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Fantasy Onboarding: a web-based application design for novice Fantasy Sports player

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Abstract

The sports industry is an important part of modern service, and consuming sports has become a recreational activity for all. In recent years, traditional sports consumption behaviour has changed, and fantasy sports have rapidly become popular, with more and more people actively participating in this activity. However, little research has been done to explore the new fantasy sports player demographic. This dissertation first investigates the factors that may influence new players to enter the world of fantasy sports, explores the motivations of fantasy sports players and designs a prototype online game, "Fantasy Onboarding", based on a fantasy sports game mod for new players with no experience in fantasy sports. The game supports basic fantasy sports gameplay and improves the UI interface, online draft and prediction features to make it more accessible to new players.

Keywords: Novice gameplay, fantasy sports, prototype design

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1. Introduction

A new report by Market Decipher estimates the size of the fantasy sports industry at US$21.46 billion in 2021 and forecasts it to reach US$92.61 billion by 2032 (Marketdecipher [no date]). Although fantasy sports existed in the traditional pen and paper format as far back as the 1960s, the development of the internet has allowed fantasy sports to be no longer confined to a location and fantasy sports are rapidly becoming popular. Fantasy sports allow players to take on the role of a team manager and select real-world players for their team through a draft. Players compete directly with other players at the start of the season or against players in their league, and are awarded points based on the athletes' performance and stats in real games (Schmierbach et al. 2014). Research shows that fantasy sports can increase consumer interest in sports, bringing in more immersed and engaged consumers (Shipman 2000).

In the last decade, fantasy sports have often been a reference model for educational tools in many other fields. SILSBEE (2016) used fantasy sports as a pedagogical tool for students learning English, introducing it into the classroom to facilitate communication between classmates. Motz (2013) argued that fantasy football is a powerful tool for educational reform in statistics, a positive and effective statistical analysis classroom application. Fantasy sports managers (i.e. players) often read a large amount of sports data (Comeau 2007) to help them perform better. Specifically, players can speculate on the probability of a player's high score during the week by knowing that player's historical and real-time data. Dzodom et al. (2020) have designed an educational prediction game that encourages players to learn about climate information by integrating the fantasy sports model into this

educational game. Fantasy sports can motivate players to access the timely sports news and related large datasets to learn more about the field, and it can also also facilitate the learning and use of data analysis tools. Sports fans spend much time and money on their favourite players, teams and sports (Wann et al . 2001). Furthermore, fantasy sports consumption is no longer just the preservation of sports fans. It can offer many potential benefits, however, the primary audience for fantasy sports still seems to be sports fans. Farquhar and Meeds (2007) found that the three most common types of players were casual players (31%), skilled players (21%), and players seeking isolated excitement (9.5%). Playing fantasy sports not only encourages people to shift their focus to real sports but also enhances their interest in sports information (Ik Suh et al. 2010; Farquhar and Meeds 2007). However, those who are less knowledgeable about sports information or have not been exposed to the fantasy sports format seem to have difficulty starting to play fantasy sports without guidance. While there has been some research exploring players' motivations for playing fantasy sports from a gender perspective (Gemar and Pope 2021; Dwyer et al. 2018) and challenging the preconceived notion that women are not true sports fans or fantasy sports players, no studies were found that specifically investigated the motivations and needs of novice online sports players, nor did they mention the fantasy sports only to abandon the category.

Fantasy sports need to attract new players. NASCAR, one of the most watched sports in the United States, has inevitably been affected by the economic downturn and declining fan interest. It has developed the Drive for Diversity program to counter this trend by attracting minority and female individuals to (e.g., as drivers or fans) a sport dominated by men and whites (Sartore-Baldwin and Walker 2011). Research by Goldsmith and Walker (2015) suggests that it is possible to use fantasy sports to activate participation from those who do not consider themselves interested in a sport. It is also

necessary to discuss the new player experience of fantasy sports as a game. New players usually refer to three specific types of players, the first being those who are only unaware of the game but are familiar with the conventions of the genre, the second being those who are unaware of such games and are attracted by the popularity of the game, a group most likely to be converted into long-term fans, and the third being complete novices for whom fantasy sports may be the first game they experience (Bycer 2020). Perhaps the low numbers of the latter two categories, especially the third, have led researchers to overlook them. Nevertheless, the fact is that understanding the new player experience is beneficial in facilitating the conversion of new players and is also important for improving the game. Cinelli et al. (2021) define the echo chamber as a relatively closed environment in which several users with similar opinions repeatedly interact, constantly reinforcing the user's perception of a certain message or point of view. The Echo chamber effect is responsible for the failure of many games precisely because of the lack of listening to the opinions of new players.

This study examines how to design games that allow new players to adapt quickly and gradually increase their interest in sports or fantasy sports. The researchers deliberately asked the following questions.

What improvements are necessary and valuable for new players?

To answer this question, we first provided an overview and analysis of existing research and then designed, developed and evaluated a prototype fantasy sports game for newcomers.

The dissertation presents the aim and objective of this prototype in Section 2. Section 3 presents the importance of introducing new players to fantasy sports, identifying factors that influence the experience of new players and a survey

and discussion of relevant research into the motivations of fantasy sports players. Section 4 examines the architectural engineering approach to the project, including the selection of the Software Development Life Cycle model, the identification of user requirements, and the technical feasibility analysis. This is followed in Section 5 by a discussion of the Fantasy Onboarding framework, user interface design and prototype implementation. Finally, we report the results of the evaluation of the application, which gave us a clearer idea of the benefits of our prototype and where it can be developed in the future.

2. Aim and Objectives

The Onboarding Fantasy Sports project is a web-based application built on the Fantasy Sports model. It makes playing the original Fantasy Sports less difficult and more fun for new players with no knowledge of sports or fantasy sports. It provides a user-friendly and readable interface for users.

The game's objective is to make a draft of the player's team, to make predicted standings based on the match-ups with players in the league and to be able to share the standings on the game forum.

Players can draft real players into their teams more fun and easily and make predictions on the outcome of the match based on their lineups against other players in the league. This predicted ranking list could be shared in the game's home forum along with each player's lineup, and they are awarded points based on the accuracy of their predictions compared to the real match outcome.

3. Product and Literature review

3.1 Background materials

3.1.1 Importance of engaging novice player into sports activities

With the continued game attendance decline in four major American sports leagues, for example, National Football League, National Basketball Association, National Hockey League, and Major League Baseball (Suneson 2019). From 2008 to 2018, sports fans' demands seem to have shifted considerably (Suneson, 2019). Besides, the COVID-19 pandemic has suspended all forms of activity in the sports sector until the third quarter of 2020 (Nielsen 2021). Few industries have been immune to the effects of the global pandemic, but its impact on global sport has been particularly marked, and it has been impossible to simply return to its pre-pandemic state.

Non-traditional competitive events, such as online gaming, have grown rapidly in number over the last decade. One of the most popular of these events is fantasy sports. Nesbit & King (2010) reported that fantasy sports complement traditional sports consumption by offering players a different way to participate, experience and enjoy sports, a conclusion that applies to both the casual sports fan and the highly engaged consumer (Karg and McDonald 2011).

Fantasy sports is a combination of the real and the virtual. It is closely intertwined with traditional sports, therefore, according to the IBISWorld (2020), the fantasy sports industry business declined by 8.4% in 2020 due to the impact of the new crown pandemic, but the high level of fan enthusiasm and engagement during this period also guarantees the potential of fantasy sports

after the pandemic. The pandemic did not have the same impact on the industry as the pandemic. The pandemic did not have as much of a negative impact on it as it did on many other industries (Baruca and Ulusoy 2021). However, due to the recession, shifting fan demand and changing audiences, fantasy sports will also need to explore more shifts in its favour.

The fantasy sports industry is expected to grow to $9.4 billion over the next five years due to increased female players, mobile internet users and online advertising (Baruca and Ulusoy 2021). NASCAR has succeeded in its attempts to develop those on the periphery of fanship (Sartore-Baldwin and Walker 2011), targeting women and ethnic minorities. In addition, there is a strong focus on attempts to engage audiences and fans in fantasy NASCAR (Elliott 2013).

Based on the evidence of Pope's (2017) research in the UK, a "fenminization" of sports fandom has emerged in today's society. Furthermore, the number of women following professional sports in Canada has increased significantly from 55% in 1990 to 69% in 2015 (Gemar and Pope 2021), meaning that women are already an integral part of the modern sporting population. Gemar and Pope's (2022) study challenged the stereotype of women's lack of interest in the sport in previous studies. Motz (2013) used fantasy sports as a tool for student learning statistics; students participating in the course had different experience levels with fantasy sports. By the end of the course, the scores for the class were not biased by the gender of the male and female students and the students' pre-course knowledge of fantasy sports. Some of the most enthusiastic players and engaged students were women who had not played FF before. Again, this challenges the speculation of some previous scholars that the statistical power of fantasy sports is a distinctly male activity (Davis and Duncan 2006).

Many studies have shown that family responsibilities remain one of the barriers to women's access to leisure time, while men may prioritise personal leisure over family responsibilities. (Miller and Brown 2005; Raisborough 2006; Bowlby et al. 2010; Gemar and Pope 2021) For some sports, a high level of monetary and time commitment is necessary precisely because women's lack of leisure time and income levels equal to those of men may lead to a relative lack of attention in the field of sport. In this case, therefore, a shallow and broad knowledge base is more advantageous than a deep and narrow cultural knowledge resource (Gemar and Pope, 2021). This is one of the main reasons for the design of this prototype, as is the effect of game difficulty on the enjoyment of novice players, which will be mentioned below.

3.1.2 Factors that effect game participation for players who is novice

The impact of Difficulty on novice players' enjoyment

There has been much research on video game difficulty and tutorial design, although not as explicitly focused on the novice experience in the fantasy sports field as in our dissertation. This section provides a brief overview of some relevant work that influenced the project of this dissertation.

The satisfaction players get from overcoming the challenges set in the game can be one of the reasons why players enjoy the game (sherry, 2004); however, there is no clear definition of challenge difficulty in the previous literature. Juul (2009) explicates that "difficulty " focuses on the actions in a game that constitute failure and the penalties that should be imposed when the failure occurs. Jagoda's (2018) definition of mechanical difficulty refers to player-participatory interactions that rely heavily on player skill. Jagoda (2018)

argues that too much mechanical difficulty can lead to a game culture that excludes novice and new players.

Casual games are often designed with shorter and less difficult challenge sessions. Given the limited time available to players, such easy games seem more attractive. Mainstream games also have integrated features such as automatic blood recovery to help players play the game more easily. This shows that game providers know that adjusting the game's difficulty attracts more players. Typical difficult games have a high threshold and may require players to react quickly or solve difficult problems, sometimes with severe penalties. Current research has not defined whether Fantasy Sports is a difficult game. However, in a SILSBEE (2016) study using Fantasy Sports as an English teaching tool, it was concluded that students agreed that the game was difficult to learn. While students also agreed that the teacher would be ready to help if needed, the situation would be very different when Fantasy Sports were used not as a teaching tool but as a recreational game for spontaneous participation. Motz (2013) also noted that his mother-in-law, a novice in fantasy sports who did not know much about the sport himself, only started working on daily running back projections when he was in his tenth week of fantasy sports. There is no doubt that fantasy sports have the appeal to keep novices hooked, but the high barrier and long learning curve may deter some novices or cause them to give up before it gets interesting. In a study of experienced players in fantasy sports, some participants felt that too much data could harm the gaming experience or even overload the data (Hirsh et al. 2012). At the same time, some could see the value of predictions, trends or more detailed data with real-time statistics. When creating new features and data types for experienced online fantasy sports players, careful consideration should be given to providing different types and amounts of data targeted at different users. This suggests that if one wants to attract new players to fantasy sports or increase the number of time newcomers spend participating

in fantasy sports to keep them playing, one should also consider removing barriers to entry for newcomers or non-sports fans to ensure their needs are adequately met, for example, by creating fantasy sports challenges that are appropriate for their level, adjusting the difficulty of fantasy sports or the complexity of the user interface.

A study by Alexander et al. (2013) found that casual players tended to choose and prefer games of lower difficulty, even when the game's difficulty did not match their actual skills, compared to experienced players who preferred games with a difficulty that matched their skills. This study used multiple difficulty levels, which illustrates the wide variation in the goals and experiences of players of different skill levels.

Rigby and Ryan (2011) argue that people develop a sense of recognition of their abilities by mastering important tasks in games. Similarly, difficult games can make players doubt their abilities by hindering them from completing tasks. For example, when novice players are playing fantasy sports, they will continuously lose to other players because they are unsure of the game mechanics or do not understand the players' abilities. Kiili et al. (2014) concluded that players who play more difficult games perceive themselves as less competent, confirming Rigby and Ryan's (2011) view that game difficulty contributes to a sense of competence. These data also suggest that a sense of competence can enhance enjoyment, with Sherry (2004) highlighting the relevance of challenge-skill balance to enjoyment. This is because a sense of competence helps players to obtain a balance between challenge and skill (Schmierbach et al. 2014). However, a series of blog posts by Doctor Professor discussed the opposition of skilled players to the inclusion of an easy mode in the game, arguing that when the game offers different difficulties for people of different skill levels to play, it will reduce the satisfaction they get from showing off their achievements to gain status in the game (In Praise of

Easy, 2009; Status and Signals, 2010; Actually Learning to Play, 2020). The game will no longer be meaningful. Furthermore, this could lead to novice players feeling excluded from the game, and the game could lose these users who see them as a casual hobby.

Many games offer practice modes for novice players to help them learn how to play the game, and blogger Josh Bycer (2019) refers to these techniques as onboarding, which is where the name of our prototype comes from. Levy's (2009) research and that of Billings and Ruihley (2013) both confirm that being a sports fan seems to be a prerequisite for fantasy sports participation and vice versa, which would seem to indicate that fantasy sports can attract a more limited number of new players, perhaps only within the sports community (Levy's, 2009; Ruihley, 2013). However, the design of practice spaces in the gaming arena considers all new players who may not have any experience with this type of game or all games. Bycer (2019) believes that the term onboarding is not limited to a beginner's tutorial, but refers to any design choice that allows the player to adapt to the new concepts that appear in the game. Cantante (2018) states that there are currently three common onboarding strategies used in games; walkthrough, hands-on and mixed. walkthrough means pausing the game when a new concept is encountered and providing explanations in the form of pictures or text, hands-on means placing the player in a situation that requires the player to do something on their own to complete the challenge. walkthrough refers to pausing the game when new concepts are encountered and providing explanations in the form of pictures or text. The study by Czerwonka and McArthur (2022) discussed the theme of the stigma that participants shared as new or unskilled players. One participant shared, "I think generally people can be over-protective of games when it comes to new players". This Protectiveness can be exacerbated in Multiplayer games, which can deter new players from trying because it involves pairing experienced players with new players in a competitive

atmosphere, leading to feelings of embarrassment and fear.

Davis and Duncan (2006) noted that people often spend a great deal of time searching the internet for statistics and injury reports, and they write that "those who are less informed are often publicly ridiculed for poor draft, trade, and roster structure decisions". This creates a potentially hostile environment for new players or women if they are less informed or less immersed in sports knowledge.

To counter this, multiplayer games can use skill-based pairing mechanics that allow novice players to be paired with novice players, encouraging a positive learning experience and reducing the chances of frustration through ridicule when mistakes or failures inevitably occur.

Bias in decision-making for novice players

Anchoring is a psychological effect that can have an impact on decision-making. This cognitive bias occurs when people need to estimate an event quantitatively and use certain values as starting values, which act as anchors to constrain the estimate. When making decisions, too much weight is unconsciously given to the initially acquired information (Kahneman 2012). In other words, when making decisions, people have preconceptions and are biased towards being swayed by the first piece of information.

For example, research has shown that RSCI's reputation heavily influences managerial decisions for the NFL (Lourim 2019). In the NBA draft environment, decision-makers widely use RSCI ranking; the official provider of RSCI ranking states that drawing definitive conclusions from any such ranking is risky. Berger and Daumann (2020) also found that The RSCI ranking is a problematic metric, which is the source of systematic draft errors.

The NBA Draft is a mechanism that regulates the competitive balance of sports

leagues by narrowing the gap with stronger teams by increasing the likelihood that weaker teams will acquire stronger young players. In theory, this policy enhances the competitive balance between all teams, contributing to the overall quality of play within the league and increasing uncertainty in in-game outcomes (Berger and Daumann, 2020). It increases interest in the product. After all, no one will pay attention to a game destined to be won or lost.

This conclusion applies to the fantasy sports decision-making environment. Novice fantasy sports players do not have expert knowledge of athlete strengths, historical seasons and injuries. Some players will rely on the overall strength ranking tables given by fantasy sports provider websites or cheat sheets from external websites to make their draft decisions, such as preferring to pick athletes with higher overall strength rankings at the expense of other factors, data sources that themselves These data sources themselves may not be reliable, which inevitably leads to skewed draft decisions and ideals for novices. Furthermore, the draft aspect of fantasy sports tries to create a rule of skill over chance, yet novice players, are more likely to lose if they play against a group of experienced fantasy players.

3.1.3 Fantasy sports and player motivations

Previous research on fantasy sports players' motivation (factors driving fantasy sports participation) and fantasy sports information-seeking behaviour has been extensive, with studies mainly based on a male perspective. In recent years, there has been an increase in research on women. However, there is still a gap in research on novice players. Future research could expand on this aspect of novice fantasy sports players' experiences and motivations and thus better understand the needs and desires of this population segment. Here we

will base our speculations on the needs of novice players mainly on previous research.

Farquhar and Meeds (2007) identified participant motivations: surveillance, arousal, entertainment, escape, and social interaction. Dwyer and Kim (2011) came to similar conclusions, for example, social interaction and entertainment/escape. Spinda and Haridakis (2008) reveal six main factors: ownership, achievement/self-esteem, escape/pass time, socialisation, bragging rights, and amusement.

While the above results were mainly based on the fact that the subjects were male, when examined from a gender-based perspective, Billings and Ruihley (2013) found that males and females showed consistent motivation on five of the seven indicators (i.e. the arousal, entertainment, surveillance, self-esteem, and escape), while males were significantly more motivated for two indicators of enjoyment and passing the time. Dwyer et al. (2018) revisited the differences in male and female motivation to play fantasy sports in terms of the dimensions of gender differences, with researchers identifying five different motivational factors: challenge, enjoy, enhance, socialize, and connect. The first three dimensions mirror the motives of male participants, and the other two are unique to women.

Lavalle et al.'s (2004) theory of perceived competence suggests that a person is motivated by demonstrating mastery of a situation. In fantasy sports, owning a team and having a great record gives a person a sense of personal satisfaction. In addition, Lavalle et al. 2004 [27] proposed a sense of competition oriented towards goal orientation and competitive orientation, where having a goal-oriented performance implies a desire to demonstrate one's ability. In a fantasy sports situation, a player who is more experienced or has more comprehensive and in-depth expertise in player information will likely draft a team that is more likely to win. Novice fantasy sports players who do not

have the knowledge and necessary skills are less inclined to participate in activities that do not have predictable benefits for them.

In Dzodom and Shipman's (2014) study, the most discussed factor among the participants was the social factor, which indicates the importance of game design for communication channels between players. Fantasy sports players congregate on social chat platforms where users connect and exchange their thoughts on strategies or ideas with certain leagues or player pairs (Marinelli 2020). Many people believe that fantasy sports are important for maintaining relationships with family, friends and work (Dzodom and Shipman, 2014). Events help tremendously maintain relationships, which social media can further strengthen (Dwyer et al. 2018).

From these results, it is easy to see the importance of social interaction and fun in motivating both men and women to play fantasy sports. Dwyer and Kim (2011) clarify that 90% of fantasy sports participants cited friendship as their primary reason for participation, with fun as a secondary reason. Not only that, but Goldsmith and Walker (2015) also infer that as long as these incentives for participation similar to connect with friends or social interaction exist, fantasy sports are likely to attract sport non-fans because of their entertaining, fun and group nature.

4.Product architecture engineering approach

4.1 Software development method

4.1.1 Waterfall model

Software Development Life Cycle(sometimes called SDLC) is a process of

software product developing or adapting. Models based on sequential and iterative approaches were built on this process. The most significant sequential model is the Waterfall Model, which is named due to its presentation of the essence of software development. This approach will result in the project moving from one phase to the next and usually not returning to the previous phase after completing the current one. Throughout the system development life cycle, projects are easy to understand and manage, simple, well organised, work well and have a high probability of producing the right results. Each phase is executed one task at a time, which will make it easier to maintain, and the start and the end of the task are clearly marked. This model allows for rewrite situations, however, as each phase of development relies on previous information, if a delay occurs (especially early in the project), it can have a huge impact on the whole project (Kramer 2018).

Given our relatively short project cycle of 12 weeks, and the fact that it was an individual development. It was important that my software requirements were formulated rigorously and clearly in the early stages of development, and therefore this was in line with the standardised activities that the Waterfall Model describes in detail at all stages of development (Matković and Tumbas 2010). I will be using the waterfall model as the main methodology for this web application development.

In fact, realistic projects are usually larger and more complex, life-cycle development processes are more iterative and interactive (Andrew P. Sage and James D. Palmer 1990), and their development requires team involvement, which leads to a preference for Agile and Lean Models. Karmer (2018) noted that the Waterfall Model is still relevant for small projects with specific and testable requirements. The advantages of the Waterfall Model are clear, but its disadvantages are equally significant. The downside of Waterfall is its rigidity, the lack of iteration and feedback between phases. In addition,

some errors are not eliminated during the development phase, and these errors will probably go undetected up to the verification stage. The later they are found, the greater the payoff.

For this reason, I introduced the Sashimi Model, which had been used as a critique of the Waterfall Model, in the development phase. It is characterised by overlapping different phases in the development phase (Matković and Tumbas 2010).

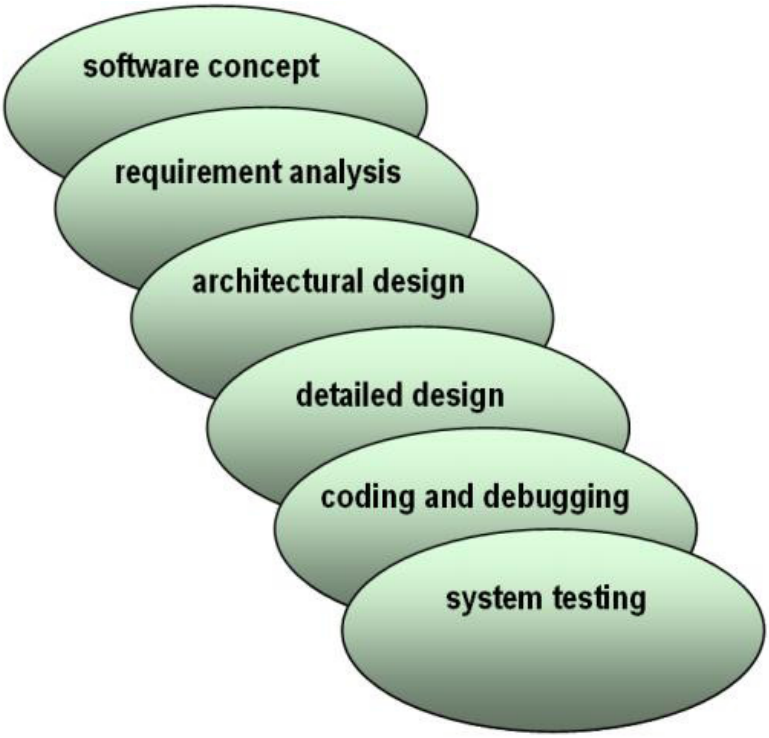

Figure 1. Sashimi waterfall model with overlapping phases (McConnell 1996)

During the prototyping development process of this dissertation, I will follow the concept of the Waterfall Model and complete the requirements analysis, system design, development, testing and operation phases of the project based on a sequential approach. I will also simultaneously introduce elements of the Sashimi Model by adding feedback and iteration to the classical Waterfall Model, which will effectively shorten development time.

4.2 Technology research

4.2.1 Tools and technology used

Visual Studio Code

Visual Studio Code, also commonly referred to as VS Code, is a lightweight source code editor made by Microsoft which is available for Windows, macOS and Linux. It has built-in support for JavaScript, TypeScript and Node.js and a wealth of features including integrating Git, debugging and extensions (Microsoft 2016).

Vue

Vue is an open-source JavaScript framework for building web user interface. It builds on top of standard HTML, CSS and JavaScript, and covers most of the common functions required for front-end development (Vue.js [no date]).

Node.js

Node.js is a server-side JavaScript environment built on Chrome's V8 JavaScript engine (Node.js Foundation 2019). It is one of the more well-known frameworks for JavaScript development. We use node here as it has a whole ecosystem of libraries created for it by the community and it keeps the language consistent as the front and back ends are written in JavaScript.

NPM

NPM is the package management tool that comes with Node.js (npm DOCS [no date]). It allows users to download third party packages and modules written by others from the NPM server for local use.

Express

Express is a Node.js web application framework that provides a set of features

for web and mobile applications (OpenJS Foundation 2017). It can simplify the code while providing a more powerful API, enhancing our development efficiency and experience.

MySQL

MySQL is the most popular open-source relational database management system (Oracle 2019). It is a client/server system and can work in embedded systems. It is commonly used in web application development due to its speed, flexibility and reliability. We also chose to use MySQL for our project as we needed to meet the requirements of simultaneous multi-user access.

4.3 Software requirements

4.3.1 Functional requirements

This section includes the requirements for the Fantasy Onboarding prototype project. These requirements are organised by features discussed in the project objectives.

4.3.1.1 Fantasy game home page news feature

The system shall display all the real-time news that can be viewed by users.

4.3.1.2 Create a league

The system shall enable user to create one or more League.

4.3.1.3 Join a league

The system shall enable user to enter the League name in the search bar.

The system shall display detailed information of all Leagues.

The system shall allow users to browse the league list in chronological order of the draft.

The system shall allow users to browse the league list in chronological order of the draft.

The system shall notify the user when the user has already joined the League.

The system shall notify the user when the user joins the League.

4.3.1.4 Read the posts of forum

The system shall display post details to the user.

The system shall enable user to enter the comment text in the forum.

4.3.1.5 Online drafting

The system shall notify the user the draft will not start when the League is not full.

The system shall enable user to enter the draft system when the League is full.

The system shall allow user to wait in the draft room until others enter the online draft room.

The system shall change the user's avatar from grey to colour when he/she enters the online room.

The system shall enable the League owner to start and end the draft.

The system shall display detailed information of the athlete.

The system shall allow users to select multiple athletes to their team.

4.3.1.6 Records

The system shall display all the competitions that the user has joined.
The system shall enable the user to view the player's line-up when the mouse hovers over a player's name.
The system shall allow user to navigate to the specific competition details page.

4.3.1.7 Predict and share

The system shall display detailed information of the selected competition.
The system shall enable user to view the lineups of others in the League.
The system shall enable user to make a prediction by selecting a player from a drop-down menu in the prediction ranking table.
The system shall display the predicted ranking table and the players' lineups shared by user in the forum.

4.3.1.8 Score

The system shall display the league table after the release of the match results.
The system shall enable users to get points when their predictions are correct.

4.3.2 Non-functional requirements

Usability requirements

People with no understanding of Fantasy Sports or who are not interested in sports must be able to use this product without any help.
Users can quickly understand the content organisation of Onboarding Fantasy Sports and can easily navigate its interface. For example, users can use the

online draft system without barriers and derive pleasure from the act of carrying out the activity smoothly.
Users can easily determine what the draft and prediction features mean, where they are located and how they are used.

Performance requirements

If all users are online and have a good internet connection, the draft status must be updated for all users in the Draft room within 0.1 seconds.
The system must provide feedback to the user within 1 second of issuing a command, for example, after a user submits a predicted league table, the post for that prediction must be uploaded and displayed on the front page within one second.

Reliability requirements - fault tolerance

In the event of a system error, the user's actions and data are saved locally and automatically uploaded when the system is restored. For example, in the event of a network drop during the draft, the user's selected players are not lost, and the user can view the selected players in his/her team after the network is restored.

Security requirements

Different user roles have different levels of authorisation and authentication. For example, the owner of a League is able to control the start and end of a draft, while the other members of the League only have the right to select athletes in the draft room.

Scalability requirements

The limit of the website attendance must be scalable and it must be able to allow 30,000 users to be online and to run the drafting at the same time.

4.4 Feasibility studies

Project overview

It is essential to define our purpose, scope and the problems we are expected to solve before development. Based on the previous literature discussion, user needs and technical requirements, we can evaluate the feasibility of this Fantasy Onboarding project.

This project has two relatively separate components: an online draft system that allows players to pick real athletes and elements for making, posting and sharing predictions to the forum.

In this dissertation, our goal is to design an online web-based application that builds on the Fantasy Sports model, which will be a multiplayer game, and the complexity of the project is mainly in the online draft system so that we will focus on the following features:

1. At this stage, it is a web-based application, but there is potential for expansion in the future.
2. At this stage, it is a small-scale application. It should be able to support 30,000 people online for the draft (daily active users) and 60,000 people for forum discussions.
3. Online draft room with low delivery latency.

4. No user should have different control rights.
5. Users can be logged into the same account on different devices.
6. Automatic calculation and return of prediction scores.

In an online draft system, a client does not communicate directly with another client, but multiple clients connect to a web service that provides all of the following functions:

1. Receive requests from the draft room owner.
2. Receive user requests to select athletes and submit the requests to the database.
3. Receive feedback from the database and reflect the results to the client.
4. If a player is not online, create a wait state for the online player until all players are online. After a customised maximum wait time, the room is automatically ended.

Analysis of possible alternatives

Most client/server applications use the HTTP protocol, a one-way data stream where the client sends a request to the server, and the server responds and returns the data. a WebSocket connection allows for two-way data transfer between client and server.

It is relatively easy for the client to initiate a request, but sending a request from the server is not. Many techniques are used to simulate the server initiating a connection, such as Polling, long Polling and WebSocket. Traditional ways of simulating bi-directional data transfer via HTTP requests are http+Polling and http+Long Polling.

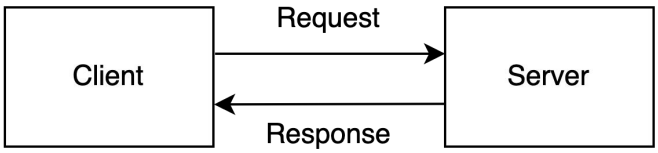

Figure 2. HTTP protocol

Polling

Polling means that regardless of whether the data on the server side is updated, the client will request to pull the data at regular intervals (e.g. 1 second) and may return updated data or an empty one. This approach can meet certain needs, but there are some problems. If there is no new data on the server side, but the data requested by the client is old, this wastes bandwidth resources and occupies CPU memory.

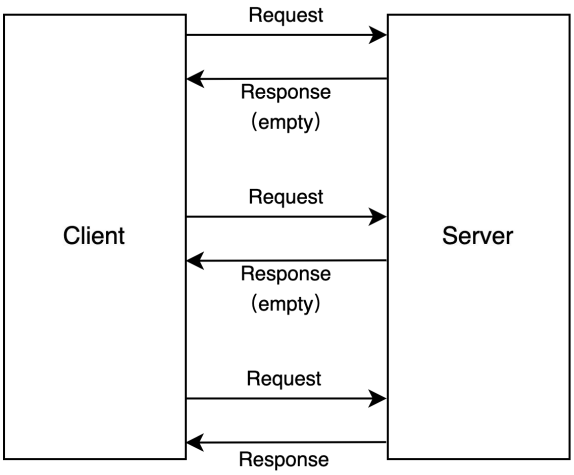

Figure 3. Polling

Long Polling

Long Polling is a variation of the traditional Polling technology, i.e. if there is no new data returned to the client from the server side, the server side will suspend the current GET request and return the new data to the client when new data is available. If there is still no new data on the server side after a certain period, the server side returns a Timeout request, and the client receives the Timeout request and continues to send GET requests, executing in a cycle like this. Although this solves the problem of wasted bandwidth resources and CPU memory to a certain extent, when the data on the server side is updated very quickly, it is no different from Polling. It is also a waste of network bandwidth. Moreover, HTTP packets often have large header data (usually more than 400 bytes), but the server needs very little data (sometimes only about 10 bytes). Such packets are transmitted periodically on the network, which is inevitably a waste of network bandwidth.

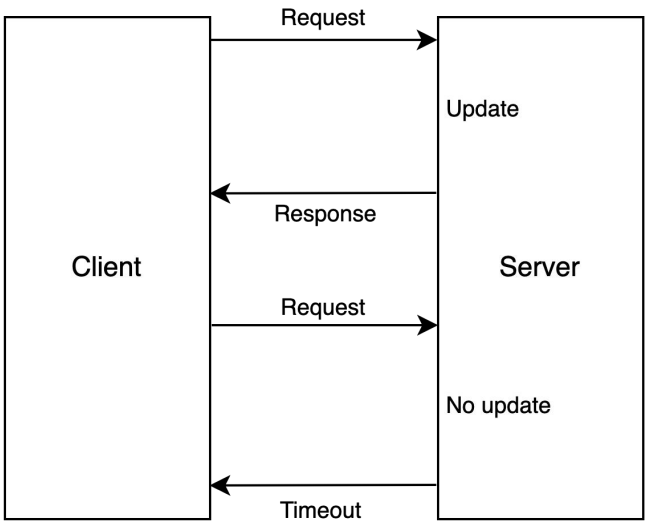

Figure 4. Long Polling

Websocket

Combining the problems of Polling and Long Polling above, Websocket has emerged to address the shortcomings of HTTP in instant messaging. Websocket is a new full-duplex communication protocol added to HTML5. After the client successfully establishes a WebSocket connection through a process called WebSocket handshake, the server and client can exchange data in both directions at any time, and a persistent connection can be established between the two, facilitating real-time data transfer back and forth from the server. The main limitation of Websocket is that it is not a general-purpose protocol, and communication must occur through the client's web browser or some specialised library.

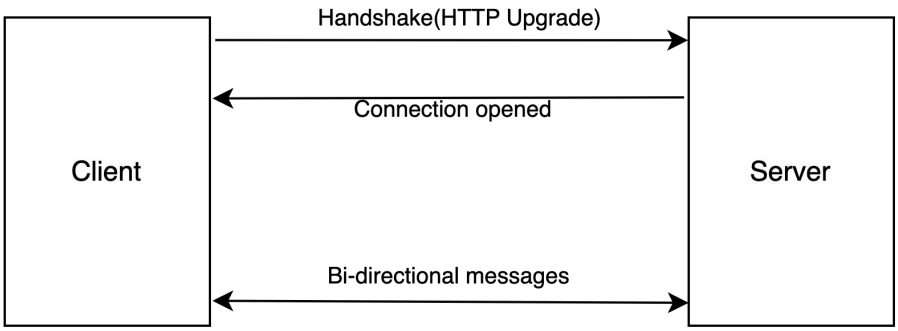

Figure 5. Websocket

In addition, in this project, only the online draft system needs to be implemented using WebSocket technology, the forum part of the secondary homepage display can be solved by polling technology. In contrast, other functions, such as sign-up, login, prediction, score, etc., can be implemented using the traditional HTTP request-response protocol between client and server.

5.Product specification and features

5.1 Design

5.1.1 Framework and game rules

For this specific population, three components, an online draft system that reduces the complexity of the data, a forum to share player predictions and gain technical support, and a reward mechanism that returns predictions based on their accuracy, were deemed essential. Our system design revolves around these three important functions.

News about the sport, real-time data from real games once the league has started, and past games and player data serve the main purpose of helping players understand fantasy sports and prompting them to make informed decisions.

This simple game system is only accessible to new players, and the forum interaction is open to all players (new and experienced). This distinction is essential to game mechanics. The player can control the draft system, but the schedule is also very important.

Rule：

Draft

Players pick their team in an online multiplayer room, with the number of

players available varying depending on the type of game. Once the owner has started the draft, players can join to grab the heroes in the hero pool. Once the maximum number of players that can be selected is reached, no further selection is possible. Once everyone has decided on their team, the room will be alerted, and the owner can end the room. If a user drops out, the draft can still occur, and the room will automatically close after the waiting time has expired. To prevent users from dropping out in bad faith, the players used to fill the dropped user's team will be randomly assigned.

Predict and share

Fantasy onboarding strongly supports social interaction between players, including not only new players interacting with new players but also new players interacting with old players. Therefore, two types of social interaction are offered to facilitate community building, one for private conversations between players on the site (i.e. instant messages) and the other for public discussion boards.

For new players who are not confident enough to share their predictions on a public forum seems risky, as they would fear ridicule from professionals. In order to keep the forum discourse friendly, we will offer a reward for experienced players who are happy to share their knowledge and pass on their skills. This reward will not involve points for official matches but potentially more access and higher ranks. Likewise, we will punish players who make unfriendly comments, for example, by banning them for a week, etc.

Rewards

As we already know, one of the ways to play fantasy sports is that players set their lineups each week and then play against someone in the league and whoever has more fantasy points that week wins. Our mechanics are similar,

except that we play an all-play match in the league each week. So as explained in the previous section, players make predictions based on a league table for the whole league. The players are awarded different points based on the accuracy of their predictions compared to the actual results.

5.1.2 System architecture

In this dissertation, we describe a method that has the potential to increase the participation and interest of fantasy sports non-fans or novice players. The architecture involves the client side which is the user interface, the database server, the web server and the application programming interfaces (APIs) which are responsible for front-end and back-end communication and data exchange.

As can seen from Figure 1, the client tier is the presentation logic part of the project, where all the user interactions with the website will take place on the front end. Through the account interface, the user can register a new account or log in to an existing account (i.e. through token authentication). The team interface allows players to create their own team or join a team. When the required draft time is reached, the player enters the online draft system with the other players in the League, and users would be able to select athletes to fill their teams via the draft interface. Once the draft is over and the real game begins, the user's prediction of his/her League will be captured via the prediction interface. If players choose to share their prediction table, a predicted league table with players' lineup information would be outputted to the front-end forum interface. The forum interface is an interface that allows players to interact with the information displayed on it.

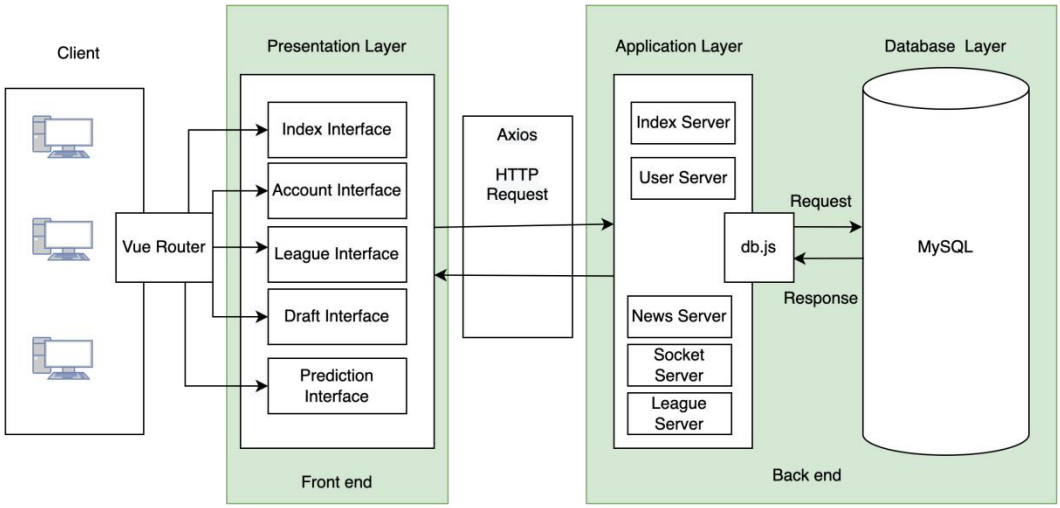

Figure 6. System architecture

5.1.3 Database design

Based on the requirements of the website system mentioned earlier, the structure of the database of Fantasy Onboarding application is designed as follows:

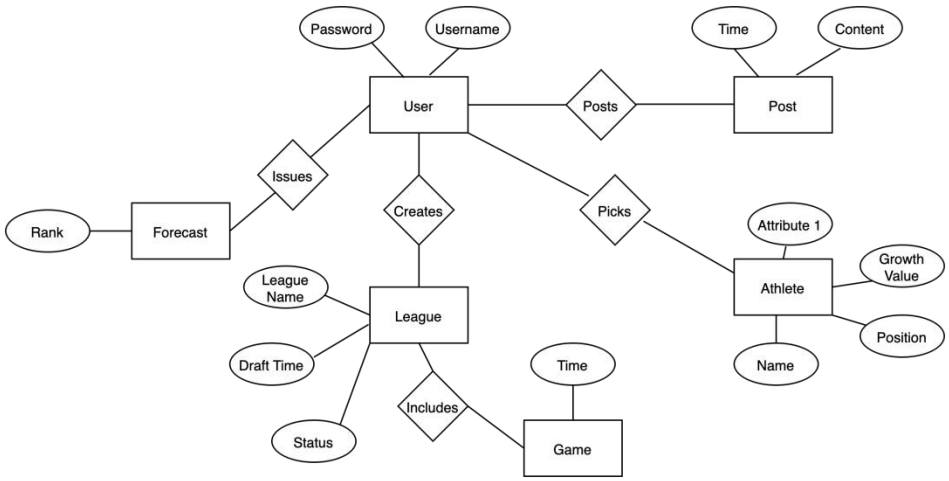

Figure 7 Entity Relationship Diagram

5.1.4 UX/ UI design

The core concept of the user interface design for this project was to provide a simple mode of the user interface for new players. For new players, the game's interactions and systems should be clearer and easier to learn, which is most intuitively evident in the user interface experience. Players require different amounts of information (In Praise of Easy, 2009; Status and Signals, 2010; Learning to Play, 2020). Sometimes, too much information on the interface can create an overload experience for the player (Hirsh et al., 2012). A study by Dzodom and Shipman (2014) included respondents who were new to fantasy sports and felt they needed a simpler user interface.

A game's UI bridges the player and the game's internal world and rules. A better UI design should increase the amount of data and content it expresses over time as the player progresses deeper into the game world. Fantasy Sports is essentially a data-driven online entertainment system, and the UI must be designed to present the information needed for the user in a more intuitive way. For Fantasy Onboarding, users get clearer feedback on the system's status, easier to navigate and information planning on pages that reduce their memory burden.

Navigation bar

The navigation bar is located at the top of the page. It is structured hierarchically, with three levels of navigation: for general information about the game site (A), for personal information about the player (B) and for specific activities (C).

The different shades of grey are used to differentiate them and to emphasise the page currently being accessed, helping the user to identify the current page. However, visual consistency is maintained because they are the same

colour and only differ in colour scale. The navigation bar's interactive effect is that the page title's background changes to a lighter colour when a specific page is selected.

The number of functional controls in the navigation bar is appropriate. The primary navigation bar is always at the top of the page, with a clear logo on the left, controls for navigating to secondary pages fixed on the right and a login control on the far right. The login control interacts as follows: after login, the login button changes to display the player's username (see Figure 8).

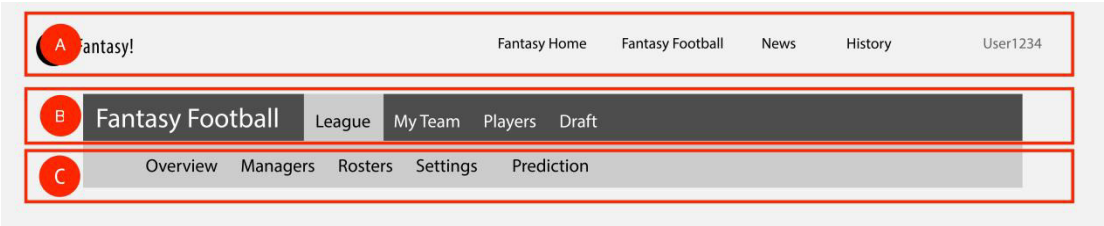

Figure 8.Navigation bar

Home Page

The home page will be set up as an interface for users to access sports and fantasy sports-related news. The main content area will have a left-right layout, with coverage on the left and live match updates on the right.

Live sports news will be selectively displayed here, with priority given to those who can appeal to shallow sports fans or non-sports fans and those who identify as sports fans but are unfamiliar with fantasy sports.

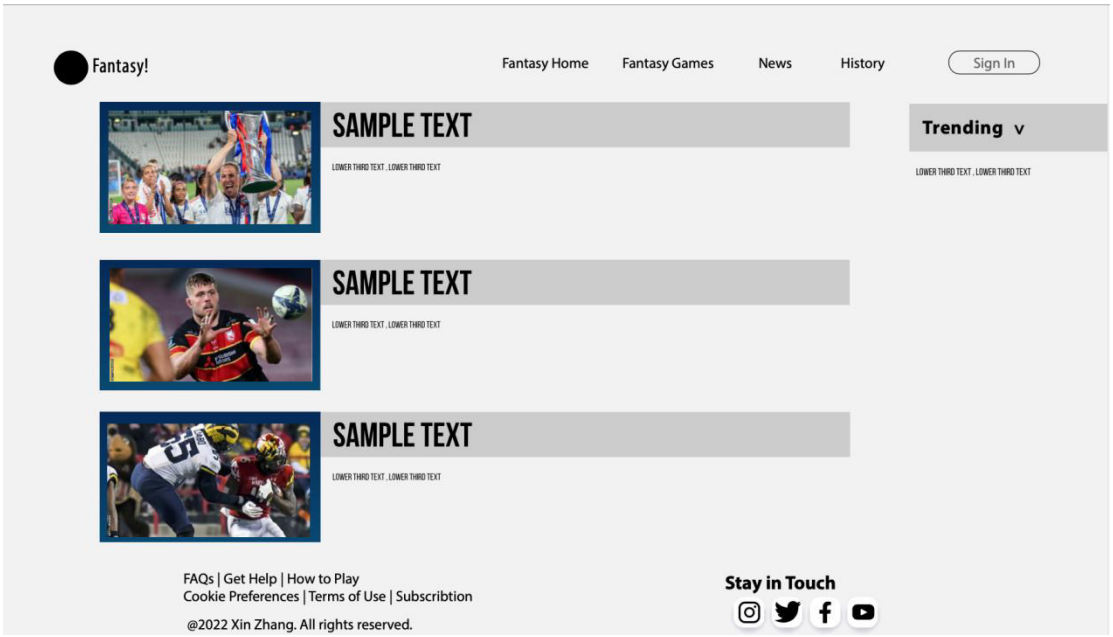

Figure 9. Home Page

The draft interface

The draft interface exists as a relatively separate container on the web page, which is divided into three sections according to the information available to the player:

the player order list on the left

the player information table in the middle

the draft status table on the right

In the player order list, players can get information on the number of rounds played, the time left in each round and the order in which players are drafted.

The middle table can be divided into two levels. The top-level shows the player's personal information and the pick button, while the bottom list allows the player to browse through the different player attributes.

The draft status table on the right shows the player's favourite players and the

list of players selected in the draft.

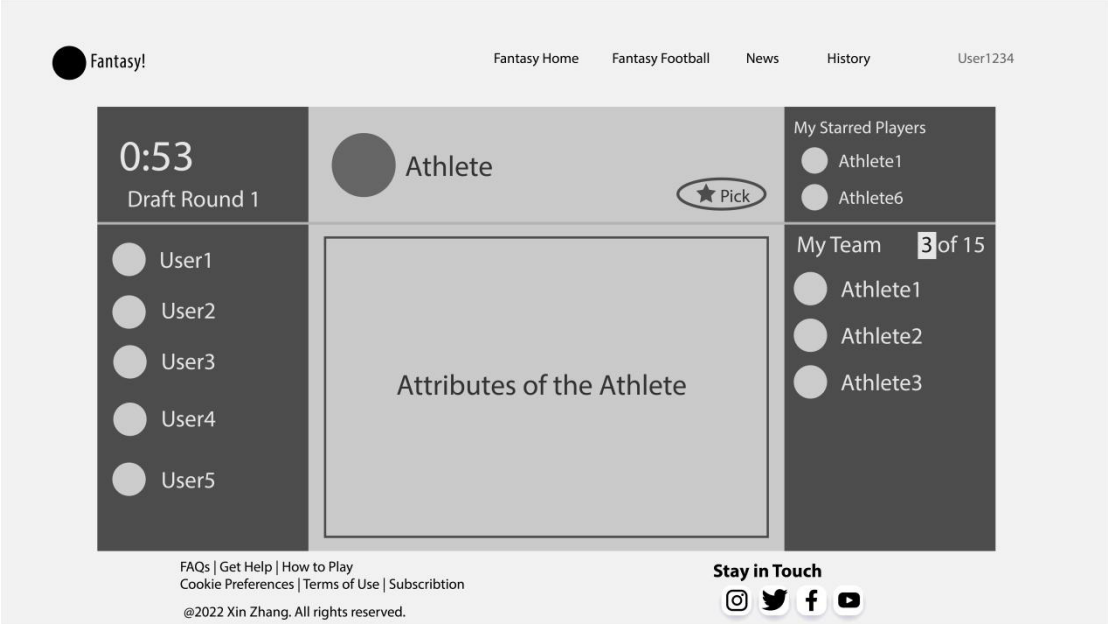

Figure 10.The draft interface

prediction interface

The prediction list will be placed under the League menu. As shown in figure x, the table consists of two columns. The number of rows in the rank column is determined by the number of people within the LEAGUE, and the player column is the part where players can interact with the system by triggering the arrows in the bottom right corner of each row a drop-down picklist can be opened to select a player. The submit and share buttons are set up on the right-hand side.

Figure x shows the results search screen after the match results have been released. On the left is the player's prediction table and on the right is the match result ranking table with an extra column for the player's real points for the week. At the top of the results table, the number of points the player has

earned for accurate predictions is displayed.

To overcome challenges, data-driven entertainment design should facilitate community building through competition or collaboration. Game design should maintain multiple communication levels, including general discussion forums for the Authority's data domain, which includes general discussion forums about data domain, other competition-level forums for discussing and setting rules or expressing and addressing member concerns, and chat systems that facilitate dialogue between users.

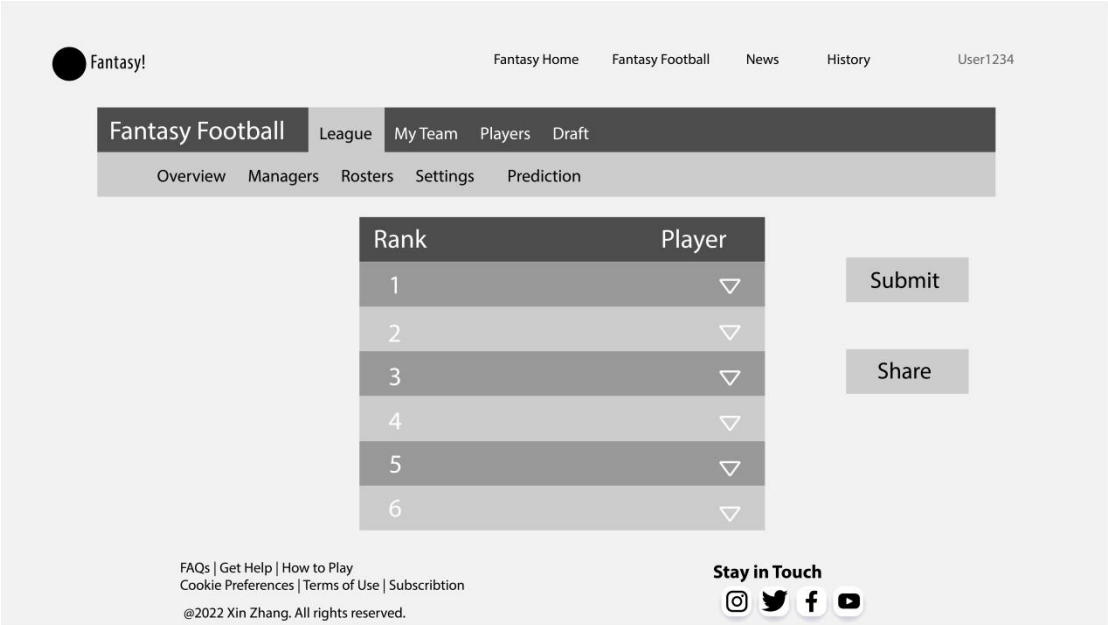

Figure 11.

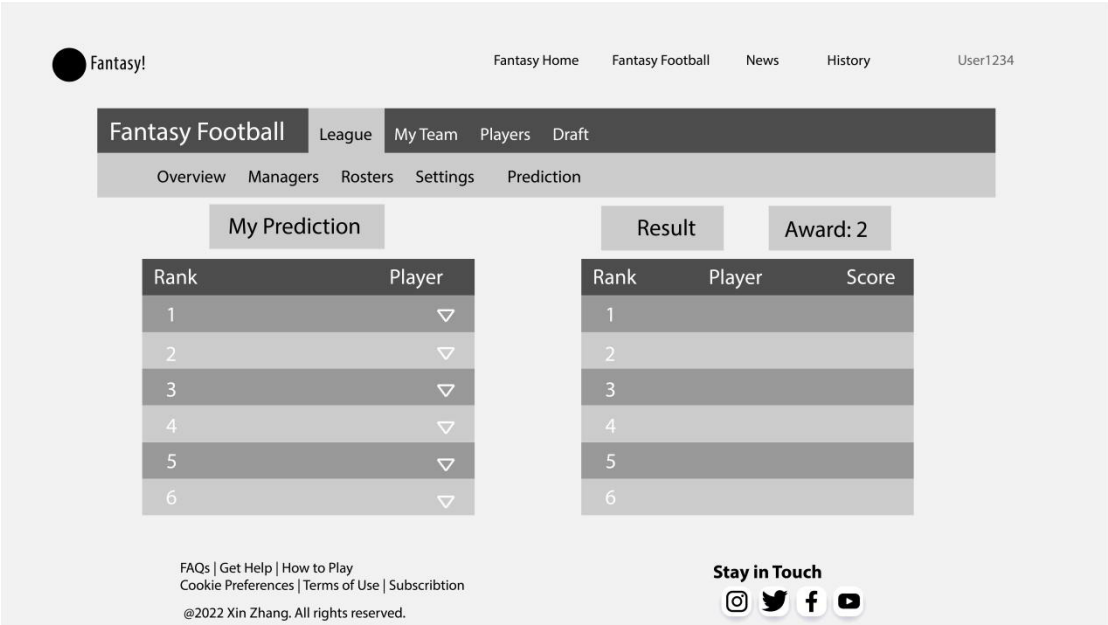

Figure 12.

5.2 Implementation

5.2.1 Prototype

1. Draft

Figure13 shows the overall structure of the draft system.
Below the main navigation bar, the square container represents where the next draft operations will take place. Inside it are the draft controls, a table showing the athlete's properties and a pick button, as well as hints and notifications for the player.

Below the square container, the player's avatar in the online room, the online status and the player selection during the draft are displayed. When a player is not yet in the room, the container will display a "Waiting for other players to join

the game..." message to other players. The avatar of the player who is not online is grey, and the avatars of other online players are coloured. This is shown in Figure 14.

When all players within the league are online and in the draft room, but the league owner has not yet started a draft, Figure 13 shows the interface of both players at the same time, with the normal player's interface on the left and the league creator's interface on the right. The system provides the league owner with controls and permissions to control the start and end of the draft, which is located in the top right corner of the container and is only available on the league owner's screen.

Figure 15 shows the player interface at the start of a draft, where User1 has selected two players and User2 has selected one. This value will be displayed in a small red circle in the top right corner of the player's avatar and will be visible to all players. In order to test the draft functionality of this prototype more efficiently, I have temporarily set the maximum number of athletes that can be picked to a maximum of two, and the player will not be able to pick another athlete after selecting two. If the user clicks on the pick button, the message "2 opportunities have been used" will appear at the top of the page, see Figure 16.

The player who has been picked will disappear from the table and cannot be picked by anyone else, and the number in the top right corner of the avatar of the player who has been picked will also change immediately.

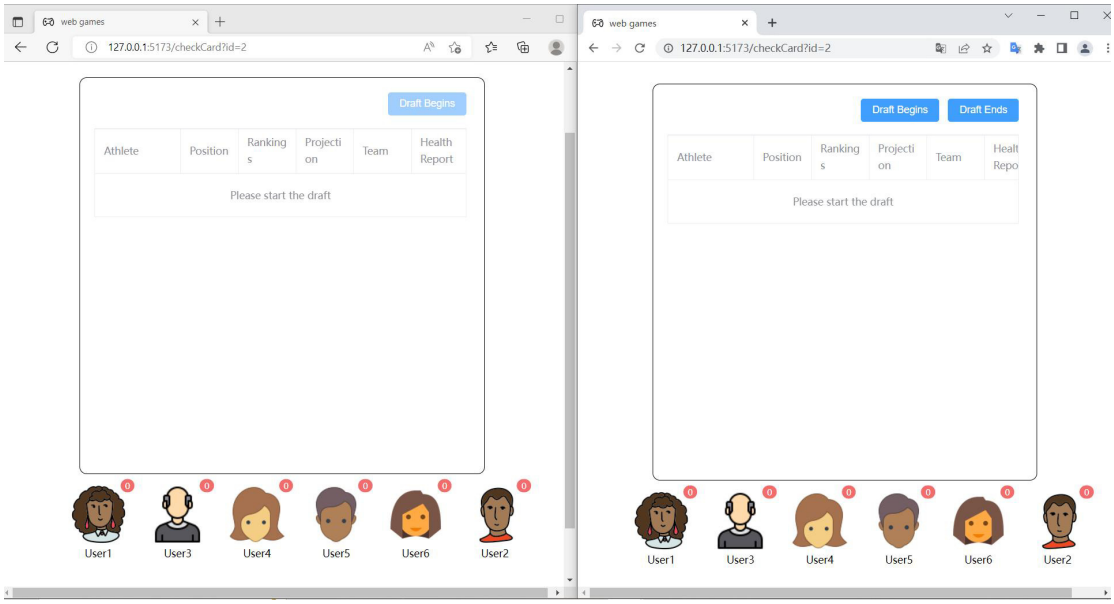

Figure 13.

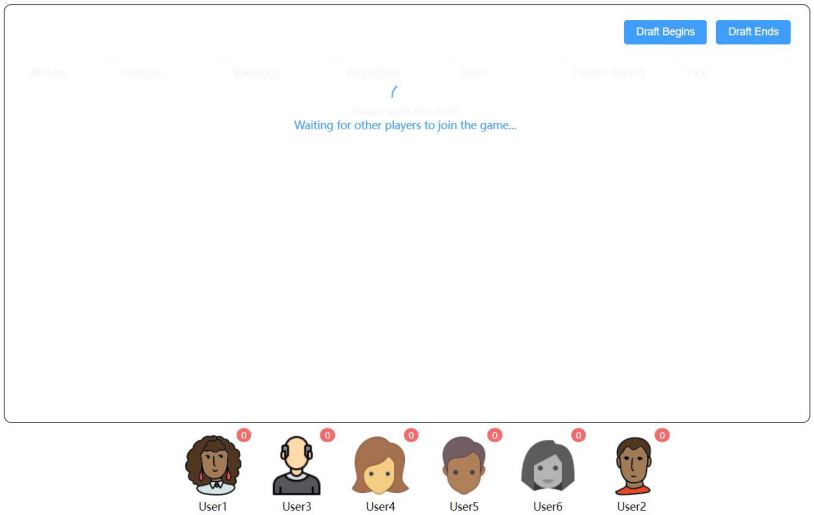

Figure 14.

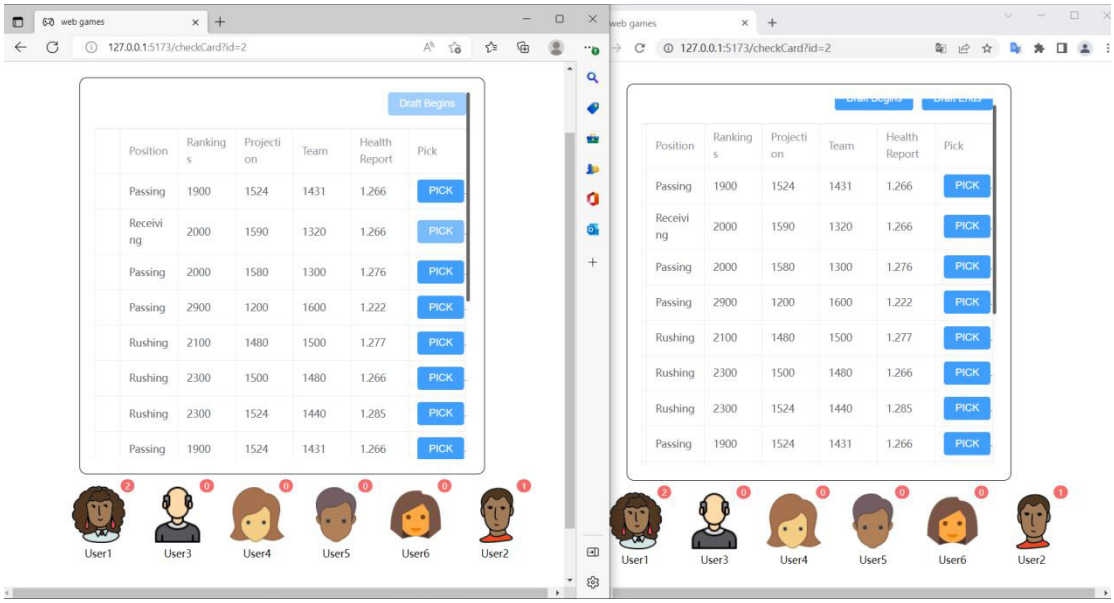

Figure 15.

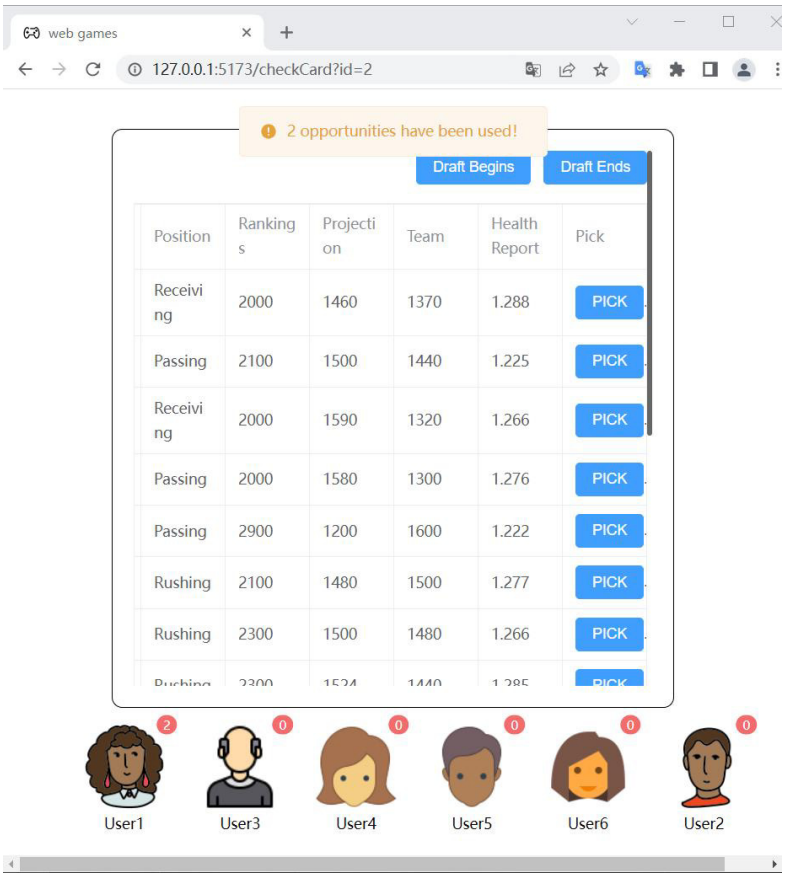

Figure 16.

2. Prediction

On the left half of the Fantasy Onboarding Home page (subpage) below the sub-navigate bar, the forum will display posts and predictions made by other players. On the right-hand side of the page, all leagues are displayed in order of draft time, and players can choose to join a league or create one of their own (Figure 17).

The secondary navigation bar helps to orient the player to the history of his matches, i.e. the records page. This page consists of a list of historical records and a button that leads to the details of a specific match. The building block for user interaction here is that the user can hover over a username in the player's bar, and a pop-up window will appear above the username containing information about the user's current match player (Figure 18). This supports a more visual presentation of information and allows the player to quickly grasp the information needed to make a clear judgement on the next action.

Figure prediction1 shows the interface that allows the player to predict a particular match and the number of members within the league changes as the league status changes.
Based on the ranking on the left, the player selects the corresponding member in the drop-down list on the right. Before submitting, the user can adjust the list in any way they wish; one way: when the mouse hovers over the completed list, the down arrow to the right of the list box turns into the delete button, and click on the delete button to delete the prediction. Method 2: Clicking anywhere other than the delete button will activate the drop-down list, and the user can select other members in the pop-up list.

Once the prediction is complete, the user can either submit it directly or submit it and share it to the forum or friends by clicking on the "submit and share"

button, which will take you back to the Fantasy Onboarding Home page, where you can see the posts you have shared on the forum. The user can see the posts they have shared in the forum.

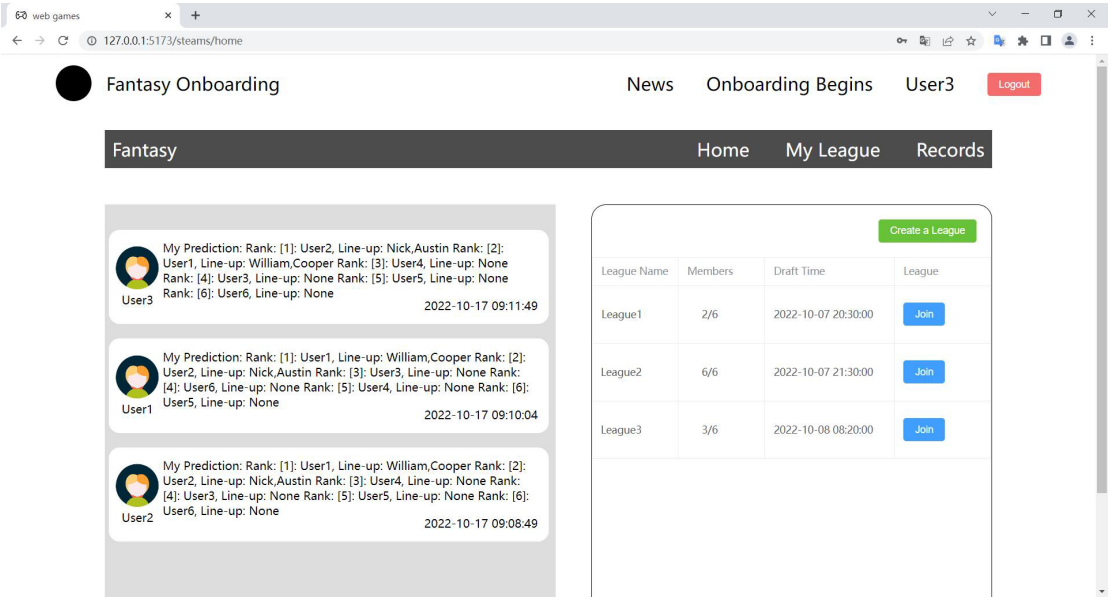

Figure 17.

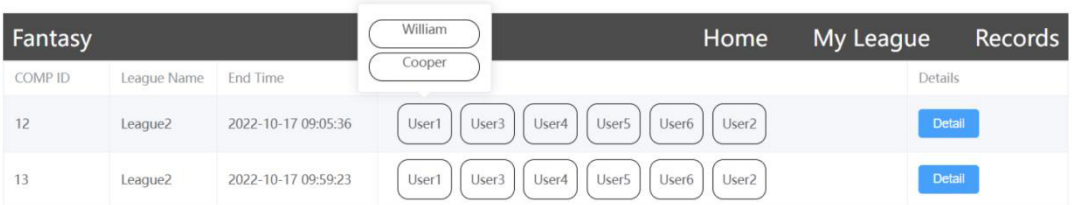

Figure 18. Interaction

6.Evaluation

6.1 Usability inspection

Method

In order to evaluate the usability of Fantasy Onboarding.

Firstly, define the persona. Figure 90 illustrates the type of users of this game system. Fantasy onboarding was developed to attract new players who are inexperienced in fantasy sports games, in other words, people who are not knowledgeable in fantasy sports. At the same time, in this study, we wanted to bring in some experienced players, friendly and helpful. Experienced players are expected to positively affect new players' knowledge and skills in the game. In addition, we need managers who can maintain and continue to develop the system. We, therefore, ended up defining three categories of people: 1 Novice fantasy sports player, 2 Experienced fantasy sports players (who are only involved in some of these functions), 3

Next, sample tasks were selected. These tasks should be representative of those that can assess the effectiveness of the user experience. The following is a list of the issues we focused on for the different groups.

For novice players (Task 1):

1 Can the player learn to use the interfaces without being instructed?

2 Whether the player can access the right amount of sporting information within the game without causing information overload

3 Whether the game draft sessions provide a more efficient and interesting experience for the player

4 Whether the player's actions as a regular member of a team and as a creator are not easily confused

5 Whether the player will have multiple attempts if a draft goes wrong

6 Whether the player is directed to the prediction page at the end of the draft

7 Whether the player's prediction can be submitted and shared on the forum

8 Does the player receive an alert message when the draft is released, reminding the player to go to the results screen to check the results

9 Can players see clear team stats and analysis

10 Will players are rewarded with points for accurate predictions after the results are released

For the experienced Fantasy player (Task 2):

1 Can the player access the forum interface effectively

2 Whether the player can comment on forum posts

3 Whether the player receives feedback (e.g., rewards) for the high number of visits or likes when comments are posted

Thirdly, define the walkthrough action sequences of tasks.

Once the detection tasks have been defined, the steps for each task are defined, such as "press enter", "open the main menu, save file", etc. During the operation, the state of the interface before and after each operation is determined, and the feedback given by the interface after the operation is described in detail, as without the necessary feedback, it is difficult for the user to know if an operation is correct and beneficial to the completion of the task.

In this project, as the interface/system developer is also involved in the CW evaluation, I will directly follow the design steps in conjunction with the possible user actions. Inspired by the Heuristic usability rules, it will also be important to note when the system design does not comply with them.

The action sequences of the Fantasy novice player for Task 1 are:

A. Open the home page of Fantasy Onboarding, log in and browse freely for news and information

B. Click on the Onboarding Begins button in the navigation bar.

C. Browse the list of leagues and click on "join" to join a league.

D. Click on "My League" in the sub-navigation bar.

E. Click on the "draft" button in the list of Leagues (where the player is a regular member) under Ready to Draft!

F. Click on the Pick button

G. Click on the Pick button again

H. Click on the main navigation bar "Onboarding Begins" to return to the

League page

I. Click on the "draft" button in the list of leagues (where the player is the owner) to enter the draft room

J. Click on the Draft Begins button

K. Click on the Pick button

L. Click the Pick button again

M. Click on the Draft Ends button

N. Click on the main navigation bar "Onboarding Begins" to return to the League page

O. Click on the records

P. Click on the "detail" button at the back of the current match to go to the details page for that match

Q. Click on the "predict" button

R. Select the user name from the drop-down list in turn

S. Fill in the form and click "Submit and Share" to jump back to the Onboarding Begins page and read the updated posts in the forum on the left.

The action sequences of the Fantasy experienced player for Task 2 are:

A. Launch the Fantasy Onboarding news interface, log in to your account and click on "Onboarding Begins."

B. Click on the latest forum post

C. Type your comment in the message box

D. Click on the 'Comment' button

Fourth, build a story.

Building on the background of the user's existing knowledge, construct a 'success story to explain why the envisaged user chose the correct action

steps to complete the task or a 'failure story' to explain why the user did not follow the correct action steps. This step is used to expose weaknesses in the interaction system. At each stage, the evaluator will ask these four questions (Lewis and Rieman 1993).

(1) Will the users try to produce whatever effect the action has?

(2) Will users be able to notice that the correct action is available?

(3) Once users find the correct action at the interface, will they know that it is the

(3) Once users find the correct action at the interface, will they know it is the right one for the effect they are trying to produce?

(4) After the action is taken, will users understand the feedback they get?

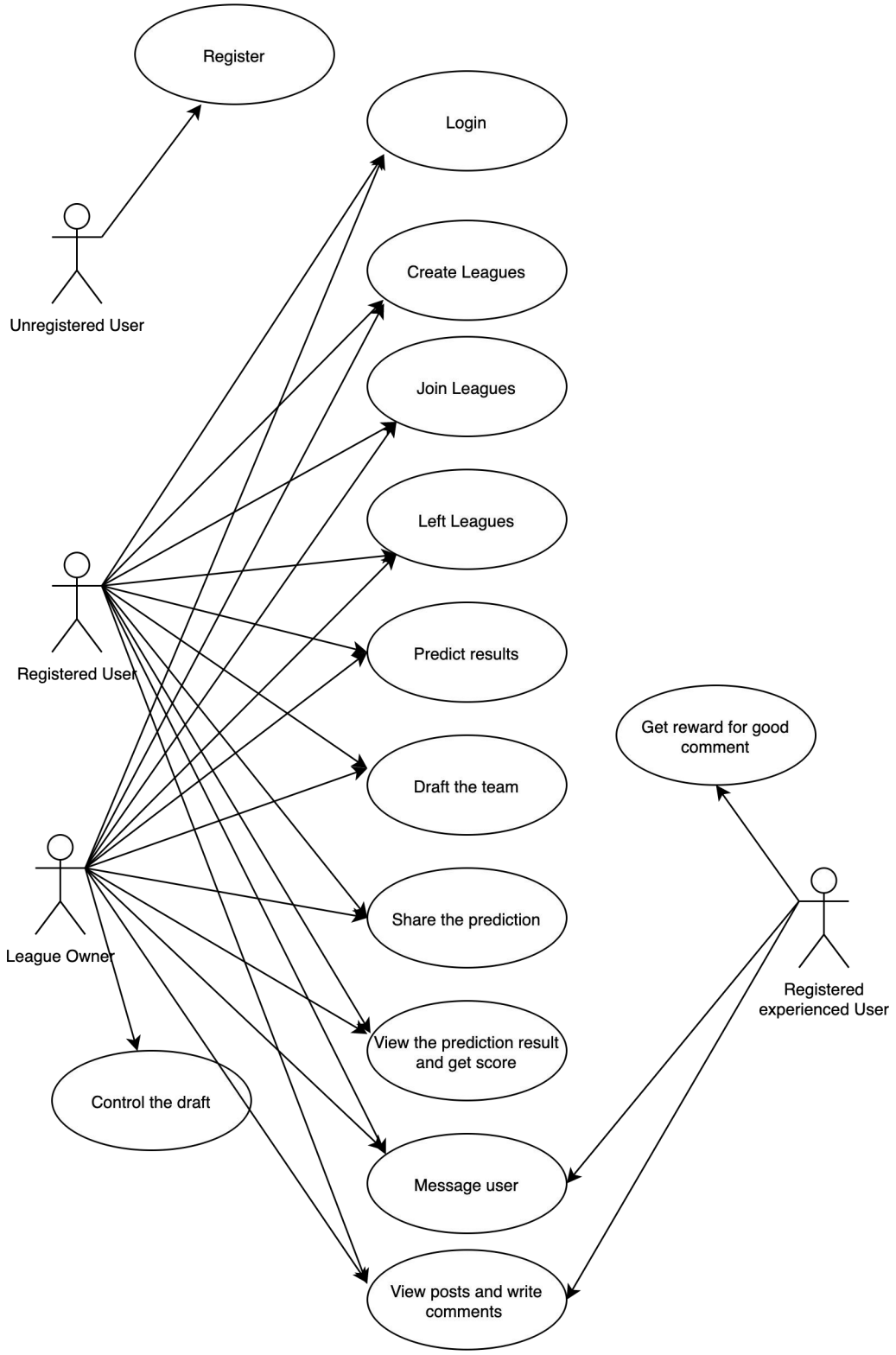

Figure 19. Use case diagram

6.2 Result and discussion

Using the four questions in Step 4 above as evaluation criteria, participants could assess the success or failure of the task. The letter 'Y' indicates that the action was performed according to the criteria, and 'N' indicates an action with usability problems. The result is indicated by an 'R' in the last line, a 'P' for Pass and an 'F' for Failure.

T1	a	b	c	d	e	f	g	h	i
(1)	Y	Y	Y	Y	Y	Y	Y	Y	Y
(2)	Y	Y	Y	Y	Y	Y	Y	N	Y
(3)	Y	Y	Y	Y	Y	Y	Y	N	Y
(4)	Y	Y	Y	Y	Y	Y	Y	N	Y
R	P	P	P	P	P	P	P	F	P

T1	j	k	l	m	n	o	p	q	r
(1)	Y	Y	Y	Y	Y	Y	Y	Y	Y
(2)	Y	Y	Y	Y	Y	Y	Y	Y	Y
(3)	Y	Y	Y	Y	Y	Y	Y	Y	Y
(4)	Y	Y	Y	N	N	Y	Y	Y	Y
R	P	P	P	F	F	P	P	P	P

T1	s	T2	a	b	c	d			
(1)	Y		Y	Y	Y	Y			
(2)	Y		Y	Y	Y	Y			
(3)	Y		Y	Y	Y	Y			
(4)	Y		Y	Y	Y	Y			
R	P		P	P	P	P			

Table 1. execution of tasks

In the table above, the usability problem for Task 1 occurs at h, m and n of the action sequence, where inaction sequence h, the user cannot find the button to end the draft, or there is no clear indication that the draft has ended. m is similar to h, but since the user is the league owner at this point and has control of the draft, the usability problem is due to the lack of feedback as a criterion for the user to find the button to end the draft. There is no usability problem in

Task 2.

We can see from the evaluation results that most of the actions meet the initial goal criteria, except for h, m and n, which are mainly usability issues for the draft session.

This problem can be solved by introducing a "draft is finished! " message, but there is a risk that the player will miss the message, so an additional feature could be provided to automatically redirect the page after a draft or a back button and countdown system could be added to the draft room. Several of the above solutions could improve this problem.

Using the four questions in Step 4 above as evaluation criteria, participants could assess the success or failure of the task. The letter 'Y' indicates that the action was performed according to the criteria, and 'N' indicates an action with usability problems. The result is indicated by an 'R' in the last line, a 'P' for Pass and an 'F' for Failure.

7. Conclusion

Because of its unique characteristics and popularity, fantasy sports have been given a much greater meaning than just a thrill-seeking tool for sports fans. One way to achieve this goal of making the world of fantasy sports accessible to a wider non-fan base is to design an onboarding game for fantasy sports suitable for newcomers. In this article, we design, implement and evaluate a Fantasy Onboarding system to help novice players learn fantasy sports and develop an interest in them unguided.

In this work, the difficulty, specialisation, user interface information overload and player environment of the original Fantasy Sports were identified as barriers to novice players playing fantasy sports.SILSBEE's (2016) findings for

students using fantasy sports to learn English surface that students find learning fantasy sports difficult, and there are many instances where they need guidance from a teacher. One survey also found that novice players are uncomfortable and ashamed of playing with skilled players in a competitive gaming environment. In fantasy sports, Novice and experienced players have different needs for information presentation, interface and social interaction.

These surveys led us to identify and discuss the specific needs of new players playing Fantasy Sports, leading to a description of Fantasy Onboarding's framework and game mechanics. This included an online draft system that would reduce data complexity, a forum to share player predictions and gain technical support, and a reward mechanism that would return predictions based on their accuracy was seen as critical. Our system was designed around these three important features.

Unlike traditional sports, where players can only passively support their favourite team, Fantasy Onboarding has a draft system that allows players to enjoy the same sense of control that fantasy sports provide. In addition, the ability to start the draft as soon as it is full and the simultaneous selection of athletes makes the draft more efficient and less difficult and professional. The ability to predict and share increases the potential for social interaction between players, a method of player communication that was missing from the original fantasy sports games and is often the way to increase player stickiness.

Given that the evaluation method for this project has its limitations, future research could use the introduction of realistic user evaluations to collect real data to extend the findings of this study. Furthermore, as this study addresses all types of fantasy sports (e.g., football, NASCAR), both of which differ in rules and draft methods, future studies should make design adaptations to suit different sports types.

Overall, the system creates a solid foundation for further research and fills a

gap in historical research regarding the needs of novice fantasy sports players; currently, no systematic studies investigating the needs of novice fantasy sports players have been identified, and no novice version (game mechanics and user interface design) of a fantasy sports application has been developed. We have achieved our goal of an easy-to-use application for fantasy sports-facing novices. While there is potential for further development in the future, Fantasy Onboarding offers insight that provides a valuable and innovative addition to more than just the fantasy sports field.

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