

VIZionaries Milestone 3

Fabrice Egger, Moritz Widmer, Matthieu Jacques

May 2024

1 Idea progression

Our objective was to create a website where visitors could access detailed information about volleyball players and teams, including comprehensive statistics on service, attack, block, defense, reception, and set. We aimed to provide a platform that not only displayed raw data but also offered insightful visualizations to enhance the understanding of player and team performances.

During the initial stages, our focus was on developing a user-friendly dashboard that allowed visitors to filter and explore data seamlessly. However, we soon realized that merely presenting the data wasn't sufficient to engage users deeply. We needed a more compelling approach that would not only inform but also captivate our audience.

Inspired by modern data storytelling techniques, we decided to integrate a narrative dimension into our site. We structured the website to guide users through different sections, each dedicated to a specific aspect of volleyball statistics. This approach helps users to grasp the nuances of the data step by step, making the information more digestible and engaging.

For the visual design, we opted for a clean and intuitive interface that aligns with the dynamic nature of volleyball. Each section of the site is carefully designed to highlight key metrics and trends, using interactive charts and graphs. This interactivity allows users to delve deeper into the data, exploring specific metrics and comparing performances across different players and teams.

Moreover, we enhanced the user experience by adding features that contextualize the data. For instance, in the service section, users can see not just the success rates but also the types of serves and their outcomes. Similarly, in the attack section, we provide insights into attack speed and position, offering a more granular view of player strategies.

We also aimed to add value beyond the basic data. By including comparative analyses and benchmarking against top players, we provide users with a richer understanding of the performance standards in volleyball. This feature is particularly useful for coaches and analysts who seek to develop strategies and training programs based on the data.

If time permits, we envision further enhancements to the site. Potential additions include real-time data updates, integration of match footage for contextual analysis, and advanced predictive analytics to forecast player and team performances. We also plan to expand the dataset to include more leagues and tournaments, providing a more global perspective on volleyball statistics.

2 Challenges and design decisions

Creating a comprehensive volleyball data visualization website presented several challenges and required iterative design changes to achieve an intuitive and engaging user experience.

2.1 Dataset:

Our dataset consisted of one .dvv file per match. This file format was not well documented as it comes from a closed-source program of DataVolley. We therefore had to first write a parser that extracts all individual actions and players over all games into one big useful JSON file. This resulted in a file of around 10MB. This file is too large to load every time a user loads our page so we had to come up with a more clever approach.

2.2 Aggregation:

We structured our visualization into different blocks of service, attack, block, defense, reception, and set. Therefore, we can also split our dataset into those individual blocks. Thus, we aggregated our data into multiple individual files each containing only one relevant action. In addition, we have an additional file that maps player IDs to a player object with first name, last name, and position of playing. We also found a lot of irrelevant or duplicated data for every match that we could eliminate since we are creating the visualization over the whole season. This reduced the file size to less than 5MB in total. This was also important to provide our data in a coherent way that is useful for creating the visualizations.

2.3 Efficiency:

We want our website to respond to new filters instantly. This is a huge challenge because of our amount of data. Our Efficiency increased due to only loading 5MB instead of 10MB every page load. Using React allowed us to create basic blocks for visualizations that worked a little bit differently depending on the data we used it on without copying all the code. This led to a more coherent view in the end which is still simple to extend in further development. The use of `useEffect` and `useMemo` hooks from React allowed us to only re-render components when the underlying data changed which saved us a lot of computation and therefore performance.

Furthermore, our spider chart at the top of the game (See Figure 1) consists of an aggregation of all values filtered by the user. This took too long to compute and blocked all computations of our website leading to nonresponsive behaviour. We fixed this by aggregating the values for every individual player into an additional JSON file and then computing the aggregation only on those already pre-aggregated values. Thus, trading less computation time for a bit of memory overhead while still ensuring accuracy.

Another problem we encountered was that our code editor slowed down extremely when trying to parse the types of the JSON file for typescript auto-completion. We created different smaller datasets to test our code locally before uploading them with the full dataset.

2.4 Optimization:

Loading 5MB is still no small size. To make the user experience as smooth as possible we created our visualizations nonblocking. Meaning that the website is already responsive even though it does not have all the needed data available. The user can already navigate the website even if not every visualization is loaded. The chart is then added on the fly whenever it is ready leading to response times as quickly as possible.

2.5 Interactive and User-Friendly Interface:

Designing an interactive and user-friendly interface was another significant challenge. Volleyball statistics can be complex, and our goal was to present this data in a manner that is easy to understand for both casual fans and professional analysts. We experimented with visualization libraries such as D3.js and ObservableHQ, to find the best way to display our data.

2.6 Service and Attack Visualization:

For the service and attack sections, we aimed to provide detailed visualizations that included success rates, types of serves/attacks, and their outcomes. Implementing heat maps and radar charts posed a particular challenge. Initially, our heat maps were looking strange. After a while, we figured out that we messed up the encoding from the source file (there was a mistake in our handcrafted parsing algorithm) which could be fixed easily after finding it. With only the rectangles it was still hard to see the actual volleyball court on the chart or know which side is up and which is down. We could solve this problem by drawing lines around the chart to draw the actual volleyball court with the three-meter line and a thick line for the net. This improved clarity significantly.

2.7 Consistent Visual Identity:

Maintaining a consistent visual identity across the site was another design evolution. We selected a cohesive color palette and design language that reflects the dynamic and energetic nature of volleyball. Each section was designed with specific colors and icons to differentiate between various statistics categories, making navigation more intuitive. We wanted users to effortlessly switch between different statistics categories such as service, attack, block, defense, reception, and set.

2.8 User Feedback and Iterative Improvements:

User feedback played a crucial role in the design evolution of our platform. Through user testing sessions, we identified pain points and areas for improvement. Based on this feedback, we made several iterative changes, such as simplifying the dashboard layout, enhancing the filter options, and improving the mobile responsiveness of the site.

3 Sketch / Plans evolution

The development of our website's design evolved significantly from initial sketches to the final polished interface. Our journey began with basic sketches and ideas that helped us conceptualize the structure and layout of the website. We aimed to create a user-friendly platform for visualizing volleyball player statistics, with an emphasis on clarity and ease of navigation.

3.1 Initial Sketches and Concepts

Initially, we brainstormed and sketched out the main components we wanted to include. This involved drawing basic layouts for player profiles, statistical visualizations, and navigation elements. Our early sketches (as seen in the first image [1](#)) outlined the player's name, country flag, a photo of the player, a spider chart for efficiency summaries, and icons representing different skills such as serving, attacking, and blocking. We had to remove the manual gathering of the flag and the photo due to time constraints. We implemented all the other features closely to our initial sketch.

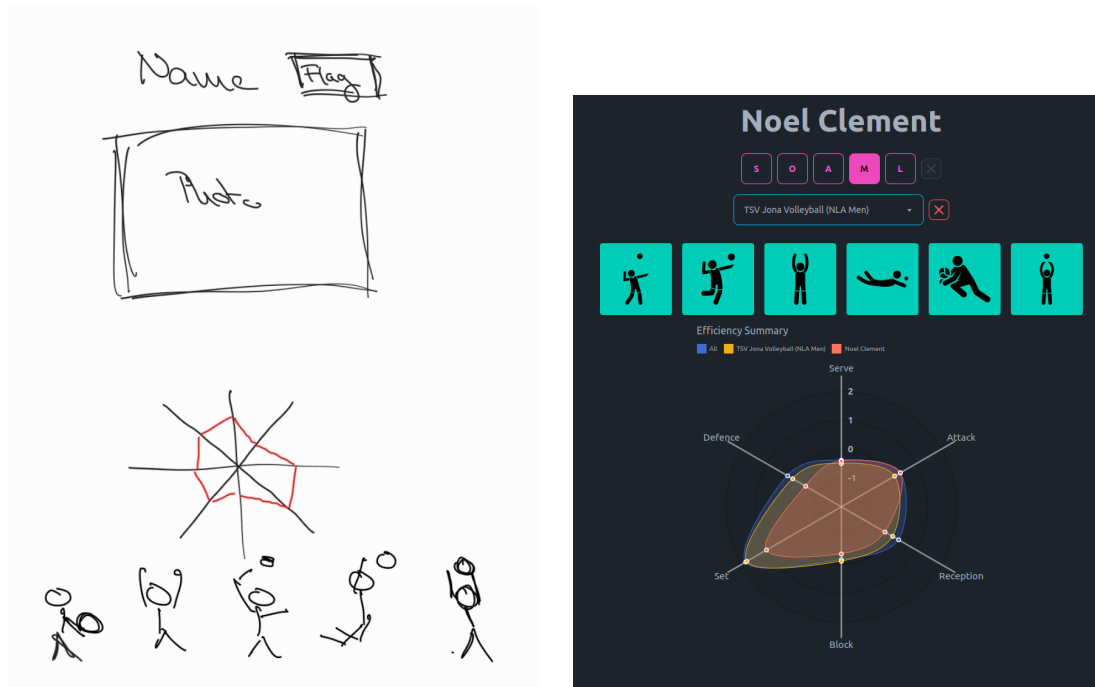


Figure 1: First Screen

3.2 Implementing the Spider Chart

We started by implementing the spider chart, which we believed would effectively display the players' efficiencies across various skills. Initially, we considered different chart types but settled on the spider chart due to its ability to provide a comprehensive overview in a single glance. The finalized spider chart (shown on the first screen 1) displays the player's performance metrics, with color coding to differentiate between individual, team, and overall performance.

3.3 Enhancing Visual Appeal and User Experience

As we progressed, we focused on improving the visual appeal and user experience. One significant enhancement was the refinement of the icons representing different volleyball skills. We aimed for a clean and modern design that would be intuitive for users to understand and navigate. This involved iterating on the icon designs and their placement to ensure they were both aesthetically pleasing and functional.

3.4 Interactive and Responsive Elements

At the beginning of the page 1 a user can filter for a specific position and/or team to only show a part of the results. This allows us to compare players with others in the same position or the same team.

Clicking on an icon reveals detailed statistics related to that particular skill. The website automatically scrolls to the corresponding section on the page. This approach not only makes the interface more engaging but also helps users easily access the information they need. We tried to make the website as interactive as possible. It is possible to click on the filters at the beginning of each section. Those filter the information and display the updated visualization in real-time.

It is also possible to click on the table which selects the current player and lets us compare every action of this player with the best of the league.

3.5 Uniform Design Across All Panels

We applied this same approach to other panels such as serve, attack, defense, block, reception, and set, ensuring consistency across all sections. Each panel followed the same design principles, with interactive icons and detailed statistics, providing users with a cohesive and intuitive experience throughout the website.

3.6 Color Palette and Consistency

Throughout the design process, maintaining a consistent color palette was crucial. We chose a color scheme that was visually appealing and ensured that all visualizations and interface elements followed this palette. This consistency helped in creating a cohesive look and feel across the entire website.

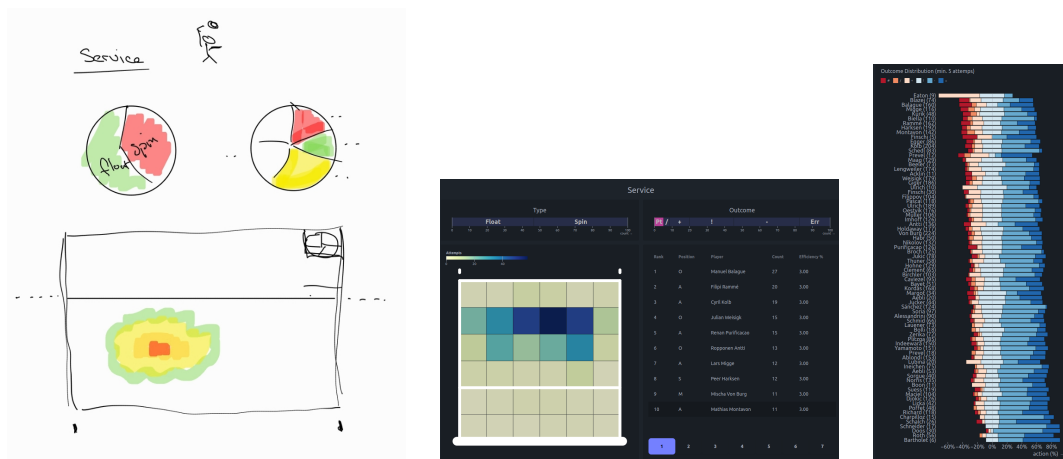


Figure 2: Service

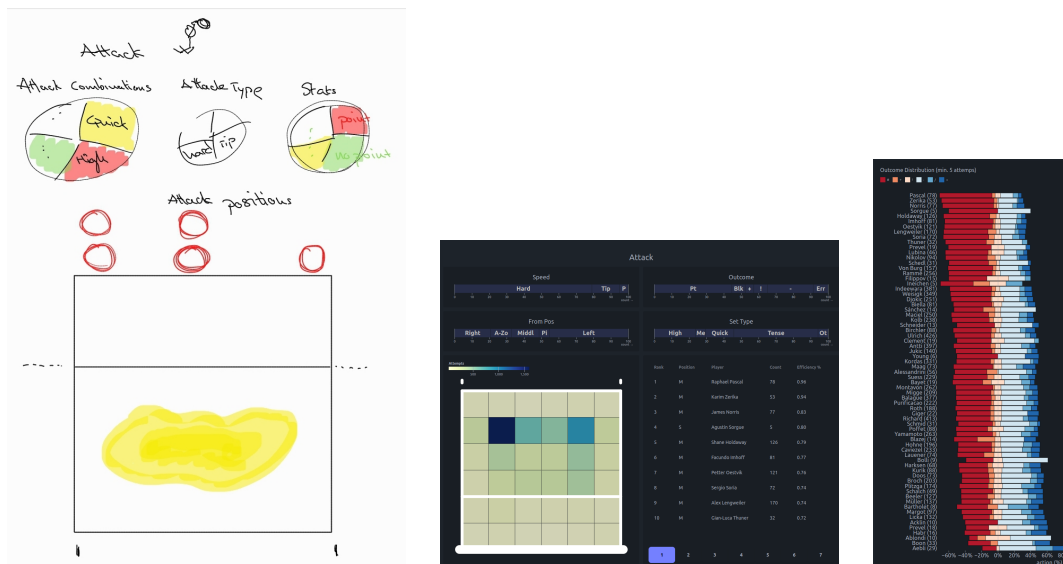


Figure 3: Attack

3.7 Filter Selection

The most obvious change we made from our initial design is the decision to not use pie charts for the filters. With pie charts, it is harder to see the relative areas compared to bar chart¹. We therefore decided on using one

¹Further information can be found here: <https://www.data-to-viz.com/caveat/pie.html>

horizontal bar that can be clicked on to select the filter. A selected filter is then highlighted with a bright pink color for good indication.

3.8 Area Plot

We first wanted to have a continuous heat map for attack and service targets as can be seen in the sketches above (2 and 3). However, when analyzing our data set we found out that the court was only split up into 36 discrete areas. We therefore opted for a discrete visualization.

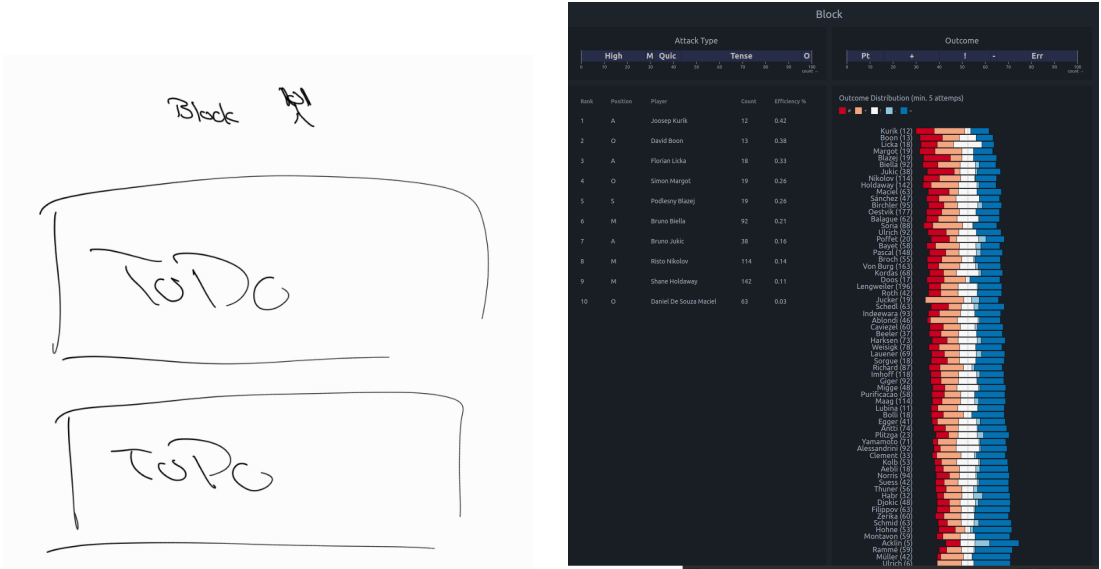


Figure 4: Block

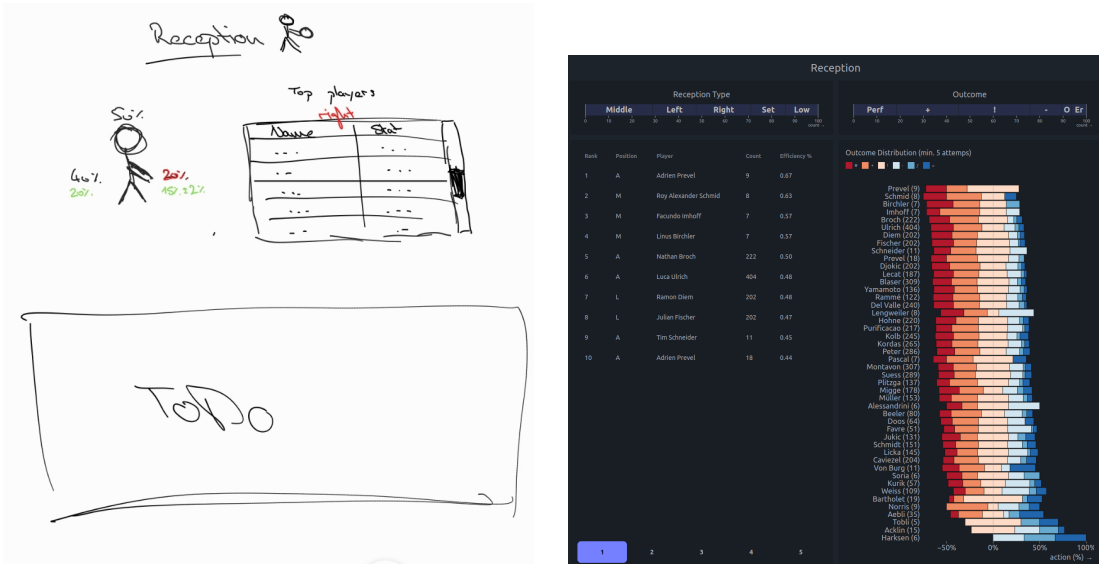


Figure 5: Reception

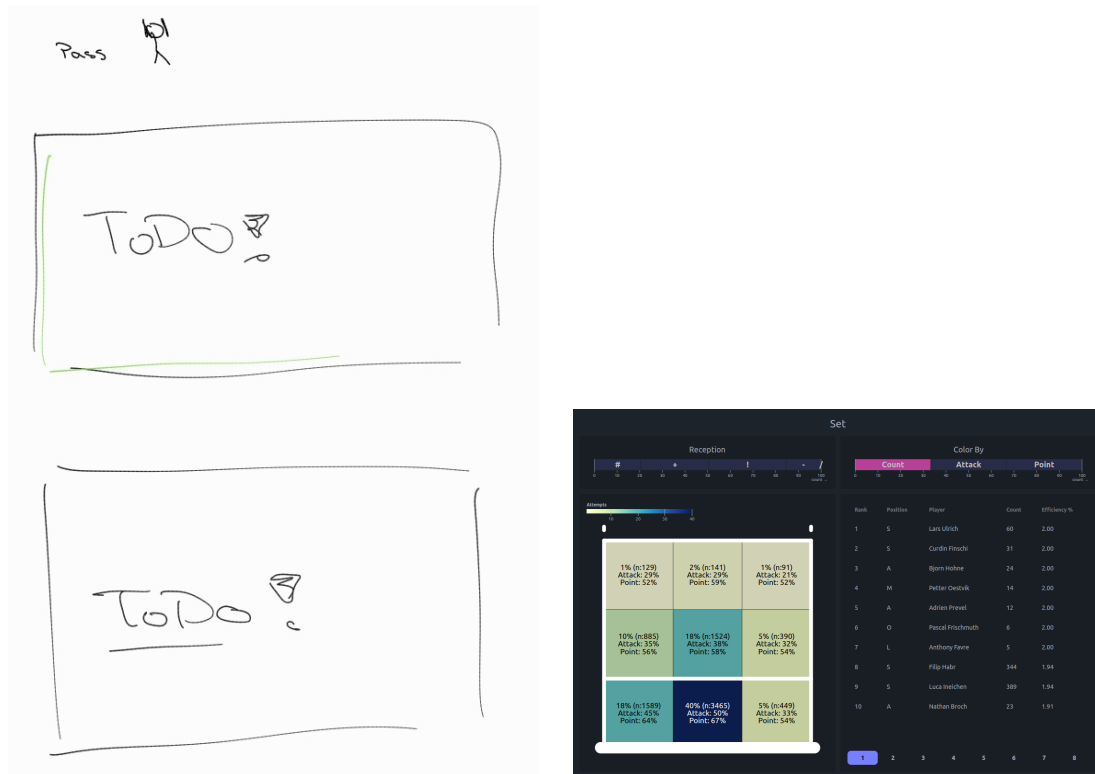


Figure 6: Set

3.9 Diverging Stacked Bar Chart

Another big change when compared to our initial sketch is the addition of the Diverging Stacked Bar Chart on every action panel. We didn't know that such a visualization existed at the time we made our sketch. Thanks to the lecture we found out that this would perfectly suit our dataset since every action is rated with symbols (#, /, +, -, =) meaning perfect (#) all the way to error (=) with many intermediate steps. This means that by assigning a score to every possible outcome we can calculate an efficiency (See tables in the figures above) and display the diverging bars to showcase what leads to this efficiency.

3.10 Final Implementation

The clean layout, interactive elements, and consistent design language all contribute to a user-friendly experience that effectively showcases volleyball player statistics. The uniform design across the serve, attack, defense, block, reception, and set panels ensures a seamless and engaging user experience throughout the website.

Overall, the design evolution of our website was a thoughtful process of refining ideas, incorporating user feedback, and striving for an intuitive and visually appealing interface. The result is a platform that not only provides valuable data insights but also offers an engaging user experience across all sections.

4 Peer assessment

4.1 Initial Planning and Idea Exchange

Our first meeting before the initial milestone involved brainstorming and exchanging ideas. We discussed our goals, the main components we wanted to include, and how we would divide the tasks.

During this meeting we planned the distribution of the workload to manage it fairly throughout the project, ensuring that each team member contributed to the final result based on their strengths and expertise.

4.2 Milestone 1

For the first milestone, the tasks were divided as follows:

Fabrice was responsible for the initial core coding of the website. This included setting up the website structure and ensuring the functionality of the site. Fabrice was also in charge of finding a suitable dataset

Moritz and Matthieu focused on the sketches and the initial design concepts. They collaborated on creating visual representations of our ideas, which were crucial for guiding the development process. They also started drafting the report 1, documenting our progress and methodologies.

4.3 Milestone 2

As we approached the second milestone, we refined our roles to ensure all aspects of the project were covered:

Fabrice continued to develop the website, adding advanced features and ensuring a smooth user experience. This included integrating the radar charts and making the site responsive. Fabrice also played a crucial role in data preprocessing.

Moritz and Matthieu concentrated on the data preprocessing necessary for visualization. They worked on cleaning and organizing the data so that it could be effectively visualized on the website. Additionally, they contributed significantly to the ongoing report, detailing our progress, challenges, and solutions.

4.4 Final Delivery

For the final delivery, our efforts were synchronized to ensure a cohesive and polished end product:

Fabrice finalized the website, incorporating all the design elements, integrating interactive elements, and ensuring that the interactive components worked seamlessly. This also included troubleshooting and refining the code to enhance performance and user experience.

Moritz and Matthieu focused on completing the report and the screen-cast, ensuring it was comprehensive and well-documented.

Each member played a vital role in the project's success, contributing their unique skills and ensuring that all aspects of the project were handled efficiently. This collaborative effort resulted in a well-rounded and functional website, complete with detailed visualizations and a thorough report.