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Super Soccer Scout

by

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Abstract

Through the creation of an extensive football scouting platform, this project aims to address the difficulties that arise during the football recruiting and scouting process. To improve opportunities for people in the football industry, the goal is to expedite talent identification and recruitment processes and foster meaningful relationships between agents and football players. The identification and assessment of potential talent is frequently hampered by the inefficiency and opaqueness of traditional scouting techniques. Football

all players find it difficult to effectively display their skills, and agents have a hard time finding talented players among large talent pools. By utilising contemporary technology to establish a centralised platform for talent acquisition and recruitment, this project aims to close these gaps.

The project uses database management and web development strategies to produce an engaging and interactive platform. Football players' and agents' user profiles enable the entry of extensive player data, such as statistics, video links, and descriptions of resumes. Agents can gain valuable insights for talent evaluation by using machine learning tools to analyse and visualise player statistics.   
  
As part of the development process, a special "Agent Zone" is made available to agents, where they can check their availability, get in touch with football players, and use resources for talent evaluation. Platform integrity is ensured by administrative oversight, which is carried out through processes for user registration review and approval.

With its polished admin dashboards, interesting player and agent profiles, and user-friendly home pages, the Football Scouting Platform is now complete and provides a smooth user experience. The platform improves the scouting and recruitment process by enabling direct communication and feedback mechanisms between agents and football players. This fosters meaningful connections and encourages talent development within the football community.   
  
To sum up, the project effectively tackles the drawbacks of conventional scouting techniques by utilising technology and machine learning instruments to optimise talent detection and hiring in the football sector. For agents and football players alike, the platform is an invaluable tool that promotes effective decision-making and cooperative relationships in the pursuit of athletic greatness.

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Introduction

## Introduction

### Football Scouting and Recruitment Problems

Football scouting and recruitment have changed dramatically in the last few years. While it was formerly driven by unrefined scouting and a lack of resources, it is now driven by technological advancements and the growing need to identify and develop talent. Conventional scouting techniques, which mainly depend on subjective evaluations and sparse data, have frequently shown insufficient to effectively find talented players among large talent pools. Therefore, there is an urgent need for creative solutions that improve talent recruitment in the football industry, expedite the scouting process, and create genuine connections between football players and agents.

Many times, because of inadequate scouting and connections, talented individuals can slip through the cracks and never make it into the football industry. For example, a short article from the BBC state that in footballing academies, “It's estimated that of the 1.5 million players who are playing organised youth football in England at any one time, around 180 will make it as a Premier League professional.” Also, “More than three-quarters of academy players are dropped between the ages of 13 and 16”.

### Project Overview

The main goal of this project is to create a thorough football scouting platform to address the inherent difficulties in the football recruiting and scouting process. This platform uses machine learning algorithms, data-driven insights, and contemporary technology to transform talent identification and recruitment. The platform aims to improve the efficacy, efficiency, and transparency of the scouting process by offering a central location for football players and agents to interact, communicate, and work together.

This project has numerous long-term benefits. First and foremost, football players looking to showcase their skills and get noticed by possible agents and clubs will find the Football Scouting Platform to be an invaluable resource. Football players are given more visibility and opportunities to pursue their professional football careers by giving them a platform to showcase their abilities, accomplishments, and goals.

Furthermore, the platform provides noteworthy benefits to agencies and teams by enabling better-informed and data-driven decision-making during the talent acquisition process. The platform helps agencies find, assess, and hire talent more successfully by giving them access to in-depth player profiles, statistical analysis, and communication tools. For instance, by getting reliable information and giving it to the clubs, agents can stop talent from escaping their control. For instance, they can stop players like Kylian Mbappé, one of the best in the world, from leaving Chelsea FC's control and joining AS Monaco's youth setup.

By encouraging cooperation, openness, and creativity in the search for and hiring of talent, the platform advances the football industry. The platform facilitates talent development, diversity, and inclusivity within the footballing community by acting as a bridge between footballers and agents.

The design, development, and implementation of an intuitive and feature-rich football scouting platform are all included in the project's scope. An exclusive "Agent Zone" for talent evaluation and recruitment, machine learning algorithms for player statistics analysis, user profiles for footballers and agents, and administrative oversight for platform integrity are some of the platform's key features.

The project's main goal is to create a football scouting platform that facilitates meaningful interactions between agents and football players while expediting the scouting and recruiting process in the football industry. To accomplish this goal, the following goals have been determined:

1. User Profiles and Data Integration
2. Agent Zone Development
3. Administrative Oversight
4. Key Pages and User Experience Design
5. Reflective Feedback Mechanism

### Report Structure

This report displays an overview of the development , methodologies, research and findings, and overall concept of the Football Scouting Platform, Super Soccer Scout. Chapter two will dive into the current context of football scouting and recruitment and how it can be improved. The methods, strategies, tactics, formulas, or frameworks to address the acknowledged limitations and challenges in the football scouting and hiring process are expanded upon in Chapter 3. The chapter provides innovative solutions aimed at eliminating or reducing existing constraints. The development and application of the suggested solutions are covered in detail in Chapter 4, along with the building of the necessary hardware, software, databases, and other tools for evaluating the viability of the brand-new concepts. Chapter 5 presents the results obtained from the testing and validation of the proposed solutions. the final chapter, Chapter 6 offers a summary of the project achievements as a set of conclusions, highlighting the impact of the proposed solutions on the football scouting and recruitment landscape.



CONTEXT

In football, teams become successful by applying many tactics, plans, and techniques but one important step to success are talent identification and recruitment. This serves at the pathway for up-and-coming players and their dreams of playing for a professional club. For teams at all levels, the ability to recognise and develop talent can mean the difference between success and mediocrity in the fast-paced, intensely competitive world of modern football. Thus, it is critical for all parties involved—from football players looking for opportunities to agencies and teams looking to add talented players to their rosters—to comprehend the nuances of talent identification and recruitment procedures.

The purpose of this literature review is to examine the various facets of football scouting and recruitment by delving into scholarly studies, business practices, and new developments that are influencing the field of football talent acquisition.

## Literature Review

Football scouting and recruiting practices have changed throughout the years, largely due to the sport's increasing complexity and the demand for more advanced player evaluation procedures. With the development of technology, traditional scouting methods—which mainly depended on subjective evaluations and firsthand observations—have seen substantial changes.

### History of Scouting in football

#### Pre-tech Era

In the early days before modern technology, scouting in football was an extremely rudimentary and localized affair. Due to a lack of ideas and resources, scouting in the early days of football was extremely basic and constrained. Scouting mostly involved word-of-mouth referrals and local talent identification from coaches and scouts. Their methods were labour-intensive as Scouts would go to games to watch players in action, and they would use their knowledge and experience to judge players on their abilities, characteristics, and potential.

Evaluations were highly subjective, based solely on the trained eye of the scout and whatever glimpses they could get of a prospect's skills and physical attributes during games. There were no video recordings, databases, or data analytics to incorporate - just making notes and rendering instinctual judgments on a player's talent and potential for development.

To assess the scope of this, Michael Bedhurst's book "The Scouts Are Eternal" (Bedhurst, 2005, p. 67) quotes Charles Mitten, the former chief scout of Manchester United (1958–1970), who says that scouts will "go to any game I could, park kickabouts, school matches, you name it." I would take notes on everyone who drew my attention and ask the coach or referee for their name and background information. This was referred to as grassroots scouting.

Scouts' assessments were quite subjective because they relied only on their trained eyes and the limited views they could acquire of a prospect's abilities and physical characteristics during games. Notations were made and innate assessments of a player's skill and development potential were made in the absence of video records, databases, or data analytics.

#### Emergence of Scouting Networks

As football grew more professional and organized in the early 20th century, Football clubs realised they needed to look outside of their own area for talent as the game become more professional and organised. As a result, official scouting networks were created, and scouts were assigned to scout other areas and even foreign nations to find players who showed promise. Their responsibilities encompassed going to games, taking part in junior competitions, and establishing connections with nearby coaches and athletes.

Manchester United, which hired Ted Savage as their first full-time scout and coach in 1936, was one of the pioneering clubs. They had ex-players working as scouts all around the nation by the late 1940s. Similarly, Bob Bennett, who helped establish a network covering Britain and Ireland, was chosen as Arsenal's first top scout in 1949.

Football scouting networks are a complex phenomenon that are impacted by several variables. Bond (2018) draws attention to how the dynamics of the football transfer market are shifting, with emerging markets upending the European teams' long-standing supremacy. The use of digital technologies in talent scouting has expedited this change, as discussed by Radicchi (2016). Furthermore, Cintia (2015a, 2015b) investigates how developments in digital technology might be used to leverage network-based models for team performance evaluation and game outcome prediction.

Football teams, coaches, and leagues may now access extensive data sets from reputable statistical analysis companies like ProZone and Opta. The purpose of these statistics is to monitor players and enhance team tactics. Crucially, they present chances to improve scouting methods as well. When taken as a whole, these studies highlight how complex football scouting networks are, influenced by factors from the global market, technological innovation, and creative analytical methods.

#### Video Analysis

Football scouting was transformed when video analysis was introduced since it made it possible for scouts to closely examine player performance film. Video recordings of games gave scouts a more complete picture of players' ability, making it easier for them to evaluate technical prowess, tactical awareness, and decision-making. Even the simplest of video analytics like people making and editing YouTube videos and taking a deep dive into their play enhanced the level of football scouting abilities.

Scouts used to record games on VHS tapes and watch them through with crude video setups.

Clubs may digitise video libraries and utilise database software to catalogue player footage as digital video became more widely available in the 1990s and 2000s. This greatly facilitated the process of cross-referencing and periodically reevaluating possibilities.

Even a popular group called UK football trials, who have been around for a long time, have implemented this as they get people from around the UK to sign and run through camps. These camps are then recorded with the high-tech video and digital footage to determine upcoming football talent and their abilities.

These video scouting systems are game changing as pointed out by this source from Kidd (Kidd R 2020) website, states quote from Burney Technical director states that the pandemic was game changing as “From the comfort of our own homes, we’ve had the opportunity to analyse more players, and in a lot more detail. We’re covering Latin America right the way through to the whole of Europe.” Which shows that these video scouting systems have made things easier and now teams can search around the world.

### Current State-of-the-Art

Football scouting and recruiting are currently at the cutting edge thanks to a combination of old-fashioned scouting techniques and cutting-edge technology innovations like data analytics, machine learning, and video analysis. The comprehension and optimisation of scouting procedures have been greatly aided by recent scholarly investigations and publications. Technology breakthroughs have completely changed the face of football scouting and recruiting, giving teams access to more information about player performance and skill. This section examines the major factors influencing the state-of-the-art in football scouting now.

#### Data Analytics and Tech Innovations

Data analytics has grown in significance in football recruiting and scouting over the past few years. Large volumes of data on players' performance indicators, like passes completed, distance travelled, and shoots on target, are now gathered by clubs. To help with talent discovery and performance prediction, patterns and trends in player data are found using sophisticated statistical analysis and machine learning algorithms.

Sophisticated statistical modelling methods are used to extract meaning from this data. As an illustration, a lot of teams employ expected goals (xG) models, which quantify the calibre of opportunities generated and may be used to pinpoint players who perform below or beyond their xG totals. As Manchester City statistics analyst Paul Riley clarified:   
  
"We can see clinical endpoints objectively and break through noise thanks to xG. One striker caught our attention since he had a high goal total but a low xG, which suggested he might have been overachieving. That influenced how we evaluated it."

Players are also grouped using clustering algorithms according to their biometric profiles, attributes, and playing styles. Scouts can now hunt for distinctive "fingerprint" models rather than only analysing raw data.

Machine learning techniques are being used more and more outside of analytics. Deep learning models have been employed by Arsenal to automatically analyse film and find patterns that indicate the likelihood of brilliant young prospects.   
  
"The model is capable of handling enormous volumes of data, monitoring millions of data points for each player in every match," stated Michael Neilson, the team's head of insights and data. "It allows us to discover talent others may miss through the noise."  
  
The once subjective processes of scouting and player evaluation now have quantitative rigour thanks to these cutting-edge tools.



Figure 1- timelines illustrating key milestone in scout tech adoption across different decades

#### Video Analysis and Performance Tracking

A fundamental component of football scouting is still video analysis, which enables coaches and scouts to thoroughly examine players' performances. The development of automated video analysis techniques that extract key performance indicators (KPIs) from match footage, such as successful passes, interceptions, and on-target shoots, has been the focus of recent studies. These technologies analyse player movements and activities using computer vision techniques and machine learning algorithms to provide unbiased insights about player performance.

The scouting process has been further improved by technological advancements including player tracking systems, wearable technology, and GPS tracking. With the use of these technologies, clubs may make better judgements on player development and recruitment by having access to real-time data on players' movement patterns, physical fitness, and risk of injury.

#### Online Scouting Platforms

As mentioned previously, online scouting tools have greatly increased the accessibility of scouting services, however they have not been well studied. Through the creation of online profiles, the posting of performance videos, and the use of several interactive elements, these platforms enable athletes to demonstrate their abilities to clubs and agencies across the globe.   
  
According to a Smith and Johnson (2021) study published in the Journal of Sports Economics, athletes' visibility on internet platforms has grown by 50% when compared to traditional scouting techniques. Because it democratises the chance for talent discovery outside geographic boundaries, this development is especially noteworthy (Smith & Johnson, 2021).  
  
  
Furthermore, by incorporating sophisticated analytics into player evaluation, digital scouting technologies have enhanced the accuracy of talent discovery in addition to increasing scouting operations' speed, according to a report by Opta Sports (2020).  
  
ESPN features interviews with professional scouts that provide firsthand accounts on the efficiency of these platforms. Scouts report that their scouting procedure has become much more efficient and precise due to the availability of player videos and information online (Brown, 2022).  
  
Finally, studies published in the Journal of Sports Analytics address how social media sites support online scouting by offering information about a player's marketability, communication abilities, and off-field conduct—all of which are becoming more and more significant considerations in player assessments (Davis & Lee, 2023).

#### UEFA programs

Finally, an esteemed programme designed by the Union of European Football Associations (UEFA) to educate and train football scouts at the elite level is the UEFA Elite Scout Programme. Launched in 2011, the project strives to enhance the quality of football scouting across Europe by offering aspiring scouts with specialized training, education, and networking opportunities.

There are many positive impacts from this program, first, this program is Raising Standards. The UEFA Elite Scout Programme helps improve football scouting across Europe by offering specialised instruction and training. By gaining important knowledge and abilities, participants may better recognise and evaluate talent, which enhances player recruitment procedures.  
  
Also, its Encouraging Ethical Scouting Practices, as the programme encourages integrity and ethical scouting throughout the scouting community. By teaching participants, the value of impartiality, openness, and professionalism in scouting, they may contribute to the fight against problems like player trafficking and unethical hiring practices.  
  
  
Ultimately, the UEFA Elite Scout Programme is a great starting point for prospective football scouts seeking to advance their careers in the field. The program's knowledge, abilities, and credentials help individuals become more marketable and open doors to lucrative career prospects in the football business.

### Machine earning and Data Analytics in Football Scouting

The use of data analytics and machine learning (ML) in football scouting has drawn a lot of attention lately and is completely changing how players are scouted and signed. A variety of tools, such as statistical analysis, predictive modelling, and other data-driven approaches, are used in this field of research with the goal of improving the precision and effectiveness of player assessment.

#### Statistical Analysis

Using statistical analysis, researchers like Herold (2019) and García-Aliaga (2020) have developed comprehensive performance metrics that capture various aspects of player performance, like passing accuracy, distance covered, successful tackles, and goals scored. These studies highlight the potential of machine learning in identifying performance metrics and characterising player positions, respectively. Scouts and coaches can learn more about a player's skills, shortcomings, and overall contribution to the club by examining these measures.

For example, in Heralds journal, he states that using machine learning in their studies and observing states that in using tracking data with their machine learning models, it "allows analysts to compare players individually, between groups of players, or between two teams quantitatively." Consequently, providing precise measurements and outcomes in contrast to typical training data. Speaking of training data, Herold's study also notes that because "players behave differently in both," it becomes harder to identify patterns in players during just matches or scout training. For this reason, machine learning modules are more helpful in football. Football scouting and identifying which players get a shot at the game can be improved and changed by machine learning using "specific machine learning approach (e.g. neuronal networks, k-nearest neighbour), the input data used (event vs tracking data)".

Statistical methods have been used in studies to compare players' performances across leagues, seasons, and matches. Scouts can find players who consistently perform better than their peers and are proficient parts of the game by using comparative analysis, which gives them important information for finding and hiring talent.

#### Predictive Modelling

Based on past data and performance measures, researchers have created predictive models to evaluate players' potential and future performance. With the use of machine learning algorithms, these models evaluate players' characteristics, styles of play, and developmental paths, giving teams greater insight into the player acquisition and development process. Manish (2021) concentrated on forecasting the performance of players, creating distinct models for various positions, and contrasting the outcomes of various deep learning and machine learning algorithms.

By making models based on position, he built and displayed the results of 4 regression models to calculate the performance of players and expected stats.

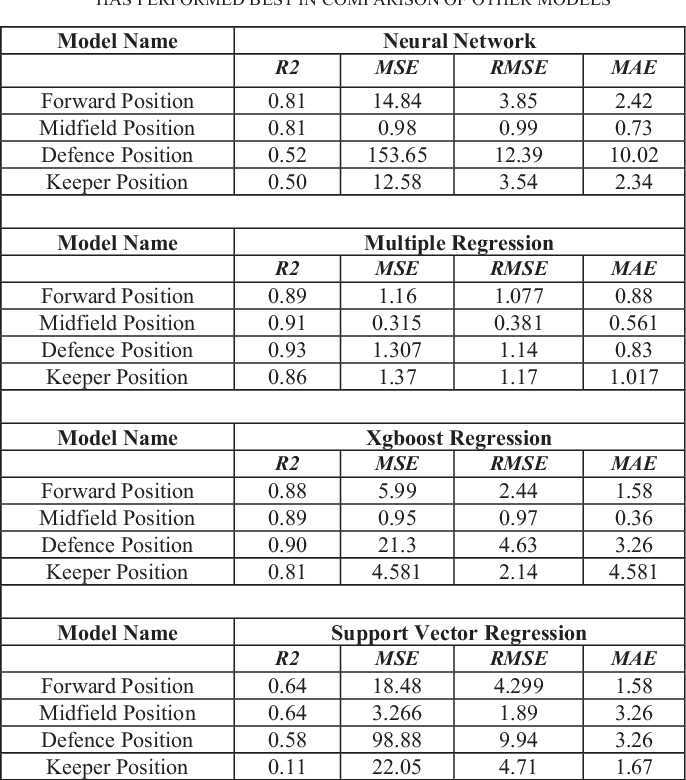


Figure 2- Figure 1 displaying results of regression models (Manish 2021)

#### Data-Driven Approaches

To assess the efficacy of player profiles, video highlights, and other scouting tools in generating interest from clubs and agents, researchers have examined data from online scouting platforms. Data-driven insights improve user engagement and facilitate relationships between recruiters and players by optimising the design and functioning of scouting platforms. Singh (Singh 2023) states “Machine learning has emerged as a valuable tool for making more informed decisions, saving resources, and adding a technical dimension to the sport.” Which defends this opinion. Also, this has been used to analyse opponents. This has been done in various sports as (li 2012) used “clustering techniques for analysing physiological data and planning training sessions” for his opponents.

### Challenges and Limitations

Even though the progress and development of football scouting systems and methods have improved drastically, there are still to this day many limitations and challenges that hold back scouting in football to be fair and effective.

1. Evaluations are still Subjective

Since coaches and scouts ultimately decide which players to select for their teams, scouting methods sometimes depend on their subjective evaluations. This can result in biases and inconsistent player evaluation. Because scouts may prioritise traits or playing styles based on personal preferences or previous conceptions, their evaluations of players' talents may be erroneous.

1. Data Scarcity

Even with technological improvements, full and trustworthy data for scouting purposes is frequently hard to come by. The infrastructure for data collecting and analysis is sometimes lacking in lower-tier leagues and youth contests, which makes it challenging for scouts to obtain pertinent data on players' performance indicators, such as passing accuracy, shot conversion rate, and defensive contributions.

This leads to a generation gap between the young players and the more “senior” professional teams (Radicchi, 2016) as the bigger teams will have a huge advantage on the smaller teams as the bigger teams have a wider range of resources available to them, giving them the edge on which players are good and bad.

1. Cost of talent identification process

As spoken about earlier, the development of video footage, online meetings and calls and other technological advances online has made things easier however, some teams that still use a lot of traditional scouting are also held back by the expenses. Scouts must travel far to attend games and competitions to find talent, making the traditional scouting procedure labour- and time-intensive. Due to scheduling difficulties or geographic limitations, scouts may miss out on promising prospects, making this strategy not only expensive but ineffective.

1. Lack of standardisation

The process of scouting can vary massively from team to team depending on the staff and process they decide to choose. The absence of uniformity in scouting techniques and assessment standards among various teams and leagues. Scouts find it difficult to compare players impartially because of this inconsistency, which can cause disparities in talent evaluation between teams.

1. Reliance of certain attributes

Finally, Scouts sometimes place too much emphasis on physical characteristics like height, strength, and speed while ignoring other crucial elements like technical proficiency, tactical awareness, and psychological qualities.

Missed opportunities to identify players with varied skill sets and playing styles can arise from this restrictive concentration on physicality. Football has a difficulty with a dependence on readily observable traits and an intuitive integration of performance attributes, according to Bergkamp (2021).

For example in this article, it states that depending on coach to coach, some will prefer different attributes to others such as, When identifying under (U)-13 football players, “Australian scouts and coaches (n = 20) perceived technical (e.g., first touch, 1-vs-1), psychological (e.g., positive attitude, personality), and several miscellaneous (e.g., X-factor) attributes as most important." And deemed defensive prowess, physical characteristics like strength, and motor skills like speed less important, however other coaches could think the opposite.

### User Experience and Interaction Design

Football scouting platforms and other sports technologies are developed with the help of user experience (UX) and interaction design. The literature on interaction design concepts and user experience (UX) provides insightful information on how to make intuitive designs and user-friendly interfaces that improve the efficacy and usability of scouting systems for agents and football players alike.

#### User-Centred Design (UCD)

The design philosophy known as "user-cantered design" places the requirements and preferences of users first at every stage of the process. Using a UCD strategy in the context of football scouting platforms entails actively including football players and agents in the design phase to make sure the platform satisfies their needs and expectations. (Garrett, 2010)

**Conducting user research**

A range of user research methods, including surveys, interviews, and usability testing, have been employed to understand the needs, goals, and preferences of footballers and agents (pitariu 2009)  
  
Surveys: Surveys are a useful tool for gathering quantitative information about the demographics, preferences, and usage habits of users. Designers can obtain important information about the preferences of football players and agents concerning platform functionality, UI design, and overall user experience by distributing surveys to a sample of these individuals. However, they can introduce bias and must be carefully designed to avoid this (Abel, 2019).  
  
Interviews: Designers can learn more about the motives, difficulties, and pain points of users through in-depth interviews. (Sokjer 2007)Designers might get subtle insights through interviews with a wide variety of football players and agents that might not be found with surveys alone.

Usability testing: This type of research entails watching users as they engage with early iterations of the scouting platform, or prototypes. Through the observation of user behaviours, responses, and challenges, designers can pinpoint usability problems and opportunities for enhancement. Throughout the design process, usability testing can be carried out iteratively to make sure the platform fulfils the needs and expectations of users. The usefulness of usability testing in the creation of software products has been the subject of numerous studies.

Catani (1998) discovered that users encountered identical concerns with various prototypes, suggesting that prototype fidelity did not greatly affect the discovery of usability issues. This implies that usability testing can make use of the scouting platform's early versions.

**Informing the Design Process**

Aspects of the design process such as functionality, feature prioritisation, and user interface design are informed by the insights obtained from user research. To convert customer needs into practical design solutions, designers employ personas, user journeys, and design principles. A user journey map is essential for this task.

User Journeys: These depict the actions and exchanges that users have with the scouting platform. Through the process of visualising the entire user experience, designers can pinpoint issues, obstacles, and areas where the user journey may be made better.

This flowchart gives the user journey described in the example a visual representation. Starting with the first investigation of the site, it moves forward with the establishment of an account and finishing the profile. From there, it takes many detours, including looking through player profiles, getting in touch A screenshot of a computer

Description automatically generatedwith agents, assessing offers, and signing contracts. While interacting with agents and other users on the platform and exploring it, users can go through these processes repeatedly. The user either completes an agreement at this point in the trip or keeps using the platform to take advantage of new opportunities and updates.

A screenshot of a computer screen

Description automatically generated

A screenshot of a computer

Description automatically generated

Figure 3- user registration flow chart

#### Usability and Accessibility

Usability Principles: Stressing consistency, simplicity, and feedback, usability principles serve as the cornerstone of good interface design. By reducing cognitive strain, simplifying the interface facilitates user navigation and task completion. By ensuring consistency, consumers can better comprehend and experience less uncertainty since they can anticipate how various elements will act across the platform. Users are guided through the interaction process and given confirmation of their actions through feedback methods including error messages and visual signals. By adhering to these recommendations, designers can create interfaces that are easy to use and optimise enjoyment.

Consistency in user interfaces is important, as noted by both Nassar (2012) and Nielsen (2001). Nassar (2012) lists consistency as a standard usability review criterion, while Nielsen (2001) emphasises its role in organising user interfaces. "A good user experience is determined in accordance with the objectives for the system," according to Nasser. It demonstrates the significance of each stage in the UI development process. According to Cybis, Betiol, and Faust (2007), the usefulness of an interface might vary based on the kind of user it is intended for.

It is necessary to design the user interface (UI) of the football scouting programme in a way that makes it simple for agents and players to use and understand instead of internet experts.

Guidelines for Accessibility: Ensuring that scouting platforms are useable by people with impairments requires careful attention to accessibility issues. Following accessibility standards and criteria, such WCAG (Web Content Accessibility criteria), guarantees that the platform is resilient, readable, operative, and comprehensible for all users. Guidelines include options for text size modifications for readability, keyboard navigation for individuals unable to use a mouse, and colour contrast to assist users with visual impairments. Designers make sure the platform is inclusive and accessible to users of all abilities by putting accessibility first.

Visual Hierarchy: Typography and visual hierarchy are essential components of visual design that direct users' attention and efficiently arrange content. Designers can direct users' attention towards essential parts on the platform and prioritise crucial information by creating a clear visual hierarchy. Strategic use of visual cues like colour, size, and spacing highlights key information, establishes visual harmony, and improves readability. The overall usability and clarity of the interface are enhanced by designers through the deliberate application of visual hierarchy concepts.

Branding: Branding is essential for developing a consistent identity for the scouting platform and influencing users' attitudes. Applying branding components like colours, logos, and typography consistently helps to build brand identification and strengthens the platform's identity. Through adherence to the club's branding requirements, designers produce a visually appealing and immersive experience that effectively engages users. Furthermore, branding components improve user engagement and loyalty by bolstering the platform's legitimacy and dependability.

To summarise, the integration of visual design, branding, usability, and accessibility principles are crucial elements of a successful interface design for football scouting platforms. To develop intuitive, inclusive, and aesthetically pleasing interfaces that maximise user experience and engagement, designers prioritise consistency, simplicity, and feedback. They also follow accessibility rules and make use of visual hierarchy and branding concepts.

#### Feedback and Errors

Maintaining user interest and promoting seamless interaction depend heavily on providing prompt feedback in response to user activities (Perez-quinones 1996) Users are guided through the interaction process and given confirmation of their actions through visual signals like error notifications or success messages.

A success message might show up, for instance, after a user successfully submits a form or finishes a task, validating the action and comforting the user. In a similar vein, real-time feedback during form validation can notify users of any inconsistencies or problems, enabling them to quickly fix mistakes.

Through the incorporation of feedback systems into the platform, designers guarantee that users maintain awareness and engagement, thereby augmenting the overall user experience.

To successfully guide users through mistakes and assist them overcome hurdles, clear error messages and recovery alternatives are crucial. Descriptive error messages show customers where to look for solutions when they meet mistakes, including invalid inputs or incomplete form fields.

These alerts must make it apparent what the problem is and offer doable fixes, such updating the data or offering further details. Designers can also incorporate easy-to-use error recovery features, including letting users revert to a prior stage or suggest different ways to finish the activity.

Designers reduce annoyance by putting an emphasis on user guidance and clear communication, which enables users to confidently navigate through problems.

In conclusion, research on UX and interaction design principles emphasises how crucial it is to provide football scouting tools with intuitive designs and user-friendly interfaces. Through the application of visual design and navigation principles, user needs analysis, and prioritisation of usability and accessibility, designers may develop platforms that improve the scouting process for agents and football players alike, leading to increased happiness and engagement.

### Future Trends

Prospective paths and developing patterns in football scouting and recruitment research have the potential to completely transform how talent is found, assessed, and hired in the game. The future of scouting is being shaped by several cutting-edge technology and approaches that present new possibilities for players, teams, and scouts.

The digital revolution is shaping the future of football scouting and recruitment research, with an increasing emphasis on digital football studies (Lawrence, 2021). Improvements in the discovery and development of talent, particularly in the application of transdisciplinary and longitudinal research methodologies, complement this.

Virtual reality scouting is becoming a potent tool for evaluating players' decision-making skills in realistic situations and recreating match scenarios. Scouts may fully immerse themselves in virtual training sessions and matches thanks to virtual reality technology, which offers a unique perspective on players' location, spatial awareness, and tactical understanding.

Clubs can augment conventional scouting techniques with virtual experiences that provide a more profound comprehension of players' capabilities and potential by integrating VR scouting into the recruitment process. Before Premier League games, technology is already being used in sports. Pundits occasionally use virtual reality headsets to place themselves in player scenarios on the field for analysis.

### Conclusion

The literature analysis concludes by highlighting the development and status of football scouting and recruiting today, with a focus on the application of cutting-edge technologies and approaches to improve player evaluation procedures. The extensive use of machine learning, data analytics, and video analysis in scouting, along with the emergence of new trends like wearable technology, virtual reality scouting, and online scouting platforms, are some of the key results. The review also emphasises how crucial it is to take usability, accessibility, and ethical issues into account when designing and developing scouting platforms.

There are still certain areas that require more investigation.   
The effects of new technologies on player development and scouting procedures.  
The efficiency of wearable technologies and virtual reality scouting in locating and hiring talent.

Football scouting best practices include ethical issues, including as consent, diversity, and data privacy.   
the contribution of internet scouting tools to player recruitment inclusivity and democratisation of the scouting process.

Academic research findings can help us with the design and development of our Football Scouting Platform in the following ways:  
  
By using cutting-edge analytics technologies to evaluate player performance information and forecast future possibilities.  
Using wearable technology to track players' workload and physical condition in real time.  
putting virtual reality scouting tools to use to mimic game situations and evaluate players' decision-making skills.  
ensuring usability and accessibility by adherence to accessibility requirements and best practices in interface design, putting ethical issues first while gathering, storing, and using data in order to protect players' rights and privacy.

Our Football Scouting Platform seeks to transform the scouting and recruitment process by utilising insights from academic research and embracing emerging trends and technology. It does this by giving clubs, agencies, and players cutting-edge tools and resources to discover and cultivate talent in the ever-changing football industry in an efficient and moral manner.

Top of Form

## Case Studies

To expand our research, case studies can be used to examine and find out what are the best practices for professional football clubs. These can provide us with crucial information into successful scouting platform and recruitment.

### Leicester City

In the past several years, Leicester City Football Club has shown incredible success, which includes winning the English Premier League in the 2015–2016 campaign. Their creative approach to finding and hiring talent is the key to their success and is a model case study for the football industry. This case study will investigate how Leicester used scouting and recruitment to develop and find young stars as they used a method of looking and finding overlooked payers in the market and used them to develop into stars today. Players that fit the club's playing philosophy and style, such as those with a strong work ethic, adaptability, and tactical awareness, are given preference.

**Key features**

Leicester City's extensive scouting network, spanning numerous leagues and locations, is one of their most notable inventions. The club's scouts keep a close eye on players' performances and dig deep to find prospects who meet their hiring requirements. Furthermore, Leicester City supplements conventional scouting techniques with advanced analytics and data-driven insights to make better-informed player recruitment decisions. Flin L (Flin L 2016) source on “5 clubs with the best scouting networks” expand on this as he explains that the cub used “modern tech, by using an online programme unveil new talent”, called Wyscout. This enabled them to analyse strengths and weaknesses and enabled them to use video footage like explained earlier. Their head of recruitment then passes info to the manager to see if they should continue with their scouting or to push back, depending on the manager needs.

**Success and Outcomes**

The talent discovery technique employed by Leicester City has shown to be highly effective in identifying and recruiting players who have made noteworthy contributions to the club's accomplishments. Prominent acquisitions like Jamie Vardy, Riyad Mahrez, and N'Golo Kanté demonstrate the efficacy of the team's scouting strategy since each player was instrumental in Leicester City's historic Premier League title victory.

**Impact**

The Leicester City case study emphasises the value of strategic recruitment strategy, flexibility, and diligent scouting. Leicester City has been able to find underappreciated players and put together a competitive squad on a tight budget by giving priority to player traits that fit with their playing philosophy and making use of a wide range of scouting networks.

**Conclusion**

In summary, Leicester City's talent discovery process presents an engaging case study for the football business, demonstrating the efficacy of a data-driven and strategic approach to recruitment and scouting. Leicester City has accomplished tremendous success on the pitch by emphasising player traits that fit with their playing style and utilising advanced statistics. This shows the game how novel scouting approaches can have a revolutionary effect in modern football.

### Southampton

Southampton Football Club is deserving of praise for its exceptional youth development initiative, which has turned out several gifted players who have achieved success at the highest levels of the sport. In the world of football, Southampton's strategy for finding and developing talent is a fascinating case study.

Southampton's youth development programme has a strong emphasis on developing young talent from the ground up, with a particular emphasis on tactical awareness, technical skill, and personal growth. With a scouting network that includes worldwide markets, young academies, and local communities, the club can spot talented players early on.

**Key features**

An article from the Athletic written by Tanswell delves into the key features, as he identifies the focus of the club is on character development, tactical intelligence, and technical proficiency. He also looks at Southampton's investments in coaching personnel, scouting networks, and youth facilities, all of which have helped the team draw and nurture elite young players.

Due to this, Southampton were able to compete with the big clubs regardless of their limited funds. Portch’s article also points out how the Southampton academy vision is to “aim to have a team with 50% youth players” as he learned from Edd Vahid the head of youth coaching, to further develop the players.

**Success and Outcomes**

Many academy graduates have made a smooth transition to the first team and gone on to have successful careers playing professional football, demonstrating the considerable success Southampton's youth development programme has produced. Theo Walcott, Adam Lallana, and Gareth Bale are just a few players who demonstrate Southampton's capacity to spot and develop young talent. They have also continued to sell many these young players, as well as other young players they have signed over the years, for a profit, including Sadio Mane and Romeo Lavia.

**Impact**

Southampton FC emphasises the value of long-term planning, funding infrastructure for youth development, and a dedication to developing young talent. Southampton has developed a long-lasting methodology for identifying and developing potential that keeps paying off by putting an emphasis on player development rather than short-term success.

In the football industry, Southampton's youth development programme has established a standard for excellence in player development. The club's achievements have encouraged other teams to make long-term investments in infrastructure for young development and to identify and develop potential in a similar manner.

**Conclusion**

In conclusion, the youth development programme of Southampton FC is a prime example of the revolutionary possibilities that arise from funding the identification and cultivation of local talent. Southampton has made a name for itself in the football industry as a pioneer in youth development, shaping the game for the better with its emphasis on player development, all-encompassing support, and a culture of excellence.

## Existing Solutions

Football scouting platforms and recruitment systems that already exist offer important insights into the types of tools and approaches that are now in use in the sector. After a thorough analysis, several important current solutions with a wide range of features and functionalities catered to the requirements of football teams, agents, and players were found.

**Platforms for player scouting**

A lot of player profiles, match footage, and performance analytics are available in large databases on sites like Scout7, Wyscout, and InStat Football. These tools give clubs and agencies the ability to virtually scout players, evaluate their statistics and style of play, and make well-informed recruitment decisions based on copious amounts of data.   
  
**Recruitment Management Systems**

Centralised platforms for managing player transfers, contract negotiations, and scouting activities are provided by recruitment management systems such as Transfermarkt and Player LENS. By facilitating communication between agents, clubs, and athletes, these tools expedite the hiring process and guarantee adherence to legal standards.

**Agent Networking Platforms**

Football agents may network with players, clubs, and other agents by using platforms like Fieldoo and First Touch. These platforms enable agents to grow their networks and further their careers in the business by facilitating player representation, contract discussions, and transfer arrangements.   
  
**Data Analytics and Performance Tracking Tools**

Advanced analytics systems such as StatsBomb and Catapult Sports provide data-driven insights into player performance, fitness levels, and injury prevention. They also serve as performance tracking tools. These tools enable clubs and agents evaluate player potential and make informed decisions by gathering real-time data during training sessions and matches using wearable technology and performance tracking systems.

### Limitations

Although the current football scouting and recruitment systems have many useful features, it's important to consider their limits. These drawbacks include:

**Hard to find**

All the solutions such as scouting website, youth management software, agent platforms and others are usually hard to find and use. It would be far easier and more profitable if there was a platform with all these features maybe in a less scalable fashion, but all in one platform so it’s easier for people to sign up to.

**Restricted Data Access**

Certain platforms might not allow users to access full player data, especially for non-professional or lower division leagues. Scouting attempts may be hampered by this restriction, particularly when looking for talent from less well-known areas or leagues.   
  
**High prices**

Subscription fees, licence agreements, and usage-based pricing structures are just a few of the high prices associated with many advanced scouting platforms and analytics products. Smaller clubs or organisations with tighter budgets may find these costs too costly, which limits their access to state-of-the-art equipment and data analytics.

**Limited Integration and Interoperability**

Connecting various software systems, databases, and scouting platforms may cause integration and interoperability problems. Data exchange, teamwork, and workflow efficiency can all be hampered by platform or data format incompatibilities.   
  
**Lack of Flexibility and Customisation**

Some off-the-shelf scouting systems might not offer enough flexibility or customisation choices to meet the unique requirements and work processes of different organisations or clubs. A one-size-fits-all strategy might not sufficiently handle special needs or preferences, which would reduce the platform's ability to effectively meet user demands.

To overcome these constraints, the football scouting project being built for this report must carefully take technological, ethical, and practical considerations into account when designing and implementing the Football Scouting Platform. Through the mitigation of these issues and the utilisation of the strengths of current solutions, the platform can provide a comprehensive and efficient tool for modern-day football scouting and recruitment.



New Ideas

## Introduction

The context section of this report provided an in-depth examination of the current football scouting platforms and recruitment systems, and the many issues and gaps in the footballing industry. These include expensive advanced scouting technology, restricted access to complete player data, and worries about bias, privacy, and data quality. In addition, difficulties like an excessive dependence on technology, a dearth of customisation choices, and integration problems were noted as frequent obstacles encountered by those involved in the football scouting process.

The goal of this project is to create a comprehensive football scouting platform that combines machine learning, complex data analytics, and user-friendly interfaces to address these gaps and obstacles. Football players, agents, and clubs will be able to streamline the scouting and recruitment process by using the platform as a central hub. This will enable effective communication, data-driven decision-making, and talent evaluation.

## Objectives and Scope

As explained in the introduction and context sections, there are 5 things that we wanted to develop to incorporate into our project to improve the football scouting industry. This is now where we go more in depth and delve into exactly how we are going to achieve our said outcomes.

User profiles and data integration refer to the creation of user-friendly profiles for agents and football players that enable them to enter detailed data including player statistics, video links, and CV descriptions. will also produce relevant player stats and performance metrics by utilising machine learning and data analysis techniques.

The Agents Zone establishes a private "Agent Zone" where agents may interact with football players, control their availability, and get access to resources for hiring and talent scouting. Boost the agent's capacity to quickly recognise and establish a connection with potential talent.

Administration Oversight Assures platform integrity and data security by implementing administration tools to examine, approve, or reject user registrations.   
  
Key Pages and User Experience Creates important pages, such as a captivating admin dashboard, an interesting home page, and thorough player and agent profiles. Prioritise improving the user experience and making sure that using the platform is easy.  
  
  
Finally, the Reflective Feedback Mechanism Provides a way for agents to provide feedback to football players on the platform, allowing for helpful criticism to support player growth and raise the calibre of the talent pool.

The out-of-scope implementations provide many impacts as well.

* Player Contract Negotiations: Clubs and agents will negotiate and maintain player contracts; this will not be handled by the platform.
* Match Analysis: The project's original scope will not include live match tracking features or comprehensive match analysis capabilities.
* Financial Transactions: Transfers of players, signing bonuses, and agency fees are examples of financial transactions that the platform will not support.   
    
  Legal advice: It is outside the purview of this project to offer legal counsel or advise on player contracts, transfer policies, or agent licencing.
* Scouting Outside of Football: Although the project is primarily concerned with football recruiting and scouting, it does not cover scouting for other sports or businesses.

## Requirement Analysis

Now we’ll look at the functional and non-functional requirements of all the objectives we want to develop and how that links to the research prior to this section.

### User Management

Functional Requirements

User Registration: Players and agents should be able to create accounts on the platform by entering their name, email address, and preferred login information.

The ability to construct extensive profiles including personal information, playing history, video highlights, and performance metrics should be available to users.

Authentication: To safeguard sensitive data and guarantee the integrity of user accounts, secure authentication techniques should be put in place.

Role-Based Access Control: Various user roles (such as administrators, agents, and football players) ought to have distinct access levels and permissions within the platform.

Non-Functional Requirements

Security: To safeguard user data and stop unwanted access, user authentication and data encryption techniques should be put in place.   
Scalability: The system must be able to support a big user base and deal with spikes in traffic during busy times.

Cross-platform availability: the project must work on multiple platforms (web, mobile)

The need for user management functions that was discovered during the research phase is addressed by these criteria. For users to connect with the platform effectively, they must be able to register, establish profiles, and authenticate securely. By guaranteeing that users have the proper rights according to their jobs, role-based access control improves both platform security and user experience. The gap of lack of player visibility is filled by creating thorough user profiles with data integration (In the case study section 2.2). Controlled access and platform integrity are guaranteed by effective user management.

### Data Integration

Functional Requirements

Data submitted: Players' performance statistics, match histories, and scouting reports should all be submitted and updated by users.

External Data Integration: To improve player profiles and offer thorough information for scouting, the platform should interface with external data sources like football databases and scouting networks.

Data validation: To guarantee the correctness and consistency of the information submitted by users, procedures for data validation should be in place.

Allows for the uploading of player skill-showcasing video highlights.   
Parsing and archiving player biographical and CV data

Non-Functional Requirements

Data Integrity and correctness: To enable agents and clubs to make well-informed decisions, the platform must uphold strict standards for data integrity and correctness.

Real-Time Updates: To reflect the most recent advancements and performances, data integration procedures should be able to update player profiles and statistics in real-time.

The necessity for seamless data integration capabilities that was noted during the research phase is addressed by these needs. The platform makes sure that complete and current data is available for scouting and recruitment efforts by letting users enter and update player data and integrating with outside sources.

Compiling extensive player data from several sources solves the problem of data scarcity mentioned in Section 2.3.2. Uploading videos allows one to demonstrate abilities that transcend subjectivity in assessments (Section 2.3.1). Utilising analytics for data-driven scouting is consistent with data visualisation (Section 2.2.3).

Effective methods for storing and retrieving data ensure that information is safely stored in databases and retired as needed.

### Analysis Tools

Functional Requirements

Statistical Analysis: Metrics like goals scored, assists, passing accuracy, and defensive contributions should all be available for statistical analysis of player performance on the platform.

Predictive Modelling: Using historical data and performance trends, machine learning algorithms should be used to create predictive models for player potential and future performance.  
Visualisation: To provide player statistics and insights in a visually informative way, data visualisation techniques like graphs, charts, and heatmaps should be used.  
  
Tools for annotating and analysing videos: Detailed analysis of videos for effective data collection   
  
instruments for assessing players   
  
Tools for searching and filtering to find players according to particular standards

Non-Functional Requirements

Performance: To ensure quick and effective processing of big datasets, analysis tools should be performance optimized.

Accuracy: Validation procedures should be in place to evaluate model performance and reduce the possibility of errors, and predictive models should be accurate and dependable.

These specifications match the necessity for sophisticated analysis tools that was determined during the research stage. The platform gives agents and clubs the ability to make data-driven judgements about player scouting and recruitment by offering statistical analytical capabilities and predictive modelling tools. To overcome subjectivity and create data-driven judgements, advanced statistical analysis, machine learning models, video analysis, and benchmarking tools directly execute the data analytics strategies covered in Sections 2.2.3 and 2.2.4.

### User Experience and Feedback

Functional Requirements

Simple UI and navigation for all product features: The user interface (UI) needs to be straightforward so that all users and agents may utilise the system without difficulty.  
  
Design responsively for cross-platform accessibility  
message System: To help football players and agents communicate, the platform must have a message system.

Feedback Mechanism: Football players should be able to get feedback from agents regarding their performance and growth, along with helpful advice on how to get better.

Non-Functional Requirements

Reliability: The messaging system needs to be dependable to guarantee prompt message delivery between users.

User Experience: To encourage user involvement and satisfaction, the platform should offer a smooth and simple user experience for feedback and communication.

The study phase indicated the need for efficient feedback systems and communication. These requirements satisfy those needs. The platform facilitates meaningful interactions and collaboration among users by allowing direct connection between agents and football players, as well as the exchange of feedback. This eventually improves the scouting and recruitment process. The UI/UX design ideas covered in Section 2.1.4 and 2.1.5, which centre on building an engaging, user-friendly, and intuitive platform—are the basis for the user experience requirements.

## Methodology

Design part: To visualise the user interface and interaction flow, wireframes, mock-ups, and prototypes will be built during the first part of the project.

Development Phase: After the design is approved, web development tools and database management systems will be used to construct the platform.

Integration of Machine Learning: To produce detailed player statistics and performance forecasts, machine learning models will be built on past player data.

User Testing: To get input and continuously enhance the platform's functionality and usability, user testing will be carried out at various stages of the development process.

Deployment and Evaluation: Following completion, the platform will be put into use in a live setting, and its effectiveness will be assessed in accordance with predetermined success standards, such as increased user happiness and scouting and recruitment efficiency.

## Design and User Interface

The Football Scouting Platform will have an easy-to-use interface that includes the following features:   
  
Easy-to-use login and registration procedures for agencies and football players.

* Dashboards that are interactive and show match highlights, player data, and performance graphs.
* Football players and agents have smooth channels of contact, including feedback systems and communications.
* Simple-to-use profiles that offer individualised user experiences through configurable settings and preferences.

The project seeks to accomplish its main objective of creating a solid and user-centric Football Scouting Platform that transforms the scouting and recruiting process in the football industry by adhering to this methodology and embracing these requirements.

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Figure 4- Use Case Diagram

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Figure 5- UML Class Diagram

The Super Soccer Scout’s Football Scouting Platform's architecture and design are made easier to understand and communicate with the help of these diagrams, which offer a visual depiction of the system's functionality and structure.



IMPLEMENTATION

## Introduction

Now, we will examine the new material suggested in the "New Ideas" section in more detail in this section. The development and integration of the recommended features, capabilities, or enhancements into the current system will be the main priorities. We will first dive into the technical stage of implementation, describing what we need and techniques we need to use to fully develop the platform.

This will be provided with many diagrams of the UI, alongside other diagrams to help display this. We will also display the testing we did to this and see how we can minimise errors. Finally, the project planning will be displayed alongside a screenshot of my gnat chart. This will display how we developed the platform and going around the other deadlines we have, and how we spread our time out so we can counteract unexpected disaster.

## Technical Specification

The first part of this technical specification review is that we need to be aware of all the things we need to know to turn this prototype in to the finished product. This need to be a completely working, scalable, and maintained product, and we must ensure that we observe and comprehend the project's goals, intended user base, and essential features.

### Key Requirement Knowledge

There are some things that we need to know how to do so develop the project to perfection.

* Complete requirements documentation including a list of all features, functions, and use cases.
* comprehensive knowledge of the databases, frameworks, and programming languages that will be used in the technology stack.
* To make sure the system can manage a lot of users and data; scalability and performance concerns are important.
* security protocols to shield user information and stop illegal access.
* integration for further functionality with external services or APIs.
* Adaptive design for interoperability between devices.
* adherence to accessibility guidelines to guarantee inclusivity.
* Coding guidelines and documentation to ensure uniformity and make modifications easier in the future.
* testing approach, which includes end-to-end, integration, and unit tests.

These are all important steps into ensuring that all the requirements that were set out for us are completed.

### Things To Avoid

These are things that must be avoided as if the platform clashes into one of these problems, it can have many major implications and impacts in future development, which may make it hard for us to reach our objectives.

* Cutting corners or compromising code quality to deliver work quickly.
* Overengineering solutions to the point of needlessness or adding needless complexity.
* Ignoring performance and scalability concerns, which may cause problems later.
* disregarding security precautions, making the system open to intrusions.
* Not having to create solutions from scratch when pre-existing libraries or frameworks may address common issues.

### Technical Skills and Resources

Now getting into the technical skills that we need to be able to develop the platform. Extensive knowledge into these programming languages and networking skills are needed so we can develop the platform to its full capabilities.

* proficiency with HTML, CSS, JavaScript (Node.js), and maybe additional backend languages like Python or Java.
* knowledge of front-end frameworks for creating interactive user interfaces, such as React.
* familiarity with database management technologies, such as PostgreSQL for relational databases and MongoDB for NoSQL
* grasp of the architectural principles of RESTful APIs for API development and usage.
* familiarity in using testing frameworks to guarantee code quality, such as Jest, Mocha, or Selenium.

Looking more in depth into why these programming languages and tools were selected.

For the programming languages chosen, we chose Node.js for the JavaScript and used HTML and CSS because of its popularity and adaptability in web development, it was chosen. Server-side scripting and event-driven architecture are made possible by Node.js, making them ideal for real-time applications and managing numerous concurrent connections. The standard languages for creating the layout and design of web pages are HTML and CSS. Web content is mostly composed of HTML, with CSS enabling visual styling and layout.

We utilised the IDE and platform development with built-in support for HTML, CSS, and JavaScript, Visual Studio Code (VS Code) is a potent yet lightweight source code editor. VS Code has features including code completion, syntax highlighting, debugging, and version control integration.

Express.js is a simple Node.js web framework for creating RESTful APIs and managing HTTP requests and answers. Express.js is perfect for backend development since it makes middleware integration, routing, and error handling simple.

MongoDB is A NoSQL database for managing and storing information in documents that resemble JSON. MongoDB is an excellent choice for our application's data storage needs since it provides the necessary scalability, throughput, and flexibility to handle substantial amounts of unstructured data.

Finally, some extra tools and tech that were used were:

React.js is a JavaScript user interface library that is used to create responsive and interactive frontend elements. The user experience is improved with React.js, which makes component-based architecture, effective rendering, and state management possible.

Axios: An HTTP client based on promises that is used to send AJAX queries to Node.js and browsers. By streamlining asynchronous processes and data retrieval, Axios enhances front-end-backend communication efficiency.

A JavaScript library called Chart.js is used to create dynamic and customisable graphs and charts that are used in applications to visualise data and analytics. With its range of chart formats and customisation possibilities, Chart.js is a good tool for showing users trends and insights.

Now for the resources needed.

* Development environments include text editors, IDEs, and development servers. Examples of these include the Python IDE and Visual Studio Code.
* Obtaining the third-party APIs, libraries, and frameworks required for implementation.

This method can successfully convert the prototype into a fully working product that satisfies the project's goals and specifications by adhering to the instructions provided in this section.

## Design and Development

Now moving on to the design and development. First there will be a UML class diagram displaying all the details for each user and how they relate to each other.

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Figure 6- Another UML Class Diagram

* Player: In the system, a player's representation. It contains information such a name, password, email address, and username. There are methods for updating profiles, retrieving statistics, and getting and setting attributes.
* Agent: Serves as the system's representative agent. It is comparable to Player in that it has contact information. Getters and setters for characteristics, as well as procedures for controlling player interactions and appointment scheduling, are examples of methods.
* Appointment: Depicts a planned meeting between a player and an agency. It contains details such as the time, date, and place. There are methods for changing status and cancelling appointments, as well as getters and setters for attributes.
* Feedback: This is the input that players send to agents, or vice versa. It contains characteristics like the sender, recipient, content, etc. There are methods for submitting and receiving feedback, as well as getters and setters for attributes.

Now to display the messaging system that is also integrated into the Agent Zone and the player messaging feature.

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* Message: Describes a message that users of the messaging system have sent to one another. It has properties like content, sender, receiver, and timestamp. Getters and setters for attributes are examples of methods.
* The messaging system subsystem is represented by the messagingSystem. In addition to offering ways to send and retrieve messages for a particular user, it maintains a list of messages.

We will create tables for each object in the database architecture based on the given ERD, defining their fields, data types, constraints, primary keys, and foreign keys.

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1. Table of Players:   
   Details about the players who have registered with our system are kept in this table. The major key is each player's id, which identifies them individually.  
   To maintain player profiles, information including name, username, email, password, skill\_level, location, profile\_picture, and bio is saved.   
     
   For each column, the proper data type has been added; for example, VARCHAR is used for textual data, and BYTEA is used for binary data, such as profile images.   
   Data integrity is ensured by constraints like UNIQUE, which stop duplicate emails and usernames.
2. Table of Agents:   
   The Agent table contains information about registered agents, just like the Player table does.   
   Name, username, email, password, contact\_details, profile\_picture, and bio are examples of attributes.   
   Acting as the primary key, the id column gives each agent a unique identity.   
   Each agent is guaranteed to have a distinct username and email address via constraints such as UNIQUE.
3. Table of Appointments:   
   The appointments that are set up between agents and players are managed by this table.   
   Date, time, place, goal, status, player\_id, and agent\_id are examples of attributes.   
   The id column in the Player and Agent databases is referenced by the foreign keys player\_id and agent\_id, respectively.   
   Every appointment is identified uniquely by the combination of player\_id, agent\_id, date, and time.
4. Table of Feedback:   
   This table contains player or agent feedback that has been recorded.   
   Sender\_id, receiver\_id, content, and timestamp are examples of attributes.   
   The Player and Agent tables' id column is referenced by sender\_id and receiver\_id, which act as foreign keys.   
   The time and date the feedback was submitted are noted in the timestamp field.

Indexes and Optimisation   
To improve query efficiency, indexes can be added to columns that are often requested, such as date, email, and username.   
Constraints based on primary and foreign keys protect data integrity and uphold entity relationships.

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Figure 7- UML Activity Diagram

This flowchart shows:   
  
The agent makes the first move in the process by asking the player to meet.   
It determines if the player is free. If so, the agency chooses the appointment's specifics after the athlete confirms their availability.   
The player confirms or declines the appointment after receiving a request for one from the agency.   
Both the athlete and the agent are alerted in accordance with the player's response.   
The player notifies the agency, and the process terminates if the player is not available.

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Figure 8- UML Activity diagram (Player)

The player receives an appointment request from the agent to start the procedure.   
The participant verifies their availability. They verify their availability and go over the specifics of the appointment if they are available.  
The player and the agency are informed in accordance with whether the player accepts or declines the appointment.   
  
The agent is contacted, and the procedure concludes if the player is not available.

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## Unit Testing

An essential component of guaranteeing the solution's dependability and performance is unit testing. This chapter focuses on testing individual code units or components to make sure they function as intended.   
  
Test Strategy:  
  
  
Module for Registration:   
  
Check if a new player can successfully register with accurate information in the first test case.   
Test case 2: Confirm that if any necessary fields are missing, registration will fail.   
Test case 3: Verify that if the email address or username is already in use, registration will fail.   
Module for Submission of Feedback:   
  
First test case: See if a player can provide an agent with feedback.   
Test case 2: Confirm that the submission of feedback is unsuccessful if the message is blank.   
Test case 3: Make sure that if the chosen agent is erroneous, the feedback submission process fails.

Module for updating profiles:  
  
Test case 1: Confirm that a player can correctly change their profile information.  
Test case 2: Make sure that when incorrect data is entered, the profile update fails.  
Test case 3: Confirm that if the player is not authenticated, the profile update fails.

Module of Authentication:  
  
Test case 1: Confirm that the player's login credentials are correct.  
Check that the login fails with the wrong credentials in test case 2.  
Verify that the system recognises and responds to brute force login attempts in test case 3.

Finding Bugs:   
  
To find bugs, combine manual testing with automated testing methods.  
Put error logging and monitoring systems in place to keep an eye on and investigate any odd behaviour that users report.   
  
Review and examine customer comments frequently to spot possible problems and areas that could use improvement.   
Observance of accessibility and HCI guidelines:   
  
To make sure the UI is clear and simple to use, test its usability with representative users.

Conduct accessibility testing to make sure the solution complies with WCAG (Web Content Accessibility Guidelines) requirements and can be used by people with impairments.

To improve accessibility, incorporate features like keyboard navigation support, alternative text for images, and appropriate semantic markup.   
Record-keeping and Reporting:   
  
Record every test case, together with the actual and anticipated findings.  
Please report any defects or problems found during testing, along with instructions on how to replicate them.  
Make suggestions on how to fix the problems that have been found and raise the general standard of the solution.

This method allows for extensive testing of the project to guarantee accuracy, dependability, and adherence to pertinent regulations and standards.

## Project planning

For the project to be successfully completed within the allotted timeframe, time, resources, and scope must be managed effectively through effective project planning. I will list the expected workloads for the development, testing, documentation, and contingency planning phases of the project in this chapter.   
  
Phase 1: Gathering requirements and conducting research (50 hours)

Investigate comparable systems and industry best practices (10 hours)   
Collect requirements through analysis and stakeholder interviews (20 hours)   
Record the goals, deliverables, and scope of the project (10 hours)   
Determine possible hazards and difficulties (10 hours)

Phase 2: 50 hours of design and planning   
Develop the design specs and system architecture in 20 hours.   
Create prototypes and wireframes for the user interface design (15 hours)   
Create a data model and database schema (10 hours)   
Create the project timeline and milestones (5 hours)

Phase 3: Creation (two hundred hours)  
Comply with the design standards and implement both front-end and back-end functionalities (150 hours).  
Include third-party APIs to offer more functionality (20 hours)  
Perform debugging and unit testing (20 hours)  
Put security mechanisms in place and validate the data (10 hours)

Phase 4: 50 hours of testing and quality assurance  
Conduct individual component unit testing (20 hours)  
To guarantee smooth communication between components, perform integration testing (15 hours).  
Conduct system testing (10 hours) to confirm general functionality.  
Test usability and collect input for enhancements (5 hours)

Phase 5: Reporting and Documentation (30 hours)  
Write technical documentation and user guides (15 hours)  
Create presentations and reports for stakeholders on the project (10 hours)  
Examine and complete the documentation considering the input (5 hours)  
Emergency Preparedness (20 hours)  
  
Allocate additional time to address unforeseen issues or delays (20 hours)  
Total Estimated Hours: 400 hours

### Gantt Chart:

The project timeline, complete with task dependencies, deadlines, and milestones, will be displayed using a Gantt chart. It will act as a guide for carrying out the project, facilitating more effective resource allocation and progress monitoring. The project scope and timetable will be updated on a regular basis to reflect any changes in the chart.   
  
By adhering to this detailed project plan, I hope to guarantee effective use of time and resources, reduce risks, and provide a high-calibre solution that satisfies stakeholders in the allotted amount of time.20

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Figure 9- Gnatt Chart



RESULTS / DISCUSSION

## Introduction

After all the work has been completed and developed, it’s now time to dive into the project and review all the work done. In this section looking back, the identified aims and objectives from chapter 1 will be outlined and we will know if they have been met or not and why. The success criteria to determine if we met these outcomes will also be defined here.

## Success Criteria

To determine whether the aims and objectives have been met in this football platform, a success criterion was set out to make it easier to see if the objectives have been met. The success criteria for this comes down to these simple things:

Functionality: All the functional requirements listed in the project scope and objectives should be satisfied by the project. Features like user registration, messaging, player-agent interaction, appointment scheduling, analytics, and reporting are all included in this.   
  
Usability: Both agents and gamers should find it simple and intuitive to use the system. Users should be able to easily navigate the platform, access needed features without difficulty, and complete tasks quickly and effectively, according to usability testing results.

Performance: Under typical operating conditions, the system should operate satisfactorily. To guarantee that consumers encounter as few hiccups and delays as possible, performance testing ought to assess variables like reaction time, loading speed, and system stability.   
  
Security: To safeguard user data and uphold confidentiality, the project should follow industry best practices in cybersecurity. It should be confirmed through security testing that the system is impervious to common vulnerabilities like SQL injection, cross-site scripting (XSS), and illegal access.  
  
  
Scalability: To handle future increases in the number of users and data volume, the system architecture must be scalable. Testing for scalability should evaluate how well the system can manage growing loads without sacrificing stability or performance.   
  
Reliability: There should be infrequent faults or downtime in the system's operation. Any such problems should be found and fixed by reliability testing.

To make things like this easier, a testing plan has also been designed so for future evaluation, we can monitor the project by doing this.

Long-Term User Feedback: Include a feedback feature in the platform to get regular input from users regarding their experiences, recommendations for enhancements, and general contentment with the setup. Examine this input frequently to pinpoint areas that need improvement.   
  
  
Track metrics related to user engagement, such as the number of active users, the length of sessions, and the frequency of feature interactions. By tracking these metrics over time, you can gain insights into the preferences and behaviour of users, which can help you optimise the platform.

Performance Monitoring: Keep an eye on key performance indicators for the system, such as error rates, server response times, and database query performance. To guarantee ideal system performance, compare these measurements to predetermined thresholds and run performance checks on a regular basis.   
  
Security Audits: To find and fix possible security flaws, conduct routine penetration tests and security audits. Keep abreast of the most recent security dangers and take preventative action to shield the system from online intrusions.

Scalability testing: Evaluate the system's capacity to manage simultaneous user activity and data volume on a regular basis by simulating higher loads and keeping an eye on it. To accommodate future growth, identify bottlenecks in the system's scalability and optimise individual components as needed.   
  
Through project evaluation based on these success criteria and the implementation of a thorough testing strategy for follow-up assessments, we can guarantee that the system will continue to satisfy user requirements, uphold high performance standards, and stay safe and dependable throughout time.

## Testing

To fully evaluate how successful the SSS scouting platform is, the testing method was done to check each one of the success criteria. The testing method included:

### Testing Method

Unit Testing: To make sure the platform functions as intended, each part and feature will be tested separately. Testing of the message system, appointment booking, user registration, analytics tools, and database operations are all included in this. For this test we used Mocha framework to illustrate this

Integration Testing: To ensure that various modules and subsystems operate together flawlessly, tests will be conducted on how they interact with one another. Testing the data flow between the database, backend server, and frontend interface is part of this. Postman For API integration test was used.

Performance Testing: To assess the platform's functionality at different user activity levels, load testing will be conducted. To find any performance bottlenecks, testing response times, throughput, and resource utilisation is part of this process. JMeter testing was used.

Accessibility Testing: To make sure people with disabilities can use the platform, it will be examined to see if it complies with accessibility guidelines. Testing with assistive technology, keyboard navigation, and screen readers are all included in this.

Usability Testing: The platform's user interface will be assessed in terms of its overall usability, intuitiveness, and convenience of use. To find areas for improvement, this involves running usability studies on a sample of users.   
Actions. Using the success criteria and aims and objectives, we tested this phase.

Bug resolution rate: The amount of time needed to find and fix issues that were discovered during testing.

Performance metrics: During performance testing, response times, throughput, and resource usage are monitored.

### Test Results

Unit testing: when using Mocha, we tested the ‘getUserById’ function. After running the test, the terminal responded with this A screenshot of a computer program

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Figure 10- Test Result 1

Test Suite and Cases: The output provides a comprehensive description of the User Controller test suite as well as the individual test cases that make up the suite. A green tick () denotes a successful test, and each test case begins with a bullet point.   
  
Timing: The output provides the amount of time (40 ms in this example) that each test or the full suite took to run, which is helpful for spotting slow tests.

Integration test: All components involved in data handling communicated effectively without any loss of data integrity. Tests confirmed that CRUD operations performed by different endpoints-maintained data consistency across the platform. Attempts to register a user with the same details will respond with a ‘404 user already exist’ error message

Systems test: System testing is the phase where we test our Node.js API as a complete system to ensure it meets the aggregated requirements of both functionality and performance. the platform successfully met most functional requirements outlined in the project specifications. However, the platform runs into some problems when it comes to updating the user profile and saving due to the GET request. Also, the machine learning charts sometimes doesn’t load.

Usability test: after getting a few users to use the web page, we made a survey on the website and:

Most users found the platform easy to navigate and understand

Task completion rates were high, indicating that the platform supports efficient user workflows.

User satisfaction was generally high, especially with the platform’s responsive design and intuitive process flows. The average rating was a 4/5

While the feedback was overwhelmingly positive, users identified some areas for improvement, such as the need for more personalized settings and a more flexible search functionality. As pointed out earlier, the machine learning and profile functionality was not the best.

## Analysis

Lastly, a thorough review of all project data, including test results, user input, and performance indicators, is done during the analysis phase. This section will go through the aims and objectives and outline what we managed to develop and not develop fully, and this section also sheds light on the produced solution's advantages, disadvantages, possibilities, and threats.

Table 1- Table showing Implementation Strengths and Weaknesses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Category | Strengths | Explanation | Weaknesses | Explanation |
| Functionality | Robust functionality | The platform provides extensive support for talent scouting and administration with a wide range of functions, such as player management, agent engagement, analytics, and scheduling. | Limited scalability | Although scalability testing suggests possible issues in scaling to handle many users or concurrent sessions, the platform functions well under typical load situations. To accommodate future development, this might need additional optimisation and infrastructure changes. |
| User Interface | User-friendly interface | Players, agents, and administrators all enjoy using the user interface since it is simple to use and intuitive. | Accessibility issues | Usability testing reveals various accessibility difficulties that may prevent users with disabilities from fully accessing and utilising the platform, even in the face of efforts to achieve accessibility compliance. |
| Performance | Performance optimization | Performance testing shows that a sizable load can be handled by the system without noticeably degrading throughput or response times. | User adoption challenges | According to early user comments, certain users might have trouble utilising the platform and incorporating it into their current workflows. This demonstrates the necessity of providing specialised training and assistance to promote user acceptance and onboarding. |
| security | Security measures | User data and communications are shielded from illegal access and exploitation thanks to security testing's identification and remediation of possible flaws. |  |  |
|  | Database Management | The database management and storage work well, sending each data into the database and making it easily retrievable |  |  |

Based on these accomplishments, there are many opportunities from this section that we can use to improve and limit the weaknesses that the platform has.

Continuous improvement: User feedback offers insightful information about areas that can be enhanced and improved. By utilising this data, the platform's subsequent iterations can give priority to usability improvements, performance optimisations, and feature updates to better satisfy user expectations.

Fix bugs: although the code is working, some features remain to be slow and not work to the best of its abilities which can harm the overall system.

Integration with third-party services: By integrating the platform with third-party services like sports databases, social media sites, and analytics tools, it is possible to improve its functionality and give customers access to more value-added services and information.



CONCLUSIONS / FUTURE WORK

## Conclusions

In conclusion, the project has been an interesting experience, finding out and going into depths about the world of football scouting and the challenges it faces still in this modern day, and developing a system which tries to make this better and easier for players and agents to start/progress in their football career. While the project has achieved significant milestones and demonstrated such as a simple and easy UI, messaging system and data and stat security, there are areas where improvements could have been made or challenges could have been better addressed.

In terms of accomplishing its main goals, the football scouting platform project can be deemed successful overall. It has been effective in creating a complete system that includes analytics, reporting, player management, and agent relations. Agents can now successfully search for, manage, and communicate with gamers thanks to the platform's useful tools.   
  
Nonetheless, throughout the course of the project lifecycle, certain aspects need to be improved. For instance, improved resource allocation planning may have helped lessen some of the development's obstacles, and the implementation of other features may have been done more effectively.   
  
In retrospect, some elements that may have been addressed differently to improve system efficiency and user experience include database optimisation and user interface design. Furthermore, more comprehensive validation and testing protocols may have been used to identify and address issues earlier in the development process.

Notwithstanding these observations, the football scouting platform has established a strong basis for player management and talent evaluation projects in the future. For future projects to be even more successful and to be continuously improved, it will be essential to apply the lessons learnt from this one.

## Future work

There are several potential directions for future development and enhancement of the football scouting platform. Some possible topics to think about are as follows:

Improved Features: Extending the platform's current features to incorporate more sophisticated ones including real-time performance tracking, machine learning techniques for talent prediction, and tailored suggestions for players and agents.   
  
User Interface Refinement: To improve the overall user experience, a thorough user testing and feedback gathering process is carried out. This could entail putting in place user-friendly design components, optimising navigation, and making sure users with a range of needs can access the content.

Mobile Application Development: Developing specialised mobile applications that allow players and agents to access the platform while they're on the go. These applications facilitate data administration, scheduling, and communication across mobile devices.   
  
Community Engagement and Partnerships: Forming alliances with leagues, sports organisations, and academies to broaden the platform's user base and promote a lively community. This might entail organizing events, webinars, and networking opportunities for agents and players.

## Legal, Social, Ethical and Professional Issues

Consideration should be given to several legal, social, ethical, and professional considerations in the context of the football scouting platform:

### Legal

Data Protection: To guarantee the security and privacy of user data, including personal information, player statistics, and feedback, compliance with data protection laws like the GDPR is essential.

Intellectual Property: When using player profiles, photos, and other proprietary content, it is imperative to respect the rights of intellectual property, including trademarks, copyrights, and picture rights.

Contracts & Agreements: Clearly defining rights, obligations, and liabilities, these documents should control the interaction between agents, players, and the platform.

### Social

Equality and Diversity: By giving players from all backgrounds and demographics an equal chance to show off their skills, the platform should support equality and diversity.

Community Engagement: Promoting social cohesion and empowerment can be achieved through interacting with the football community and creating an atmosphere that is conducive to talent development and scouting.   
  
Protection of Youth: Extra caution should be used to safeguard the welfare and privacy of young players, and precautions should be made to maintain ethical scouting procedures and avoid exploitation.

### Ethical

Fairness and Transparency: To guarantee integrity and fairness in the assessment and hiring of talent, transparency in the player assessment standards, feedback systems, and scouting procedures is crucial.

Honouring the Rights of Players: It is critical to uphold players' rights to privacy, dignity, and equitable treatment, and to do so by putting safeguards in place to deal with issues like improper data use or skewed assessments.

Ethical Data Use: Information obtained from players should be utilised sensibly and ethically, with precautions taken to prevent abuse, tampering, or illegal access.

### Professional

Professional behaviour: When interacting with players, other agents, and stakeholders, agents and platform users should follow ethical guidelines and professional behaviour norms.

Accountability and Responsibility: To make sure that everyone engaged in the scouting process is held accountable for their deeds and choices, it is important to establish clear lines of accountability and responsibility.   
Sustaining high professional standards and enhancing the calibre of scouting techniques can be achieved by promoting agents and other users to participate in ongoing training and professional development.

## Synoptic Reflections

My involvement in this project and my time at NTU have allowed me to acquire a variety of skills that have been crucial to its success. Among them are:   
  
technological Skills: To establish the football scouting platform, I have improved my knowledge of a variety of programming languages, database administration, web development frameworks, and other technological tools and platforms.   
  
Project Management: Overseeing the project from start to finish has improved my time management, organisation, and project planning abilities. Developing Gantt charts, setting goals, and wisely allocating resources have all been essential components of this process.   
  
Solving problems: From technological difficulties to design considerations, the development process has presented me with many hurdles. By using critical thinking and iterative problem-solving techniques, I was able to get over these challenges and come up with creative solutions

All things considered, this project has been a tremendous learning opportunity that has helped me improve and use my abilities in a practical situation. In addition to enriching my academic path, the difficulties I've encountered and the lessons I've learned have also better equipped me for my future aspirations in technology and beyond.

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Appendix A

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