

Redesigning the Firing Range in Apex Legends

Abstract—This project concerns a full design lifecycle on the Firing Range within Apex Legends. Needfinding, heuristic evaluations, prototype redesign, and prototype evaluation were performed. Further design changes are suggested after consolidating feedback.

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1 INTRODUCTION

The interface I am redesigning is the 'Firing Range' presented in Apex Legends, a free-to-play battle royale-hero first person shooter (FPS) game developed by Respawn Entertainment and published by Electronic Arts. In Apex Legends, players can select from a number of modes:

- **Unranked:** Players are pitted against each other with less stringent skill-based matchmaking in a battle royale (last team to survive wins), or arenas (three versus three elimination).
- **Ranked:** The competitive ladder based mode for either the battle royale game type or the arenas game type.
- **Limited Time Modes:** Intermittent special game modes with their own unique rulesets and features
- **Firing Range:** A separate server instance that allows players to practice skills relevant to succeeding in the preceding gamemodes.

As an FPS game with an added 'hero' or legend element, players can choose unique characters with their own abilities that often augment their mobility or provide some sort of support or offensive capability. For example, the 'Pathfinder' legend can use a grappling hook to access vertical areas that other legends may not be able to get to. Players use their legends alongside equipment

found within the game world to engage other players to eliminate them whilst simultaneously ensuring they avoid taking damage from a damaging, hostile circular 'ring'. When a team is fully eliminated, the player returns to the lobby and must queue again to enter a game where they then repeat the process. Thus, beyond the battle royale game, the opportunity to practice certain skills lies solely within the Firing Range.

2 NEEDFINDING

2.1 Problem Space

As Apex Legends primarily offers player versus player (PVP) modes, the tasks the Firing Range supports are concerned with allowing the player or user to best other users in a competitive function. Much like the utilization of a court or field in physical sports like basketball or football, the firing range acts as a simulative environment in which users can drill common activities needed to succeed within the "actual" game modes. One benefit provided by software-based games and sport is that the simulative capabilities are much greater than those limited by physical constraints. However, as a battle royale game can be posited as a partially observable system much like other sports, it can be argued that providing players the opportunity to practice a potentially indefinite number of game states or scenarios is infeasible from a development perspective. Nevertheless, there are strategies and tasks that both can be simulated and players will commonly utilize to draw closer to the user's primary goal when playing Apex Legends—being the last player or squad alive and becoming the battle royale champion.

2.1 Subcomponents and Player Tasks

- *Rotating*: The concept of traversing the game arena or map to enable a better position.
- *Looting*: Players are not provided with weapons when they begin the game, thus they must efficiently find weapons and ammunition alongside armor and storage items assorted throughout the map.

- *Combat*: Perhaps the crux of any FPS battle royale: players must develop their gunplay (ability to utilize the weapons and general aiming skill) alongside their movement and positioning to win combat engagements. When players are defeated, their loot becomes available to other combatants within their 'deathboxes'. Furthermore, this is the primary way of ensuring that a player's squad draws closer to 1st place.

As the primary practice environment of Apex Legends, the Firing Range's ability to provide players the ability to practice these tasks will be assessed and the focus of the redesign.

2.1.2 User Types

Previously, the goal of Apex Legends players was vaguely defined as 'winning the game'. As such, the target demographic for needfinding is anyone who would like to improve at Apex Legends—regardless of initial player skill.

Like most competitive games, there are stratifications of skill level, and it would prove useful to engage in needfinding that discerns the goals of novice players, intermediate players, advanced players and so forth. Players have varied environments and potentially different inputs—users may use controllers or mouse and keyboard to play the game, thus mastery over these inputs is also a contextual but important aspect of improving as a player. A redesigned Firing Range should accommodate individuals regardless of input decision.

2.2 Post-Event Protocol Plan

2.2.1 What will you do?

I intend to ask players to record themselves playing the game with the intention of winning, and reviewing the VOD (video-on-demand) afterwards with the player and discussing elements of the game: their tasks, subtasks, goals during combat engagements, rotations, what they were thinking during the early, mid, and endgame phases of the match, whilst reconnecting these thoughts with the firing range and whether they felt the firing range enabled them to succeed in the many scenarios.

2.2.2 What steps will you follow and what data will you collect?

Steps:

1. Inform players to record a video of their gameplay.
2. Receive consent on recording the post-event protocol.
3. Discuss phases of the game and their thought processes, cognitive focuses, and general tasks during the game.
4. Refocus these discussions to reflect the firing range's presence in enabling and improving in these general tasks.

Data Inventory:

- *What are their needs?*
- *What are their goals?*
- *What is their context?*
- *What are their tasks?*
- *What are their subtasks?*

2.2.3 Biases

- Leading Questions : As an interviewer who has also played the game and has his own skill level, it is important to avoid embedding my potential concerns and interests in a redesign when questioning other players.
- Expectation Bias, as well as other observer-related biases: During post-event protocols, many individuals do not generally review their previous gameplay, and in the event of reviewing gameplay with another individual they may feel pressures from the interviewer to engender responses or thoughts that they may not have actually had during the game. As such it is important to ensure the participant that any degree of thought post-event is valid and considerable. Furthermore, as a player myself it is important not to review the participant's gameplay in a way that will persuade the participant to share my perspective and instead do so in a questioning, but neutral manner.

2.3 Forum Review

2.3.1 What will you do?

Review forums like the subreddit r/apexuniversity, a subreddit dedicated to improving at the game, as well as the EA forums and generalized Apex discussion boards.

2.3.2 What steps will you follow and what data will you collect?

1. Fill the same data inventory elements as the post-event protocol.
2. Review top rated posts with 'firing range' in the post body or post title.
3. Collate concerns and user motivations from the commentaries.

2.3.3 Biases

The immediate biases that come to mind are selection and expectation biases. It is important to search for firing range related commentary that is not self-selecting for negative appraisals or for those that align with my thoughts on the interface. Performing some sort of data scraping or generalized selection of results and then reviewing may assist in avoiding these biases.

2.4 Needfinding Results

2.4.1 Post-Event Protocols

The full recordings of the post-event protocols are linked within Appendix 8.1. Two post-event protocols were taken ranging from 30 minutes to one hour each. Each post-event protocol was done on an unranked battle royale game with no expectation of the user to win or lose the game.

2.4.2 Post-Event Analysis

The post-event protocols were successful in gathering an understanding of both the user's activities during the game as well as their motivations, goals, tasks, and subtasks. Depending on the player's skill level, responses were more or less complex depending on the discussed skill. Each user was asked to define the skill or task they were undertaking, asked to rate or discuss the skill as a novice, the process of improving at that skill, and how they would rate themselves at that

skill currently. Furthermore, each user then discussed how the existing interfaces-Apex Legends and the Firing Range, in specific allow the user to improve at these skills or tasks and subtasks. Overall, users described that although the game provided some basic feedback-the overall learning curve was slow and belabored. They stated that largely much of their improvement was often through brute force and rote activity, and that if there were simulative opportunities to practice certain skills that they feel the learning curve would have been much steeper had they had such an interface when they began playing the game. Generally, users also stated that they found the Firing Range to accommodate some subtasks users engage with during regular gameplay, but that the interface fails to accommodate the more complex tasks that exist during the actual game.

2.4.3 Forum Review

I searched the subreddit '/r/apexuniversity' for 'firing range' and searched by the all-time top posts and averaged the first 30 results to determine what concerns, issues, or discussions were around the Firing Range.

2.4.3 Forum Review Analysis

Generally, the forum review reflected similar concerns with the post-event protocols. Most users were of lower-medium skill level, however, many posts were user-made drills and activities to expand the utility of the 'Firing Range'. By omission, this insinuated that the current capacities and game-provided functions in the interface are not enough for users to achieve their tasks. Furthermore, general lack of customizability to address these tasks was a significant complaint. Whilst the base firing range was adequate for some simplistic tasks, users found that it did not represent the overall complexity of the game states and that the Range did not provide adequate practice.

2.5 Data Inventory

1. Who are the users?

- a. Users are any individual interested in improving at the game and practicing Apex Legends-specific skills.

2. Where are the users?

- a. Users play games on some sort of display-computer-peripheral combination. This can be on a laptop, console and monitor, PC and monitor. Furthermore, they utilize controllers or a mouse and keyboard combination.

3. What is the context of the task?

- a. The context of the task is generally isolated to the game itself—where the game takes up to 100% of the users' cognitive load.

4. What are their goals?

- a. The primary goal of users within the Firing Range is to improve in their execution of tasks necessary to win in Apex Legends.

5. What do they need?

- a. The ability to perform game specific tasks as well as feedback to determine the success of these tasks.

6. What are their tasks?

- a. Users practice repetitive inputs on their peripherals and perceive the changes in game state to determine whether they were successful.
- b. Socially, users may also enter the firing range with other players to engage in one versus one combat or to otherwise practice skills that cannot be facilitated by the existing firing range.

7. What are their subtasks?

- a. Subtasks can be described as the various independent skills users want to practice and perform. Skills related to movement, aiming or gunplay, and 'gamesense' (or general strategy related skills).

3 HEURISTIC EVALUATION

In analyzing the Firing Range, I will assess the subcomponents of gameplay where the Firing Range should minimize the difficulty curve that players encounter, or otherwise leveraging how the interface's components assist in

making the game easier to play and improve. We might assess the learning curve of the 'Firing Range' in a vacuum; that is how difficult it is to utilize the Firing Range—however, this does not on its own provide an analysis of whether the Firing Range suffices in aiding the game interface in a holistic manner. A player might be able to very quickly discern that weapons and ammunition can be equipped, and that they are able to shoot at targets presented to them—however, it must also be analyzed as to whether the targets provided provide proper expectations for actual gameplay. Does the Firing Range provide a reasonable mapping of the player's combat experience? Are there gulfs in evaluation between the activities performed in the Firing Range and the gameplay loop? These concepts are related to an interface's robustness, 'the level of support provided to the user in determining successful achievement and assessment of goals' and an interface's learnability, 'the ease with which new users can begin effective interaction and achieve maximal performance.' (Dix et al., 2004). The sub principles of each are depicted in Figure 3.0.

Table 7.1 Summary of principles affecting learnability

Principle	Definition	Related principles
Predictability	Support for the user to determine the effect of future action based on past interaction history	Operation visibility
Synthesizability	Support for the user to assess the effect of past operations on the current state	Immediate/eventual honesty
Familiarity	The extent to which a user's knowledge and experience in other real-world or computer-based domains can be applied when interacting with a new system	Guessability, affordance
Generalizability	Support for the user to extend knowledge of specific interaction within and across applications to other similar situations	—
Consistency	Likeness in input–output behavior arising from similar situations or similar task objectives	—

Table 7.3 Summary of principles affecting robustness

Principle	Definition	Related principles
Observability	Ability of the user to evaluate the internal state of the system from its perceivable representation	Browsability, static/dynamic defaults, reachability, persistence, operation visibility
Recoverability	Ability of the user to take corrective action once an error has been recognized	Reachability, forward/backward recovery, commensurate effort
Responsiveness	How the user perceives the rate of communication with the system	Stability
Task conformance	The degree to which the system services support all of the tasks the user wishes to perform and in the way that the user understands them	Task completeness, task adequacy

Figure 3.0 - *Summary of principles affecting learnability and robustness.*

Robustness and specifically the principle of task conformance is of significant measure—further defined through task completeness and task adequacy. Completeness discusses whether an interface or system can support all the tasks of interest to a user. Whereas adequacy determines whether the interface minimizes the effort of articulation and observation elements within the user-input-system-output interaction framework as depicted in Figure 3.1.

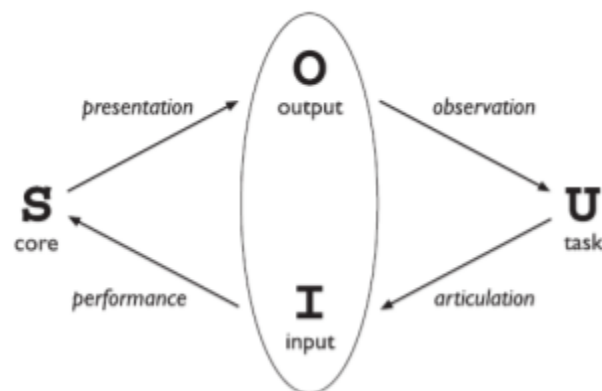


Figure 3.1-The general interaction framework with translations between components

Articulation governs the ability of the interface to provide a clear input language where the user can directly realize certain goals. Observation relates to the ease in which the system's output helps the user evaluate their inputs. An interface that does not have task adequacy or task completeness cannot be robust and thus is poorly fit to meet the users' motivations defined in the data inventory.

To begin, I will discuss subgoals or tasks present in the gameplay loop discussed in the Problem Space and assess each with attention to specific design principles.

3.1 On Rotation

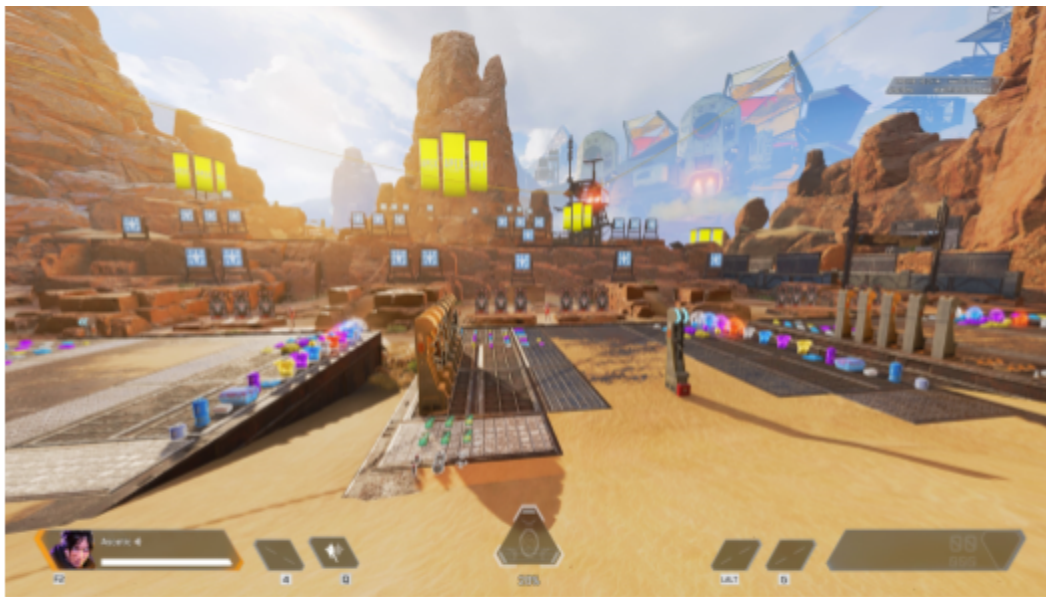


Figure 3.2-*Weapon racks and assorted loot amidst Firing Range targets.*

Rotation was previously defined as 'The concept of traversing the game arena or map to enable a better position.'

The offerings of the Range are presented in Figure 3.2. Some standstill targets, weapons, and basic challenges exist within the Firing Range, however, it does not provide any battle royale simulation functionalities. We can say that the Firing Range fails to provide task completeness in this regard as users have no way to articulate rotation based skills and subtasks within the existing interface. As

such, with regard to these rotation based tasks, the Firing is fully task incomplete.

1.2 On Looting

Described as ‘the process of acquiring equipment by locating, interacting, and equipping items found around the game world’, looting is further complicated by the existence of ‘deathboxes’--when players are defeated their equipment and inventory at the time of death is made available to those able to access it; either by standing adjacent to it or through special character abilities.

The Firing Range does have all accessible items present for the user to equip. Though there are no directives or dialogues provided in the Firing Range, there are ‘Equip’ pop ups that are displayed when the player is in range. Defined at its most generalizable, looting can be described as moving the cursor and/or pressing the equipment interaction button. However, one of the most important tasks of a user during combat scenarios is looting from player death boxes amidst combat, and performing an ‘armor swap’. There are no ways to simulate deathboxes in the current Firing Range, and as the deathbox has a unique inventory menu, it cannot be discovered through the Firing Range, as seen in Figure 3.3.

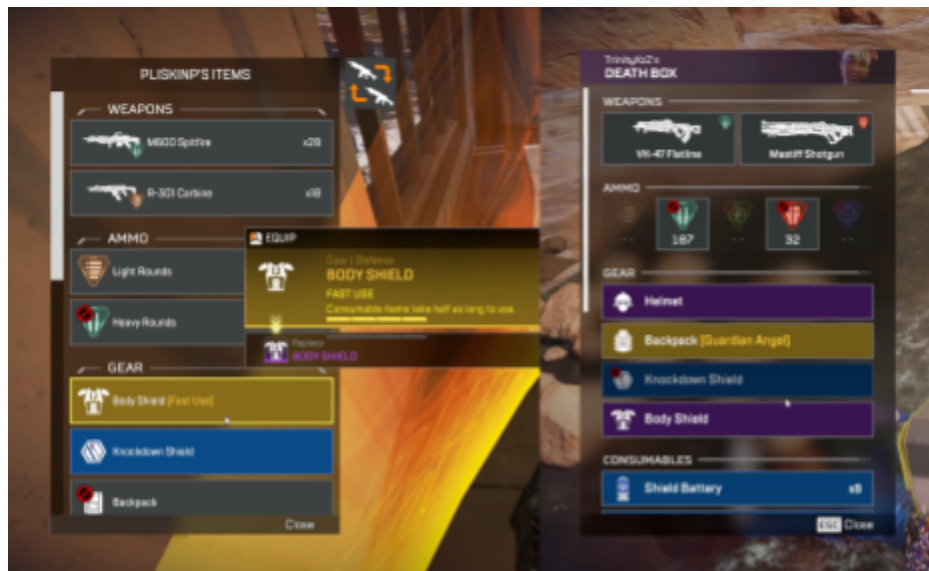


Figure 3.3 - The previous ‘deathbox’ user interface alongside the current ‘body shield’, or armor UI placement.

Here, the Firing Range can be said to be weakly robust:

- *Recoverability*-If a user picks up something wrong, it is straightforward to pick up another item or weapon. Similarly, the inventory displays how to drop items on mouseover. This is equivalent to the actual game's looting mechanic.
- *Responsiveness*-Inventory is updated immediately and replicates the actual interaction speed in-game with concessions to network latency.
- *Task conformance*- There is high task adequacy with regard to basic looting, however, the Firing Range fails to provide task completeness and as such has no adequacy for a missing task.

Overall, the Firing Range could use improvement in enabling user-relevant tasks and suffers from lack of simulative capabilities.

1.3 On Combat

Combat: Perhaps the crux of any FPS battle royale: players must develop their gunplay (ability to utilize the weapons and general aiming skill) alongside their movement and positioning to win combat engagements. Furthermore, this is the primary way of ensuring that a player's squad draws closer to 1st place.

The current Firing Range provides a few general target modalities for the user and player to improve their gunskill. There are humanoid, flattening, and square targets seen in Figure 3.4. There are rectangular targets that are either immobile, or moving left to right at fixed speeds. Lastly, there are some additional generic firing targets that will collapse momentarily after being struck once.



Figure 3.4 *The dummy, flattening targets, and square targets.*

For combat purposes, the Firing Range provides nothing to maximize the learning curve beyond the most novice of players. As a partially observable game, Apex Legends pits players in potentially an innumerable number of game states-the permutations of player position, health status, weapon types, inventory status, ring state and more can all complicate the possible game scenarios. Nevertheless, as an FPS game, much of a user's success and game state will be driven by their executive abilities relevant to aiming and moving in manners superior to others. This can be as simple as hitting more shots on an enemy player's head hitbox, or by outmaneuvering in ways that the other players are unable to hit the player. In all of these regards the Firing Range fails to provide any simulations whether coarse or fine. Targets cannot be made to shoot back, they do not share similar hitboxes to legends, and they do not perform different or randomized strafing and combat maneuvers. Similarly, from the user's perspective there are no indicators to assist the player in understanding advanced maneuvers. There are certain techniques like 'supergliding', 'wall jumping', 'door play' (efficiently utilizing interactable doors during combat for cover), and more that have no representations or signifiers to suggest what the

game itself affords. Some of these skills or subtasks can be performed in the Firing Range, however, they must be learned or recognized elsewhere.

Overall, we can say that the Firing Range fails to be robust in any regard to combat beyond the most novice task expressions.

1.4 Summation

Below is an assessment of each of the principles relevant to learnability and robustness.

Learnability

Predictability: The Firing Range does act like the regular game in that actions have immediate noticeable effects and the game state is displayed accordingly through the user's monitor. However, in the notion of knowing which operations can be performed next, or operation visibility, the Firing Range does not provide a good understanding of what users can do. They are limited to their existing understanding of the system image and mental model of what can be done next within the free reins of the Firing Range and their trial and error.

Synthesizability: Arguably, the Firing Range instance as an interface does provide the user the understanding of how user operations affect the system state. Inputting certain movements and attacking certain targets is met with expected behaviors of maneuvering or destroying targets.

Familiarity: Although Apex Legends has its own idiosyncratic tasks and capacities, users *can* largely understand how to use the Firing Range without accommodating text. Knowing what a Firing Range informs the player that it affords some degree of aim-based practice.

Generalizability: Players can quickly generalize basic movements into combinations that will further complexify the potential tasks that can be achieved. A new user may recognize that sliding can be chained into a jump and that this newly obtained skill might benefit in traversing terrain or obstacles in the actual battle royale game. Furthermore, many underlying sub tasks and goals like 'defeating the enemy player', can largely be achieved through varying

means. Tasks performed in the Firing Range do generalize to elements of the battle royale game to varying degrees—looting is generalizable, hero/legend skill usage is generalizable, aim practice is less generalizable.

Consistency: The Firing Range can be argued to be consistent. Actions performed will largely have the same result over hundreds or thousands of iterations; deviations that occur are usually user error rather than design-related issues.

Robustness

Observability: Like mentioned in predictability, the lack of operation visibility constrains the Firing Range's ability to provide proper task completeness as described later. Many game states and skills, whether it be character movement or enemy movement patterns are unknown to the player until encountered within the battle royale gamemode. The Firing Range's lack of customizability ensures that players can only reach certain end behaviors through effort of their own rather than through the interface.

Recoverability: There is some inherent recoverability in system state available to the user due to the sandbox nature of the Firing Range. Users can repeat training related tasks if errors occur.

Responsiveness: The Firing Range has immediate response times on key presses and player input activity.

Task conformance: Although there have been concessions that the Firing Range is weakly robust in some principles, and generally provides the user some task adequacy with regards to basic tasks—it is evident with further analysis that the Firing Range lacks the task completeness to properly provide players an adequate model-world metaphor that players would need to succeed in the actual game (Hutchins et al.,1986). Though the interface succeeds in introducing preliminary tasks and basic interactions, it offers no assistance in steepening or improving the learning curve by forcing users to learn skills from extraneous forums, practicing them in the actual competitive game state, and other auxiliary methods of 'learning the game'. In certain areas, there are infinite gulfs or distances in execution and evaluation as the player simply cannot articulate and

perform certain tasks and skills to practice because the interface does not provide enough simulative opportunities to the user.

4 INTERFACE REDESIGN

As an interface within a closed-source game, generating a medium to high-fidelity prototype was created using Figma and DaVinci Resolve to mockup potential additions to the existing Firing Range. The full prototype video can be viewed in Appendix 8.2. Additional expanded UI menus were added, whereas simulative environments were added or mocked up using video-edited footage of the existing game or an Apex Legends mod called R5 Reloaded. To limit the large amount of subtasks a user can perform within Apex Legends, a subset of the simulated environments were presented. Two new features, the 'Custom Game', and 'Skill Training' were added to the existing Firing Range menu. Users can now enter a custom game where they can either Free Roam or play against bots and further customize the game environment to simulate battle royale elements. Skill Training offers guided and directed practice to practice certain combat related scenarios currently unavailable in the existing firing range.

5 INTERFACE JUSTIFICATION

Much of the issues defined in needfinding and the heuristic evaluation were the limited task completeness and robustness within the Firing Range to adequately map user motivations with the functions of the interface. The Firing Range was somewhat capable of meeting users' desires to improve at certain skills like practicing recoil control or aiming, but either eschewed completely certain skills like 'armor swapping' and gamesense related components like 'rotating' or 'positioning', or failed to adequately meet the needs of users with different expertise levels. In other words, the interface was only superficially task adequate—users could practice with great synthesizability and predictability only the most basic of tasks. The learning curve was thus high when practicing things like basic looting interactions or practicing standstill recoil control. However, once these basic skills were learned, issues arised. For players wishing to grow into the intermediate or advanced states, the skills required were neither described by the Firing Range nor were the users informed how to perform more

complex interactions possible within the Firing Range or Apex Legends at large. The goal was thus to add new features rather than eliminate existing ones in order to provide a higher degree of learnability and greater task completeness. Users stated that early on they would use the Firing Range, until it did not meet their needs sufficiently.

Regarding the 'Custom Game' feature, the prototype gives users the ability to practice a more direct version of the battle royale game. Similar to playing chess vs an AI, the custom game gives players the options to control more of the variable and probabilistic game states—users can practice under game-like situations and can now practice elements of the game previously unavailable without actively engaging other players. This feature grows the task completeness of the Firing Range and mitigates most concerns with missing or unavailable practice tasks.

Regarding the 'Skill Training' feature, the prototype both displays various skills and tasks the user can engage with, whilst also providing an example and opportunity to practice this skill in rote. This both improves the operation visibility, in which users now have a greater sensibility of what operations can be done within Apex Legends, as well as the task conformance. Users now can directly perform the tasks they wish to perform and get feedback on whether or not they were successful—performance in the skill training drills is garnered by increased accuracy when striking the targets, or visual success when performing certain movements.

6 EVALUATION

As I am introducing wholly new features to an existing interface, I intend to perform a qualitative interview reviewing the video prototype and getting insight on whether the learnability and robustness issues were adequately addressed, and if not where the prototype could be improved.

6.1 Evaluation Plan

- Demographics

- The primary demographic is any individual who plays Apex Legends using either controller or mouse and keyboard.
- Recruitment Method
 - Recruitment will be done across a select set of friends contacted online who use Discord in varying levels of capacity, as the prototype should suffice regardless of the user's expertise-though with varied reception.
- Location of Evaluation:
 - Interviews will be performed over VOIP utilizing Discord through the video prototype screenshared within a voice call.
- Recorded?
 - I will inform participants that the contents of the interview will be recorded using Nvidia Shadowplay.

6.1.2 Interview Questions:

Generally the approach will be a semi-structured interview to allow the interviewee to expand on tangents (controlled by the interviewer to the extent that the interview does not escape the subject at hand), that may allude to further evaluative concerns as well as potential need-finding for future reiteration.

Questions:

1. What is your background with Apex Legends–time played and self-rated level of expertise?
2. How often did you or do you use the Firing Range compared to your overall time spent playing the game?
3. What sort of things do you like about this interface compared to the existing interface?
4. What things do you dislike, or would you prefer to see expanded on?

5. If you had this interface when you were a novice user or player, would you have utilized the Firing Range more?

6.1.3 Discussion of Requirements and Data Inventory

The primary concern is to glean from the interviewees whether or not the prototype meets the learnability and robustness issues defined in the heuristic evaluation and needfinding.

Data Inventory:

- To what extent do the interviewee's comments depict changes in present goals, subtasks, and tasks as we are now introducing new features to an existing interface?

6.2 Evaluation Results

6.2.1 Evaluation Proceedings and Raw Results

Three interviews were done at each stratum of skill level-beginner, intermediate, and advanced. Interviews were held whilst the interviewee viewed the elements of the prototype and were given free rein to comment on elements or serendipitous thoughts. Each interview was recorded using Shadowplay with interviewee consent and uploaded to an unlisted YouTube channel and anonymized to protect personal information.

The raw results are present in Appendix 8.3.

6.2.2 Evaluation Analysis

Largely, evaluation was positive across the board. Participants stated that if the prototype were to replace the existing interface, they would both spend more time utilizing the interface and would be more willing to recommend it to new players. Furthermore, they stated that they felt they would have reached their current skill level and expertise earlier had they had access to the existing interface.

The singular point of improvement was to introduce further customizability features and/or to make them more clear if they were afforded by the new interface. Some designer-sided difficulties were present in that I found it difficult to mock up certain simulative elements without having access to the game code itself and was thus required to create accommodating features. Nevertheless, users did positively rate the additional UI menus and functions. Overall, participants felt that the new prototype alleviated the learnability and robustness concerns present in the existing interface.

6.2.3 Suggested Changes

Further intermediate UI menus and explanatory or hover tooltips could be useful to have more direct engagement between the user and the tasks they want to perform within the Firing Range. Similarly, a customization menu for the 'Custom Game' mode to better represent the options the interface provides to the user. For the 'Skill Training' menu, a redesign could be used to make it more clear what skills can be performed, alongside consolidating customization of what the enemy bot will do. For movement related skills, adding the proper keystroke order would let users know exactly how to perform certain movements.

7 REFERENCES

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2. E. L. Hutchins, J. D. Hollan and D. A. Norman (1986). Direct manipulation interfaces. In D. A. Norman and S. W. Draper, editors, *User Centered System Design*, pages 87–124. Lawrence Erlbaum Associates
3. Respawn (2019). *Apex Legends*. Electronic Arts.

8 APPENDIX

8.1 Post-Event Protocols

1. [Beginner PEP](#)
2. [Intermediate/Advanced PEP](#)

8.2 Video Prototype

1. [Prototype](#)

8.3 Evaluation Interviews

1. [Beginner Evaluation](#)
2. [Intermediate Evaluation](#)
3. [Advanced Evaluation](#)