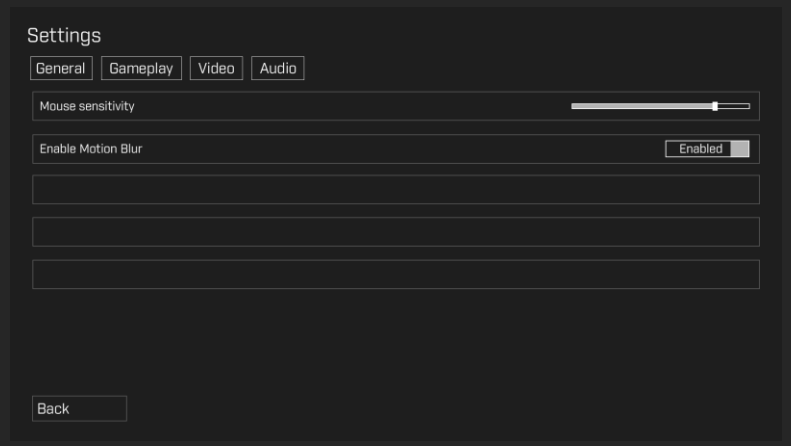
Wireframes

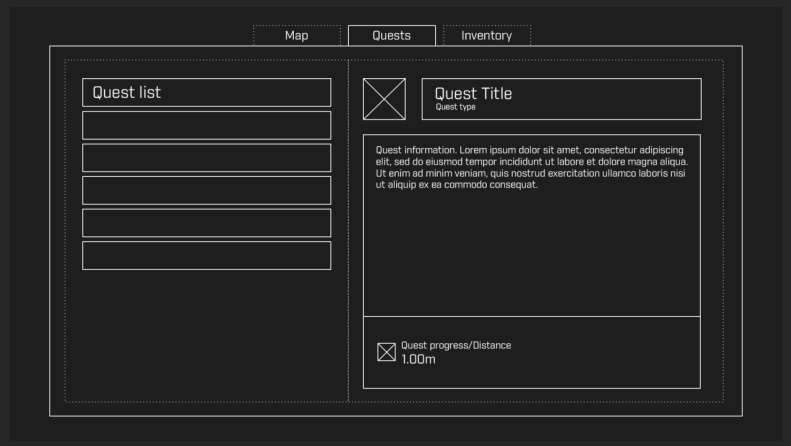
The remaining UI wireframes were designed using the same principles, prioritizing ease of information readability and usability.

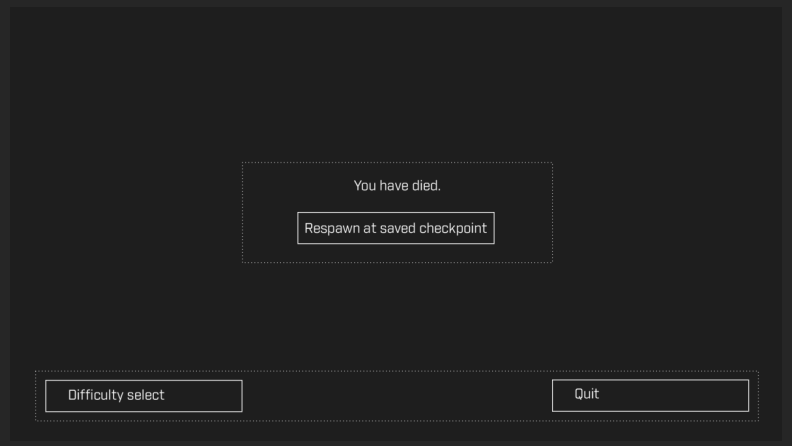
- Gestalt theory was applied to group related elements intuitively, enhancing visual hierarchy and reducing cognitive load
- F-scan reading patterns were considered to align important information with natural eye movement









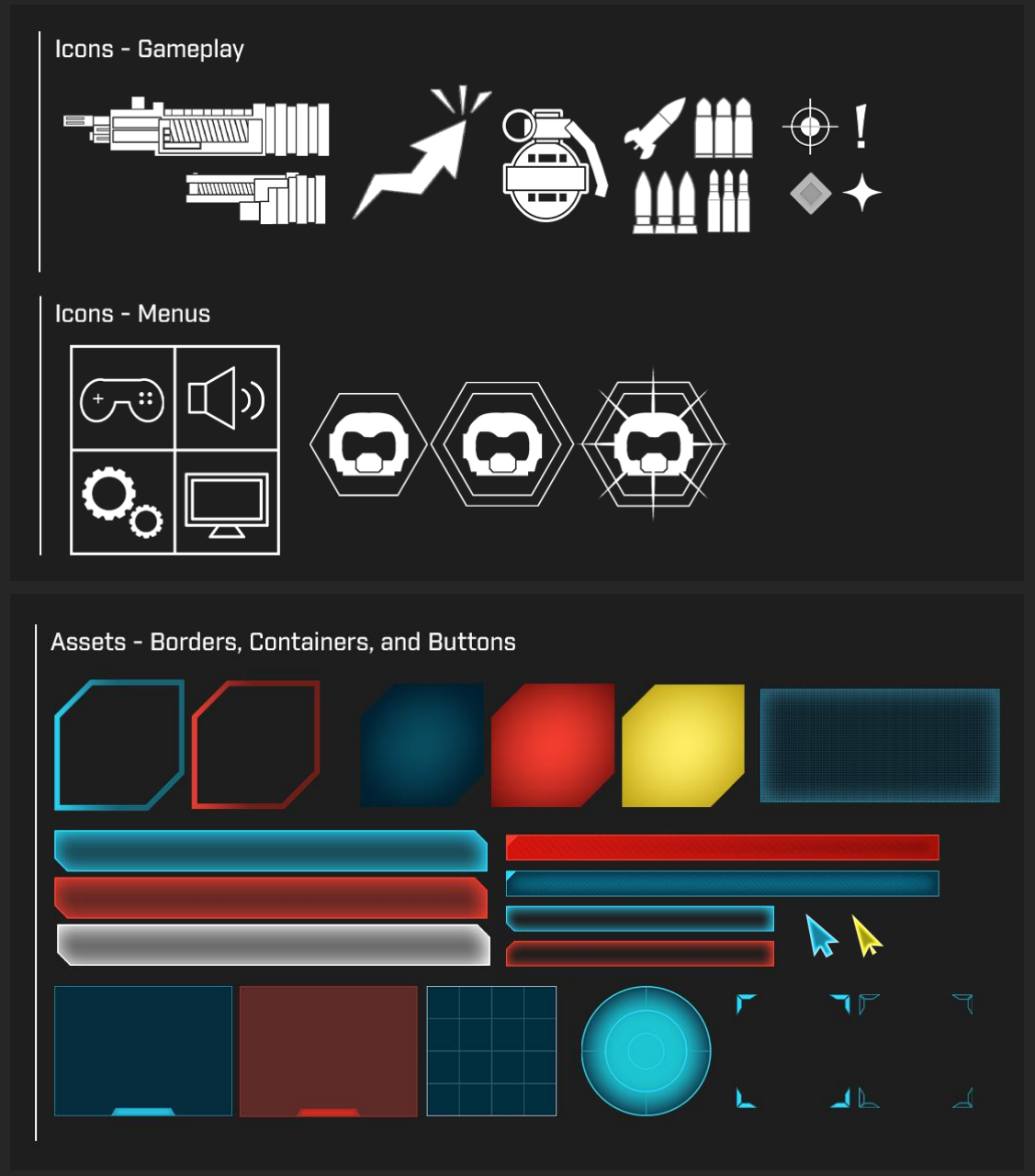


Asset Creation

- Research informed designs of the icons created for this project;
- A flat vector style was chosen for the how suitable it would be for the application of pick-up and HUD elements

Asset list includes:

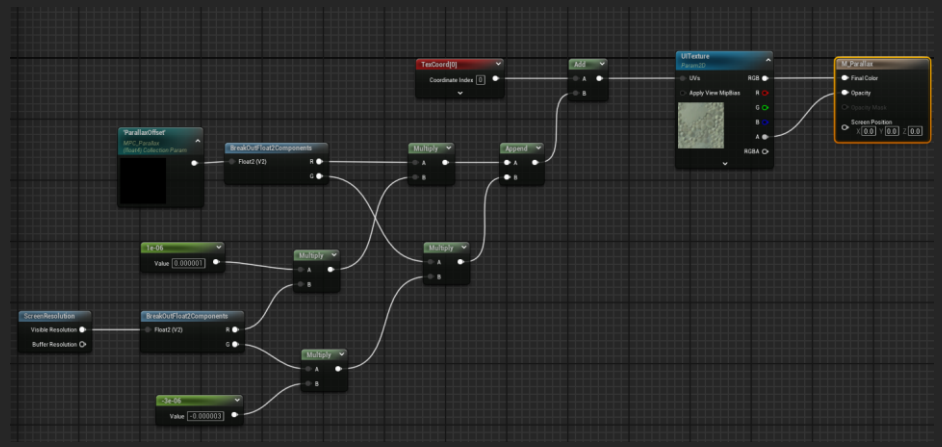
- Buttons
- Borders and backgrounds used for panels
- Progress bars
- Custom Icons
- Minimap assets (minimap texture and icons)

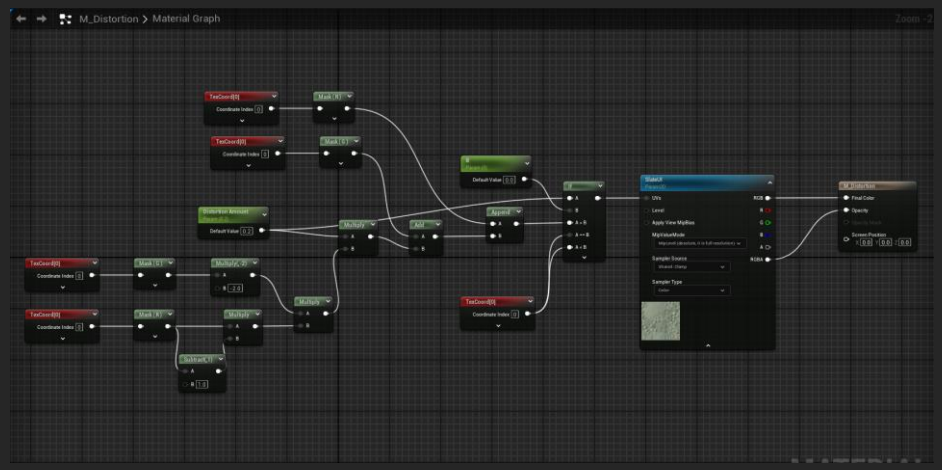


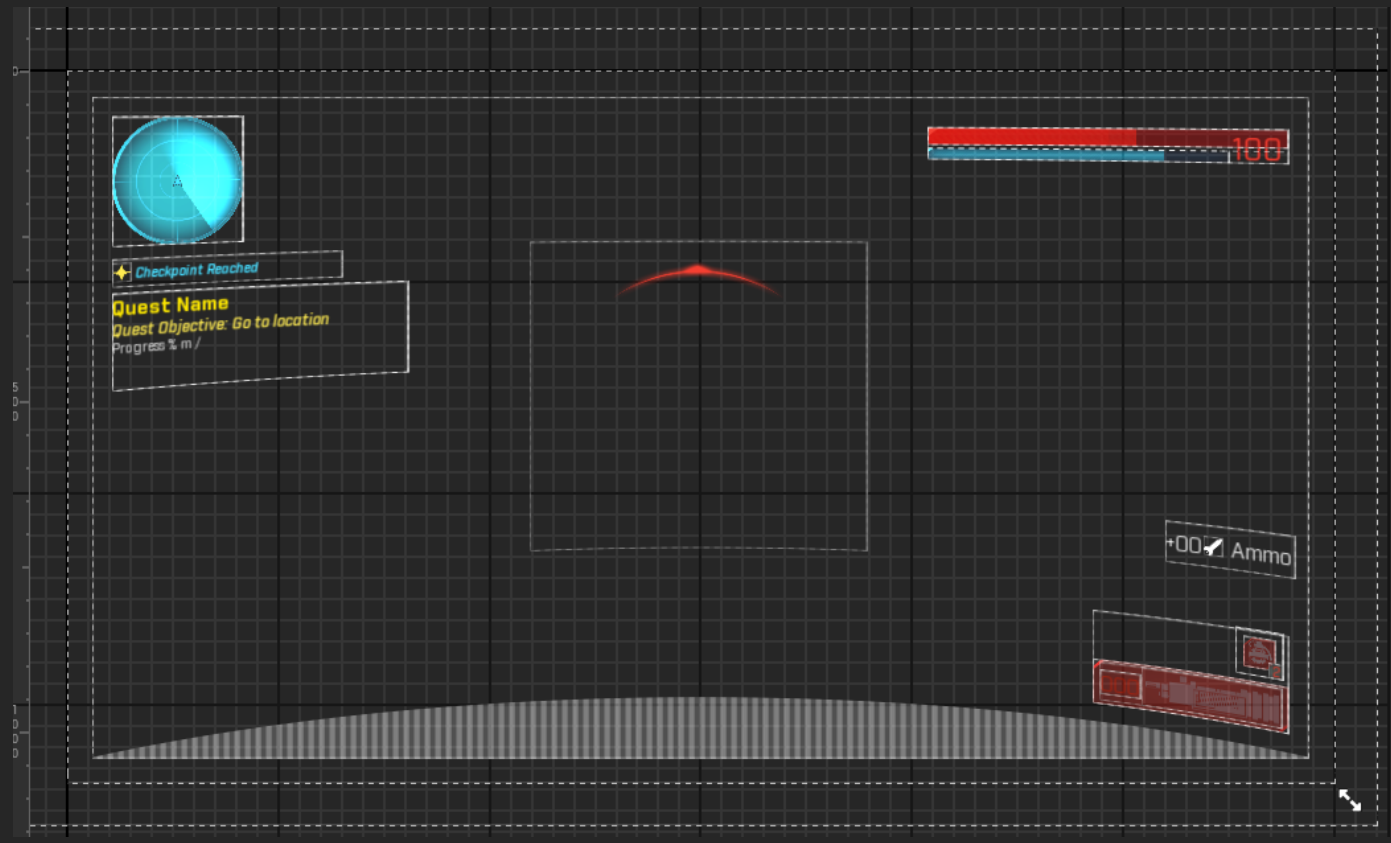
Development Pipeline

HUD Materials

- Two materials were created for the HUD. The first material creates a parallax effect for the HUD
- The second material creates a curvature distortion effect on the HUD that was commonly seen in games in my research (*Battlefield 2042* and the *Halo* Series)



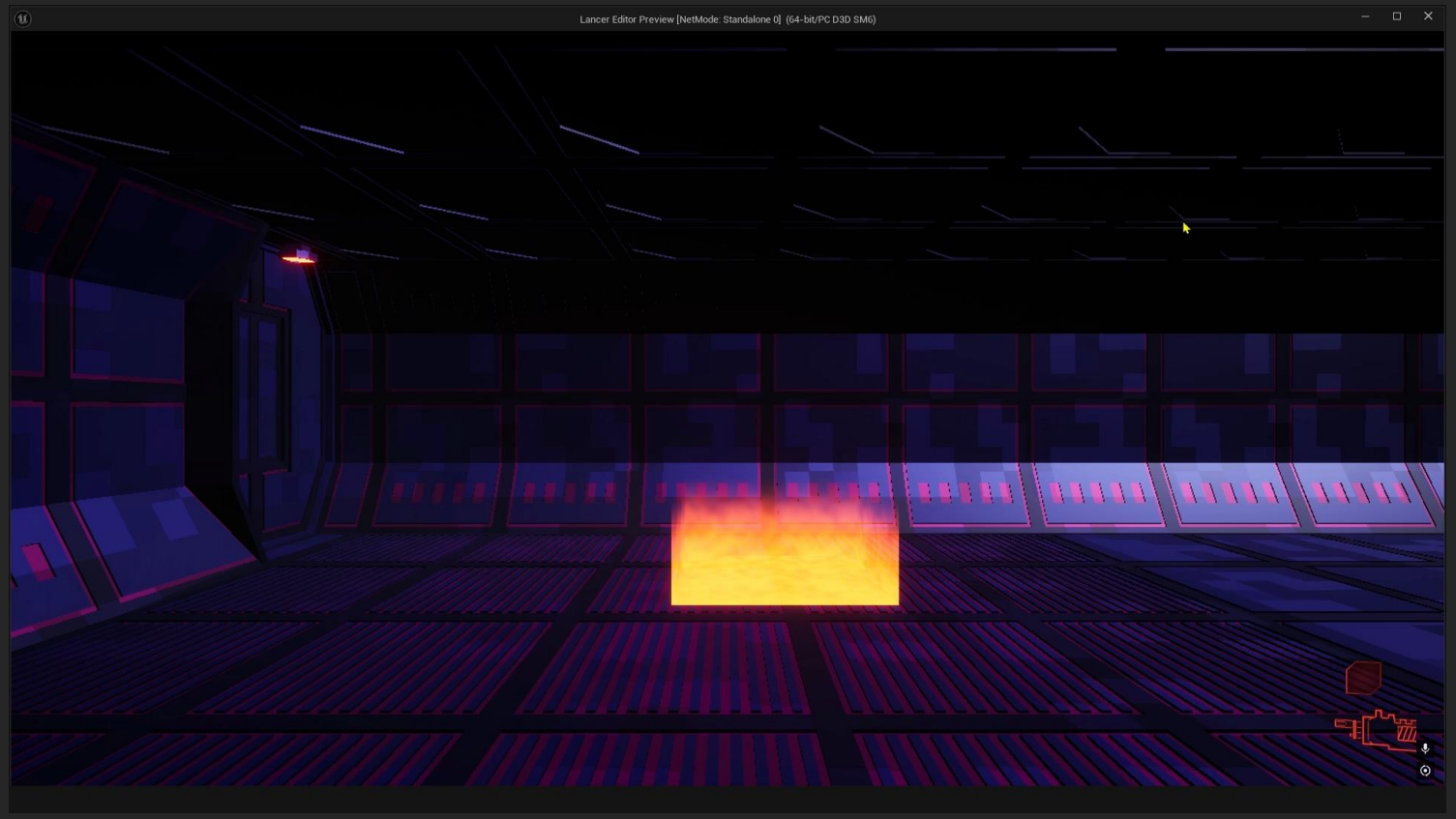




Development Pipeline

Dynamic player vitals on the HUD

- Dynamic visibility optimises screen space while providing immediate feedback
- Player vitals visibility can be toggled on/off by the user

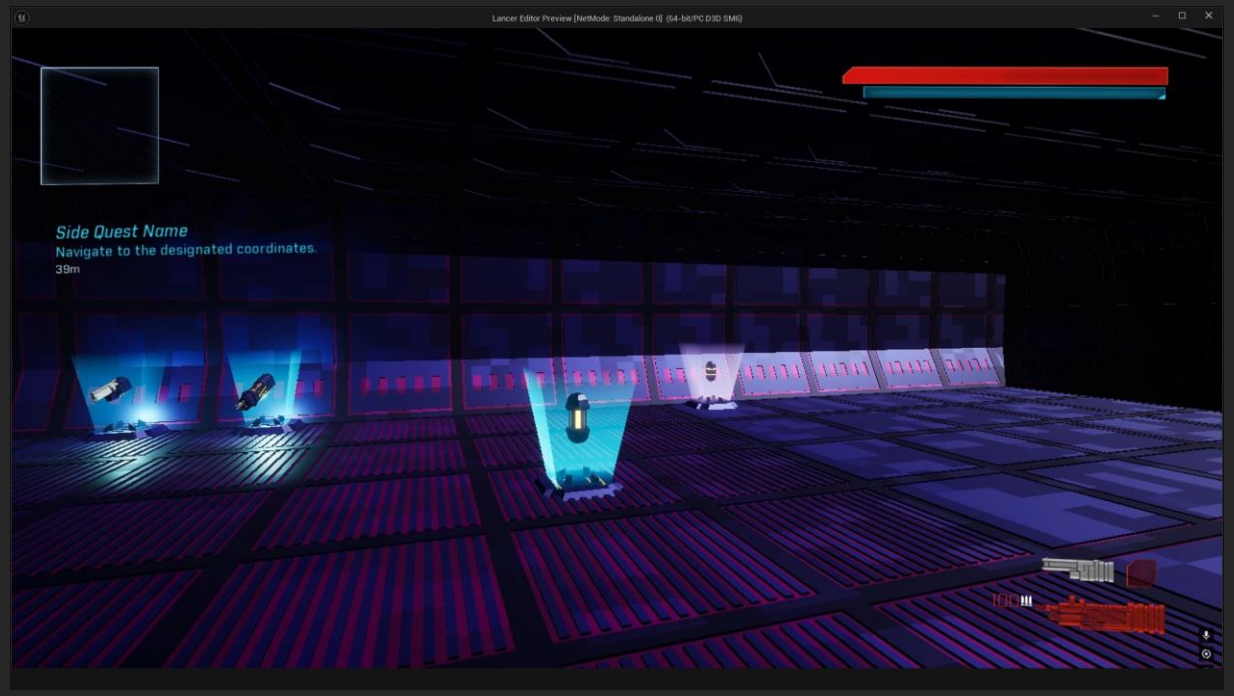


Dynamic player vitals during development showcase.

Development Pipeline

Pick-up widgets

- The initial layout featured stacked information (inspired by *Dead Space*)
- Later iterated into a more horizontal design



Initial pick-up design. Stacked Information

Iterated pick-up design. Horizontal layout

Development Pipeline

Pick-up widgets

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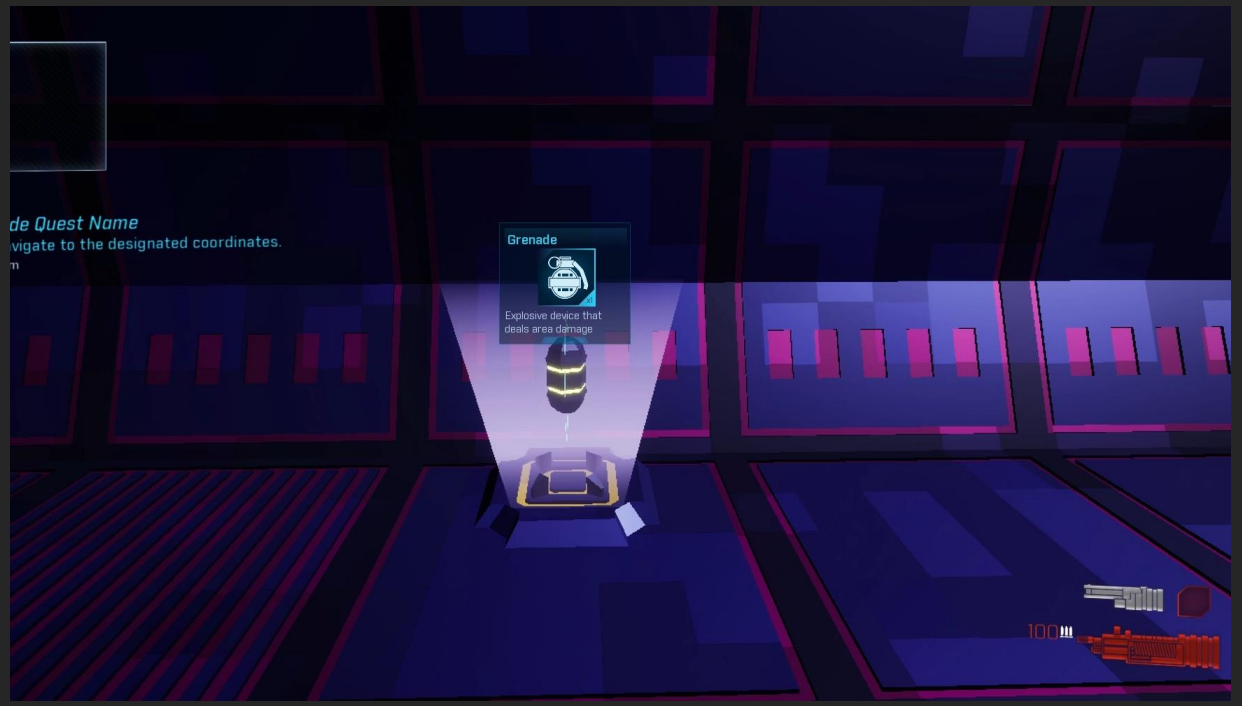
- Later iterated into a more horizontal design



Initial pick-up design. Stacked Information

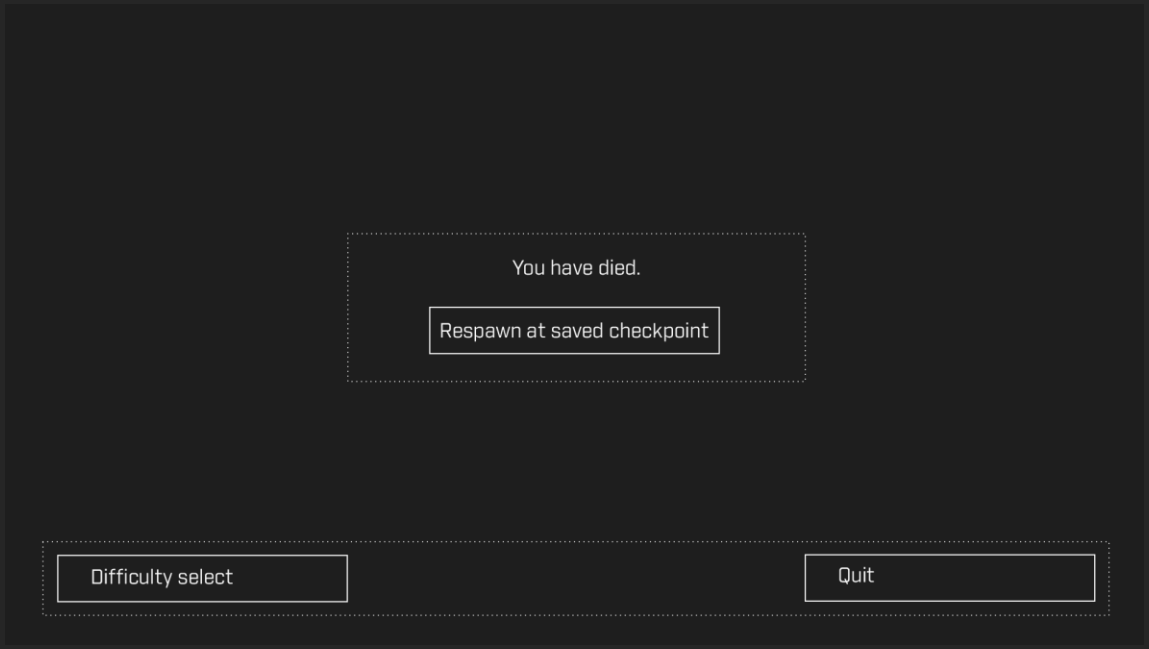
Iterated pick-up design. Horizontal layout

Development Pipeline

Death screen

- Two wireframe designs were made;
- Classic, direct layout focusing on quick information display and minimalism with no death cam
- Cinematic approach, shows the death from the perspective outside of the character and death cam shows post-death action

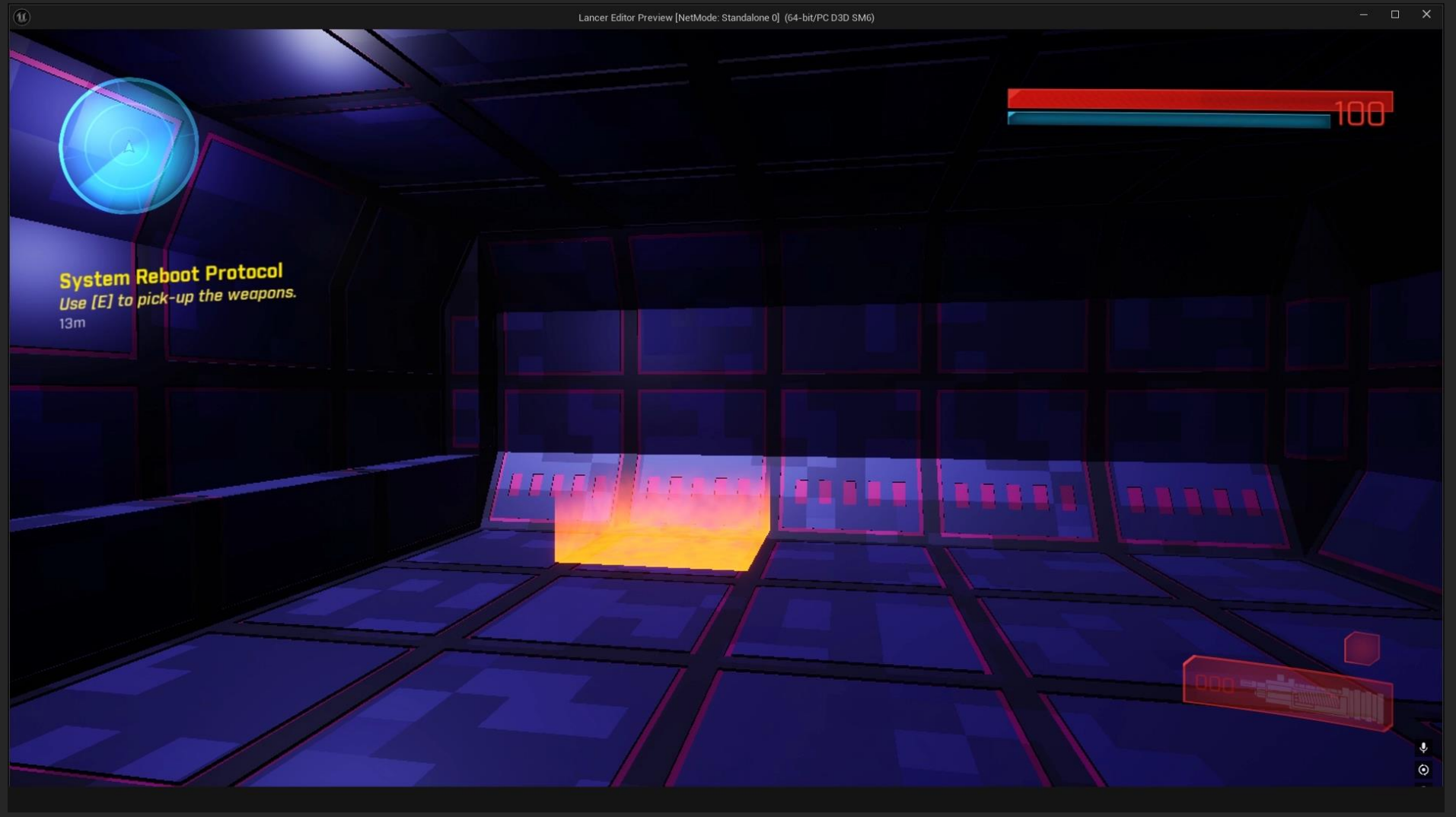
Centralised, simple death screen design.



Cinematic/death cam death screen design.

Development Pipeline

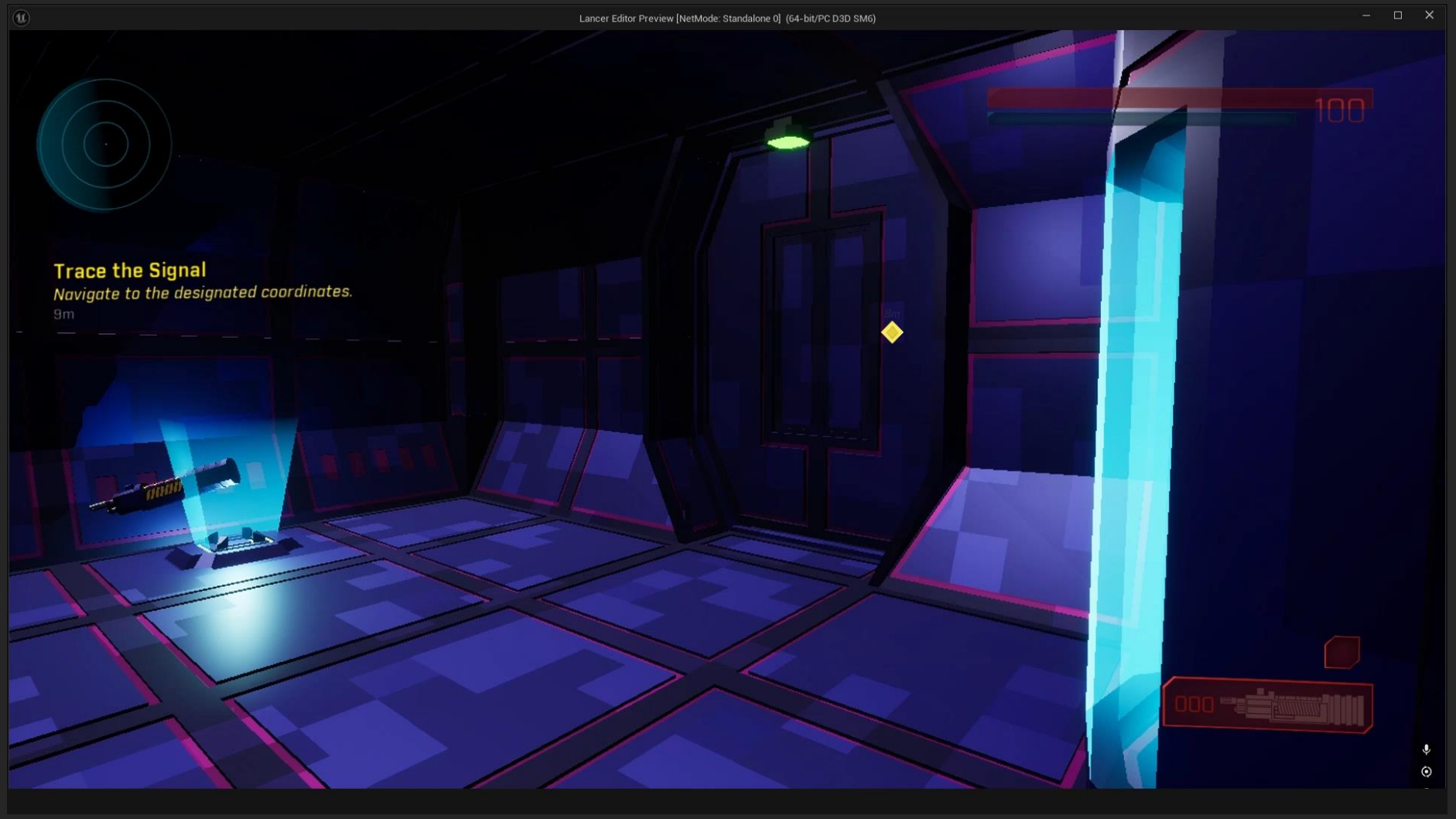
Death screen in engine implementation



Death screen implementation.

Development Pipeline

Objectives marker and quest navigation

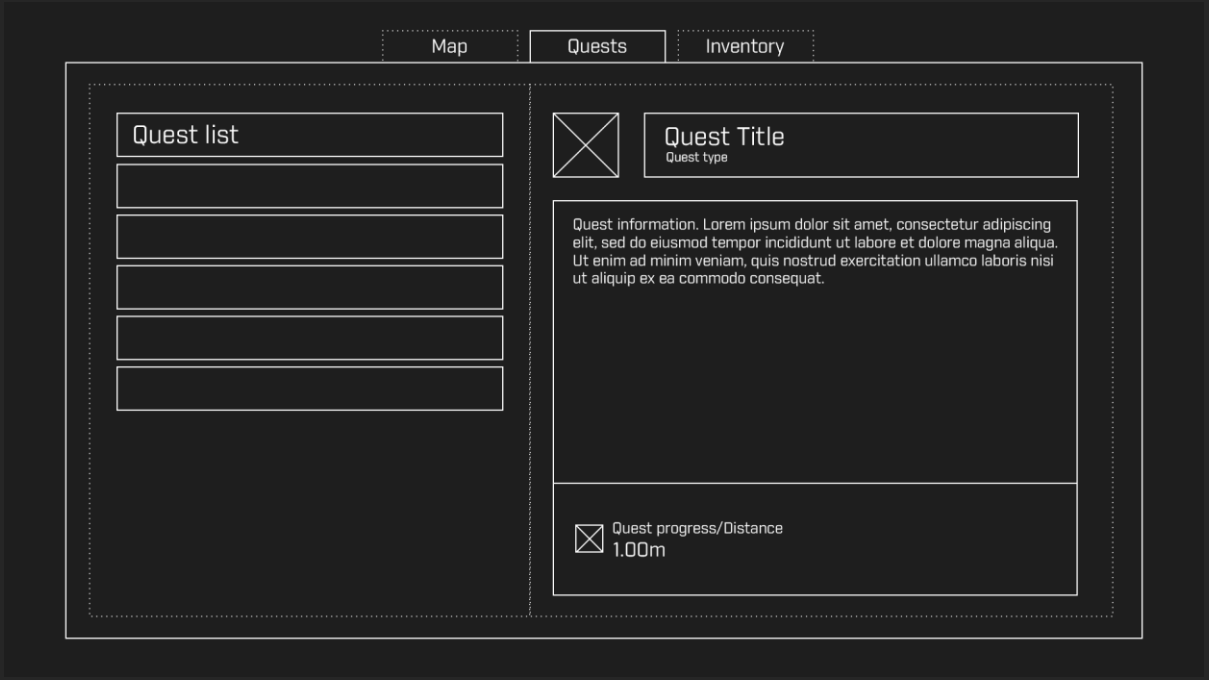


Objectives and quest navigation during development.

Development Pipeline

Objectives screen

- From the initial wireframe design, the UI layout was refined further with a focus on readability.
- Anchored, non-changing elements on the left, with dynamic objectives on the right



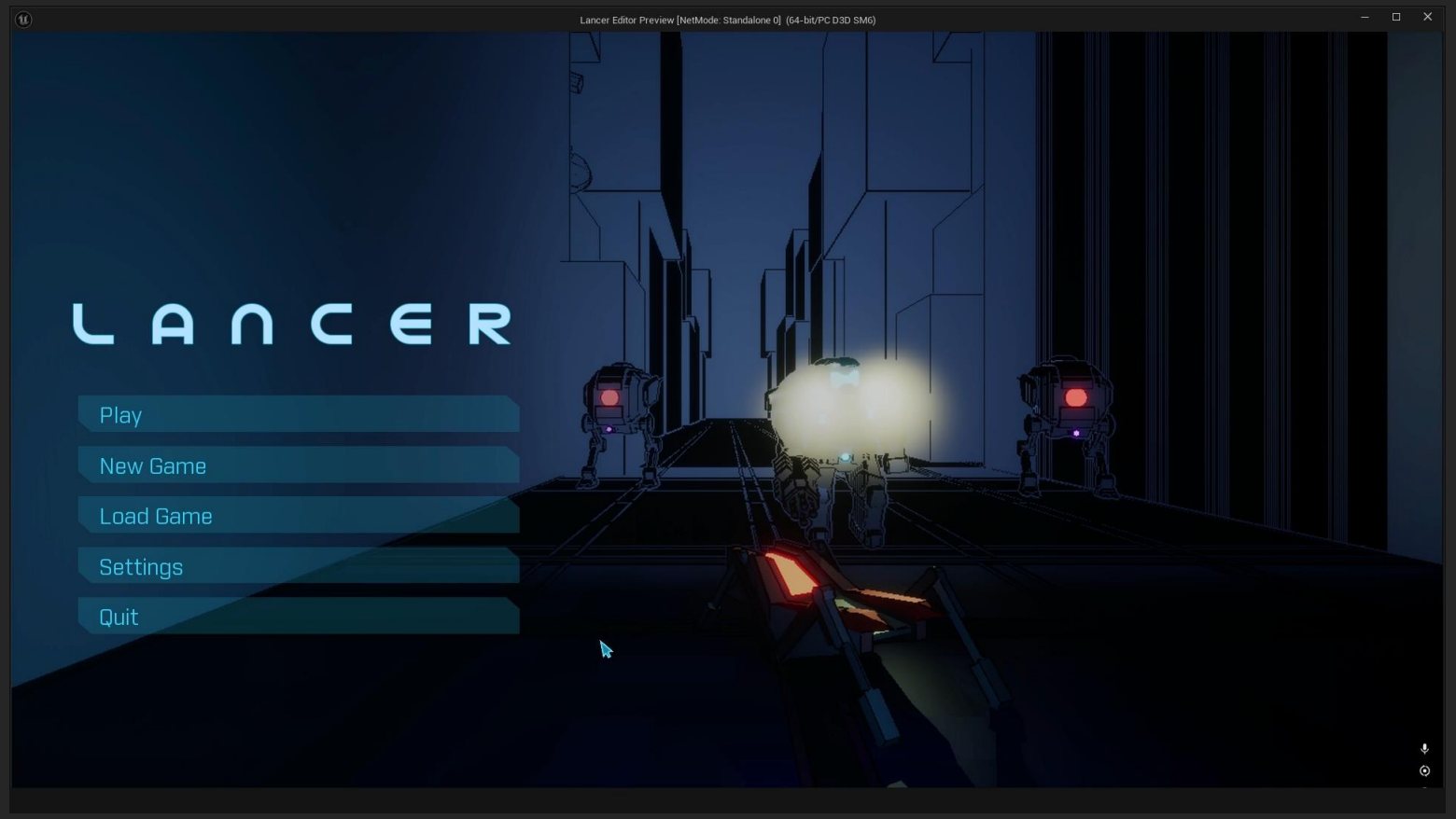
Objectives and quest screen original wireframed design.

Objectives and quest screen implementation and iteration.

Development Pipeline

Menus: settings, pause, and main menu

- Each menu follows the same visual structure, typography, and interaction patterns, ensuring intuitive navigation and seamless transitions between screens.



User testing

The first user testing session focused on gauging the impact of the UI on the gameplay experience.

Out of 5 testers:

- 100% of users found UI intuitive and easy to understand
- 100% of users felt that the HUD was not cluttered or overwhelming during gameplay
- 60% noted the UI was not confusing or unclear

Features or elements about the UI users liked the most:

- Simplicity and cohesive UI
- Animations for grenade pick-up
- Minimalistic HUD

- Overall rating 4.00☆ out of 5

User testing

Iteration based on user testing feedback:

- Weapon and pick-up feedback highlighted some confusion regarding weapon and ammo changes
- In response, adjustments were made to communicate weapon switching and ammo status changes to the player

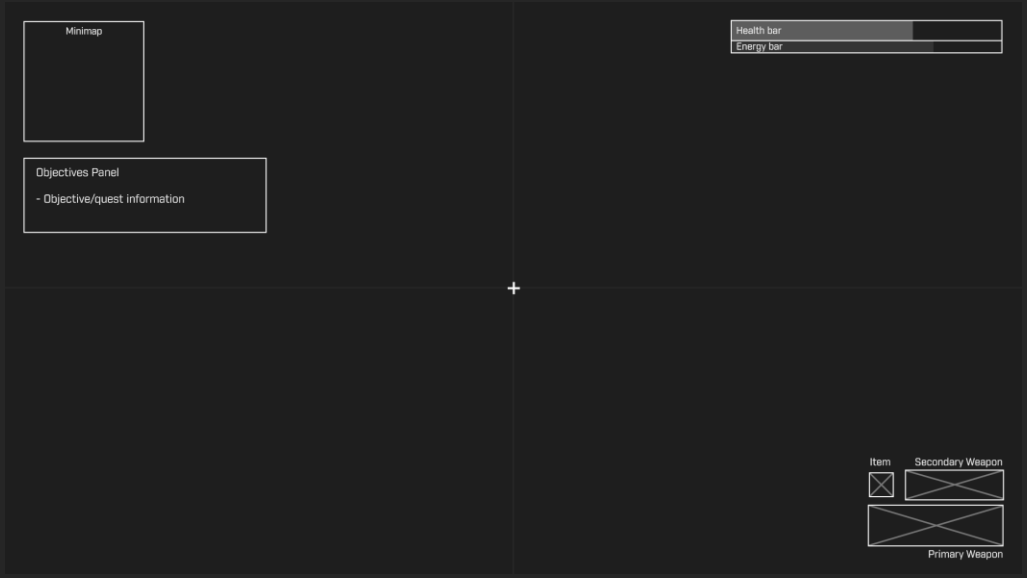
Development before first testing

Development after testing; ammo and weapon information update

User testing

Second user testing for testing HUD variations.

- As there were multiple HUD layouts designed in the early stages of this project, a different layout was tested to gather more feedback.
- 100% noted the UI was not confusing or unclear
- 40% preferred the first layout and 20% preferred the second layout (40% did not test both layouts)



First layout: Minimap left side / Vitals right side

Second layout: Minimap right side / Vitals left side

User testing

Iteration based on user testing feedback:

- Small bugs but no major issues were identified in user testing
- Iterations and refinements were made to enhance the UI cohesiveness and readability.

Development before first testing

Development after testing sessions with improvements and iteration

User testing

Final user testing feedback.

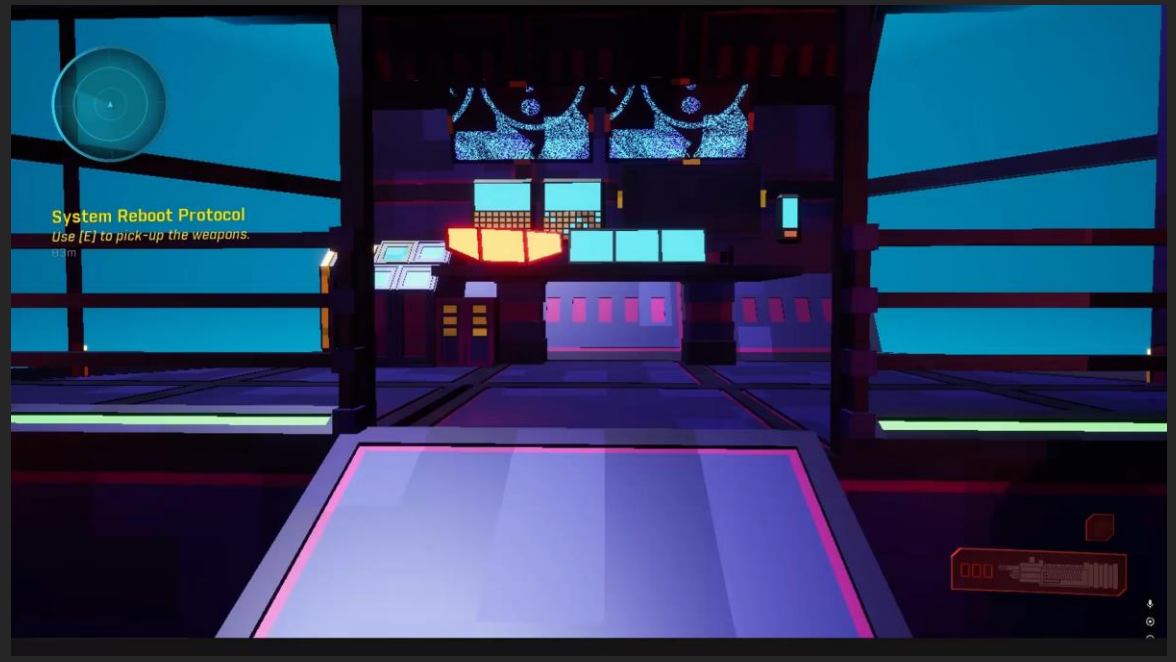
Out of 4 testers:

- 100% of users found UI intuitive and easy to understand
- 100% of users felt that the HUD was not cluttered or overwhelming during gameplay
- 50% noted the UI was not confusing or unclear
- 25% noted the UI failed to adapt
- Overall rating 4.75☆ out of 5

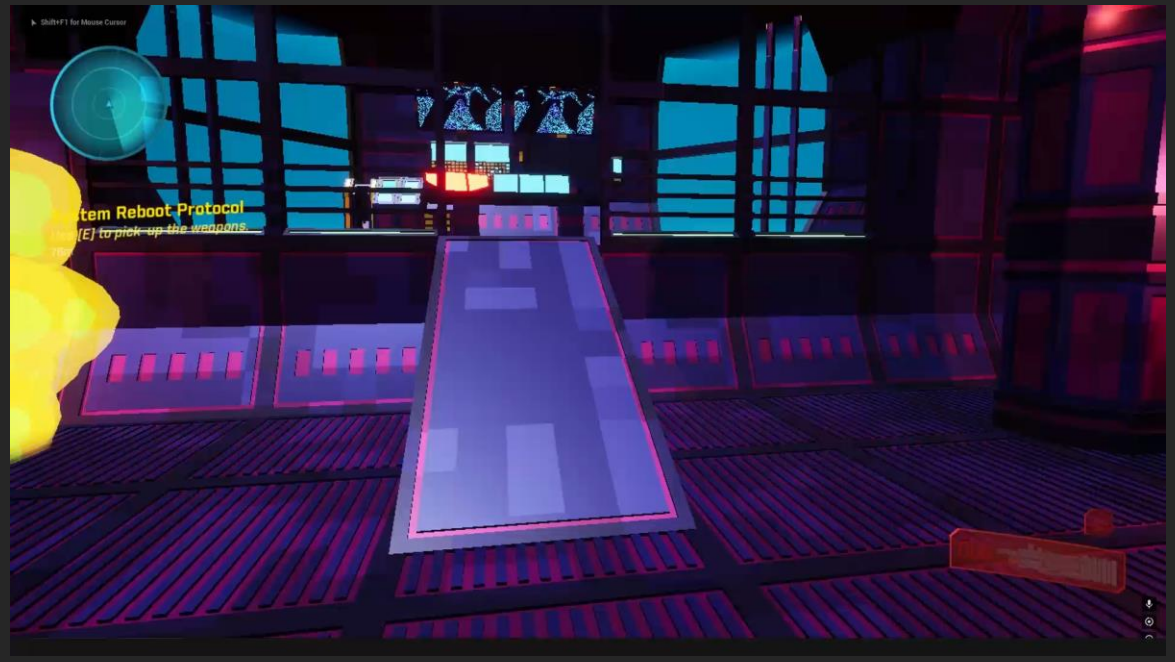
User testing

Iteration based on user testing feedback:

- Improved readability for ‘interact’ widget
- Tutorialisation implemented into the quest system

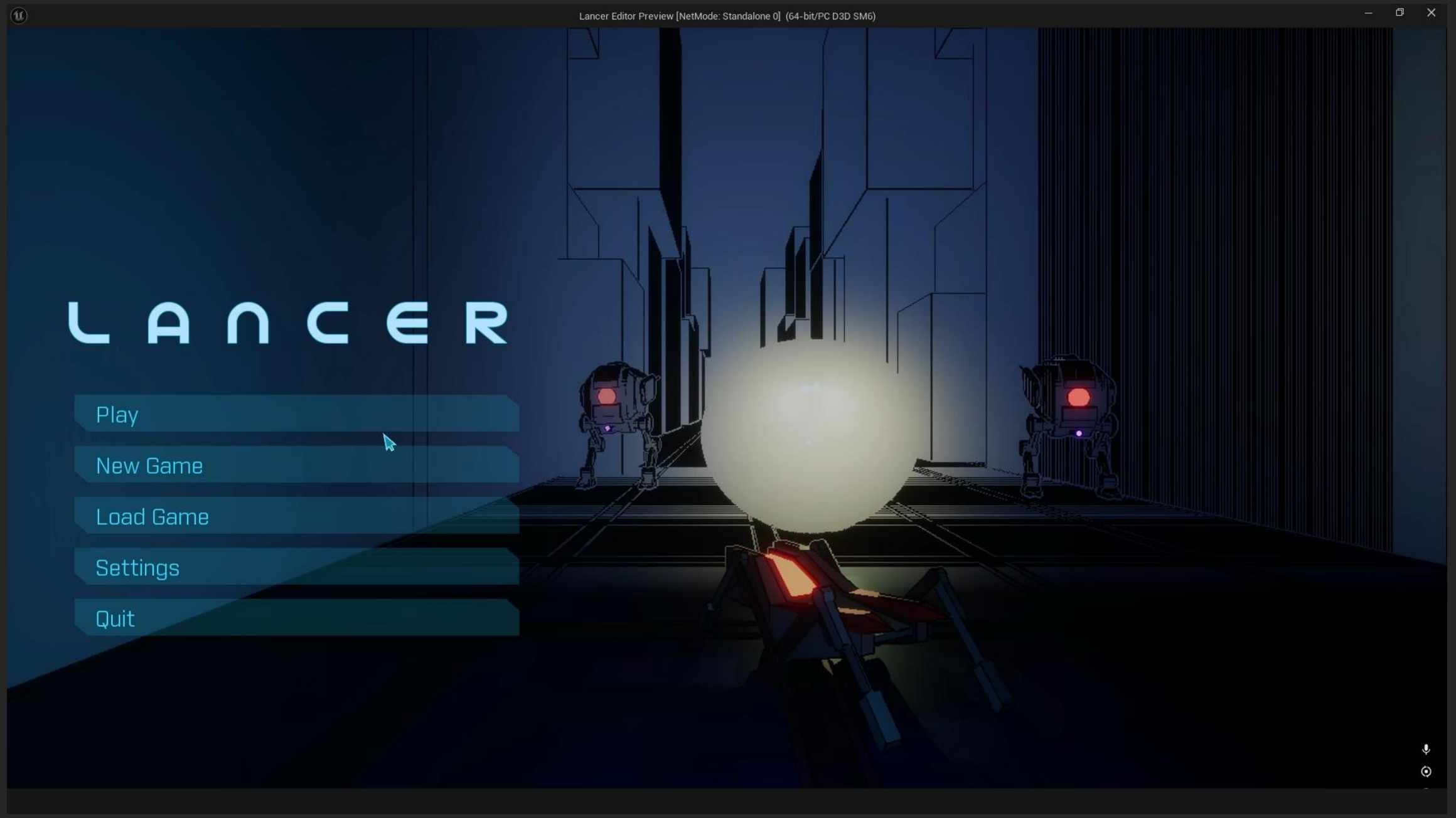


Interact widget before iteration



Interact widget after changes

Final Artefact



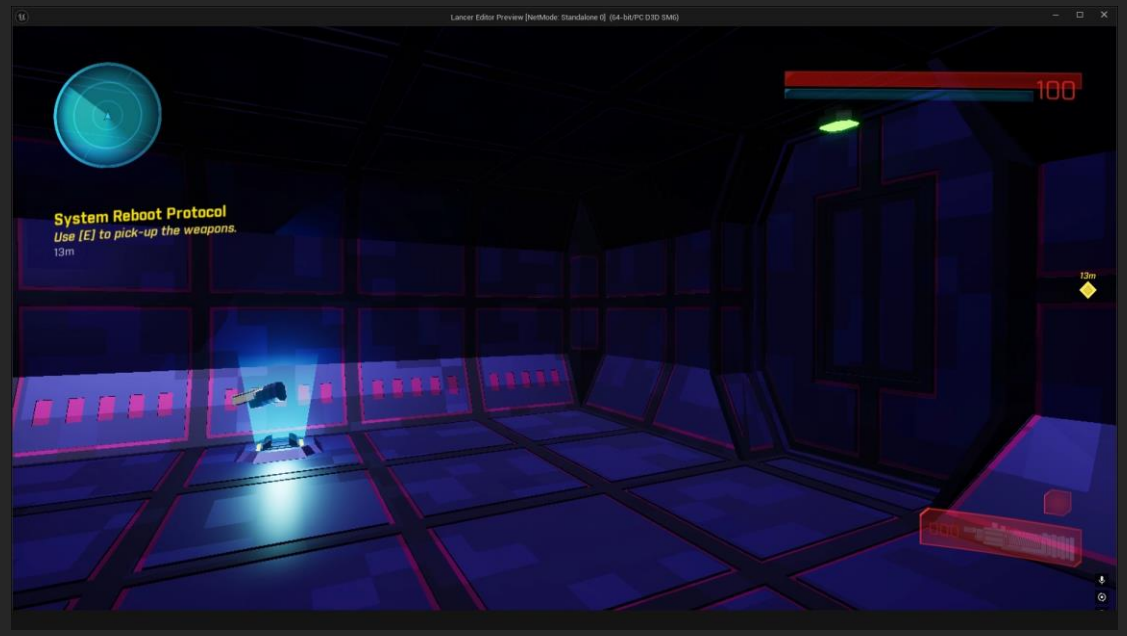
Evaluative Review

Dynamic HUD elements: aligned with practises seen I games like *Halo* and *Cyberpunk 2077*.
Areas for improvement when comparing to industry:

- Animations and responsiveness: Industry standards feature polished transitions and more responsive interactions for small details

- Possible refinement: Basic motion principles are used, but ore refind animations and micro-interactions could enhance over responsiveness and experience

Animation style references from Cyberpunk 2077



Animations in the final artefact

Evaluative Review

- This project met its original goal: improved user experience with a dynamic UI design

Areas for future development:

- Expansion of minimap and objective navigation screens for better wayfinding
- Potential UI customisation for player preferences

Key successes:

- Effective design through research, applied design principles
- Visual consistency maintained across menus and HUD, leading to an intuitive experience
- Improved designs progressively throughout development with the iterative design process

References

- 10 Usability Heuristics for User Interface Design (Jakob Nielsen, 1994)
- 7 fundamental user experience (UX) design principles (Emily Stevens, 2024)
- Battlefield 2042 (DICE, 2021)
- Cyberpunk 2077 (CD Projekt Red, 2020)
- Dead Space (Visceral Games, 2008)
- Designing Text UX for Effortless Reading (GDC, 2018)
- Doom Eternal (id Software, 2020)
- Fortnite (Epic Games, 2017)
- Halo Infinite (343 Industries, 2021)
- Halo Reach (Bungie, 2010)
- Marvel Rivals (NetEase Games, 2024)
- Mass Effect (BioWare, 2007)
- Overwatch 2 (Blizzard Entertainment, 2023)
- Robocop: Rogue City (Teyon, 2023)
- Ratchet & Clank: Rift Apart (Insomniac Games, 2021)
- Parallax HUD material (Uriah Youtube DK 3D, 2023)
- Distorted HUD material (3S Game Studio Youtube, 2021)
- Material Design (Google, n.d)
- Gestalt Principles for Visual UI Design (Jakob Nielsen, 2018)
- Text scanning patterns: Eye tracking evidence (Kara Pernice, 2019)