



Women's Super League (WSL) Team of the Season 2020/21 City AM

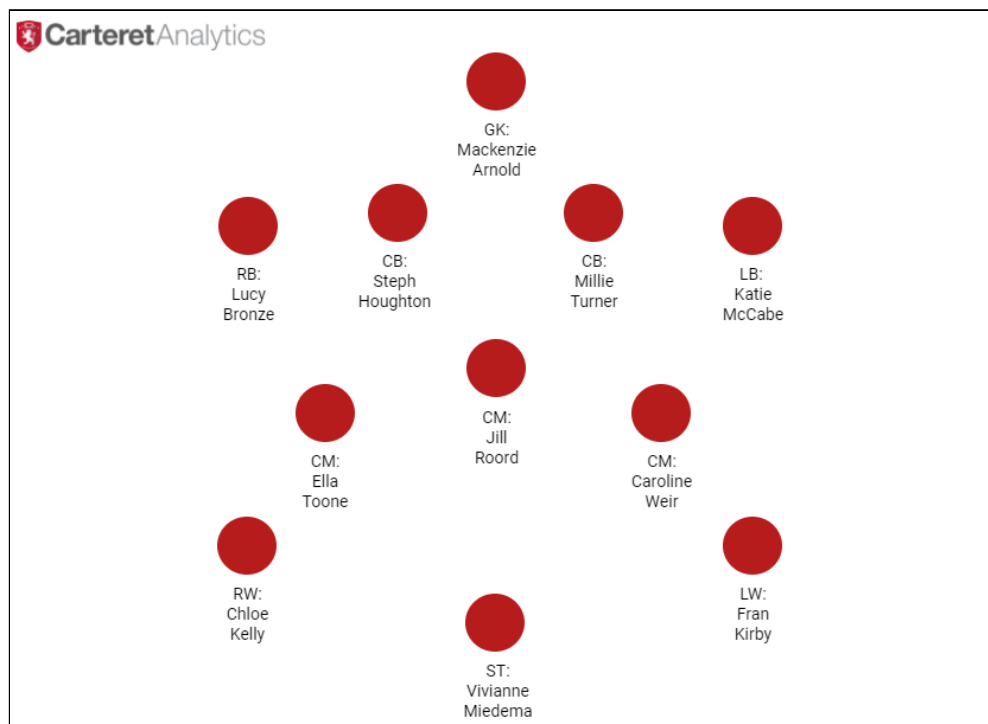
Molly Crawford¹, Jack Morris², Matthew Belford³, James Powell⁴

1. Abstract

This research paper utilises purely objective, quantitative player performance analysis to construct a Women's Super League (WSL) Team of the Season (2020/21). Although Manchester City's Lucy Bronze was named Ballon d'Or Féminin runner up in 2019, it is Chelsea's Fran Kirby who has been identified as the strongest player competing in the WSL, gaining the highest **Carteret Rating** of **380.8**. Carteret's 2020 WSL Player of the Year, Arsenal's Vivianne Miedema, followed closely with a **Carteret Rating** of **357.4**, just **3.1%** lower than **Kirby**. With four Manchester City players selected, they have the greatest number of players within our WSL Team of the Season (2020/21).

2. The WSL Team of the Season 2020/21

Exhibit 1: A WSL XI selected by Carteret Analytics based on a player's objective performances this season (2020/21)



¹ Molly Crawford, Corporate Analyst, Carteret Group, London. T: +44 20 3876 2414. E: mcrawford@carteret.group

² Jack Morris, Corporate Analyst, Carteret Group, London. T: +44 20 3876 2414. E: jmorris@carteret.group

³ Matthew Belford, Director, Carteret Group, London. T: +44 20 3876 2414. E: mbelford@carteret.group

⁴ James Powell, Chief Executive Officer, Carteret Group, London. T: +44 20 3876 2414. E: jpowell@carteret.group

3. Headlines

- Chelsea forward **Fran Kirby** has the highest **Carteret Rating (380.8)** of any player competing in the WSL this season, making her the 2020/21 'Carteret WSL Player of the Season'. 'Carteret's 2020 Player of the Year' **Vivianne Miedema** is this season's second strongest player, with a **Carteret Rating of 357.4**, down **8.9%** from **389.3** last year (2020).
- Manchester City's **Chloe Kelly (Carteret Rating 289.6)** has recently been short-listed for the 2020/21 WSL Player of the Season. The data appears to support this, with **Kelly** objectively rated as the third strongest player in the WSL this season. She rated quite poorly on the **Discipline⁵** attribute, and if not for this, she would have taken the top spot.
- Arsenal defender **Katie McCabe** has signed a new long-term contract with the club, and the quantitative analysis identifies her as the best defender in the WSL this season with a **Carteret Rating of 261.5 (3.8% higher than 2019 Ballon d'Or Féminin runner-up Lucy Bronze)**.
- As seen in Exhibit 2 (below), four of our selected players are from Manchester City, and this is the most from any WSL team.
- The best performing goalkeeper in the WSL (2020/21) is West Ham United's **Mackenzie Arnold**, with a **Carteret Rating of 228.9**. But it was tight - **Arnold** surpassed her closest competitor, Arsenal's **Manuela Zinsberger**, by just **0.5% (Carteret Rating 227.6)**.

Exhibit 2: Table outlining the best WSL players of 2020, based on their objective performance levels this season (2020/21)

| CarteretAnalytics | | WSL' - Team of the Season 2020/21 | | |
|-------------------|--------------------|-----------------------------------|-----------------|------|
| Player | Principal Position | Team | Carteret Rating | CRCI |
| Fran Kirby | Forward | Chelsea | 380.8 | 0.85 |
| Vivianne Miedema | Forward | Arsenal | 357.4 | 0.64 |
| Chloe Kelly | Forward | Manchester City | 289.6 | 0.61 |
| Ella Toone | Midfielder | Manchester United | 268.8 | 0.62 |
| Jill Roord | Midfielder | Arsenal | 268.1 | 0.92 |
| Caroline Weir | Midfielder | Manchester City | 263.0 | 0.87 |
| Katie McCabe | Defender | Arsenal | 261.5 | 0.73 |
| Lucy Bronze | Defender | Manchester City | 252.0 | 0.81 |
| Steph Houghton | Defender | Manchester City | 235.5 | 0.77 |
| Mackenzie Arnold | Goalkeeper | West Ham United | 228.9 | 0.94 |
| Millie Turner | Defender | Manchester United | 215.5 | 0.50 |

⁵Terms highlighted in yellow in this Research Paper are key terms related to the proprietary quantitative analysis utilised by Carteret Analytics to produce the various insights on the player. Each key term will be highlighted in yellow when it is first used in the Research Paper, and each is defined in more detail in the **Glossary** at Appendix B of this Research Paper.

4. A little bit of science...

At Carteret Analytics we have developed the quantitative analysis utilised to good effect in investment banking for trading strategy, portfolio optimisation, derivatives pricing and hedging, and risk management by our sister corporate finance firm, Carteret Capital - and applied it to football. **In particular, our work provides an objective measure of how good a football player really is - removing all the subjective noise and opinions.**

An integral part of the analysis is to calculate a **Carteret Rating⁶** for every football player, which rates and values a player's contribution to her team winning football matches. It is incredibly accurate at predicting a player's capabilities. Indeed, we always start with the premise that a professional football club's primary objective is to win matches - and therefore the more a player contributes to her team winning matches, the better the player.

The *Glossary* located at the end of this Research Paper will provide more information about the *key terms* and *metrics* used throughout the Research Paper. **Key terms will also be highlighted in yellow when they are first used in this Research Paper.**

5. About Carteret Analytics

Carteret Analytics is part of the Carteret Group of companies, based in the City of London, New York and Geneva. It provides leading-edge quantitative analysis and commercial analytics to clients worldwide, with particular expertise in the sports sector. In football our work includes player rating and valuation, head coach assessment, team performance analysis, and applying proprietary analytics to transform commercial revenues.

Further information and contact details

If you have any questions, or would like to enquire about further services provided by the Carteret Group, then please feel free to contact one of the team members listed below.

Matthew Belford

Director - Carteret Group

E: mbelford@carteret.group

T: +44 20 3876 2414

James Powell

CEO - Carteret Group

E: jpowell@carteret.group

T: +44 20 3876 2414

Jack Morris

Corporate Analyst - Carteret Group

E: jmorris@carteret.group

T: +44 20 3876 2414

Molly Crawford

Corporate Analyst - Carteret Group

E: mcrawford@carteret.group

T: +44 20 3876 2414

⁶*Carteret Rating*: this is a proprietary method of determining how good a player really is. It is a significant and leading-edge algorithm. We assess a player by identifying every match in which he has been involved (for which we have data) and identifying the key events in each and every one of those matches. These Key Match Events ("KMEs") are events that led to a goal being scored; could have led to a goal being scored; led to a goal being conceded; or could have led to a goal being conceded. Then, for each and every KME, in each and every single match, we analyse that player's contribution to each of those KMEs. This is a substantial piece of analysis, and one which produces a unique *Carteret Rating* for the player. It is a dynamic rating, and it changes with each additional match played.

Appendix A

Team of the Season 2020/21 A Detailed Analysis by Position

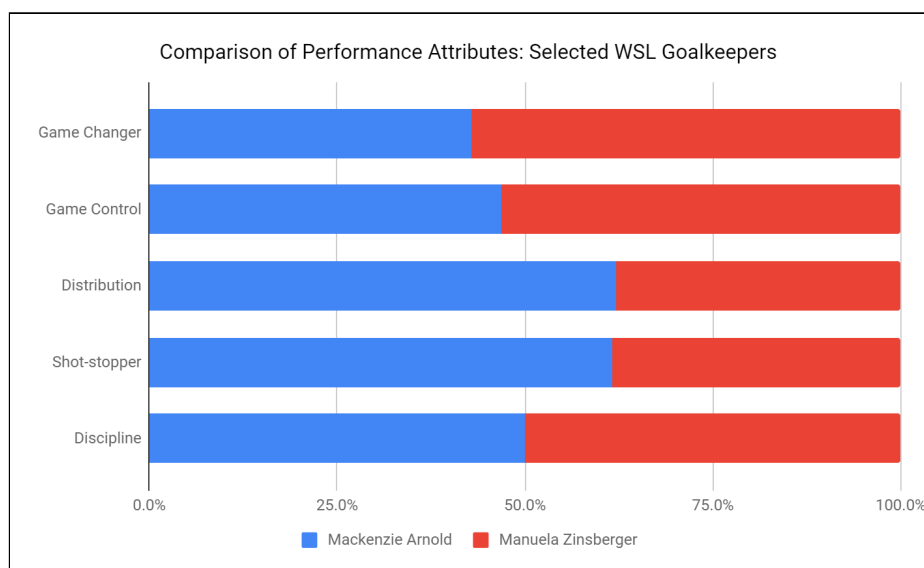
A.1 Goalkeeper of the Season

Mackenzie Arnold - Carteret Rating 228.9 (West Ham United)

The quantitative analysis data objectively determines West Ham United's Mackenzie Arnold as the best performing goalkeeper in the WSL 2020/21 season.

The stacked ratio chart in Exhibit 3 (below) compares the performance attributes of **Arnold** with Arsenal's Manuela Zinsberger. **Zinsberger** was the second-best performing goalkeeper in the WSL this season, with a **Carteret Rating** of **227.6**. Although both players' performance attributes are closely matched, ultimately it is **Arnold's** superior **Distribution** and **Shot-stopping** capability that positions her ahead of **Zinsberger**. Both goalkeepers demonstrate an almost identical level of **Discipline**, with **Zinsberger** preceding **Arnold** solely in regard to her **Game Changer** and **Game Control** attributes. The data analysis highlights that although it was **Arnold** who ultimately gained the spot in our WSL XI, **Zinsberger** was incredibly close competition.

Exhibit 3: A comparison of Performance Attributes for both shortlisted Goalkeepers this season (2020/21)



A.2 Defenders of the Season

The data analysis identifies **Katie McCabe**, **Lucy Bronze**, **Steph Houghton**, and **Millie Turner** as the best performing defenders in the WSL this season, therefore securing a place in our WSL Team of The Season (2020/21). Exhibit 4 (below) features a bar chart comparing the performance attributes of the four highest rated WSL defenders with all other defenders in the WSL (season 2020/21 to date).

Right-back: Lucy Bronze - Carteret Rating 252.0 (Manchester City)

Lucy Bronze demonstrates an exceptionally high level of *Game Control*, emphasised by her short-pass success on the pitch. **Bronze** has completed more short passes than any other defender in the WSL this season (457 to date).

Centre-back: Steph Houghton - Carteret Rating 235.5 (Manchester City)

Steph Houghton is objectively the most consistent player in regard to her performance attribute levels, with each attribute reaching above the 65th *League Percentile*. Despite not offering the same level of *Game Control* as the other defenders in our Team of the season (2020/21), **Houghton** displays more *Discipline* on the pitch.

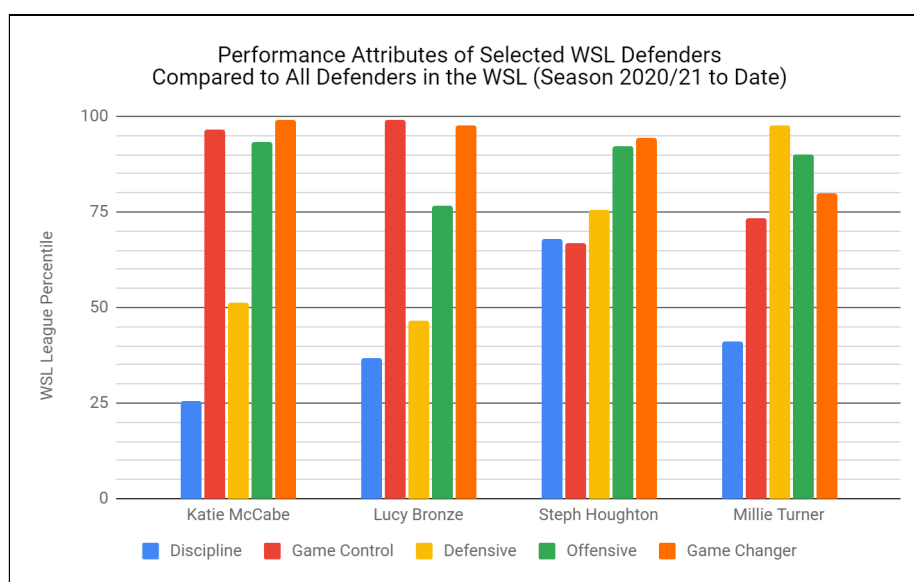
Centre-back: Millie Turner - Carteret Rating 215.5 (Manchester United)

Millie Turner has the strongest *Defensive* attribute in comparison to the other defenders in our Team of the Season (2020/21). Despite this, **Turner's** performance attributes require improvement if she hopes to achieve the same level of consistency displayed by England Captain **Houghton**.

Left-back: Katie McCabe - Carteret Rating 261.5 (Arsenal)

Left-back **Katie McCabe**, has the highest **Carteret Rating** of all defenders in the WSL for season 2020/21. **McCabe** also possesses high shot accuracy with over 50% of her 21 shots so far this season being on target. This accuracy is what has set **McCabe** apart from her competitors in the WSL this season.

Exhibit 4: A comparison of Performance Attributes for each selected WSL defender ranked against the rest of the league's defenders this season (2020/21)



A.3 Midfielders of the Season

Ella Toone, Jill Roord and **Caroline Weir** have been recognised as the best performing midfielders in the WSL (season 2020/21 to date), according to objective quantitative data analysis. The horizontal stacked bar chart in Exhibit 5 (below) provides an insight into each player's performance attributes.

Central Midfield: Ella Toone - Carteret Rating 268.8 (Manchester United)

Toone has the highest **Carteret Rating** of all midfielders in the WSL this season, also showing the potential to further exceed her competitors next season. **Toone** must be able to maintain her current performance levels whilst also applying greater *Discipline* to her gameplay.

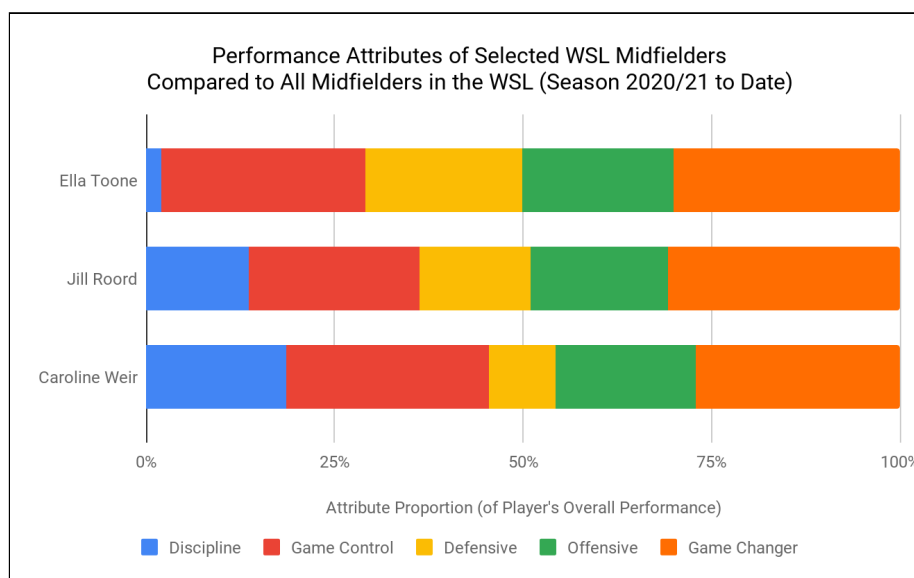
Central Midfield: Jill Roord - Carteret Rating 268.1 (Arsenal)

The data shows that **Jill Roord** is this season's most all-rounded WSL midfielder in regard to her performance attributes. **Roord** possesses the greatest *Game Changer* ability when compared to the other midfielders in our WSL XI.

Central Midfield: Caroline Weir - Carteret Rating 263.0 (Manchester City)

Caroline Weir has also remained consistent across all her performance attributes this season, showing the most *Discipline* on the pitch. However, **Weir's** *Defensive* contribution requires improvement if she hopes to challenge **Roord** and **Toone** for the top spot next season.

Exhibit 5: A comparison of Performance Attributes for each selected WSL midfielder ranked against the rest of the league's midfielders this season (2020/21)



A.4 Forwards of the Season

Fran Kirby, Vivianne Miedema and **Chloe Kelly** have been recognised as the strongest performing centre forwards competing in the WSL this season (2020/21). Exhibit 6 (below) displays a horizontal bar chart and a radar chart, comparing their performance attributes.

Forward: Fran Kirby - Carteret Rating 380.8 (Chelsea)

According to the data, **Fran Kirby** is this season's strongest performing Women's Super League player, largely due to her contribution when scoring goals and assists for her team. **Kirby's** impressive ability to change a game and the strict *Discipline* that she applies on the pitch, justifies why she has been recognised as the top player this season.

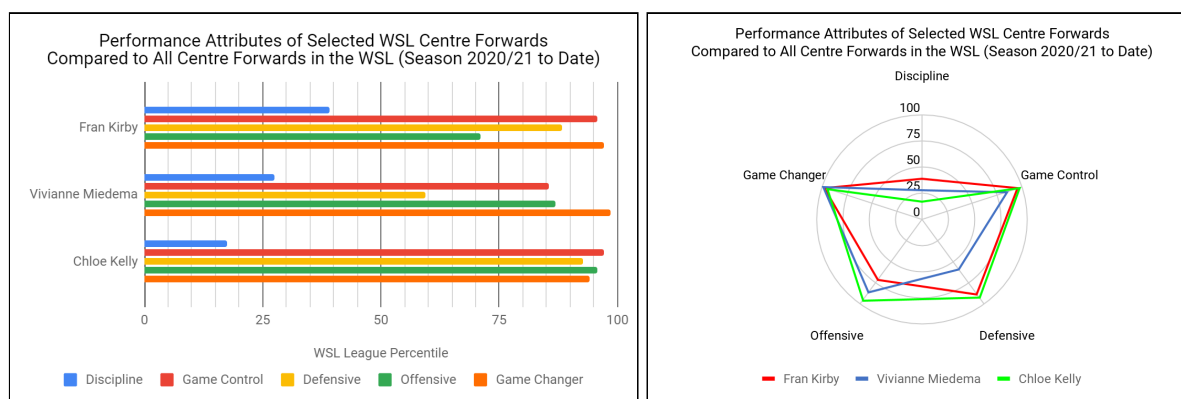
Centre Forward: Vivianne Miedema - Carteret Rating 357.4 (Arsenal)

The data shows that Carteret's 2020 Player of the Year, **Vivianne Miedema** has retained her position as the strongest finisher in the WSL. **Miedema's** ability to score goals has contributed to her *Game Changer* attribute scoring above the 75th *League Percentile* and exceeding that of her rivals.

Forward: Chloe Kelly - Carteret Rating 289.6 (Manchester City)

Chloe Kelly proves to be the strongest in 4 out of 5 of the *Performance Attributes*, therefore holding the potential to challenge **Kirby** as the best player next season, if she is able to build on her current *Discipline* level. Specifically, **Kelly** must maintain greater composure during tackles, in order to commit less fouls, as well as ensuring that her positioning is correct to avoid being caught offside.

Exhibit 6: A comparison of Performance Attributes for each selected WSL forward ranked against the rest of the league's forwards this season (2020/21)



Appendix B

Glossary

Carteret Rating

This is a proprietary and objective method of determining how good a football player really is (and aims to accurately predict future performance in various scenarios set by the football club). It is based on a series of leading-edge algorithms that have been developed by Carteret Analytics. These algorithms have evolved from the quantitative analysis utilised in investment banking by its sister company, Carteret Capital, for, inter alia, asset and equities trading strategies, pricing and hedging of derivatives, portfolio optimisation and risk management. The algorithmic methodology assesses each player by identifying every match in which he/she has been involved (for which we have data) and then identifying and isolating the Key Match Events (“KMEs”) in each and every one of those matches. Then, for each and every KME, in each and every single match, we analyse that player’s contribution to each of those KMEs. This is a substantial piece of analysis, and one which produces a unique *Carteret Rating* for the player.

It is a dynamic rating, and it changes with each additional match played. Its ‘beauty’ is in its pure objectivity - ignoring characteristics such as age and nationality, and avoiding the ‘noise’ of subjective considerations that are frequently taken into account (often wrongly) in trying to determine the ability, attributes, characteristics and the ‘fit’ of a player into the club style or systems. It is an exceptionally accurate rating, with an *r-squared value* between 0.88-0.90 for Women’s Super League players - demonstrating that it is very precise at predicting how good a player will be in the future. The dynamic nature of the Carteret Rating also enables Carteret Analytics to accurately predict the impact of the player in different clubs and different leagues.

Carteret Rating Confidence Index (“CRCI”)

We are in the business of predictions, and, more specifically, accurately predicting the future performance levels of players, managers and teams - in a variety of league, style, player combination and formation scenarios. We have built a series of algorithms that are able to utilise a huge amount of raw data to produce highly accurate predictions - which we constantly measure after every match to ensure the predictive levels (*r-squared value*) remains high. The line of predictive extrapolation in any data analysis will always be dependent on the quality and quantity of raw data. We are usually very confident with the quality of raw data that we are able to utilise, but sometimes the quantity of the raw data is lower for one player for a particular period than another player. We need to recognise that difference in quantity, and the CRCI is our mechanism for doing so. A CRCI of 1.00 or lower suggests an extremely high level of confidence that the quantity and quality of the raw data is of a sufficiently high level to produce a strong extrapolated line of prediction.

Attribute

In addition to a player’s Carteret Rating, we are also able to break down a player’s performance into a number of Attributes - Game Changer, Game Control, Offensive, Defensive and Discipline. This provides greater clarity on the player’s strengths and weaknesses, and enables us to provide insights into **how** the player actually contributes to increasing the probability of her team winning matches. Where the Carteret Rating provides the overall (objective) measure of the player’s performances, the Attributes allow us to peel back the layers of those performances - to identify strengths and weaknesses, but also to help us understand how he might fit into preferred styles and formations. These Attributes have been quantitatively constructed based on rigorous data testing, to provide an accurate representation of how a

number of KMEs can be combined to build a picture of how a player can best contribute in a match to increase the probability of the team winning.

The **Game Changer** Attribute measures a player's creation of, or contribution to, specific KMEs that were demonstrated to move the in-match position to a better score position (weighted against the extant opposition score position), or to retain a score position in circumstances where there was a material probability that the score position could have moved against the player's team.

The **Game Control** Attribute measures a player's ability to maintain a positive score position, and avoid a reduced or negative score position, through a variety of in-match scenarios such as proactive ball control and movement, maintenance of possession, and transitioning between offensive, defensive and 'special teams' types of play (moving the ball and gameplay away from dangerous scenarios in a positive score position, late in the match). It is a good measure of tactical leadership on the pitch, and it is an extremely beneficial Attribute for teams that value a possession based style of play as well as those teams that need to contain the game for periods of time.

The **Offensive** Attribute measures a player's ability to create and contribute to 'positive' KMEs that actually provided an incremental step to offensively maintain an in-match score position or to positively transform an in-match score position. This will involve forward play, as well as play in a offensively forward zone. Likewise, the **Defensive** Attribute measures a player's ability to create and contribute to 'protecting and continuing' KMEs, i.e. to avoiding a reduced and/or negative in-match score position. All players will have both an Offensive and Defensive Attribute, whatever their position, and these Attributes (as with all Attributes) are generally measured against a League Percentile of other players in the same position (in a particular league). High levels for both the Offensive and Defensive Attributes often indicate a player's [strong] ability to transition quickly and effectively between attack and defence (and vice-versa).

The **Discipline** Attribute is a useful measure of a player's ability to avoid losing control of various aspects of a match and to avoid reducing the options of the team to maximise the probability of winning future matches because he has been suspended through poor Discipline. Poor in-match Discipline often leads to loss of possession, and frequently leads to negative KMEs. It is usually measured on charts *in the positive* - i.e. on radar charts or bar charts set against the League Percentiles for the Attribute, a player whose Discipline is in the bottom 25th League Percentile has a poor Discipline Attribute.

League Percentiles

The mechanism to measure and rate a player against their peers (usually in the same position) in a particular league. References are often made to the lower 25th League Percentile (which indicates a poor performance measure), 50th League Percentile (which is the average measure), and in the 75th League Percentile (which indicates high performance - in the top 25% of players in that League).

Key Match Events ("KMEs")

Key Match Events ("KMEs") are events that we have identified (through constant quantitative testing) as having the greatest influence on the outcome of a football match. Our current quantitative modelling includes 42 KMEs, and in very general terms these are events that, to varying degrees, lead to a goal being scored; could lead to a goal being scored; lead to a goal being conceded; or could lead to a goal being conceded. The *Carteret Rating* - which is obviously the proprietary objective measure that permeates everything that we do - measures a player's creation and contribution to each and every KME, in each and every match for which we have data on that player. This is a huge piece of data analysis, and is the reason why the *Carteret Rating* is so accurate and predictive.