JTS

Journal of Techno
Social

Using the Enterprise Architecture Approach to Analyse the Current Performance of Manchester United Football Club

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Abstract: Manchester United Football Club (MUFC) is one of the most successful football clubs in England, if not the world. However, the football club's recent performance in domestic and European tournaments has left a lot to be desired. The recent 2021 Europa League final failure encapsulates the football club's decade-long condition. MUFC's days of competing seriously for trophies in every tournament open to the club are over. MUFC came close to winning the local league in the 2017 and 2021 seasons but fell short, just like they did in the previous Europa League final in 2021. Numerous reasons have contributed to the current poor performance streak. This study aims to apply an enterprise architectural framework to enhance football player performance and manager-player relationships. This study discovered that MUFC might leverage big data analytics-IT integrated systems by following easy-to-understand enterprise architectural framework phases, which streamlines the adoption process for MUFC.

Keywords: Big data analytics, enterprise architecture, football club

1. Introduction

Football is the most popular sport in terms of followers and fans, with a multibillion-dollar economy that dominates sports economics. European football clubs and regulating organisations are key actors in this market. Since the early 1990s, a wide range of concerns have developed in this sector, with a focus on Europe. For any professional sport, European football has established significant financial benchmarks. With yearly TV rights income of more than $2.5 billion, the UK Premier Competition is the world's most aired league, trailing only the NFL (National Football League) (Tsordia, Apostolopoulou, & Papadimitriou, 2021). It also ranks in the top ten most valuable sponsorship agreements negotiated by overseas clubs. Teams in Spain and the United Kingdom have made a fortune by selling jerseys and securing stadium naming rights. More precisely, record sums of prize money are distributed to participating teams through organisations such as the European Football Associations (UEFA) Champions League. To gain a bigger piece of the cake, teams strive for greater worldwide recognition and supremacy over one another. The fundamental key to this accomplishment has been consistent presence in international organisations. Clubs qualify for such organisations when they achieve a certain top slot in their final national league standings, such as the English Premier League, where the top four teams compete for the UEFA Champions League (Moore, 2021)

To connect the topics of football, Enterprise Architecture (EA), and Data Analytics, Liverpool Football Club have effectively combined the use of business information and data analytics with football. In recent years, the club has had a tremendous recovery in both sporting and financial success (Lawrence & Crawford, 2022). The use of data analytics

and artificial intelligence (AI) in this transformation has ramifications for managers and executives across a wide range of sectors, not just sports management (Li, 2021). Despite the fact that artificial intelligence has been one of the most significant industry breakthroughs for some years, the recent coronavirus epidemic has elevated the strategic relevance of AI for enterprises across the board (Ruta, Lorenzon, & Sironi, 2019). As a result of the crisis, several businesses have increased their digital transformation initiatives and reinforced data management throughout their organisations. Companies are already gathering more detailed data, which might provide the basis for applying AI and data analytics to improve corporate efficiency (Arzimi, Bakar, Mahrin, Kama, & Hussein, 2021). However many firms recognise the value of AI and data collecting but they do not actively utilise their data. Furthermore, firms that employ AI purposefully often fail to achieve a competitive edge from their efforts (Nasef & Bakar, 2020).

Enterprise Architecture (EA) is a conceptual blueprint that outlines an organization's structure and functioning. The goal of EA is to establish how an organisation can successfully meet its present and future goals. Data management, application development, IT infrastructure, business processes, and organisational effect are five main areas that benefit from EA implementation. Data management, application development, and IT infrastructure, when integrated with EA, will have an impact on costs, redundancy, integration, agility, reuse, and standardization. Modularity, automation, integration agility, and address redundancy are all injected into business operations. Typically, the advantages of business processes have an influence on EA maturity and governance (Norbib & Bakar, 2021). These controls serve as a foundation for the organization's decision-making. EA benefits productivity, agility, product and service timeliness, revenue growth, and cost savings.

Football teams would gain the most from the employment of EA, as football may be considered a game of chance, especially when it comes to scoring a goal. EA and AI may boost the rate of producing opportunities, for example, as players have more and more possibilities of getting a shot on the opponent's goal, raising the possibility of scoring a goal for the team (Ratten, 2020). EA would also assist football clubs in the process of acquiring new players because the performance of scouted players would be based not just on scout observation but also on statistical input, allowing the football club to make better informed decisions (Ratten, 2020). EA would also enable football club organisations to develop better tactical evaluations and tactics for their squad and opponents. As in the case of Football Association of Indonesia (PSSI), a study was conducted to create a blueprint for the football association, with the goal of assisting in the creation of the organisation's blueprint architecture to help solve information flow problems in existing business processes and as a guide when developing information systems. This was done in the information system for sports platforms to guarantee that the football organisation has an information system capable of supporting ongoing business procedures (Cruz, Schregel, & Zülch, 2021). In the case of MU Football Club (MUFC), an EA framework would be created to improve the efficiency of information in the club's existing business systems. Thus, this paper offers the concept and design of an EA framework for MUFC in order to enhance the club's performance and players on and off the field.

2. Literature Review

Football is one of the most well-known games in the world, notably in Europe and South America, where national teams and local football leagues have produced outstanding teams throughout centuries. Various tournaments have been established in Europe to determine who is the best of the best in their local league, intercontinental league, and national league. These events have gained prominence over the years, particularly the UEFA Champions League (UCL), an annual club competition organised by Union of European Football Associations (UEFA) and participated in by the top four teams in Europe's major divisions (Cruz et al., 2021). Other European events include the UEFA European Championship (Euros), a national championship played by European nations that have qualified via a four-year qualification period that requires teams to compete in round-robin group rounds (Ratten, 2020).

In England, a season consists of the domestic league and numerous cup events. In the case of MUFC they would compete in at least three tournaments each season, including the domestic league (the Premier League), the Carabao Cup (the EFL Cup), and the FA Cup (the Football Association Cup). They have a possibility to compete in intercontinental leagues such as UCL, UEL (UEFA Europa League), or UECL based on their previous season's performance and league ranking (UEFA Europa Confederate League) (Cruz et al., 2021). Overall, MUFC would compete in three or four different tournaments during the season, which runs from August to May of the previous year. Depending on the size of MUFC's roster, the manager, staff, and players must all play a role in preserving the players' health and ensuring they play winning tactics and methods. The performance of the squad is important to ensuring future success because winning these tournaments would allow them to collect a sizable reward fund (Ratten, 2020).

2.1 Manchester United Football Club Business Model

This, however, has only been the football side of MUFC have grown into more than just sports clubs over the years, becoming more of a business model in which these players disseminate brands and create income for their particular teams. MUFC is a company whose main offering is a football game marketed to viewers and supporters. It is in charge of producing this core provision, while the club's non-sporting structural functions have been outsourced (Horrocks, McKenna, Whitehead, Taylor, & Morley, 2016). Fig 1 depicts the organisational structure of MUFC.
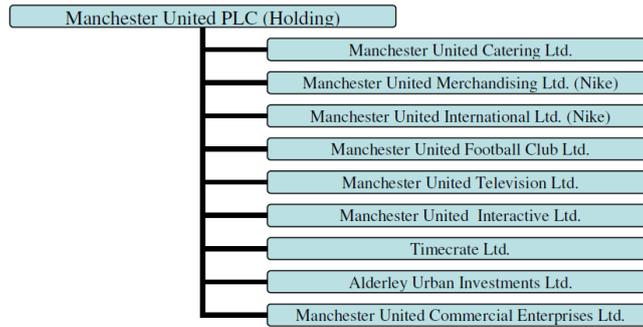
Fig. 1 - Strategic Business Model of the MU Football Club

MU PLC (Product Limited Company) owns nine subsidiaries, the only one of which is MUFC Ltd, which is managed directly by the club. MU formed the remaining eight subsidiaries with the assistance of commercial partners, with the PLC serving as the controller.

2.2 The Open Group Architecture Framework (TOGAF)

The Open Group Architecture Framework (TOGAF) is an EA framework that provides a precise technique and collection of supporting tools for designing, planning, developing, and managing IT infrastructure organisations (Hermawan & Sumitra, 2019). TOGAF is used by organisations to design and implement EAs that ensure a design and procurement specification that can help them launch open systems with minimal risk. TOGAF is used in EA design to reflect stakeholder needs while taking current and future business needs into account. The TOGAF Architecture Development Method (ADM) is the result of ongoing contributions from numerous architects. It is the foundation of TOGAF and describes a method for developing and maintaining EA over its life cycle (Herdiana, 2018). It combines TOGAF components outlined in this article with extra architectural assets to achieve an organization's business and IT objectives. TOGAF 9.1 includes four architectural domains that allow enterprises to specialise in

- Business Architecture: knowledge on business strategy, governance, organisation, and how to modify any existing organisational processes are covered in this subject.
- Applications Architecture: This domain provides a blueprint for organising and implementing application systems based on business goals, organisational frameworks, and essential business processes.
- Data Architecture: this area specifies the organization's data storage, management, and maintenance, as well as logical and physical data models.
- Technology architecture, also known as technical architecture, describes all of the hardware, software, and IT infrastructure required to design and deploy business applications.

Figure 2 describe the TOGAF conceptual framework.
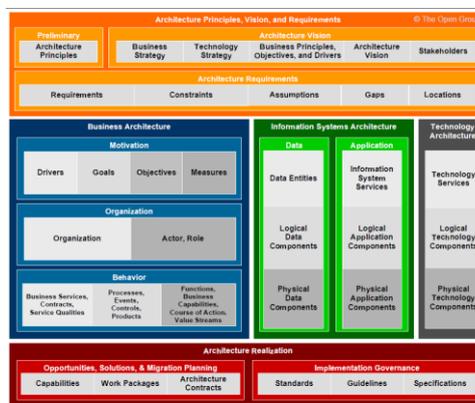
Fig. 2 - TOGAF Conceptual Framework

These interactions can be explained in 6 different interactions between the various domains:
- Interaction between the organisation's operational services and the supporting data assets.
- Interaction between the organisation's operational services and the supporting applications.
- Interaction between the organisation's operational services and the supporting technical infrastructure.
- Interaction between applications and corresponding parts of the technical infrastructure that hosts them.
- Interaction between the application and corresponding data assets.

● Interaction between data assets and corresponding parts of the technical infrastructure that hosts them.

2.3 Potential Solution

Knowing that MUFC is not only a football club but also a business that consists of multiple subsidiaries, the use of EA would be essential in maintaining a business that has done various forms of business diversification since MUFC not only requires a stable and profiting financially performance but also require the use of EA to improve the performance of their players as well as improve the decision for the staff and managers in strategising tactics and signing players for the club. An English club that has successfully applied data analytics and emotional intelligence in their organisation would be MUFC's biggest rival in football, Liverpool Football Club (LFC).

The main challenges that MUFC faces stem from poor player recruitment and poor manager and player relationship management. To improve and overcome these issues, an application of big data analytics and integrated IT systems could be introduced (Li, 2021). These improvements can be facilitated by an EA framework. Since the topic of big data analytics can be overwhelming for an organisation new to the concept, an EA framework would enable a smooth transition into the technology. An EA framework would segment the adoption of big data analytics and integrated IT systems into phases that are much easier to comprehend and comply with. Furthermore, since the adoption process is segmented, goals and objectives could also be divided according to phases. This puts less strain on the football club and the people involved in their attempt to achieve the goals and objectives.

Once big data analytics and integrated IT systems are implemented for MUFC, every data of players and managers would be stored and used accordingly. Data collected could be used to improve the decisions made within the organisation. The football club operations can be enhanced by applying supervised machine learning for making predictions and data visualisations for better insight (Ratten, 2020). These operations include player recruitment and player-manager relationship management. Based on the collected data, better players can be identified and hired, and better methods for player-manager relationships can be developed (Li, 2021). The benefits of an EA framework and an integrated big data analytics-IT system are not limited to just the two issues MUFC were facing. The EA solution would not only help solve the current issues the football club is facing. Still, it would also help mitigate any future problems and challenges by enabling the football club to develop the necessary skills and capabilities for the organisation's future. The EA framework and its plans will slowly allow MU to gain an advantage over their competitors over time..

3. Methodology Applied

This study proposes using EA in MUFC blueprint architecture to help solve MU's problems. The EA information systems for MUFC will be designed using TOGAF to develop the various information system phases. The research would be based on the strategies applied at Liverpool Football Club for MU to replicate similar outcomes with the added implementation of EA. A strength and weakness analysis was needed to understand MUFC's current situation. For this purpose, the Strength, Weakness, Opportunities and Threats (SWOT) analysis was applied. Table 1 below underlines the results of the MU SWOT analysis.

Table 1 - SWOT Analysis on MUFC

Context	Strength	Weakness
Internal	● Big Financial Power of the football club(Tsordia et al., 2021) ● Past achievements attract world-class players(Horrocks et al., 2016) ● The current team have several world-class staff and players(Paramio-Salcines, Downs, & Grady, 2016) ● World-class training utilities(Paramio-Salcines et al., 2016)	● Have not been able to win trophies in recent years (Horrocks et al., 2016) ● Poor player recruitment(File, 2018) ● Poor player-manager relationship(File, 2018)
	Opportunities	**Threats**
External	● Large fanbase globally(Tsordia et al., 2021) ● Income from global viewership(Tsordia et al., 2021)	● Competition and rivals have shown more progress and better results in recent years(Paramio-Salcines et al., 2016) ● Rival expanded influence in local and international competitions with better achievements and performance(File, 2018)

Once the SWOT analysis was done on MUFC, the issues were identified, and potential solutions are developed to overcome the problems. Then, the TOGAF is selected as the EA framework because the TOGAF framework provided the segmentation by core layers namely Business, Data, Application and Technology architecture which happened to be suitable to analyses the MUFC structure.

3.1 Steps to EA Implementation

To implement an EA solution in MUFC, it is necessary to identify the football club's problems or issues. This analysis on the current capabilities of MUFC had been done in the 'as-is analysis' section and the previous SWOT analysis section. An EA framework can help guide the football club in its plans to overcome the current issues the club are facing. One method to overcome poor player profiling and recruitment is implementing a centralised relational database system for current and future potential players. A relational database system organises data and statistics into tables that could be linked.This ensures that football players' data can be stored efficiently and retrieved based on its relationships among all available data within the same database scheme. Since a data instance in a relational database system is linked to another data instance, it is easier for organisations to gain new insights and identify opportunities.This is particularly important for team sports such as football. The data and statistics of a player are essential. The performance of specific players when teamed up with another player is also necessary to identify the best team composition. A relational database system could also store data of a player based on the opposing team the player played against. Therefore, a centralised relational database system would be able to improve MUFC's player profiling and recruitment.

Another issue MUFC were facing was the poor player-management relationship management. A sports team is an organisation that consists of coaches and players or athletes under the same guidance of code of conduct and goals. Leadership is a trait that brings people within the same organisation together under a goal and helps promote both individual and collective effort. In a team sport like football, leadership is essential. However, the action cannot be one-sided. The players also must be motivated to work together for the football club. An organisation can function better when everyone in it has the motivation to work together.Thus, to improve the leadership and the inspiration of MUFC managers and players, a leadership and motivation feedback framework that maintains the team morale can be developed and implemented. Based on the mentioned issues and potential solutions, an EA framework like the TOGAF framework could help MUFC overcome their problems by redefining their business, data, application and technology architecture (BDAT) according to the suggested solutions.

4. Results and Discussion

4.1 As-Is Analysis

As a vast worldwide known football club, other than expanding the fanbase and influence and earning revenues, MUFC goals are to be able to win football tournaments and obtain trophies to maintain its status as one of the biggest clubs in the world. However, while the fanbase and influence of MUFC are huge globally, with more than a billion fans all over the world.the football club's performance in recent years has been very disappointing. The most recent trophy won by MUFC was in the 2016-2017 Europa League. The last local league beaten by MU was in 2013, almost a decade ago, and the previous UEFA Champions League trophy won by the club was in the year 2008.MU used to compete seriously in every competition at the highest level during the years of manager Sir Alex Ferguson.

There are various reasons for the football club's poor performance. One such reason is poor player profiling and recruitment by the club. In 2015, for example, MU signed a 30-year-old Bastian Schweinsteiger from another big club, Bayern Munich.Schweinsteiger was undoubtedly one of the best football players in the world at some point in his career. He has won various trophies with his club and country, including the 2013 UEFA Champions League and the 2014 FIFA World Cup.However, the player MU signed in 2015 was past his prime and suffered various injuries during his time at MU.Schweinsteiger spent more time on the sidelines than on the football field for MUFC during his two-year stint at the club. Schweinsteiger was only one example in the long list of players signed by MU but did not perform as expected.

Another reason for the poor football club's performance is the poor player-manager relationship management. Jose Mourinho was a well-known football club manager when he joined MUFC in 2016.Given that Mourinho has won almost every trophy at club level football, MUFC was going in the right direction by hiring this manager. However, Mourinho has a lousy track record of relationships with his previous players and staff, especially when the match results are not good. At MUFC, the manager got into arguments with his players and tended to blame and single out his players publicly.The issue, however, was not one-sided. MUFC at the time had good players such as Paul Pogba, who had just won the FIFA World Cup in 2018 with France national team, and Romelu Lukaku, who with Belgium had managed third place in the same tournament.The arguments and the conflict reached their peak when Mourinho clashed with these players. The arguments escalated, and in a team sport where trust is crucial, it did not seem like MU had any among the players and the manager.Once the players and manager do not trust each other, good communication and results would be hard to achieve.

Based on the discussed issues, it can be observed that the current MUFC business strategy is not working. If the organisation continues to operate similarly, the football club will risk losing its fanbase financially (Tsordia et al., 2021). In a football club, players and managers are investments made to improve the organisation. A player or manager who could not provide the necessary results is considered a failed investment. This is especially true for modern football as the cost of hiring a player could go up to hundreds of millions of pounds. Thus, the recruitment of players and the player-manager dynamic are essential factors in sustaining MUFC as a successful business. Multiple hired football players did not provide the expected value return and sold to other football clubs at cut-price. Therefore, an introduction of an

integrated big data analytics and IT system to solve the problem is proposed. Big data analytics and an integrated IT system would enable improved data-driven decision making within MUFC.

TOGAF could be used within their organisations based on the running documents and processes. The blueprints could be produced to create information systems that can support the ongoing business processes, the solutions offered for mobile and web-based sports platform information systems, and the integrated technology platform for each proposed information system.As shown in the literature review, the use of TOGAF will allow a smoother workflow process within an organisation, especially for a large organisation such as MUFC. What was also found and can be used as a comparison is the performance of Liverpool Football Club. Liverpool Football Club utilised a strategy of integrating big data analytics and AI in their management in recruiting players.Among the key takeaways that could be taken from the article are five things:

1. Executives need to make AI a top strategic priority
2. The organisation has to develop integrated intelligence
3. Executives need to strike a balance between optimisation and new business models.
4. Executives need to allow for experimental transformation.
5. Executives need to prepare for changing their leadership behaviour.

It should also be highlighted that Liverpool Football Club use emotional intelligence in its man-management. This emphasises the significance of integrated intelligence of AI and data-driven insights, as well as the experience and competence of emotional intelligence and people skills, which MU lacked.

4.2 To-Be Enterprise Architecture Framework

This section discusses the proposed EA solution for MUFC to overcome the football club's problems from business, data, application and technology layers. Business Architecture design will help MUFC to get clear overview of its vision and strategy. The aim to increase MUFC's performance and surpass rivals in football is the major incentive driver for the commercial architecture of this proposed EA solution. The EA framework's purpose is to achieve victory in football contests. As a result, the targeted motive driver and aim are to improve player profiling and recruitment, player-manager relationships, and football data processing and usage. Fig 3 describes the MUFC EA Business Architecture.
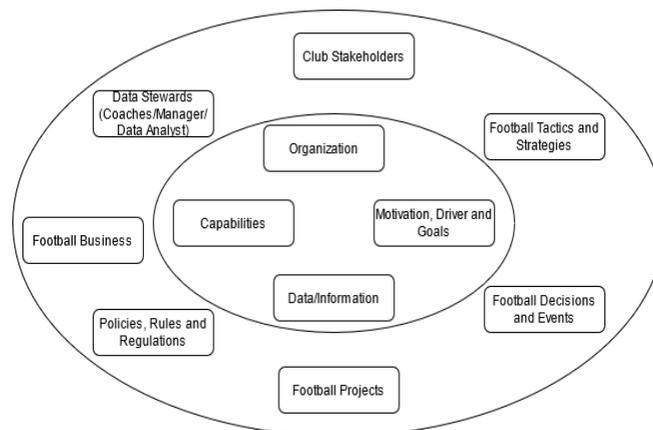

Fig. 3 - MUFC EA Business Architecture

Considering that the planned EA is primarily concerned with the football and technical aspects of the MUFC, the actors and responsibilities that have been included in the framework are the Chief Information Officer (CIO), Chief Executive Officer (CEO), and data stewards (club coaches, club manager and data analyst).

MUFC's proposed data architecture is a relational database structure. As previously stated, a relational database is a database that organises data in a way that allows data objects to be linked.The database saves and makes available data points that are connected to one another. The data is stored in logical data structures such as data tables. A relational database has many advantages, including the ability to add, delete, and update data, improve data consistency, simplify data summarisation, retrieval, and reporting, and reduce duplicate data. Using a relational database would also improve the quality of the data saved. Once this data architecture is in place, it will be linked to all instances of the application layer. Fig. 4 shows the example of a football data relational database scheme.
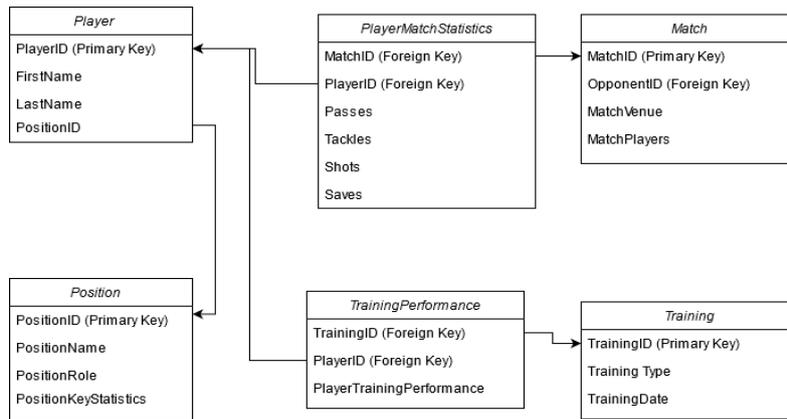
Fig. 4 - Example of a football data relational database scheme

Following the implementation of the relational database in the data architecture, the EA's application architecture may be implemented. The application layer in this proposed enterprise architectural framework includes everything that could be utilised to collect player and player performance data. This includes, but is not limited to, activities like training, football tactic sessions, and even formal football matches. Furthermore, because the suggested EA framework aims to strengthen the relationship and dynamic between players and managers, the application layer would emphasise player and coach feedback as well as both coaches' and players' mental health. Positive mental health may help workers avoid working stress. This, in turn, would not only assist to improve and prevent confrontations between football players and managers, but would also help to establish a better connection dynamic between them. Fig. 5 presents the possible applications that are connected to the data server.
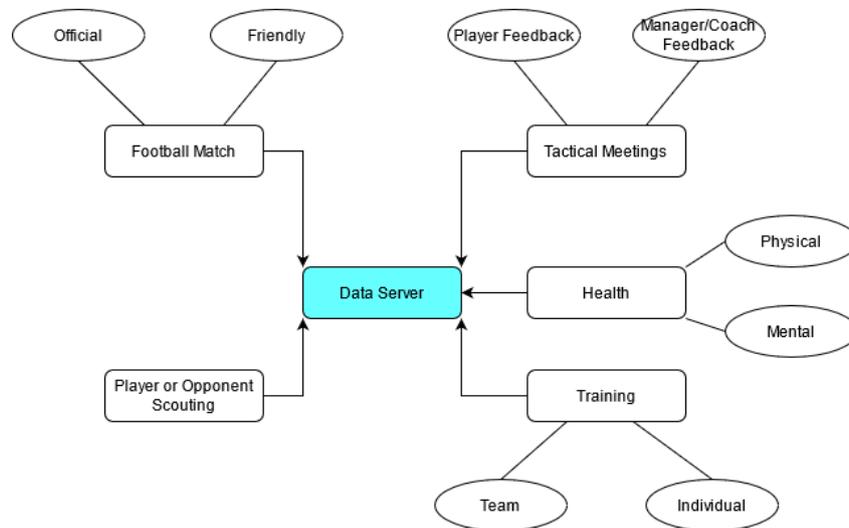

Fig. 5 - Applications that are connected to the data server

The proposed EA solution's technology layer is divided into two distinct parts. Machine learning applications and visualisation dashboards are the technology layers. MUFC could employ supervised machine learning to predict factors that could improve player and team performance. Key Performance Indicator (KPI) can be managed and expected to inform coaches and players of target performance. Managers and coaches could make tactical changes during football games based on expected variables using the data server to predict player performance and improve results. Furthermore, forecasts may be made utilising player scouts and profiling data to help acquire players that best fit the manager's tactical plans as machine learning has the potential to improve player monitoring and training.

Dashboards are another technical layer focus. Dashboards for data visualisation display data from the data server. The amount of data gathered during a football game or training session might be overwhelming for coaches and managers to digest. The football club can analyse recorded data to better understand its players and strategy. Creating a comprehensive data visualisation dashboard would aid data users, in this case coaches and managers, in understanding the data. Visualized data may assist MUFC coaches and managers in identifying underlying data patterns and trends, hence boosting data-driven decisions. Figure 6 depicts the example of sports data visualisation dashboard.
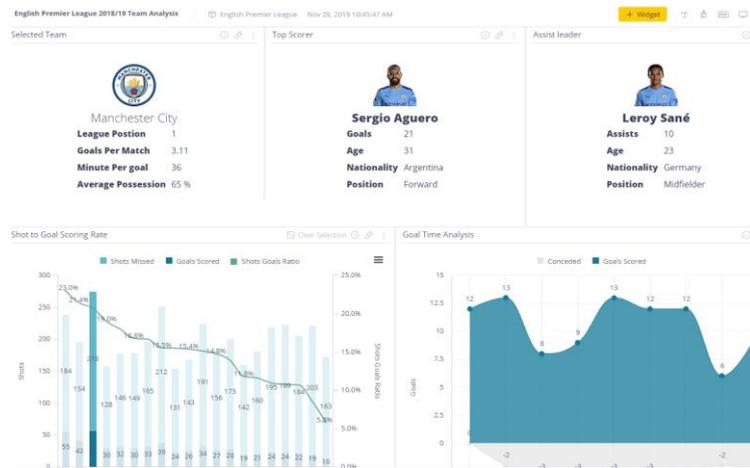
Fig. 6 - Sports data visualisation dashboard example

5. Conclusion

MUFC is not only a football club but also a business with multiple subsidiaries, using EA would be essential in maintaining a business that has done various forms of business diversification. MUFC's big data analytics and integrated IT systems will store and utilise every player and manager's data. The collected data may be used to improve organisational decisions. Using machine learning to make predictions and data visualisations can improve football club operations. Recruiting players and managing player-manager relationships are examples for a better player-manager relationship using the obtained data. The EA frameworks and integrated big data analytics-IT systems can solve various problems and assist the football club's current challenges such as building the required football skills and talents for the future. Furthermore, a competitive advantage will be gained over time by the EA framework and its plans.

MUFC's biggest issues are poor player recruitment and bad manager-player relationships. Big data analytics and linked IT systems could be used to better and overcome these difficulties. An EA framework would ease the move into big data analytics for a company fresh to the notion. It would break down the deployment of big data analytics and connected IT systems into manageable phases. Goals and objectives could also be split based on the adoption process's phases. This relieves the football club and the people engaged in achieving the aims and objectives. In conclusion, MUFC should be able to overcome existing obstacles by implementing structured EA solutions in big data analytics and emotional intelligence. The focus was on resolving existing MUFC concerns, player recruiting, and player-manager relations. To overcome existing obstacles and not only bridge the gap between the club and their rivals but also to provide a competitive advantage in club operations and football contests, an EA framework is required.

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