Project Title : England's Soccer Superstars

Names of students who worked on the project :

Advait Lad, Akshar Dhondiyal, Tim Schott

Project goals, including what kinds of tasks the interface containing the visualization is targeted towards.

- Introduce the basics of soccer to viewers who have very little or no knowledge about soccer, England national team specifically. Some of the basics covered through the project are:
    - The shape and design of a soccer field
    - The general structure and formations of soccer teams
        - Highlight three key areas - Defense, Mid-Field and Attack
    - The traditional formations that Engalnd played with
        - Have interactive interactions within the interface to allow viewers to play around with different positions for the players
- Introduce three of the key players for England – Harry Kane, Mason Mount and Trent Alexander-Arnold
    - Learn more about their style of play, highlighting their strengths and weaknesses.
    - Highlight how their individual abilities could benefit England in the upcoming 2022 World Cup
    - Also, highlight how their individual play styles could gel well with each other which could make them the key players for England this World Cup
- Have non-traditional visualizations (like in the shape of soccer fields) to help viewers better imagine and understand the soccer world
- Use preattentive attributes of visual perceptions like length, orientation, size, color, position, intensity, etc to highlight key aspects of soccer
- Introduce some of the more detailed metrics which are used by experts to compare and analyze soccer players
    - Use examples of players to highlight how these metrics are used and how conclusions are made
    - Provides an opportunity for readers to continue learning about these metrics and explore more on their own from linked data sources

Discussion of related work. You must discuss at least 3 pieces of related work for each student on the project. You must say how your project relates to these readings or projects, and provide an image or sufficient description of the related work for the reader to understand how it is related.

1. The Athletic: Playing a High Line

- ○ *The Athletic* sits at the forefront of the "data-journalism" discipline for sports reporting. They hire top talent to write highly detailed pieces that often utilize inventive and engaging data visualizations.
- ○ Something our group really likes about their reporting is the way that they mix summary charts with individual examples from gameplay.
- ○ This story explains a particular defensive strategy known as the "high-line" where defenders organize themselves horizontally to induce the other team to play passes to someone that is "offsides."
- ○ While the specifics of this operation are pretty intricate and beyond the scope of this report, the article provides a great template for the types of visualizations we wanted to carry out for our project. For example, they use graphics of the field itself when drawing their conclusions.
- ○ We especially like this tactic because it makes the subject matter more clear for the reader when the data that is being visualized is superimposed against a field – a familiar context for our group.
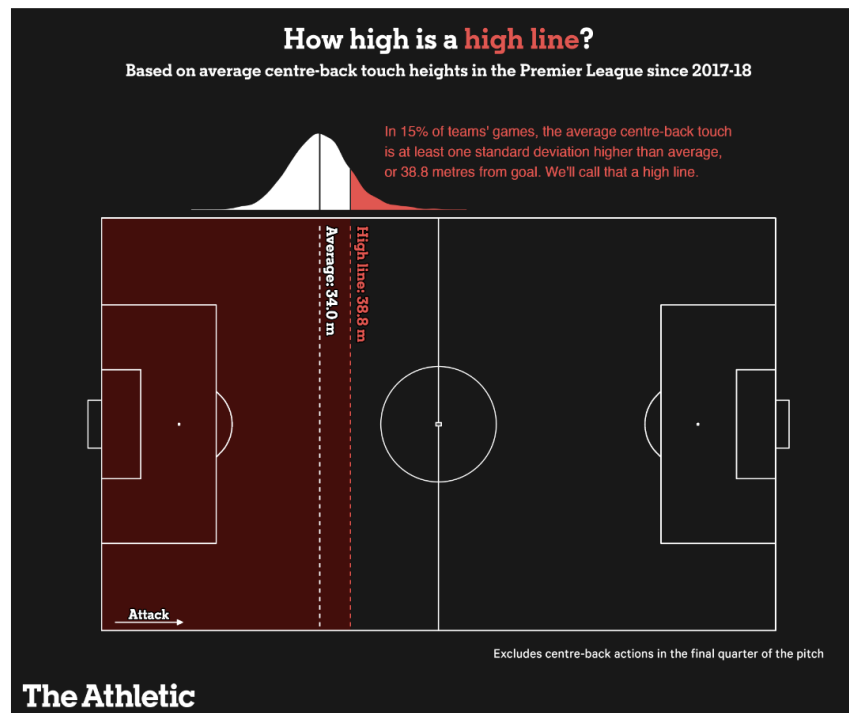
2. [Space space space: This is the Year of the Elbow Back](#)
    - ○ This piece is sourced from John Muller's substack, where he wrote droves of fascinating stories prior to being hired by (you guessed it) *The Athletic*.
    - ○ This article focuses on a particular tactical adjustment that's been in vogue. Mueller calls it the "elbow back" where an outside defender has the freedom to move either more centrally or towards the sideline depending on the position of their teammates and the ball.

- Muller notes that this type of operation is particularly effective because the shape of a team's defensive line has major impacts for how easy it is for them to keep control of the ball and eventually play the ball forward towards the goal.
- This story has some excellent interactive visualizations that work well to show readers how the manipulation of that single, elbow-back's positioning can be quite consequential.
- The graphics themselves are .gifs rather than truly interactive browser based visuals but effectively convey the changes in positioning to the viewer especially with a great color palette and excellent captioning.

The elbow back is part fullback, part outside center back.

@johnspacemuller
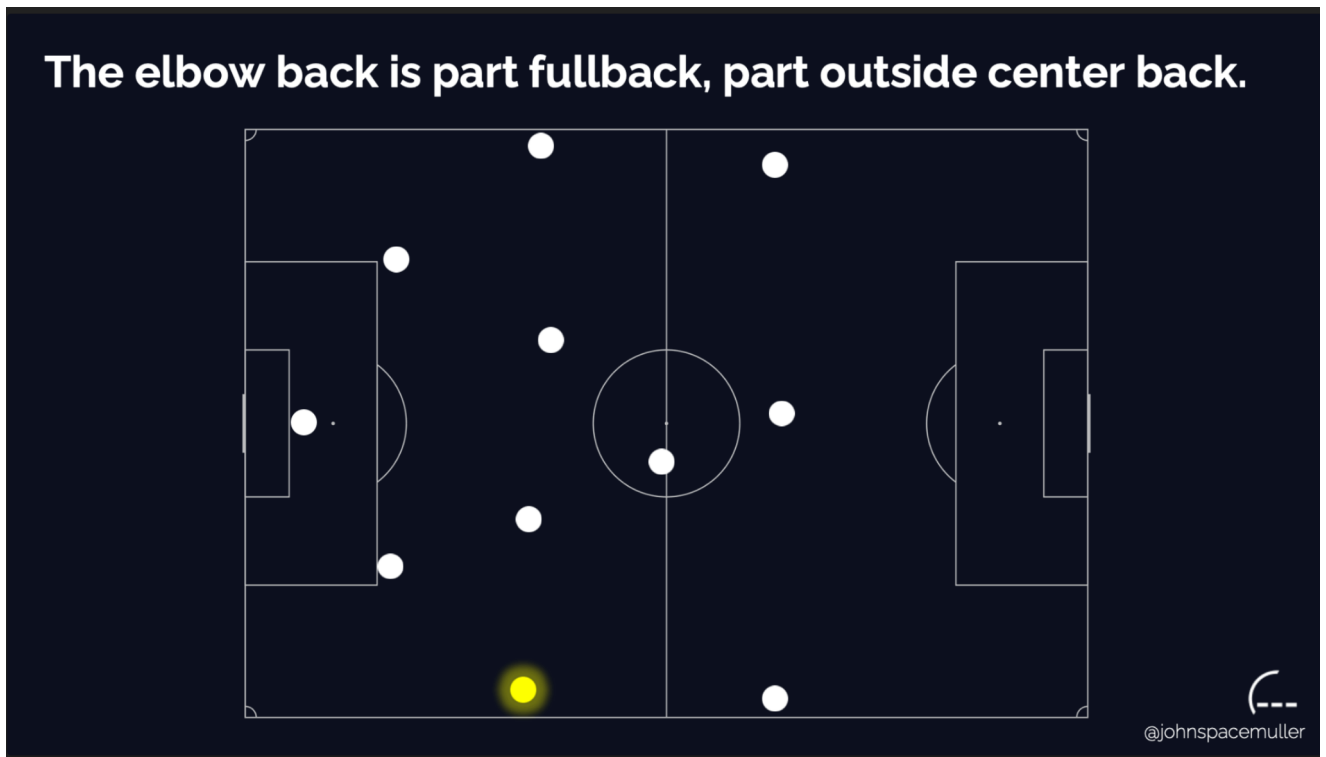
3. [New York Times: Soccer's Fastest Growing Market is the One for Ideas](#)
   - This *NYT* piece highlights the growing landscape of data-driven soccer analysis. Particular clubs, like the German team "Red Bull Leipzig" (owned, interestingly enough, by the makers of the energy drink) detailed in this story employ large data analytics teams that analyze everything from fitness recovery to merchandise sales to player valuations.
   - Something that major European clubs are increasingly looking for is the ability to scout players from far corners of the world with enhanced precision. Because matches take place all over the world, it's quite challenging for any one team to effectively track the progress of up and coming youth players without a robust data analytics department.
   - This story also provided some fascinating insights from Ralf Ragnick, who was an executive at RB Leipzig and is now in charge of Manchester United, one of

the world's most historic and largest clubs. They have entrusted him to turn "Man U" around after a few seasons of stagnation.
- After approaching this article, our team thinks that Ragnick would do well to replicate the data-first approach that works so well in Leipzig. Overall, this article shows that in today's top-athletic competitions, pure instinct or other more spurious evaluations of a player or of a team are not as sophisticated and often not as comprehensive as investigations that utilize data.
- Soccer is of course not the only sport to incorporate data into its decision making toolkit; there are other successful examples in other sports like the NBA and MLB.

The New York Times

Soccer's Fastest-Growing Market Is the One for Ideas

Wealthy teams accustomed to pursuing players are simultaneously competing for the signatures of a new era's most sought-after talents: data analysts.
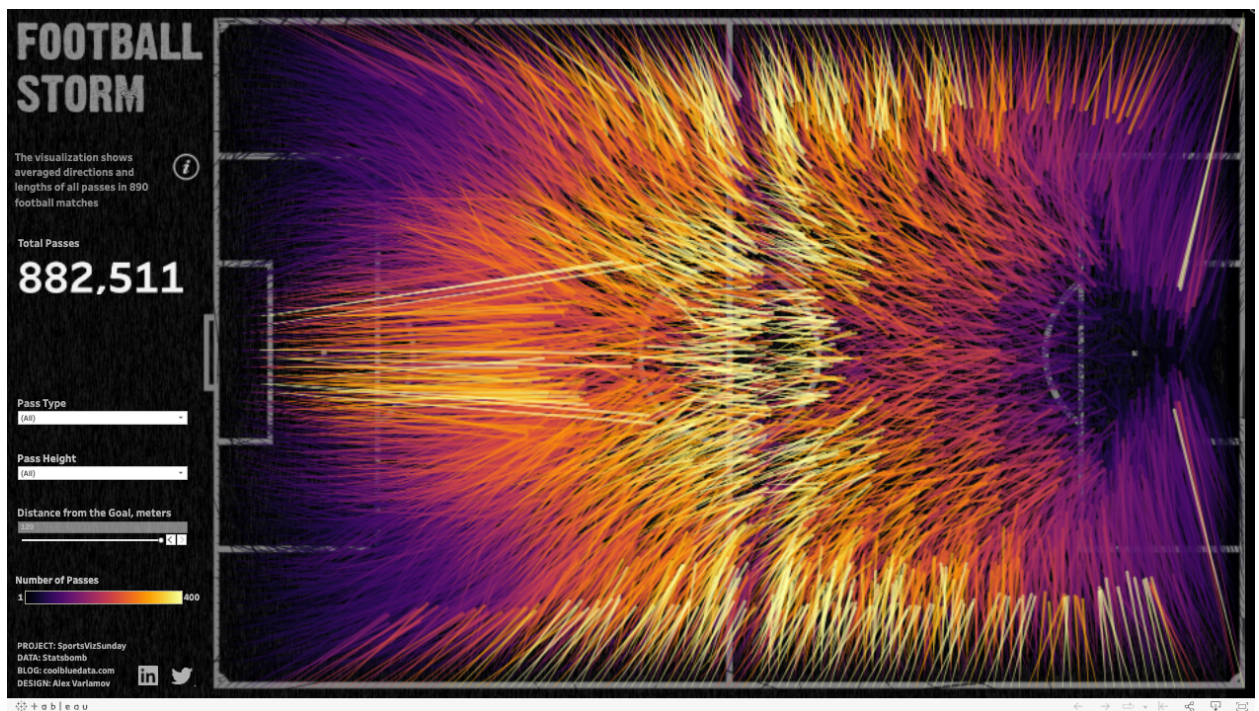
🎁 Give this article   ↪   🔖   💬+

4. Football Storm Passing Tableau Visualization
- This is a project which is done in tableau
- This viz aggregates all passes on a grid with 1 meter step. It means, all distances and passes on a square meter of the football pitch represented by a line with average length and direction. So this viz is an 'averaged' picture.
- It gives the user to interact and apply filters like PassType, PassHeight, Distance from Goal, etc
- The data includes:
    i. Champion League 1999 - 2019
    ii. FA Women's Super League 2018 - 2020
    iii. FIFA World Cup 2018
    iv. La Liga 2004 - 2020
    v. NWSL 2018
    vi. Premier League 2003 - 2004
    vii. Women's World Cup 2019
- This project also introduced us to StatsBomb where we got a lot of data eventually.

       i.   StatsBomb are committed to sharing new data and research publicly to enhance understanding of the game of Football. They want to actively encourage new research and analysis at all levels. Therefore they have made certain leagues of StatsBomb Data freely available for public use for research projects and genuine interest in football analytics.

       ii.   StatsBomb are hoping that by making data freely available, they will extend the wider football analytics community and attract new talent to the industry.

- ○ It also uses color very effectively to highlight the number of passes
- ○ This was the inspiration behind the visualization we made for the passes made by Mason Mount in the last two major international tournaments.
- ○ Soccer is not the only sport to incorporate data into its decision making toolkit; there are other successful examples in other sports like the NBA and MLB. This can essentially be used for any team sport that involves passing of any kind

5. [An Introduction to the worldfootballR package](#)
   - ○ This article talks in detail about the use of **worldfootballR R** package to extract soccer data from various competitions.
     - i. This package is used to aid in the extraction of Football (Soccer) data from [fbref.com](#)
       1. The Sports Reference sites first launched with Baseball-Reference.com in April 2000 by Sean Forman, Pro-Football-Reference.com in December of 2000 by Doug Drinen, and Basketball-Reference.com in April of 2004 by Justin Kubatko.

2. Sean Forman formed Sports Reference, Inc. in October of 2004, and in December of 2007 the three groups joined forces with Jay Virshbo to create Sports Reference LLC (based in Pennsylvania).
    ○ This R package is relatively new and this article is how we came to know about it.
    ○ The article specifically analyzes Liverpool's use of substitutions in the English Premier League (EPL) over the last three seasons to understand whether there has been a change in behavior in the current season, and whether there was a change around the COVID outbreak and subsequent pause taken during the 2019–2020 season.
    ○ The article also introduces other packages which were used to get match summaries, stats around fouls, substitutions, red cards awarded, yellow cards awarded which were used in the project.

An Introduction to the worldfootballR R Package

Using the worldfootballR R package to extract Premier League substitution data

6. [Five Thirty Eight: Possession is the Puzzle of Soccer Analytics. These Models are Trying to Solve It](#)

- ○ FiveThirtyEight, sometimes rendered as 538, is an American website that focuses on opinion poll analysis, politics, economics, and sports blogging.
- ○ This article is about possession of a soccer ball during matches and how its location on the field has an impact on the game.
- ○ The simplest kind of possession value model is location-based: the average probability of going on to score from wherever the ball is. Passing or dribbling toward the opponent's goal typically improves the team's chance of scoring, so players who progress the ball add value with their actions, while players who pass backward or turn the ball over lose value.
- ○ This article also introduces the concept of using a video to clearly illustrate the idea of the importance of positioning on the field when you have the ball and when you don't.
- ○ It also gave us ideas to introduce visualizations around the possession of the ball and passes for playmakers like Mason Mount
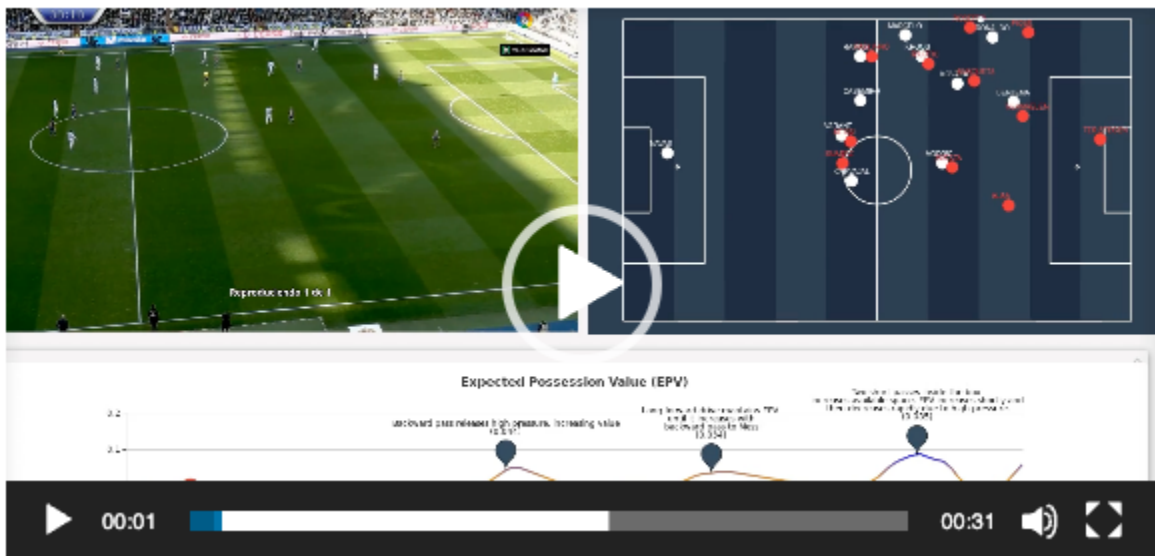

7. https://www.invertedwinger.com/football-analytics-using-r-and-fbref-data-part-1/
   - ○ This is a project done to compare the clubs participating in the major local Soccer league in England called the English Premier League.
   - ○ The comparison is based on xG(expected Goals) and xG/90(expected Goals per 90 minutes) for each team on a scatter plot.
   - ○ We have used a similar approach including xG and xG/90 in our comparison between different players to showcase their unique playstyle. Instead of a scatter plot we found a radar chart to showcase the player more holistically as compared to a scatter plot which is only able to compare across two axes.
   - ○ This project uses the same data source(fbref) as our project.
   - ○ Lastly, this project uses R for fetching the data. We have followed a similar approach to fetch data via R as well as Python.

np Goals vs np Expected Goals (per 90m)
English Premier League 2021/2022 GW1-GW7
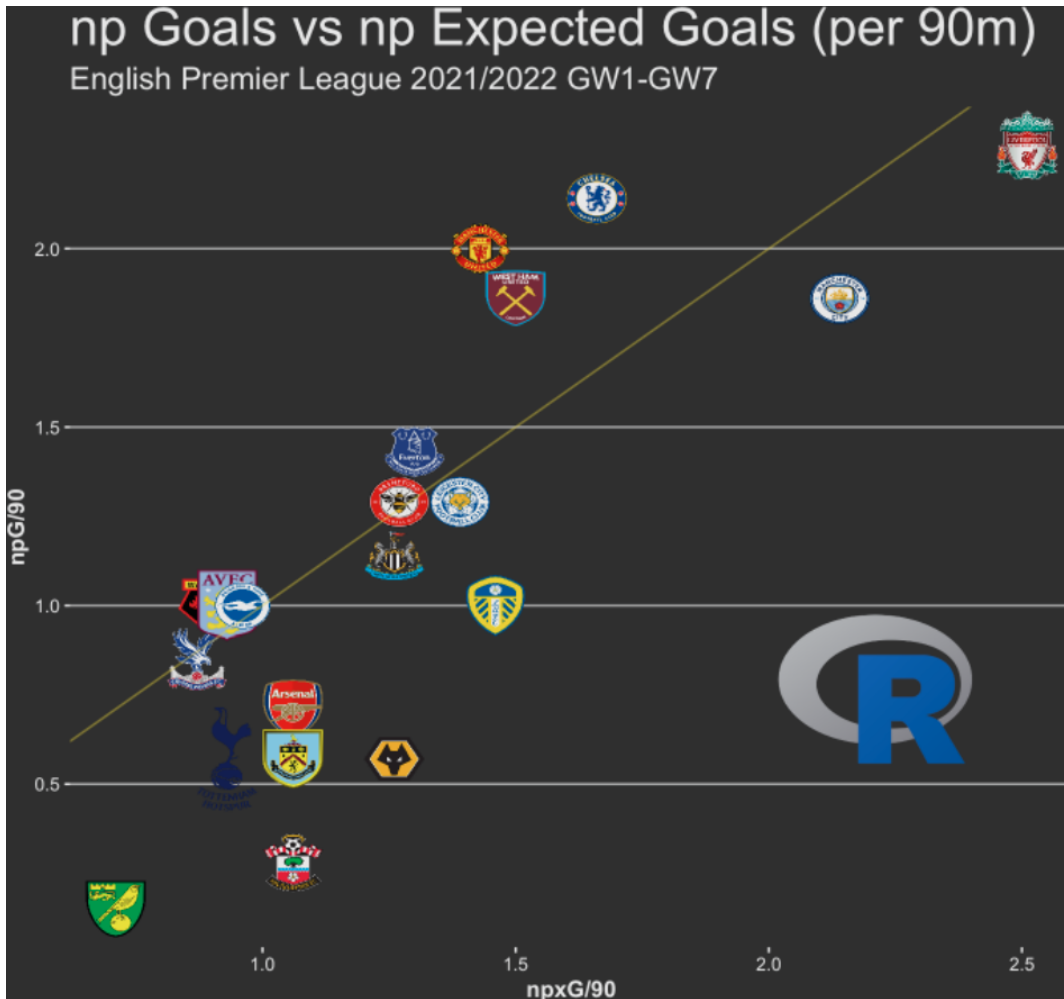
8. https://frankphopkins.medium.com/why-did-arsenal-perform-so-badly-in-2020-21-2a294fde32be
    ○ This project tries to investigate why Arsenal(A club level soccer team) was performing poorly. Our project derives a similar approach for assessing an international team like England which has even less time for players to work together.
    ○ Their approach is very similar to ours in that they go in a player by player comparison to see how each member in their team contributes to their success.
    ○ This project used Machine learning to find feature-importance of various features like expected goals and age of the player among others to find the most contributing factor.
    ○ We on the other hand chose a more rounded approach of doing all three(attack, midfield and defense) features so as to look at the problem very holistically.
    ○ This project fetches data on the players of the team using API's from Kaggle which compared to our sources is less vetted and more prone to error.

9. https://traceup.com/radar-view-heat-maps-soccer-performance
   ○ This is a visualization created by a camera company which uses high-tech cameras to capture player possession of a team across multiple matches to drive better insights to improve their game style.
   ○ Once they have collected the data they are using a heat map to draw a comparison across different matches for the same team as can be seen in the visualization below.
   ○ The team working on this project was able to draw this data over time and see when open spaces were available in the enemy defenses to help build over the team's strategy to exploit such opportunities.
   ○ We found it extremely interesting how we were able to not use cameras but instead freely available data to drive similar insights. We believe there could be a difference in the accuracy of the information but were happy with the results we were able to draw using the resources we had in our hands.

4. 8/28/21, score: [2:0]
vs Great Falls

5. 8/29/21, score: [2:0]
vs Vienna Youth Soccer 06 G
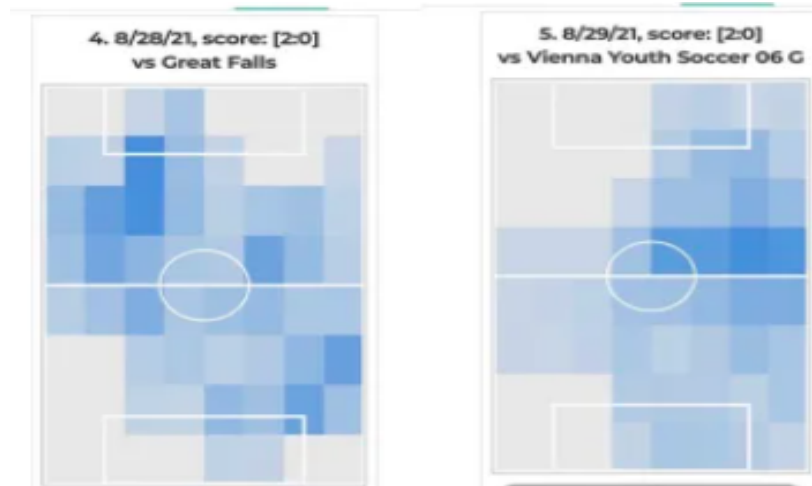
10. https://soccermatics.medium.com/using-heat-maps-to-assess-attacking-play-56348f52dee5
    - This project very effectively used a heat map and overlaid it with the pass map as shown in the infographic below. They also compared different players using this technique to understand the playstyle of a player much better.
    - We found that this approach is not very simple and easy to understand and have taken inspiration to break these to show cases like in the case of Mason Mount so that people who are new to this field can make more sense out of the infographic and are not overloaded by the information which is coming in.
    - Also we found that by using green as the field background and using shades of green as variations in the heatmap in our visualizations it helped simulate an actual soccer field and made it more easier to understand the meaning for users new to the sport.
    - Lastly, we felt this visualization worked very well in cases when we want to show the direction of the movement of the ball for a particular player and became especially useful when showing the data for players like Mason Mount who primarily function to provide balls to players like Harry Kane in the attack.
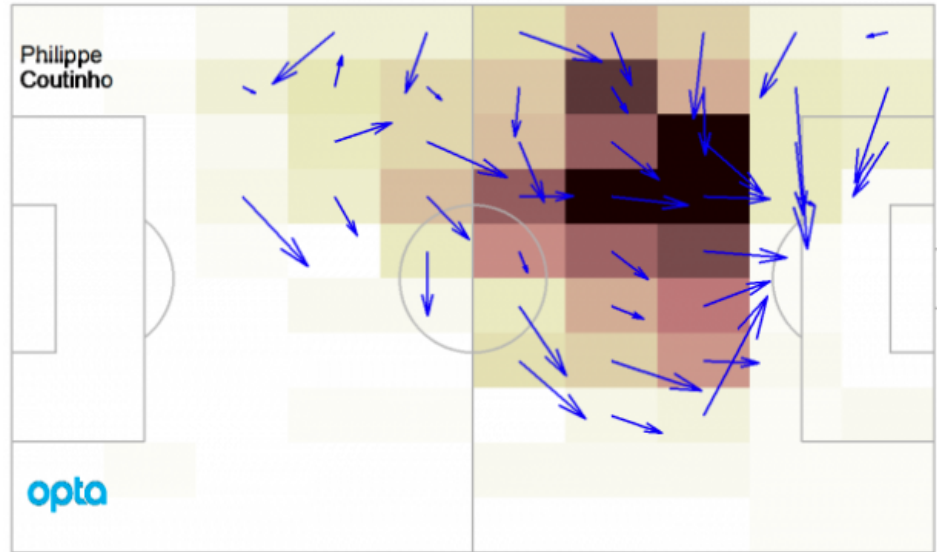
A description of the visualization, with adequate screenshots and/or illustrations.

NOTE: Description is followed by the images

1. **Player Cards :** These cards give a brief introduction of the players, their career and the description of their primary role in the game. The idea behind these cards is to make them look similar to FIFA Football Collectible Cards

2. **Structure of Soccer Teams :** This visualization is intended to do two jobs-
   a. Introduce and highlight the fact that a soccer team virtually lines up in three areas in most cases – Defense, Midfield and Attack
   b. Give the viewers a visual understanding of where each part of the team plays for most of the game with respect to the soccer field
   c. Highlight the three parts in three different colors to clearly illustrate the different parts

d. Screenshots from actual soccer games are also added to provide more examples for the same.
e. Another benefit of this visualization is to establish a consistent directionality for the site. For every subsequent graphic, the "attacking" direction is to the viewer's right. This consistency increases people's understanding of our visualizations.
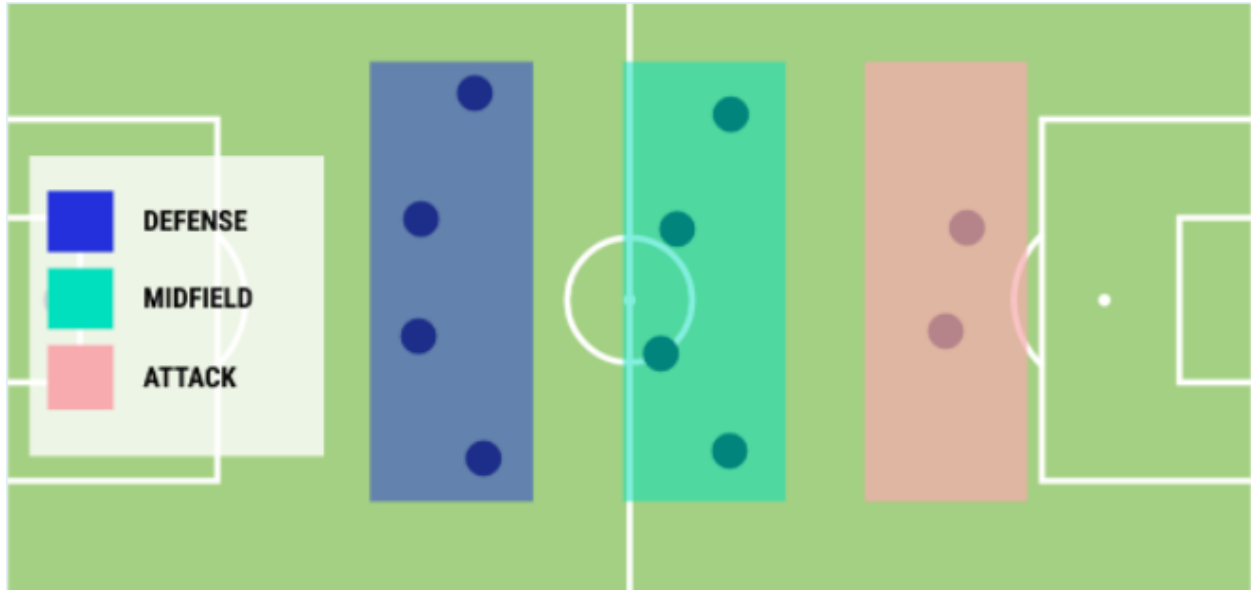
3. **Tactics and Line Ups :**
    a. Show how England's team is traditionally structured and what we think would be a better formation for them based on the players they have
    b. We also have an interactive visualization that allows viewers to move around players into the formation that they want and hence, try out different combinations and formations
    c. Each "dot" will show the player's name when the viewer hovers over it.
    d. This visualization was designed using d3
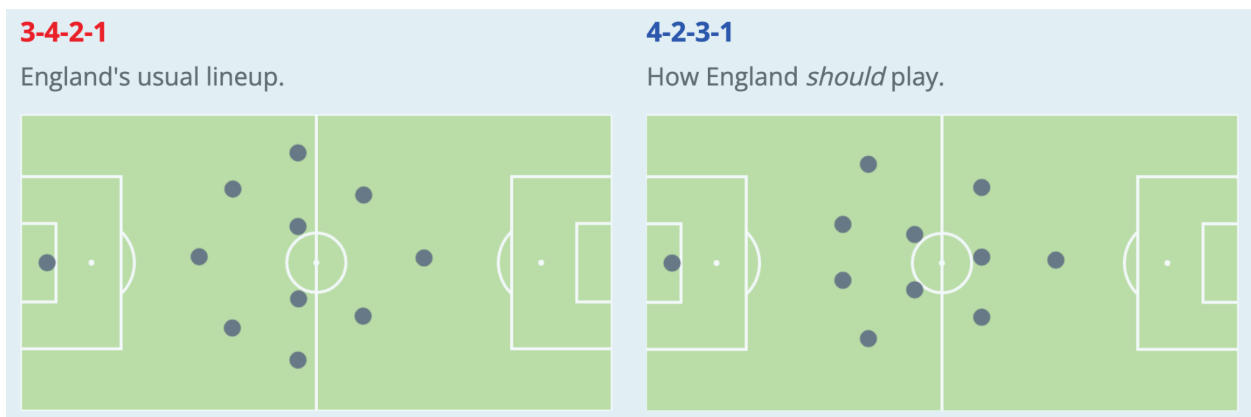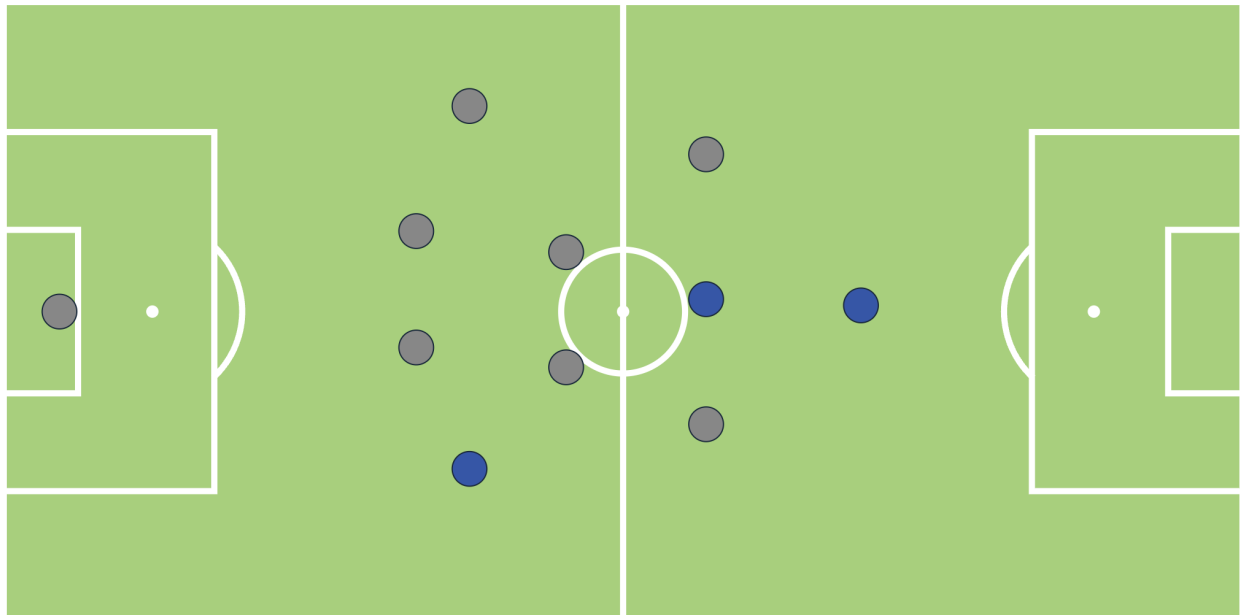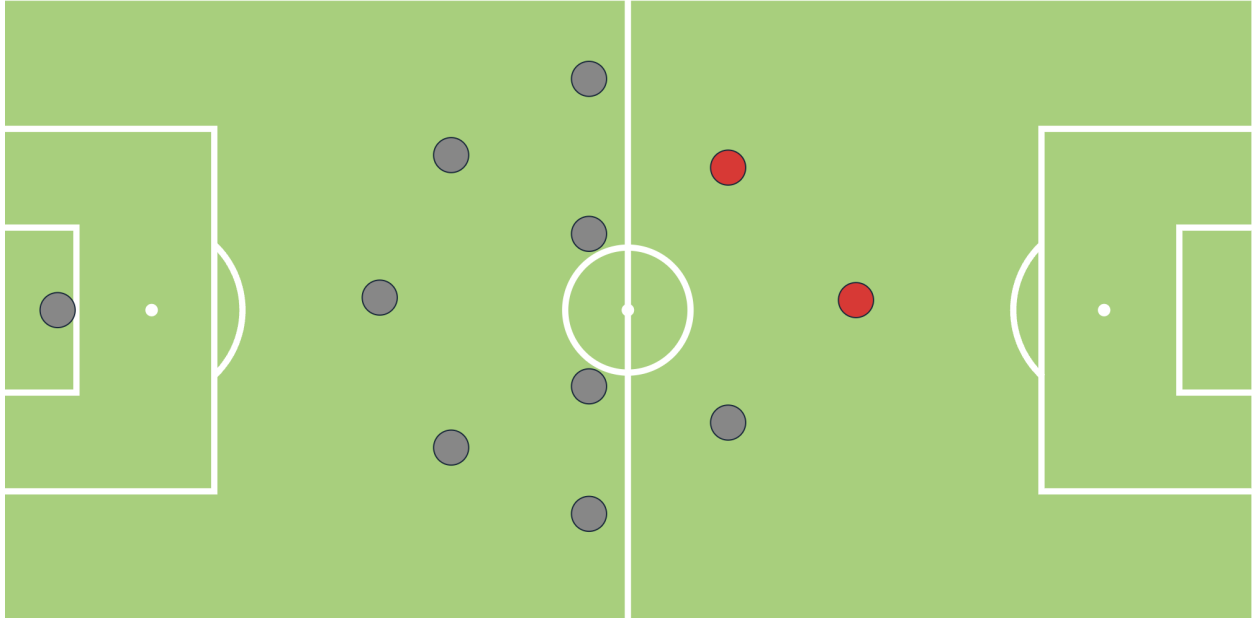
4. **Harry Kane's Bar Graph :**
    a. The name "Harry Kane" is pink/red to be in line with the previous visualizations that shows attack in that coordinating color
    b. The bar graph compares Harry Kane to the other top leading goal scorers for their respective countries and shows that he has been the leading goal scorer over the past 2 major recent International Competitions - 2018 World Cup and 2020 Euro Cup. This is a phenomenal performance!
    c. The bar graph was designed using d3

Top Goal Scorers, 2018 World Cup and 2020 Euro Cup
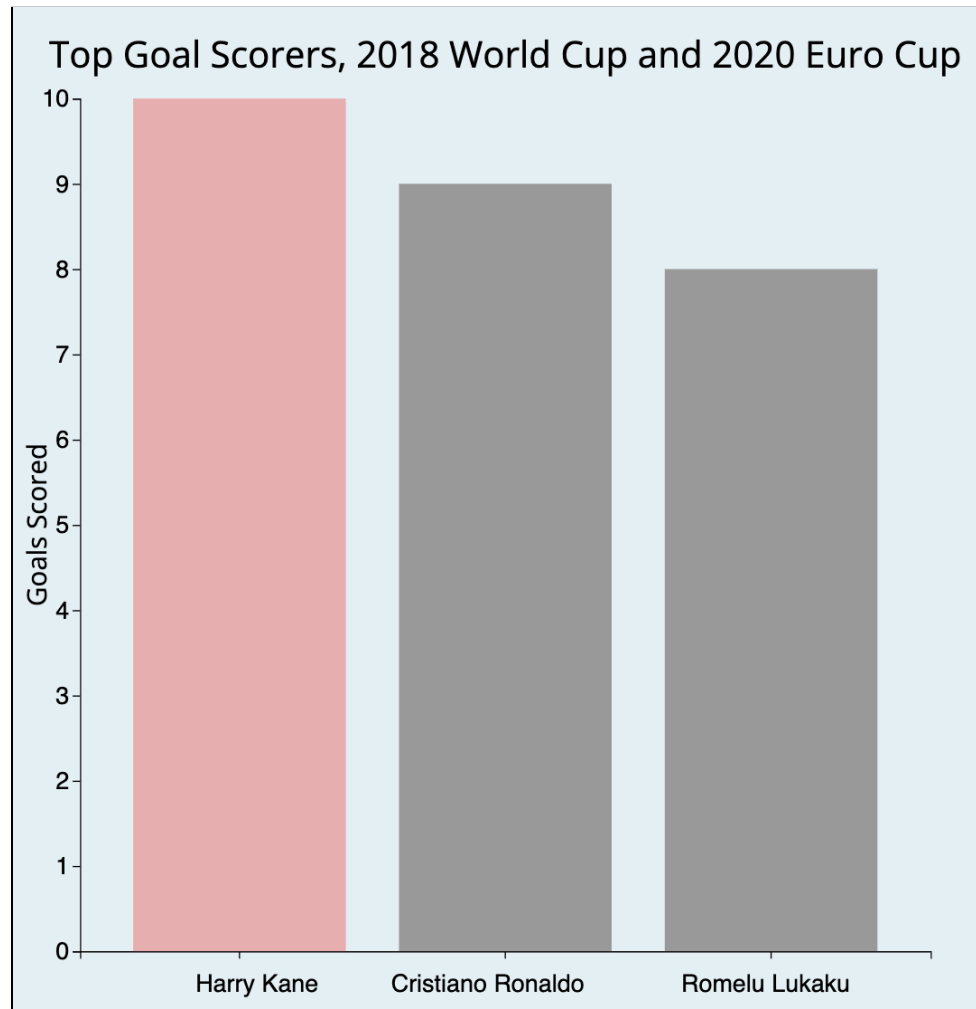
5. Harry Kane's Shots and Goals :
   a. Highlights the general positioning of Harry Kane on the soccer field.
   b. Shows the exact positions from where he took attempted shots on goals
   c. The visualization also shows which shots resulted in goals and which did not.
   d. A measure scale (in yards) is provided to give the viewers a sense of how far the shots were taken from.
   e. Some numerical data at the bottom is provided to summarize key numbers.
   f. This graphic was originally created with R and was polished with Figma

Harry Kane's Shots and Goals

Shot locations and outcomes
from 2018 World Cup and
2020 Euro Cup games

● Goal
● No Goal

Distance to Goal (yards)

18   12   6

Kane is potent shooting
close to the goal, but not
from far away.

Games	Shots	Goals	xG
14	26	7	4.2

Penalty kicks excluded. Data via StatsBomb
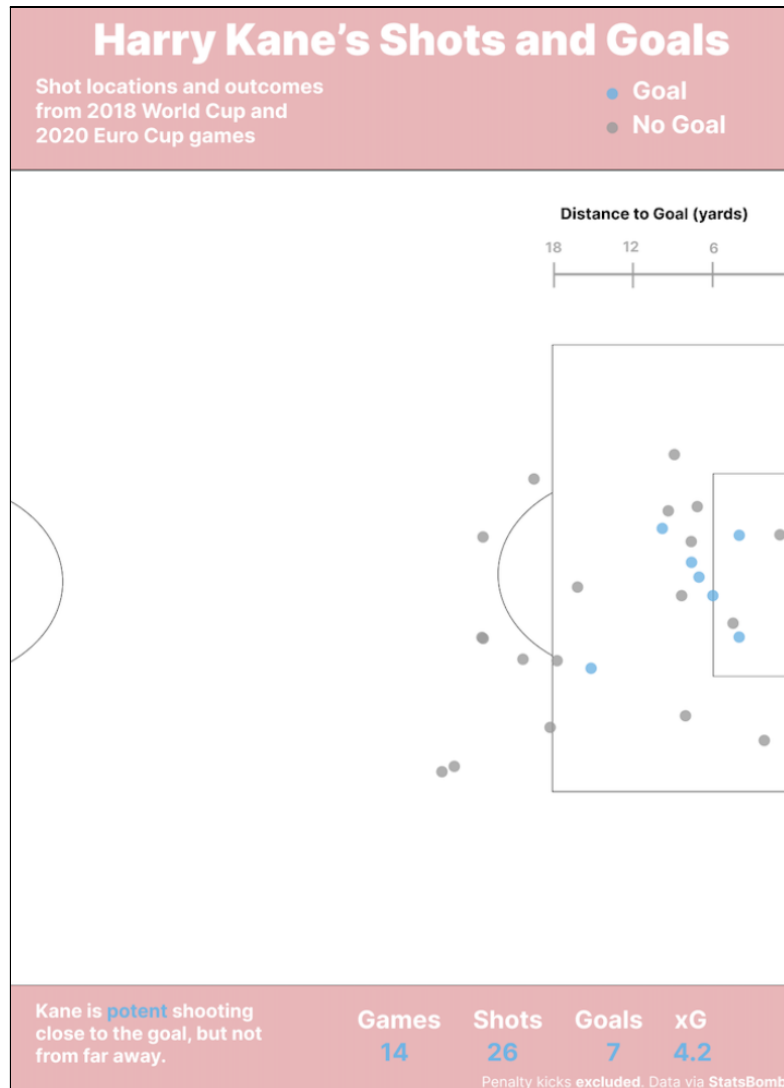
6. **Mason Mount's Touches on the field :**
    a. A heat map to show where Mason Mount has the maximum possession of the ball on the field
    b. Uses general color principles of color perception where a darker color is correlated to a higher value.
    c. A darker shade of green (like the grass on the field) to show that Mount plays more in the attacking half of the field
    d. The map is in the shape of a soccer field to again highlight different parts of the field
    e. Numerical data to help viewers understand visualization better.
    f. A nudge about the direction of play (Defense to Attack) on the soccer field.

Number of touches in different parts of the field for Mason Mount ⚽

				255
14	117	156	246	102	106
				321
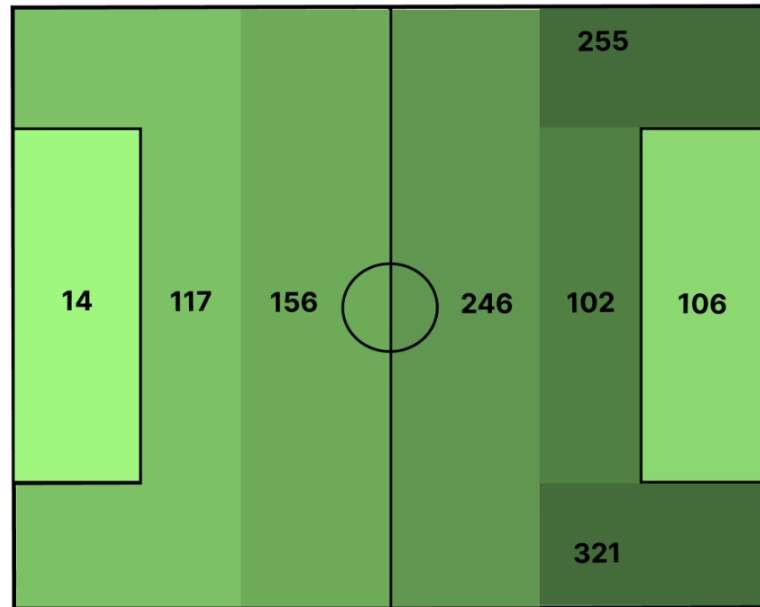
Defense 🏃‍♂️⚽   Attack 🏃‍♂️⚽

→

7. Mason Mount's Passing:
   a. The map is in the shape of a soccer field to again highlight different parts of the field and also to show exactly where Mount's passes start and end with respect to the opponent's goal.
   b. One end of the lines is a dot to highlight the ball and the end is a arrow to indicate the direction of the pass
   c. The length of the lines indicates how far the ball was passed
   d. This visualization in tandem with the previous visualization emphasizes on the point that Mount plays around the opponents goals and that he passes the ball near the goal net (more towards the center) for other attacking players to score the goals.

Mason Mount's completed passes in the attacking third in Euro 2018 and World Cup 2020
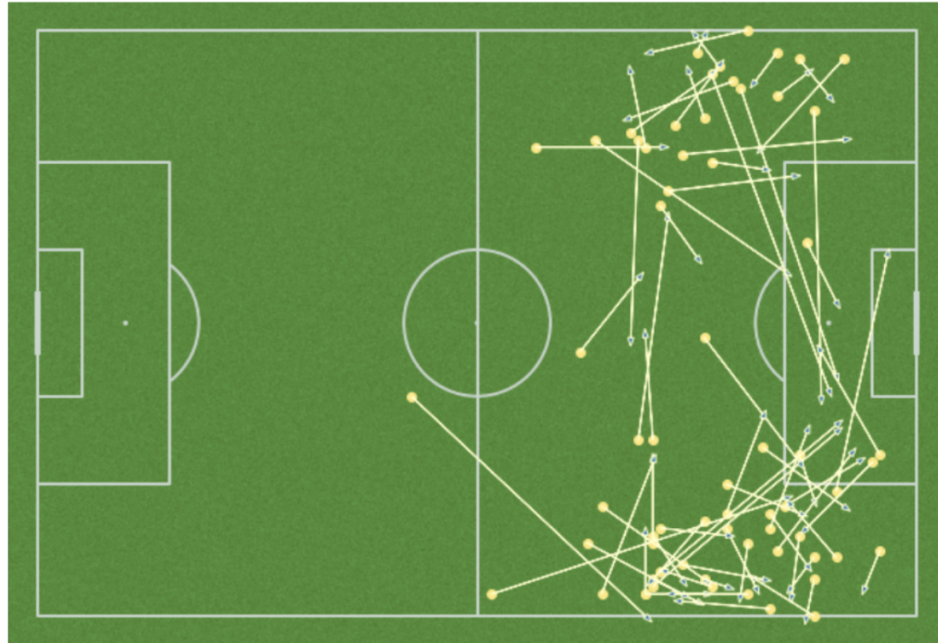
8. **Trent comparison chart:**
    a. To make the user familiar with what a good attacking as compared to a defensive players radar chart would ideally look like.
    b. Shape and size is being used as a mark to denote the features of a player.
    c. Color of the lines is used in a way to develop a connection between Trent and an attacking playstyle to make it easier for the user to further make the generalization.
    d. Multiple data points like Sh(total shots taken), dist(average distance from goals for total shots taken), xG(expected goals) are used to show the difference between an attacking and a defensive player. Attacking players would score highly in these areas whereas defensive players would not.
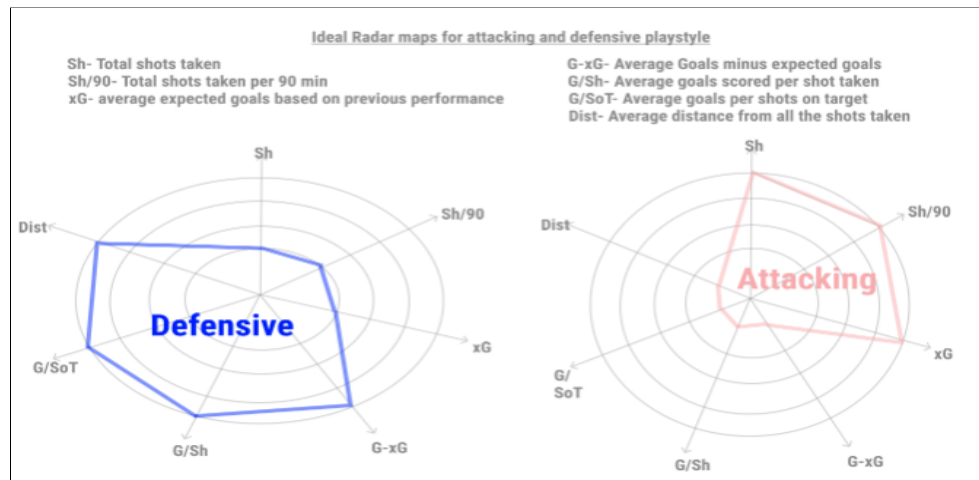
9. **Trent vs Kyle Radar chart**
   a. We have chosen a radar graph as it helps us compare two players across different areas of the sport. Using shape as a mark and using color to help the user identify and distinguish different playstyles between both the players. The colors are particularly significant. Throughout the site we use a set color scheme to represent defense, midfield and attack. By casting Trent's data with the pink color, we demonstrate that he has lots of attacking traits. This cements to the reader our larger point that although Trent is nominally a defender (position wise) his skillset is very aggressive and attacking which makes him an asset for his team.
   b. A new user to the sport would be able to reflect on the trends on the graph before this and use Trent's and Kyle's data on this radar graph to ascertain that Trent is more attacking and Kyle is more defensive.
   c. This chart depicts Kyle's vs Trent's statistics on the radar chart so that users who are slightly more familiar with the sport are able to derive more insights from the graph.
   d. In that respect, A new user will understand **who** is more attacking between the two but a more experienced user might be able to answer **why** that is the case. For example: The *dist* metric shows the average distance from the opponent's goal for all the shots that player has taken. As can be seen in the graph, Kyle is larger in this metric which shows he prefers to take shots from far away and tries less often to attack more and go close to the opponents goal post.
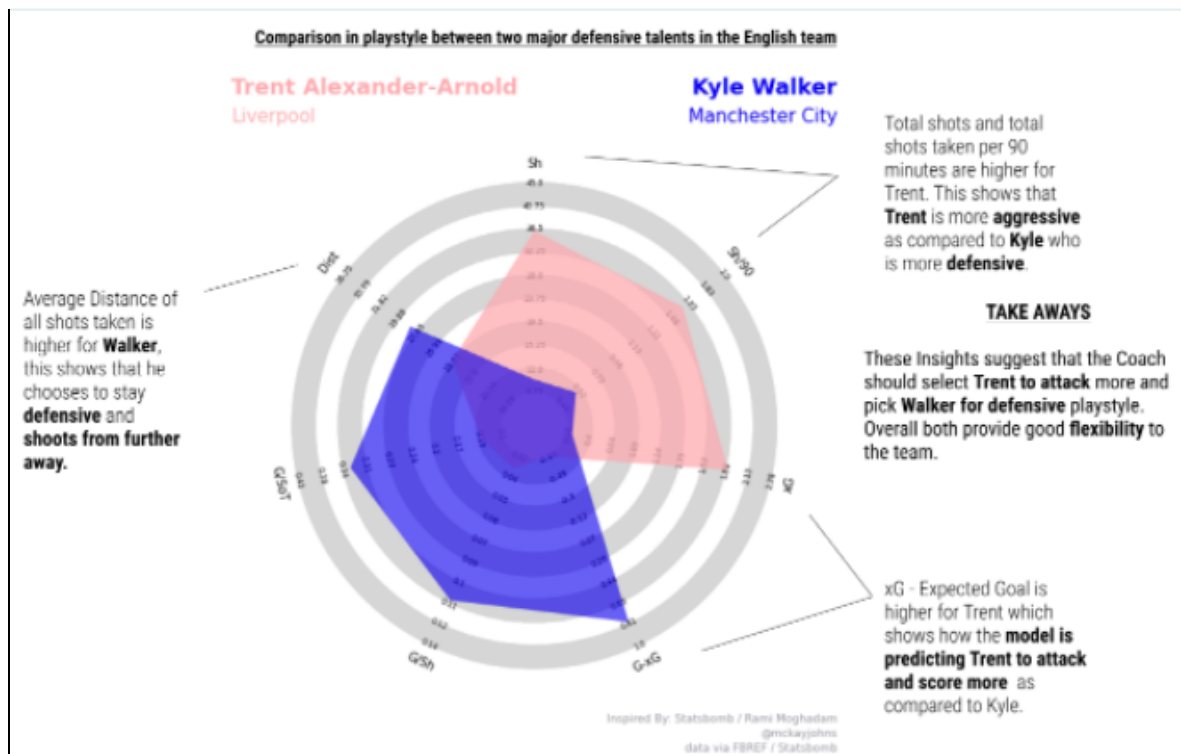
What data was used to accomplish the goals.

Data sources
Mainly two sources of data were used, fbref and statsbomb. Both provide excellent data on soccer players and their respective teams.

Fbref (short for Football Reference) provides great "static" and after-the-fact data about specific performances. For example, it has a detailed list of all the different passing statistics that get generated during a match. Their information is completely free and publicly accessible.

Statsbomb is an advanced analytics company that uses a wide array of data tracking to create what they call "snapshots" of every player's participation in a game. They can tell you, for instance, which player was standing where on the field and who had the ball for each second of gameplay. For each match, Statsbomb collects on average, over 3,000 "events" including shots, passes, dribbles, defensive pressures, duels, saves, clearances, ball recoveries, interceptions, fouls, etc. However, some parts of Statsbomb data are only available through a paywall.

Luckily for us, Statsbomb's data for the 2018 World Cup and 2020 Euro Cup is available for free as part of a promotional campaign. So, we have detailed information about these two events. This works well for our project because these 2 tournaments are the most important competitions that England's soccer team has competed in recently.

We used both sources' APIs as well as manually pulling data in spreadsheets from the website. This was done using wrappers in R and Python such as worldfootballR (for fbref) and statsbombR (for statsbomb). We chose different datasets for example the attacking dataset to showcase the attackers like Harry Kane, Passing datasets for midfielders like Mount and defensive datasets to describe Trent.

Kane and Mount have played numerous times for England, so it was exciting that we had access to their detailed Statsbomb information. But for players like Trent, who haven't been given a lot of opportunities to play for England, we did not have access to the detailed information from Statsbomb. As a substitute, we used the information that can be found about his performance in the fbref API, which catalogs statistics related to his performance for his "club" team, Liverpool. This was used to demonstrate our argument for why he would perform well if given the chance to play for England more often.

Finally, we also collected images of the three soccer players from google images to build their visual cards which we have presented on our website.

Exact data per player

Harry Kane - Goals scored + data on shot locations and outcomes from World Cup 2018 and Euro Cup 2020
Mason Mount - Number of touches and passing data from World Cup 2018 and Euro Cup 2020

Trent Alexander Aronld- Attacking data for Trent. This included 6 data points namely : Total shots taken, expected goals, average distance from goal for all shots taken, among others.

Which tools were used to accomplish the goals.
- Coding Languages - Python, R, D3, HTML, CSS, Javascript
  - R and Python were used for extracting data from the APIs as well as creating certain graphics like the Radar Plots and Kane's shot map
  - D3 was used for the interactive tactics graphic, with affordances like showing player names upon hover, as well as Kane's bar chart.
  - HTML and CSS were used to provide structure and styling to the website. The site is connected to Github pages which is how it generates its content. The site uses Bootstrap for enforcing a layout.
  - Javascript was used for showing/hiding the tactics graphic when users click. It was also used for substituting the text below that graph after that click takes place.
- IDE - RStudio, Google Colab
- Data Visualization - Tableau, Figma

What kinds of results you obtained, with a focus on usability tests or responses from prospective or real users.

- Participants were more interested in the visualizations and had found reading the text to be very tedious. All three participants mentioned that they felt the text was too much. At the same time all the participants also mentioned that the amount of information conveyed through the visualizations was apt. **Based on this finding, we revamped the info-visualizations to reduce the amount of text in efforts to deliver the same content as concisely as possible.**
- We learned that many minor details and questions in the minds of the participants were missed by us in our initial draft. Slight confusions about whether the players already play in the international level and which direction is the field oriented were things we as developers who are entrenched in this field had missed. **Based on the responses we have subsequently added these minor fixes to the info-visualizations. We now find ourselves appreciating the importance of usability testing much more post this project.**
- We ran tests on three types of people ranging from ones who knew nothing about the sport and were not interested in it to ones who were very entrenched in the sport. Across this spectrum we found all three participants to appreciate the narrative and the structure of the info-visualizations. But we found the depth of insights taken away from the info-visualizations increasing with the prior knowledge of the participant with the sport. For example participant three found the radar chart interesting because they could spot the difference between attack and defense but failed to derive deeper understanding from the vis, something

which was much easier for the participant two who could qualitatively tell more about the playstyle based on their previous knowledge. **Based on this learning we have increased the text size of the insights on the infographics so that even users new to the field can read the insight if they can't derive it on their own.**

- Participants paid careful attention to the non-visualization parts like the formatting, text size as well as the zoom on the page. A message that got more clear to us was that everything from the minutest of details like the level of zoom in practice does indeed become a part of the visualizations and should not be ignored. **Reflecting on this learning we have reduced the zoom as well as have reduced the size of the text to accommodate for this discomfort to a person with smaller screen size.**

- Participants were more inclined to see the animations as compared to static images and texts. This reaffirmed our understanding from class that animations do capture larger interests and do add to the message that needs to be conveyed.

- Participants had close focus on the narrative and were indeed able to answer our questions to a large extent from a narrative perspective. On a similar note, participants found it confusing when they did not have context about new elements being added to the narrative. **Based on this we are looping back to the narrative time and again, especially in the end so that participants will not lose focus from the primary narrative.**

- Participants have a tendency to get lazy and skip parts like large blobs of texts, long videos and their level of focus decreases as it gets closer to the end. To counter this **we have removed large blobs of text and split them in a uniform way** so that participants don't have a long gap between infographics. We have **also converted the long videos to screenshots** so that participants no longer have to wait or be confused about when to stop the video. Lastly **we have color coded the players and the positions, a coding of blue for defense, green for midfield and pink for attack which is consistently reflected across all headers as well as infographics so as to reduce the cognitive load on the participants.**

- Based on the positive feedback and a very good completion rate for the task we had set for the participants, we were able to conclude that this infographic is doing a good job at introducing the topic to people who are relatively new to the field but have an interest in learning more about it. By keeping the infographic simple we were able to lucidly explain the sport and achieve the aim of this infographic which was to successfully raise interest for soccer as a sport.

Links to demos, documents, or whatever is needed to show the visualization.

Please click here to view the web visualization.

A table showing which parts were done by each student, and in what proportion approximately. This is a requirement, and must be provided in detail. If it is not sufficiently detailed, points will be deducted. We reserve the right to assign different numbers of points to team members if necessary.

Task	Student
- Visualizations for Mason Mount showing number of touches - Visualizations for Mason Mount showing passes - Data work for Mount - All text for Mason Mount - Text under 'Primer' and 'Structure and Formation' - Tactics Visualization - Positioning and Spacing of images and text on the final interface - Project planning - Preparation for Usability Study doc - Preparation for Final Writeup	Advait Lad
- Visualizations for Trent Arnold showing his comparison with Kyle Walker - Visualization with spider graph - All text for Trent Arnold - Data work for Trent - Visualization showing structure and formation - Text under Tactics - Color scheming - Preparation for Usability Study doc - Preparation for Final Writeup - Summary	Akshar Dhondiyal
- Visualization with Harry Kane's shots and goals - Visualization with Bar Graph for Harry Kane	Tim Schott

- Screenshots of real match and highlighting formations using Figma - Data work for Kane - All text for Harry Kane - Player Cards and Introductions - Preparation for Usability Study doc - Preparation for Final Writeup - Creation and Maintenance of Github Repo - D3/js work - API introductions to other group mates (example code / support) - Website work (css, structure)	

A small thumbnail image (100x100 pixels)

(In addition to the report, uploaded separately) Software created, to the degree this is possible. I realize there may be issues with sharing data, or datasets may be too large to share directly; links to repositories, or the software itself without the data is acceptable.   Also, if you used external software packages you may include only the software your team wrote.

Files:
1. Github link which contains all the files and data used for the project.
   a. Repository containing relevant website code as well as the graphics used (in the extra/ folder) and other relevant files (like the code we wrote to interface with the APIs)
2. shotMapCreate.R
   a. Template code for generating a shot map
3. statsBomb.R
   a. Code for pulling data from statsbomb for Harry Kane
   b. Also contains the code for calling the shot map file and creating that (line 187)

4. goal_graph.js
    a. The d3 code for generating the Harry Kane goal bar chart
5. Formations.js
    a. The d3 code for the tactics board visualization
    b. Also contains vanilla JS for swapping out the text content below the rendered tactics board (line 257)
6. Python-radar.py
    a. The template code for the radar chart to compare players
7. Mount-collab-passing.py
    a. The template code for creating the pass map used for creating Mount's graph.
8. Figma design file
    a. Figma link to illustrations used in the project.
9. Main index.md (html file) link

Appendix

All screenshots have been attached above