



About the Presentation

In this interview, I understood that the role requires more than just technical ability in data science and modelling. The key objective is to enhance collaboration and communication across all sports departments using Catapult products at a Premier League club. Therefore, I prioritised a holistic approach, emphasising the importance of clear communication, effective collaboration, and seamless integration of data insights.

To demonstrate the idea, I developed **Phylix** – a dashboard demo designed to answer typical questions posed by sports departments with provided data, and encourage the communication inside the dashboard. This PDF not only showcases the techniques, but also highlights the importance of representing the band in product design and promotion in a dynamic sports environment.

Kick-Off



Presenter

Shuyao Chen

Contact

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Date

May 2024



For The Premier League Academy Coaching and Analysis Staff

Physical Analysis Dashboard

“Phylix”

Shuyao Chen

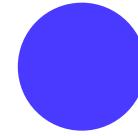
Contact

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Date

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Presentation Overview



— Presentation overview

01 Why Phylix

Discover the key features, functions, and benefits that shapes the game-changer way of Phylix.

02 What Can Phylix do

Explore the powerful capabilities and functions of the Phylix platform in depth.

03 How Phylix Supports Your Team

See real-life case studies of how Phylix enhances team performance and player development.

04 Appendix

Find a comprehensive glossary of metrics, data processing, current limitation and future plans for Phylix.

Why Phylix

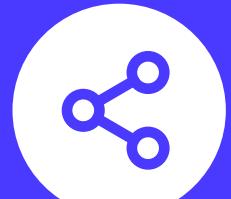
Discover the key features, functions, and benefits that shapes the game-changer way of Phylix.



Our Platform 

Why Phylix

Discover unparalleled player tracking technology, boosting athlete performance, preventing injuries, and enhancing synergy between teams and departments.



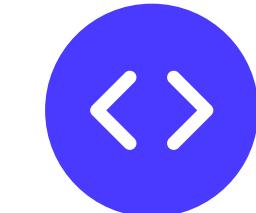
Feature

A highly collaborative, precise, and actionable player monitoring technology.



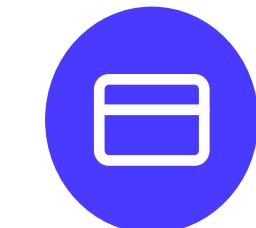
Advantage

Track training volume, intensity, agility, and advanced IMA metrics to optimize performance. Enjoy top-tier customer service and bespoke analysis tailored to your needs.



Function

Measure, analyse and discuss physical performance across clubs, teams, and players with detailed daily and monthly insights.



Benefit

Foster collaboration across medical, analysis, and coaches to enhance player development through integrated data and teamwork.



The Way of Phylix



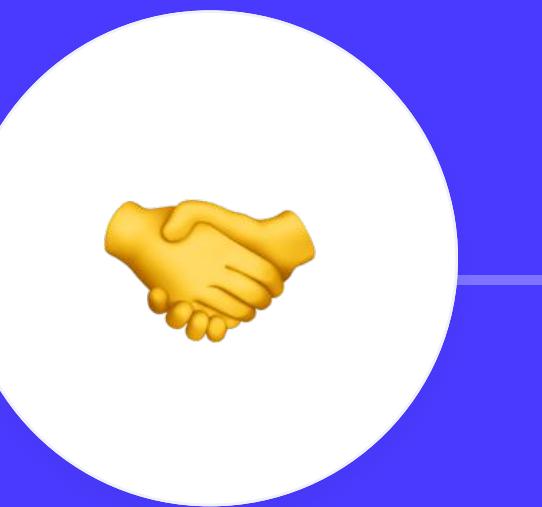
Monitor

Stay ahead of the game with real-time insights into every player's performance on the field.



Analysis

Unlock the power of data by connecting today's stats with historical performance trends.



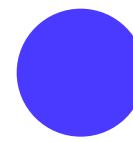
Collaboration

Enhance teamwork by streamlining communication across all departments for optimal player development.



Prescribe

Transform insights into action to elevate your team's performance and achieve success.



What Can Phylix Do



Explore the powerful capabilities and functions of the Phylax platform in depth.

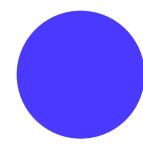
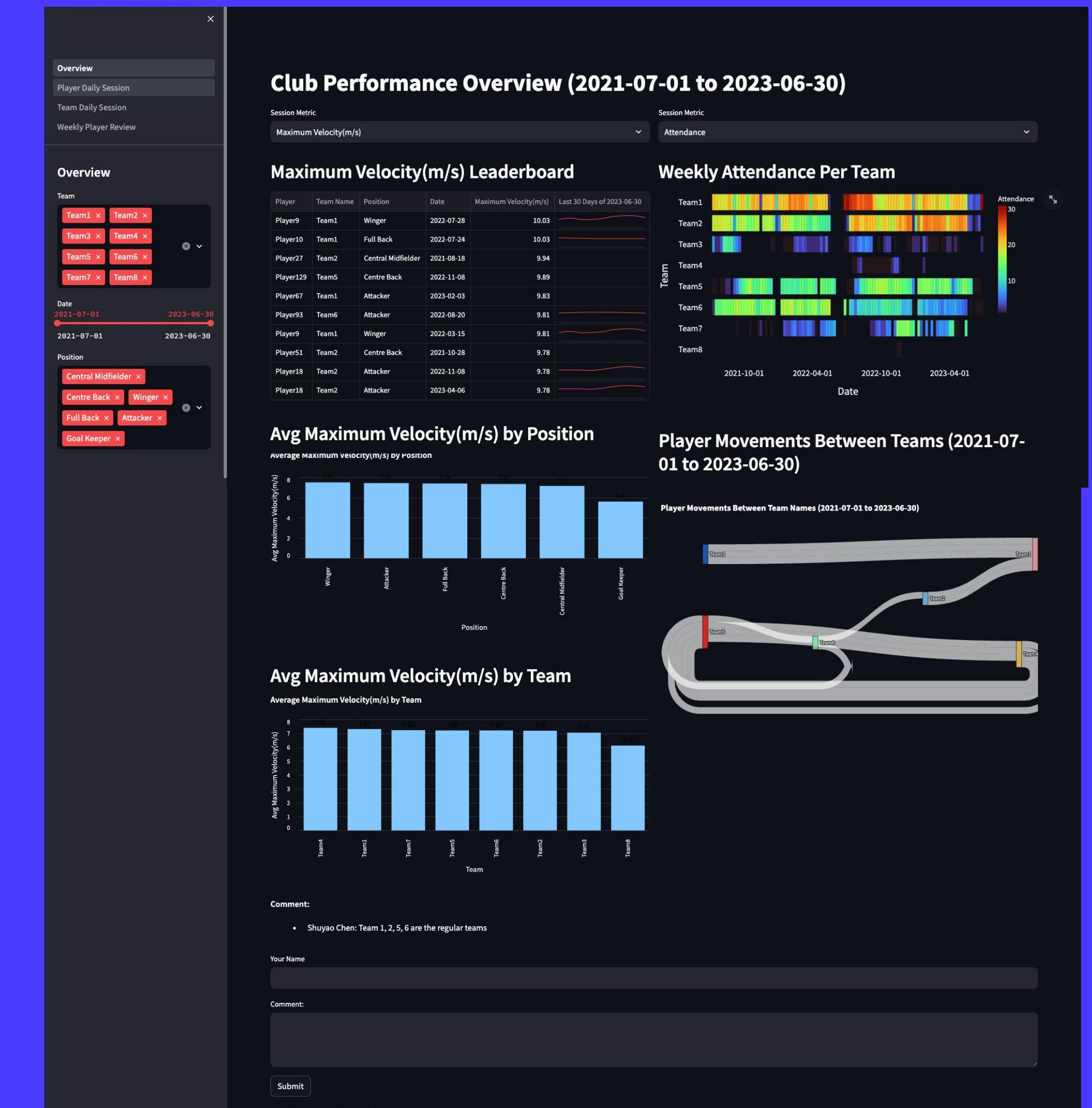
Phylix Club Performance Overview

This dynamic and interactive page provides comprehensive overview to support club teams' performance management.

Key Features:

- Leaderboard*:** Instantly identify the players with the best performance, observe progress or concerns with "Last 30 Days" trend.
- Weekly Team Pattern:** a clear heat-map highlighting trends and anomalies in attendance and various metrics across teams and dates.
- Player Movements Between Teams:** Track player movements between teams over time, simplifying complex player movement histories.
- Comment Section:** Engage with the team by leaving comments and insights directly on the dashboard.

*Players have the right to decide whether to appear on the leaderboard



— What Can Phylix Do

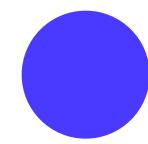
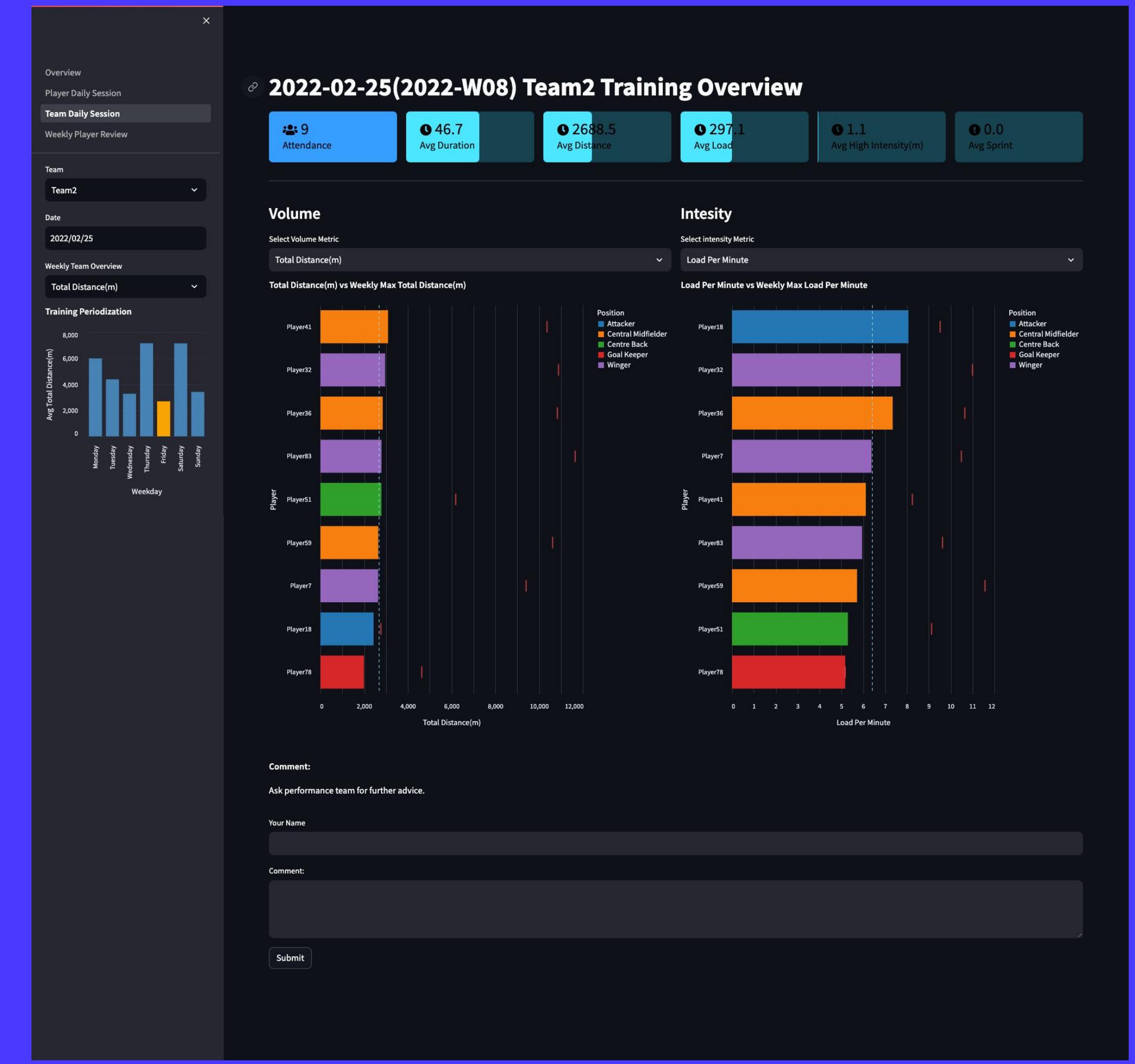
06

Team Daily Performance Review

The dashboard offers detailed insights into daily training sessions, helping you track and optimise team performance effectively.

Key Features:

- Holistic Performance Tracking:** Monitor all critical training metrics in one place, promoting optimal player readiness.
- Comprehensive & Accurate Metrics:** Choose from various training volume, intensity, agility and IMA metrics. Easily switch between teams and dates to get specific insights tailored to club's needs.
- Training Periodisation:** Visualise training load across the week to help understand workload distribution and plan future sessions.
- Improved Communication:** Encourage feedback and discussions within the performance team to ensure collective goal achievement.



— What Can Phylix Do

Phylix

Player Weekly Performance Monitor

Analyse player performance and track progress, identify players at risk with clear indicators, enhance player development and mitigate risks.

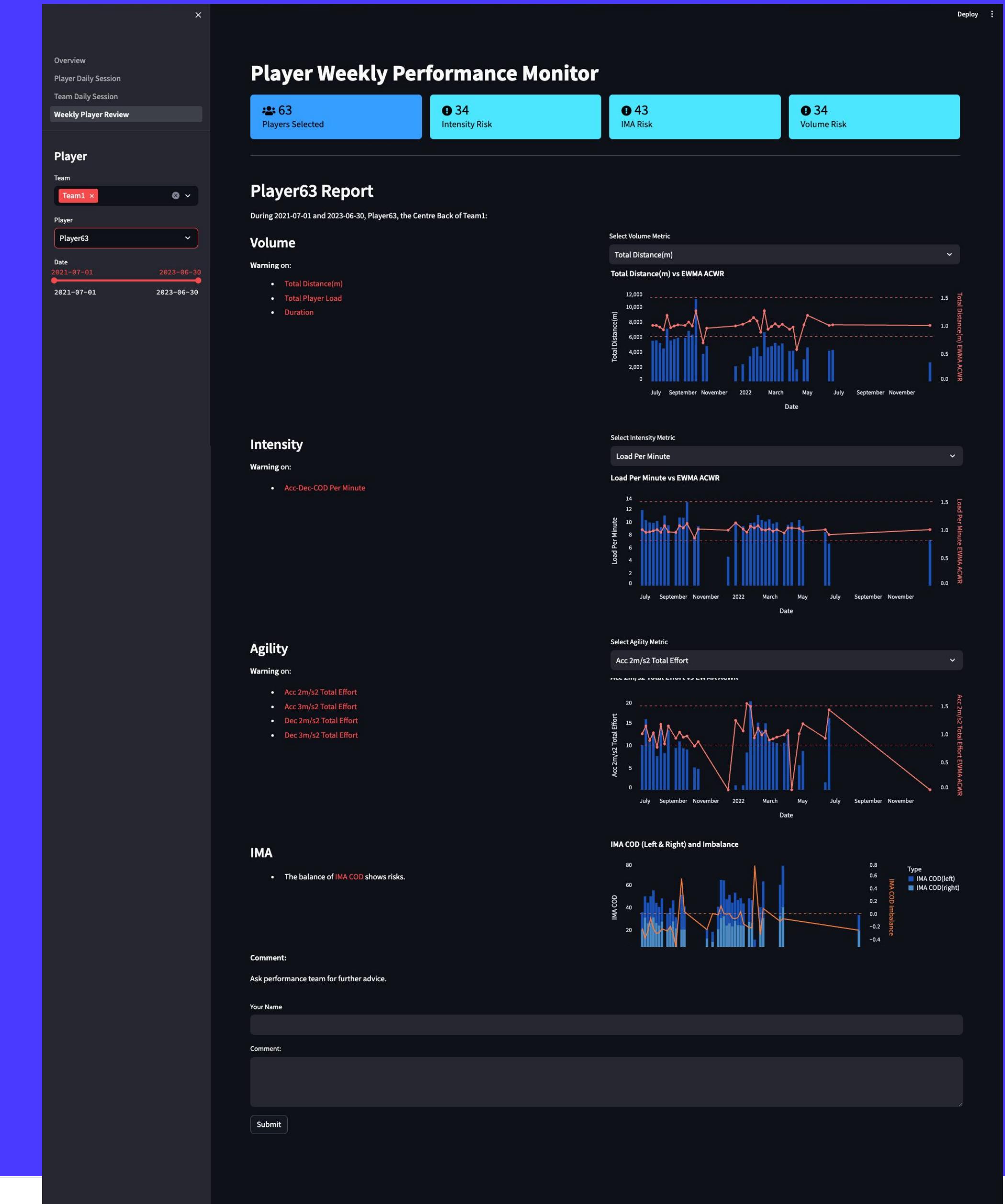
Key Features:

Proactive Risk Management: Quickly spot potential risks with tailored *EWMA ACWR* and *IMA Imbalance*, enabling timely interventions.

Team Overview: Instantly see the number of players being tracked and identify players at risk with intensity, agility IMA, and volume indicators.

Customisable and Flexible: Tailor the analysis to focus on specific metrics, players, and timeframes that are critical to the team.

Enhanced Communication: Facilitate better communication within the performance team with interactive feedback and shared insights.



— What Can Phylix Do

08

Phylix Player Daily Performance Monitor

A closer insight into each player's daily performance, identifying strengths and areas for development with the last 30 days* trend.

Key Features:

Performance Tracking: Daily insights into *metrics vs EWMA ACWR, into IMA Imbalance*, enabling targeted interventions and balanced training.

Periodisation KPI: Quickly view KPI for player's daily performance vs the max weekly requirement, providing a snapshot of the activity and effort.

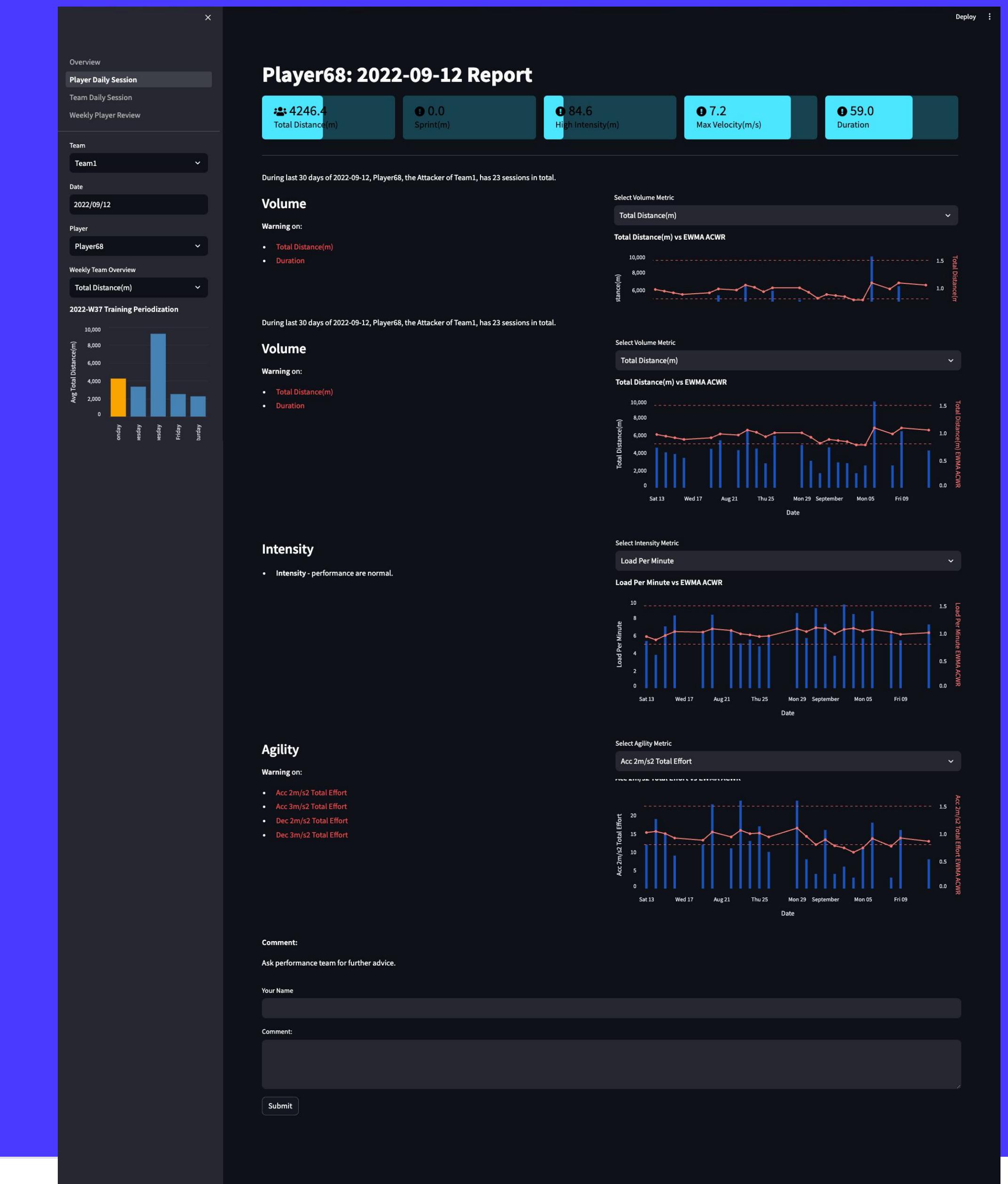
Customisable and Flexible: Tailor the analysis to focus on specific metrics, players, and timeframes that are critical to the team.

Enhanced Collaboration: The Comment Section supports collaboration and ensures that all stakeholders can provide input and stay informed.

*The observe period depends on the requirement of coach staff



— What Can Phylix Do



How Phylix Supports Your Team

See real-life case studies of how Phylix enhances team performance and player development.



Case Studies

"How are players' training loads align with match demands & prevent fatigue and injury?"

The dashboard allows the head coach to compare training metrics across the week to the peak performance metrics required during the week*. By reviewing the training periodisation graphs, the coach can see the distribution of KPIs.



COACHING STAFF

*Due to the data provided does not distinguish between matchday and training day, the highest weekly KPI will be approximated as matchday demand in this analysis.

"How to tailor recovery programs based on the player's historical training KPIs?"

The dashboard provides detailed metrics The Performance Physio can review the warning **EWMA ACWR** and **IMA COD Balance** to identify players who are experiencing high physical stress and discuss with other expertises.



PERFORMANCE PHYSIO

"How can we track the teams' metrics to gain insight into the club's overall success?"

The dashboard offers insights into training periodisation and weekly workload distribution across team. By analysing these trends, the director can devise optimal training that enhance performance while minimising injury risk.



DIRECTOR OF PERFORMANCE



Coach Staff

“How are players’ training loads align with the match demands & injury prevention?”

2022/10/17 to 2022/10/23

2022W42 Team 1 Analysis



— How Phylix Supports Your Team

01

02

03

Find Periodisation Patterns

Analyse the weekly and seasonal training loads to identify patterns that optimise player performance and align with match demands.

Recovery and Preparing

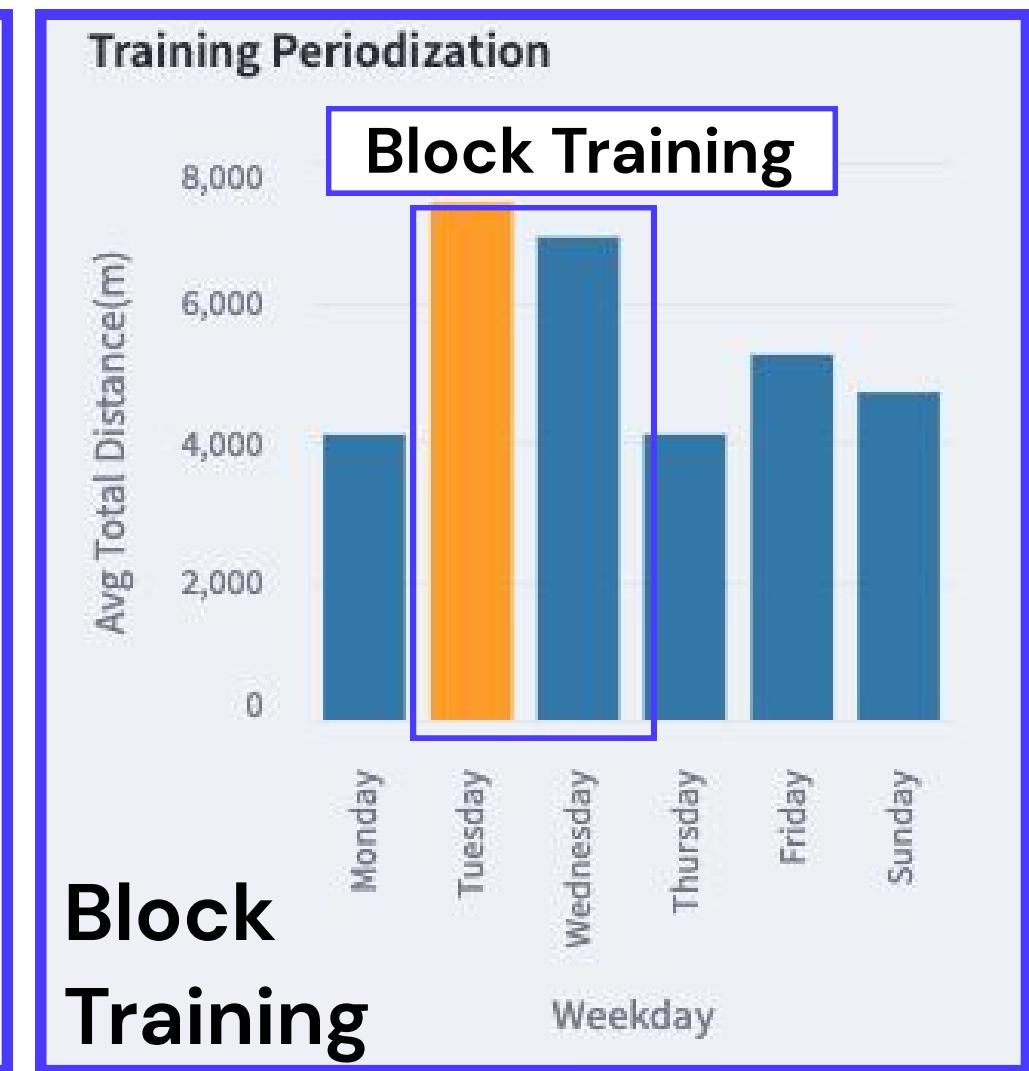
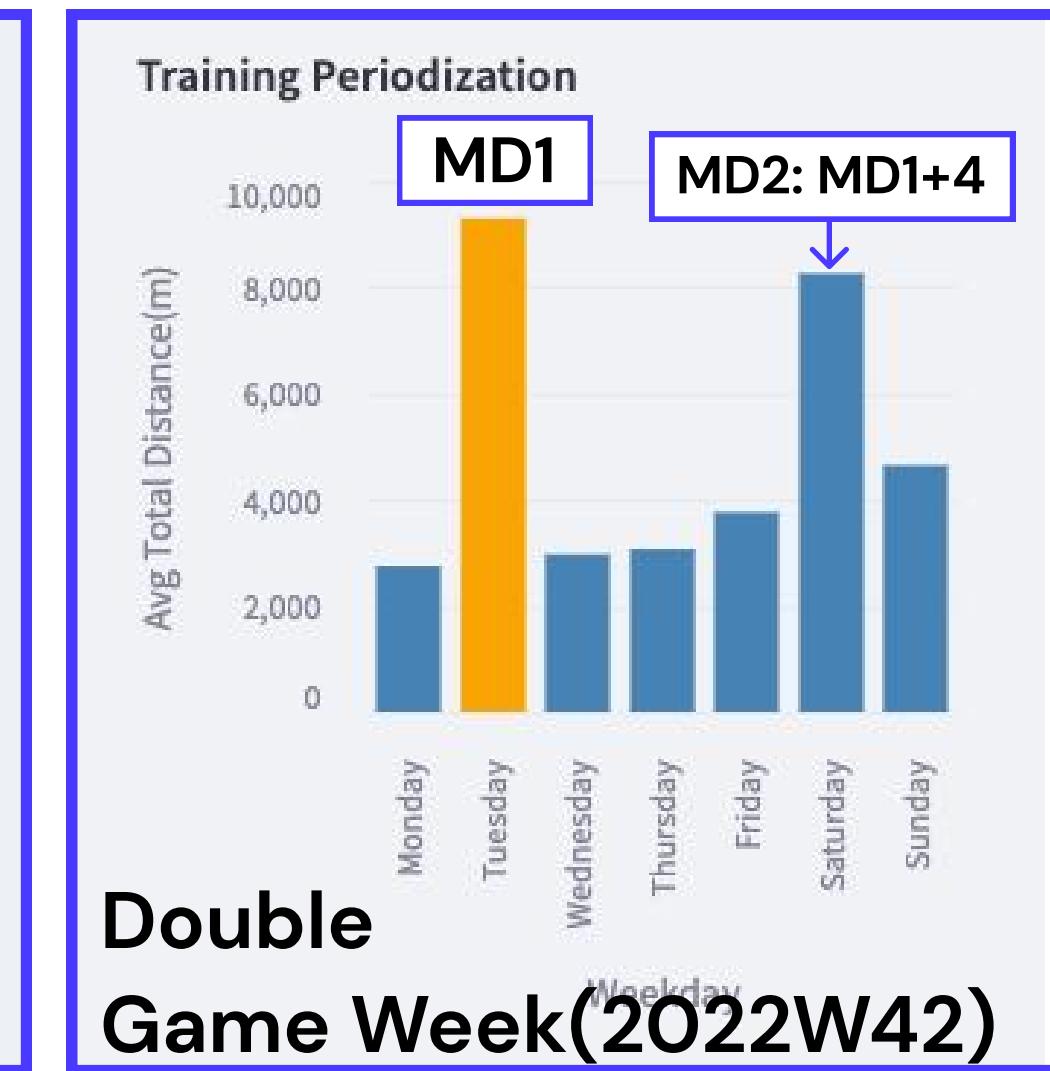
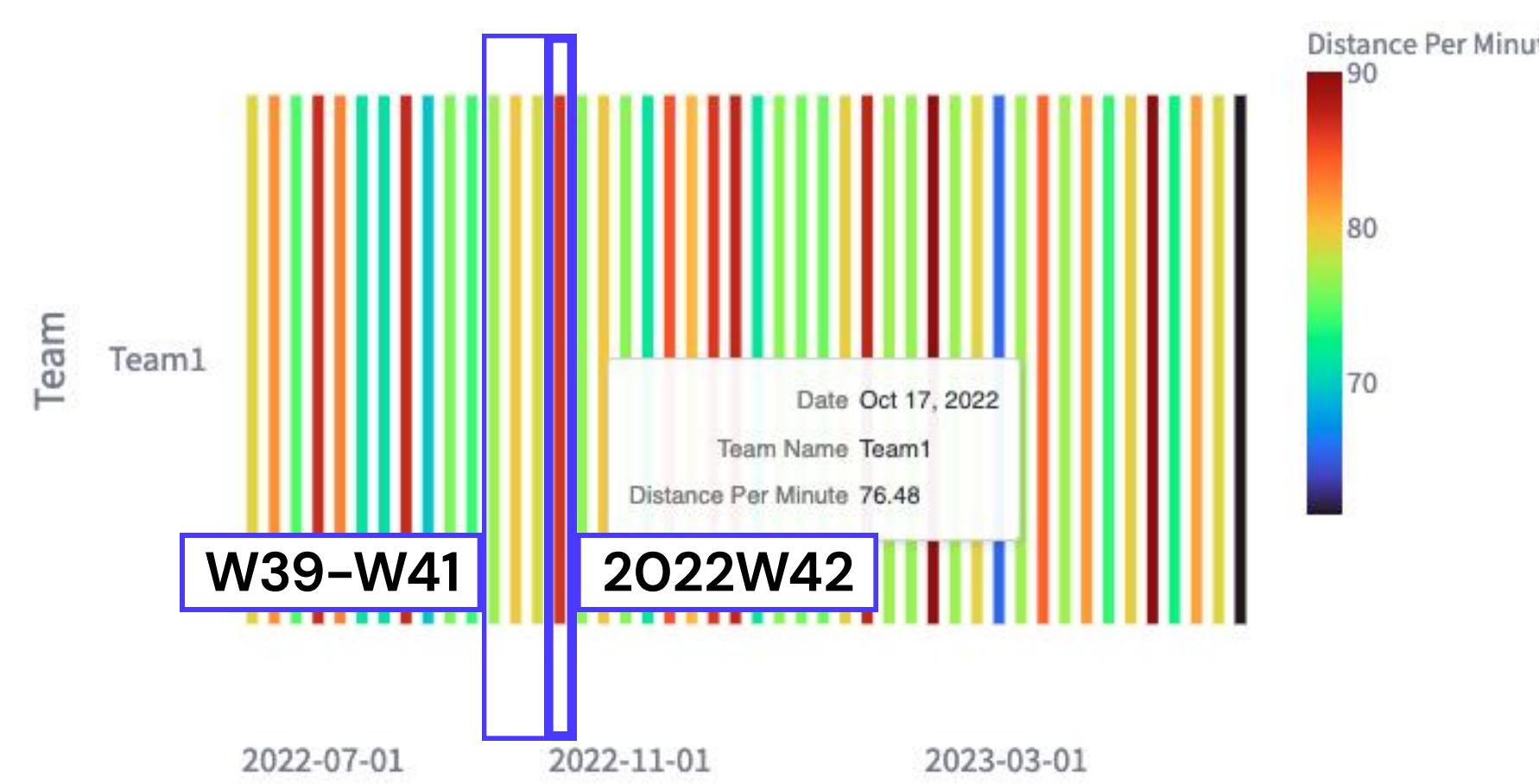
Use data-driven insights to tailor individual recovery plans, ensuring players are adequately prepared and minimising injury risks.

Identify abnormal

Address issues promptly to prevent injuries and ensure all players maintain optimal training intensity, supporting their overall health and performance.

Team 1 2022/23 Periodisation Pattern

Weekly Distance Per Minute Per Team



Macrocycle & Mesocycle

Pre-Season Intensity: From the start of July until August 14, 2022, the team undergoes intense pre-season training designed to build stamina and strength. This period is crucial for laying the foundation of physical fitness required for the demanding season ahead.

Peak Mesocycles: There are notable periods of high intensity. The weeks from September 26 to October 10, and November 14 to December 5, show the highest training loads. These peak mesocycles are critical for pushing the players to their optimal performance levels.

Microcycle

Diverse Microcycles: Team 1's training includes 3 types of microcycles:

1. Single Game Week: Regular weekly training preparing for one match.
2. Double Game Week: Adjust load to accommodate two matches a week.
3. Block Training: Training blocks, primarily seen in the pre-season phase.

Focus on 2022W42: As a DGW, despite the demanding schedule, this week belongs to a lower workload mesocycle compared to the previous intensive 3 weeks. This strategic reduction in load helps in managing player fatigue and reducing the risk of injuries, ensuring that the team remains in top form.



Strategic Recovery after Intense Game(1)



2022-10-18(2022-W42) Team1 Training Overview

The KPI indicators at the top of the Team Daily Session page highlight the intense workload and physical demand of October 18, 2022 (Tuesday). Given that there is another crucial match scheduled for MD+4 (Saturday), the coaching staff has to meticulously plan the recovery and subsequent training sessions.

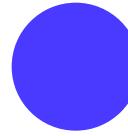
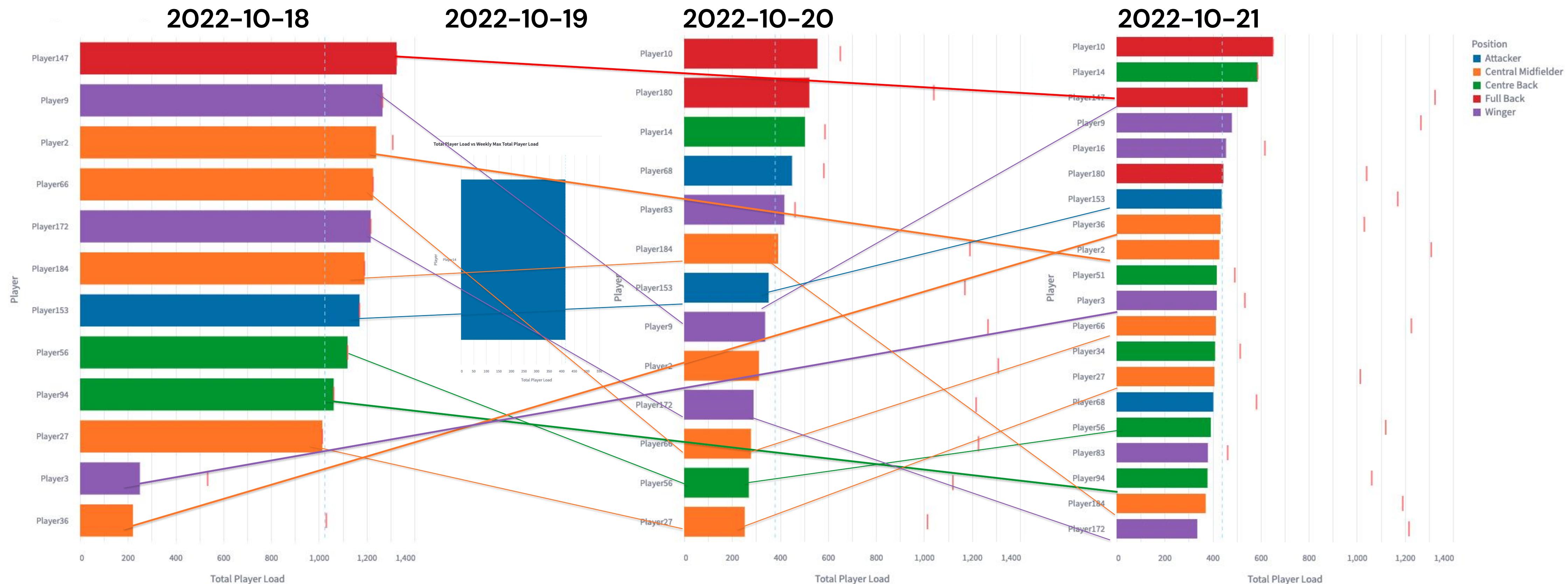
From the record, the coaching staff applied the following strategies:

- Optimising Recovery:** Ensuring that players recover adequately from the high intensity of Tuesday's session to prevent fatigue.
- Balanced Training:** Adjusting the training load to a relatively lower level to prepare for the next matchday without overloading.
- Preventing Injuries:** Strategically managing player workload to minimise the risk of injuries, particularly given the short turnaround between match days.



Strategic Recovery after Intense Game(2)

Total Player Load vs Weekly Max Load



Strategic Recovery after Intense Game(2)

During MD1+1 to MD1+3, the team adopts a strategic approach with lower intensity training to ensure optimal recovery and injury prevention between matchdays:

MD1+1 (2022-10-19): Only one player's data, who didn't participate in Tuesday's game, was collected. This indicates that the rest of the players were resting or engaging in light indoor activities, prioritizing recovery.

MD1+2 (2022-10-20): Five key players (2, 3, 94, 36, 147) from MD1 were absent from training data collection. The session remained low-intensity, with all KPIs dropping to below 50% of MD1's intensity,

except for the duration. This continued focus on recovery.

MD1+3 (2022-10-21): All players who participated in MD1 returned to training, but the intensity remained light. The workload was slightly increased compared to MD1+2, ensuring a gradual build-up without overloading the players.

2022-10-20(2022-W42) Team1 Training Overview



2022-10-21(2022-W42) Team1 Training Overview



2022-10-19(2022-W42) Team1 Training Overview



Summary: This well-planned strategy by the coaching staff ensures that players recover adequately and are well-prepared for the next match. By managing training loads effectively and prioritizing rest, the team aims to prevent injuries and maintain peak performance for upcoming games.



Compare Intensity - MD1 vs MD2

In this section, we will compare the session **intensity** of MD1 and MD2 by analysing the **player load per minute**.

Key Observations

Overall Decrease in Intensity: Except for players 2 and 27, most players experienced a decrease in load per minute from MD1 to MD2.

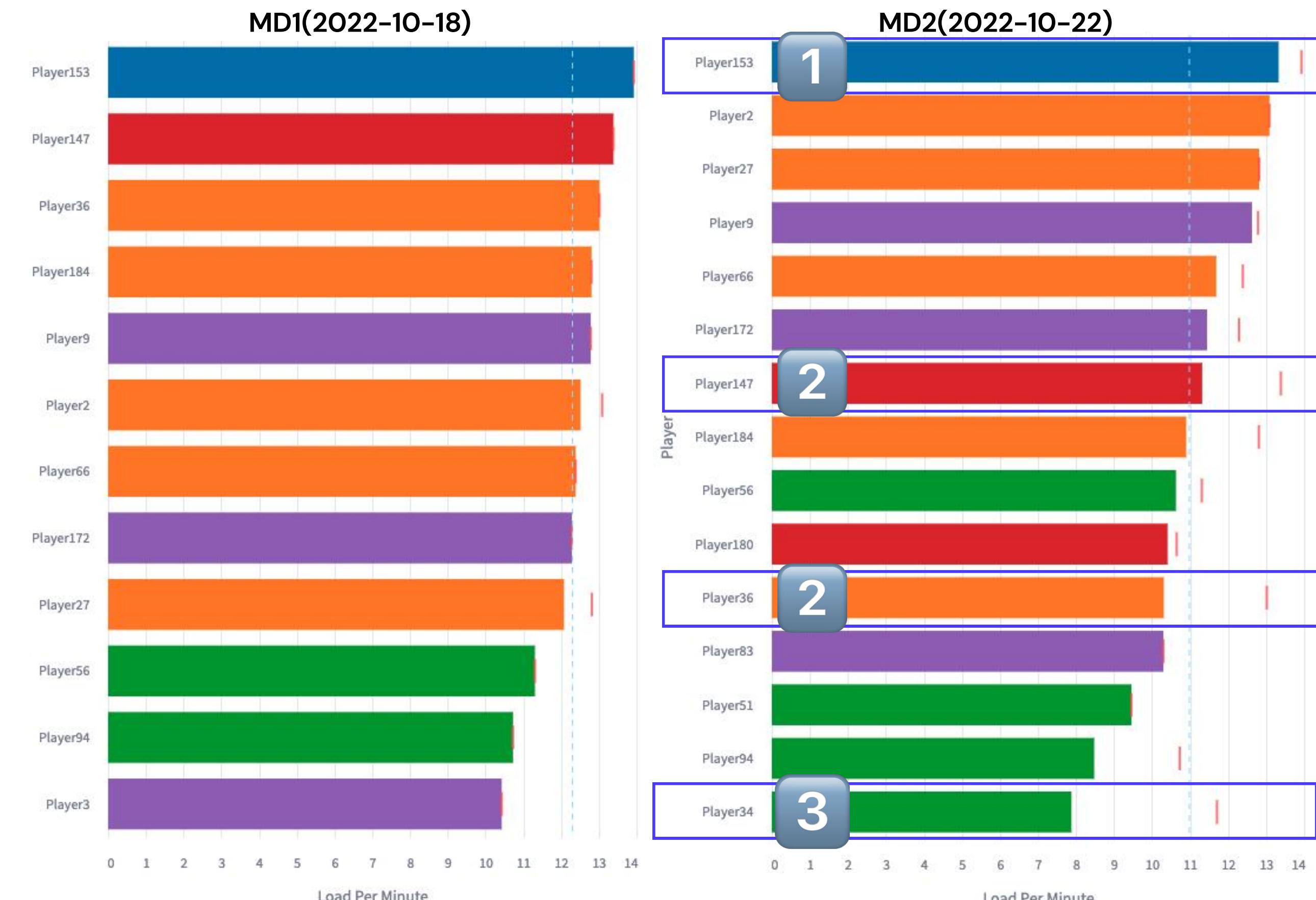
Player-Specific Insights:

1. Player 153: Maintains the same intensity across both MDs. It is advisable to review their workload over the last 30 days to ensure optimal management.
2. Players 36 and 147: Show more than 20% reduction in load per minute.
3. Player 34: Did not play in MD1 and was unable to achieve the same intensity levels during the relatively lower load training in MD2.

Summary:

These insights are crucial for tailoring training and recovery plans, ensuring all players are optimally prepared and preventing overtraining or undertraining.

Player Load Per Minute - MD1 vs MD2



The two graphs presented here illustrate the player load per minute on matchdays. The bars represent the player load per minute, while the red sticks indicate the highest player load for the week, which, for most players, corresponds to MD1.



IMA COD Abnormal and ACL Risk

In this section, we will compare the balance by IMA COD Imbalance in Player Daily Session section, which is calculated by:

$$Imbalance = \frac{IMACOD(Left) - IMACOD(Right)}{IMACOD(Left)}$$

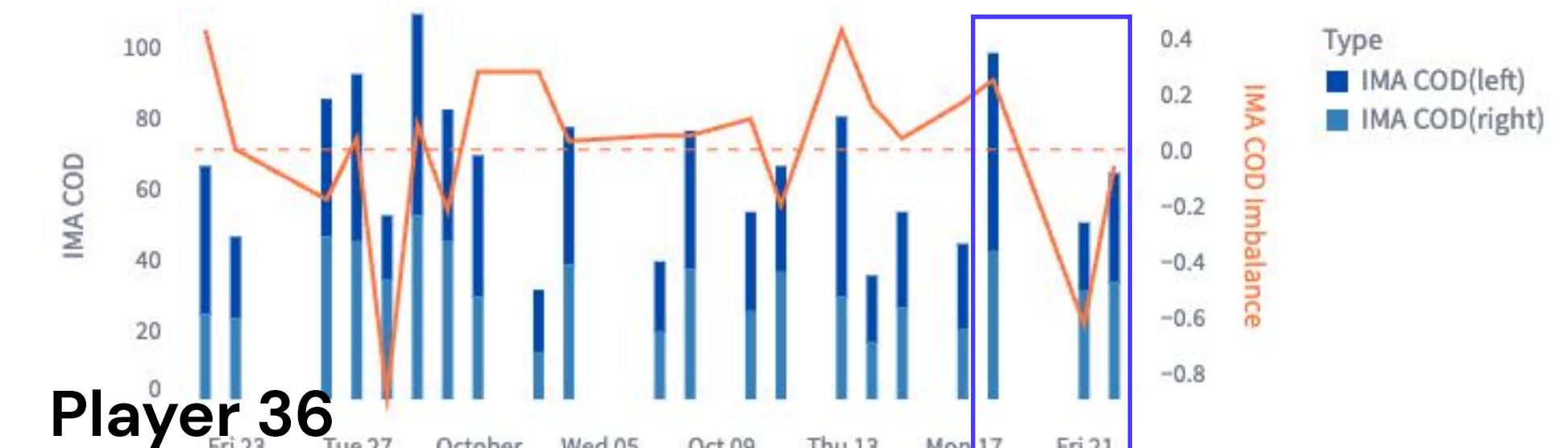
We mentioned that both player 147 and player 36 show more than 20% reduction in load per minute during the MD2(2022-10-22). Additionally, both players' imbalance shifted significantly from left-oriented to right-oriented in the last 7 days of MD2, indicating potential asymmetry issues.

Recommendations:

Ensure players use correct techniques during training and matches. Proper landing mechanics and cutting techniques can significantly reduce ACL strain. Better to communicate with the sports scientist and performance physio to tailor professional advise based on the analysis.

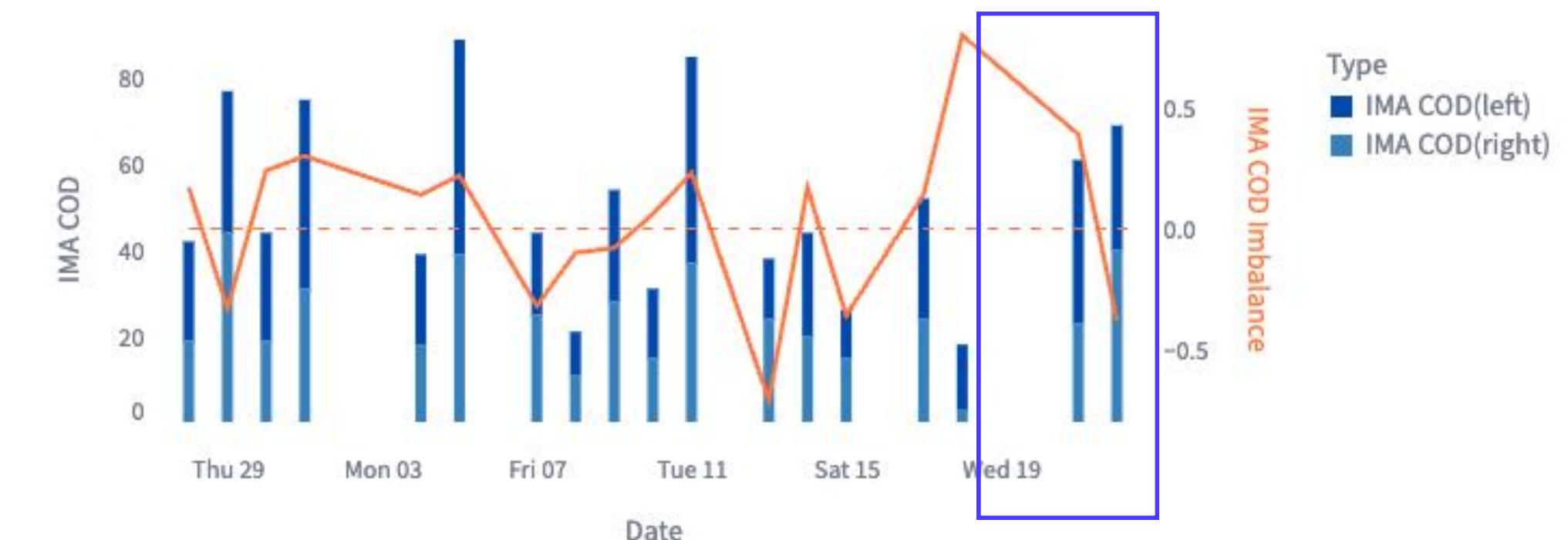
Player 147

IMA COD (Left & Right) and Imbalance(Weekly)



Player 36

IMA COD (Left & Right) and Imbalance (Daily)



Performance Physio

“How to tailor recovery programs based on the player’s historical training KPIs?”

Team 1 Player 63 Analysis

01

02

03

Identify Performance Risk

Analyse training loads to spot risks, optimize performance, and align with match demands.

Discover Training Pattern

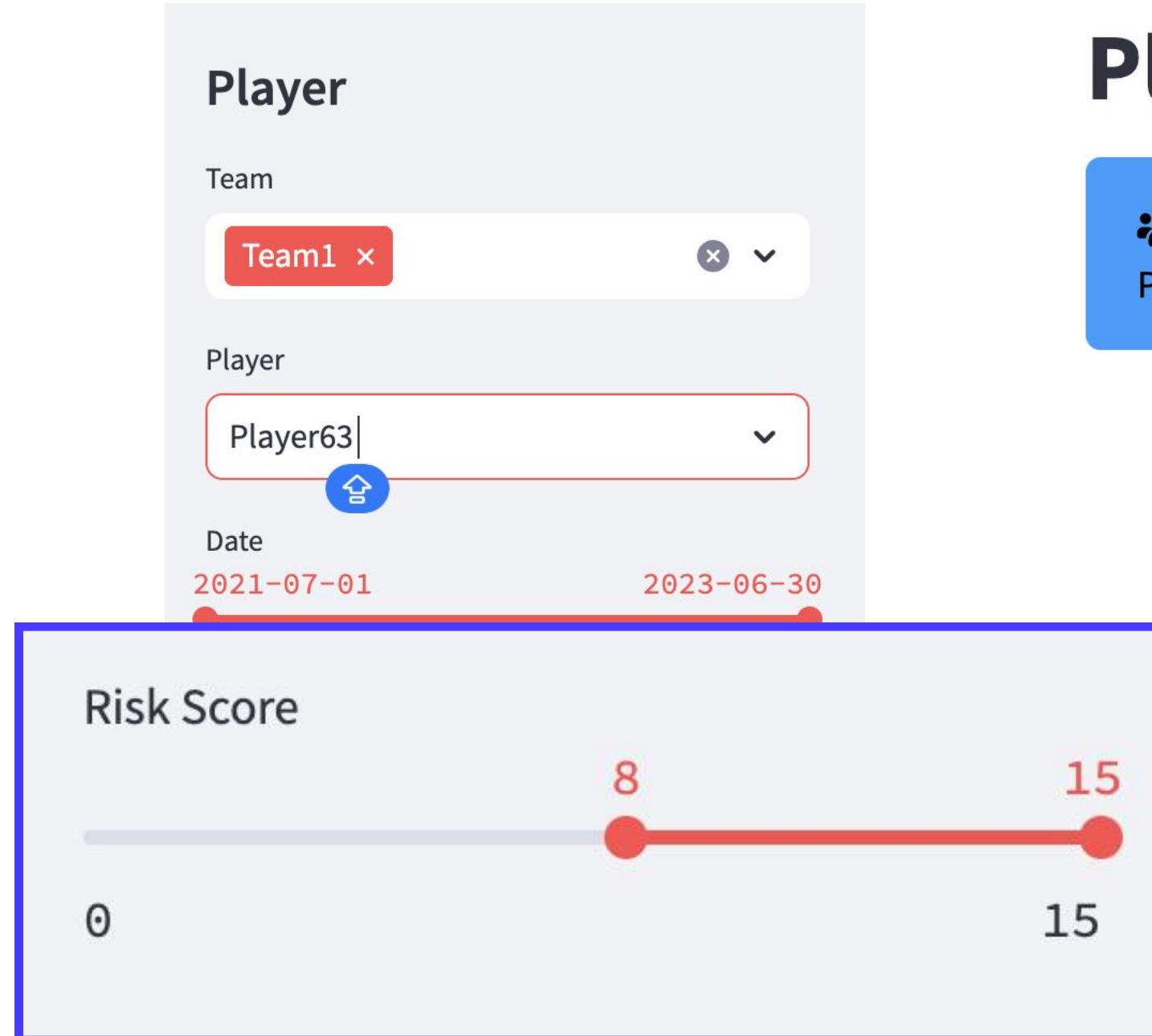
Recognise player-specific training trends to ensure balanced workloads and prevent injuries.

Discuss Rehab Plan

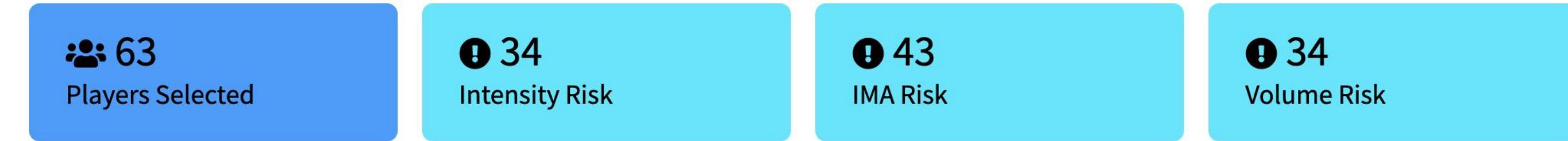
Collaborate across the department on personalised recovery strategies to maintain fitness and expedite injury rehabilitation.



Monitor Player with Risks Score



Player Weekly Performance Monitor



The Player Weekly Performance Monitor can quickly identify how many players shows risks, and filter the players with potential performance risks in the selected team and timeframe by filter the **risk score level**, which is calculated by **EWMA ACWR of each metrics**, include 3 new intensity metrics (Load Per Minute, Distance Per Minute, Acc-Dec-COD Per Minute) the Phylix introduced. The risk will be considered if the **EWMA ACWR** is larger than **1.5** or less than **0.8**. Please read appendix for more details.

In this section, [Player 63 from the Team 1 who shows 9 risks](#) will be examined to see how Phylix can help performance physio to tailor recovery programs based on the player's historical KPIs.

Risk Score includes: Duration, Total Distance(m), Total Player Load, Acc 2m/s² Total Effort, Acc 3m/s² Total Effort, Dec 2m/s² Total Effort, Dec 3m/s² Total Effort, High Intensity Distance(m), Sprint Distance(m), Maximum Velocity(m/s), IMA COD(left), IMA COD(right), Load Per Minute, Distance Per Minute, Acc-Dec-COD Per Minute

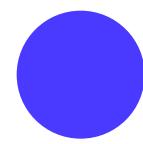
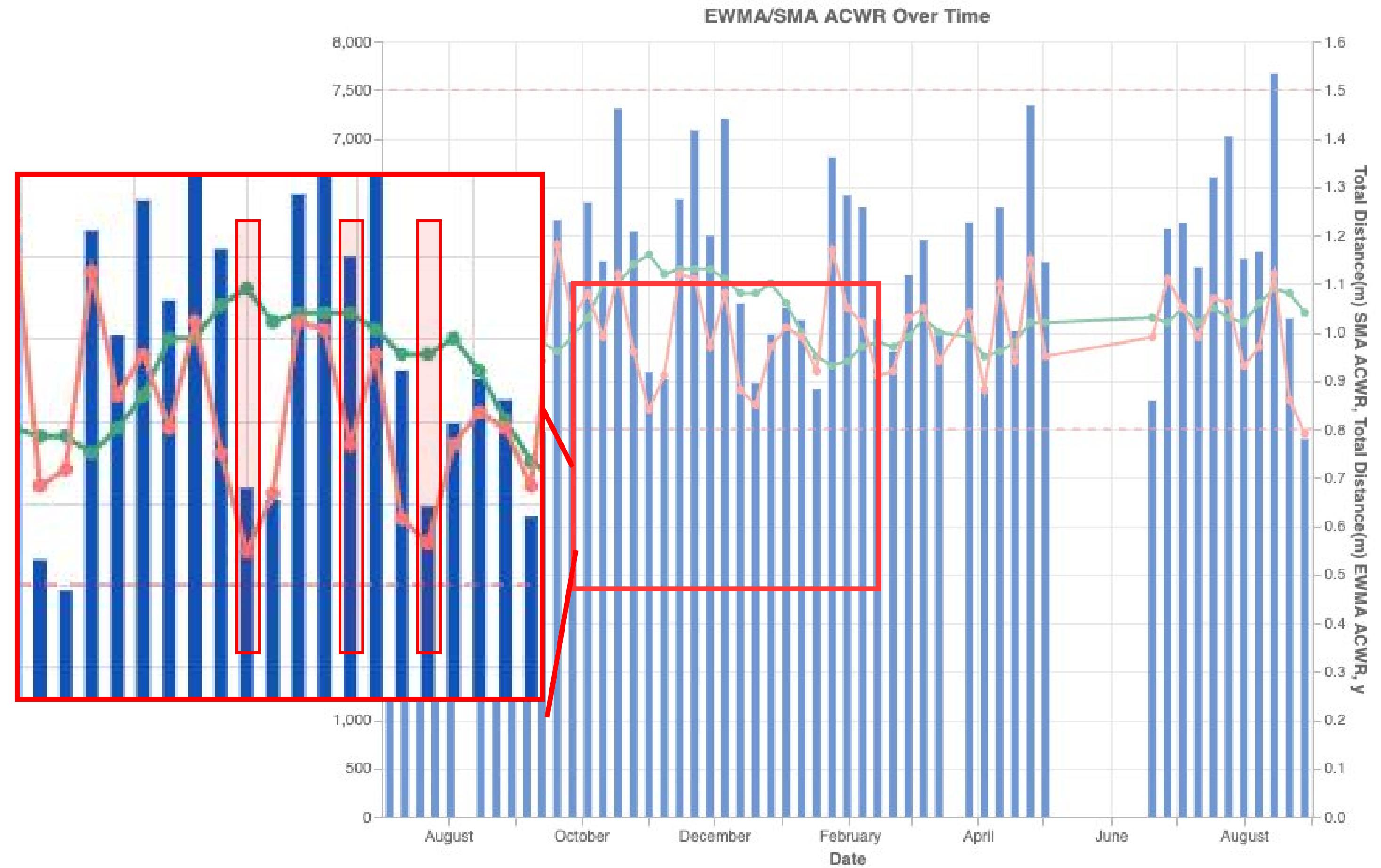


ACWR vs EWMA ACWR?

Exponentially Weighted Moving Average (EWMA)

Acute Chronical Workload Ratio (ACWR) offers a more dynamic, accurate, and practical approach to monitoring athlete workload compare to traditional ACWR, where:

- **Weighted Recent Data:** Gives more weight to recent days, accurately reflecting current workload.
- **Reflects True Workload:** Better captures workload fluctuations, timely identification of workload spikes, ensuring a more precise assessment of training stress.
- **Optimised Training:** Allows for more informed decisions on training adjustments, timely identification of workload spikes to reduce the risk.

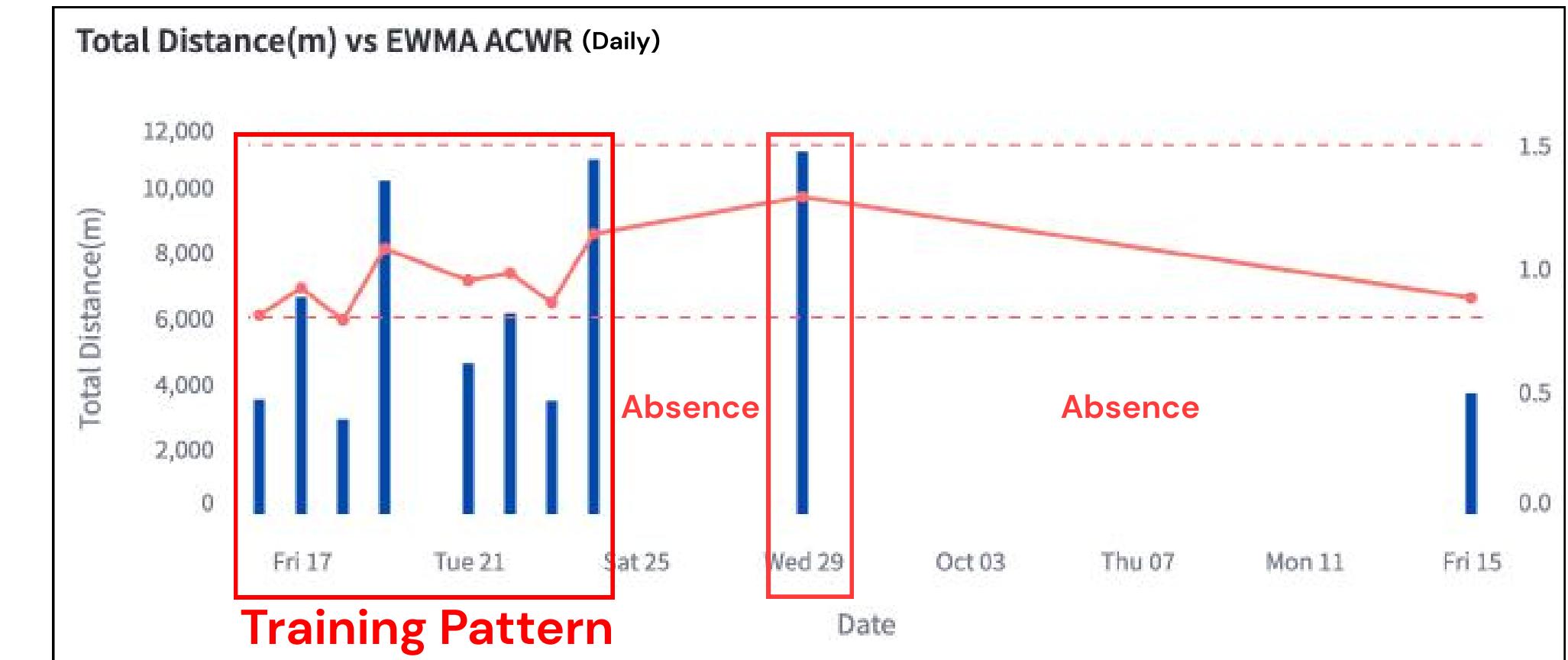
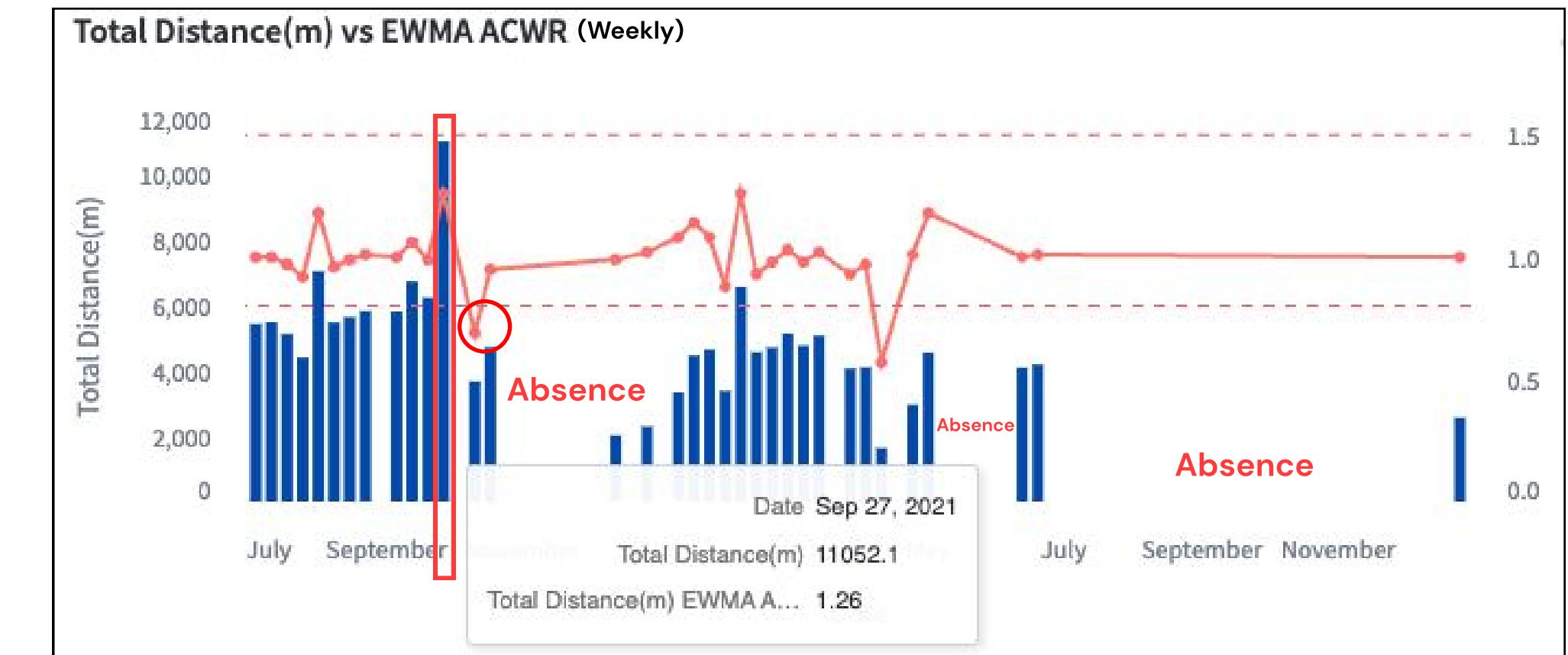


Player 63 – Training Volume Risk

From Weekly Avg Total Distance: Phylix revealed a critical spike in Player 63's EWMA ACWR starting September 27. This sharp increase was followed by a 16-day absence from September 30 to October 14.

Moreover, after October, Player 63 shows a concerning 2-month absence, with his overall weekly total distance markedly reduced compared to previous levels. There is a half-year absence from June to December, 2022, which indicates a significant decline in training volume, raising red flags about his conditioning.

From Daily Total Distance: There is a pattern that typically, the player completes 3 slightly shorter distance sessions (<10,000m) before a heavy session (>10,000m). However, this routine was disrupted on September 29, which saw a high-intensity session without the preceding shorter sessions. This irregularity likely contributed to the subsequent 16-day and then 2 months absence, suggesting a potential light injury due to inconsistent training.

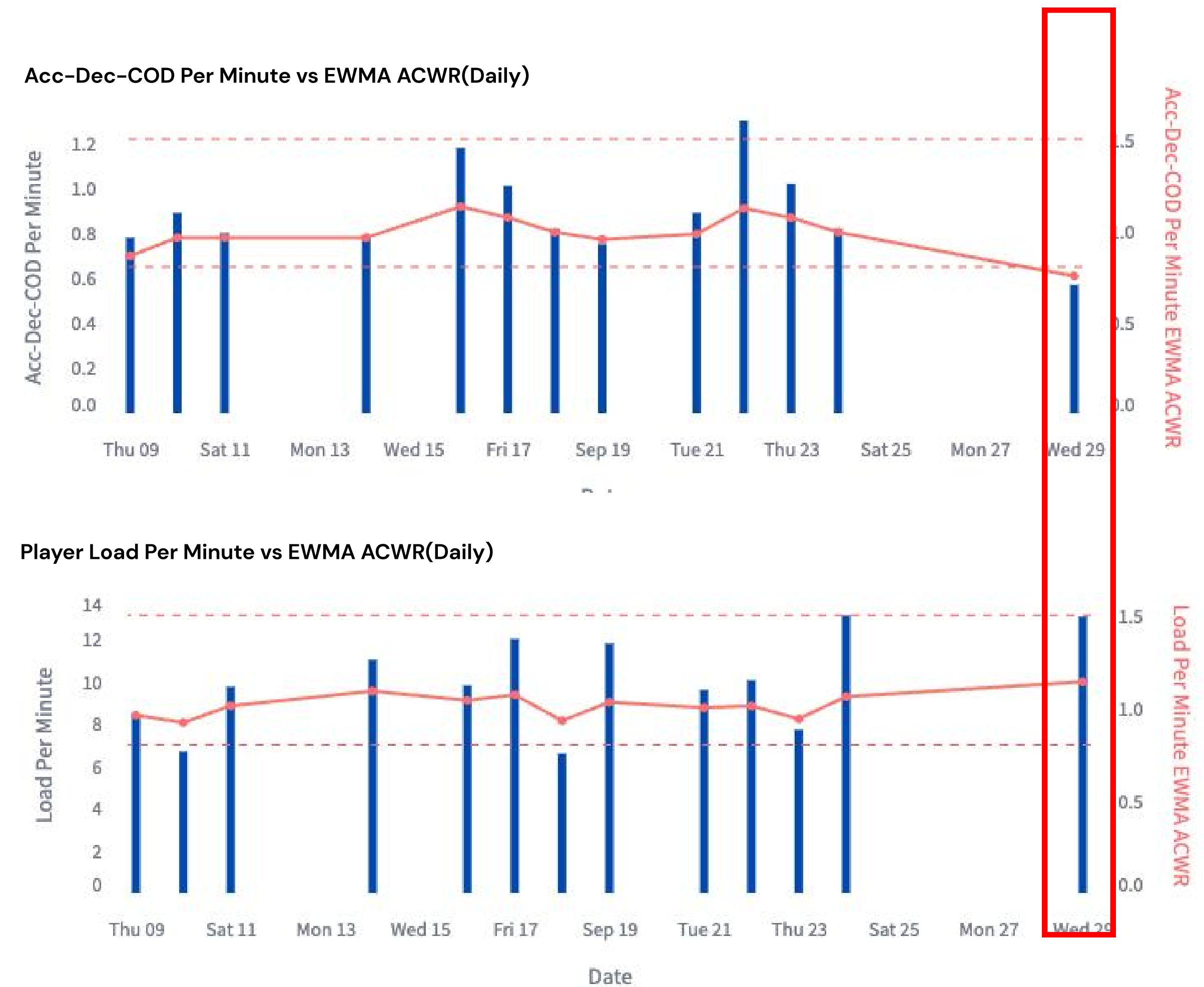


Player 63 - Intensity Risk

Acc-Dec-COD represents the total count of all acceleration, deceleration, and Inertial Movement Analysis (IMA) Change of Direction (COD) activities, excluding vertical jumps, focusing on 2D ground movements.

Phylix identified a notable drop in EWMA ACWR for Acc-Dec-COD per minute on September 29. Despite this decrease, the overall player load remained consistently high. This indicates an irregular increase in physical activity on the z-axis, potentially heightening the risk of injury.

The discrepancy between consistent load and irregular activity patterns warrants close monitoring to prevent injury and ensure optimal performance.



Player 63 – Discuss Rehab Plan

Phylix encourages collaboration across departments by providing a comment section. Here, coaches, physios, and performance analysts can:

- Share Insights:** Post observations and analysis for review by the team.
- Discuss Strategies:** Engage in discussions to develop and refine training and recovery plans based on specific player data.
- Track Decisions:** Maintain a record of decisions and adjustments made to training protocols, ensuring everyone is informed and aligned.

For Player 63, the comments might include:

- Training Adjustments:** Propose changes to the player's training schedule to include more recovery time.
- Injury Prevention:** Discuss potential strategies to prevent recurrence of similar issues.
- Performance Monitoring:** Suggest additional metrics or monitoring techniques to better track the player's condition.

The collaborative environment within Phylix ensures that all departments work together effectively to support each player's performance and well-being.

- Shuyao Chen: here is a pattern that typically, the player completes 3 slightly shorter distance sessions (<10,000m) before a heavy session (>10,000m). However, this routine was disrupted on September 29, which saw a high-intensity session without the preceding shorter sessions. This irregularity likely contributed to the subsequent 16-day and then 2 months absence, suggesting a potential light injury due to inconsistent training.

The screenshot shows a software interface for player management. On the left, there are dropdown menus for 'Team' (set to 'Team1') and 'Player' (set to 'Player63'). Below these are date range sliders for 'Date' (from 2021-07-01 to 2023-06-30) and 'Risk Score' (from 0 to 15, with markers at 8 and 15). To the right, there is a 'Comment:' field containing the text from the bullet point above. Below this field, there is a 'Your Name' input field with 'James Brown' typed in, and a larger empty 'Comment:' field for other users to add their own comments. A 'Submit' button is located at the bottom right of the comment area.



Director of Performance

“How can we track the teams’ metrics to gain insight into the club’s overall success?”

Club Training Overview



— How Phylix Supports Your Team

01

Player–Team Transition

Analyse training loads to spot risks, optimize performance, and align with match demands.

02

Club KPIs Overview

Recognise player-specific training trends to ensure balanced workloads and prevent injuries.

03

Leaderboard

Collaborate across the department on personalised recovery strategies to maintain fitness and expedite injury rehabilitation.

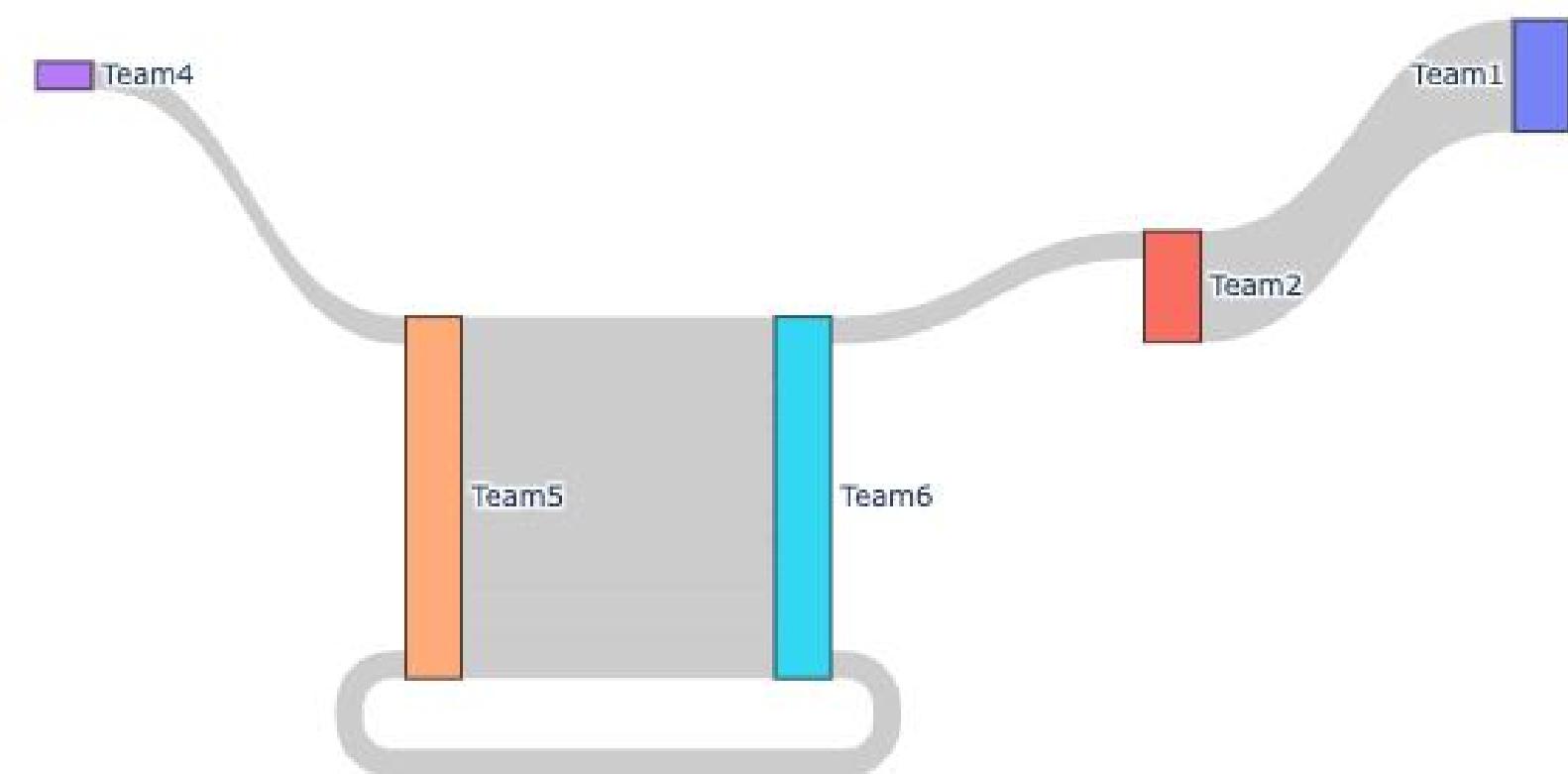
Player Transition Between Teams

With Phylix's Overview page, the club can easily visualise the transitions of player between teams to better understand player status, team dynamics, and evolving team definitions.

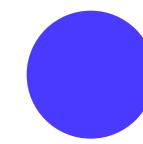
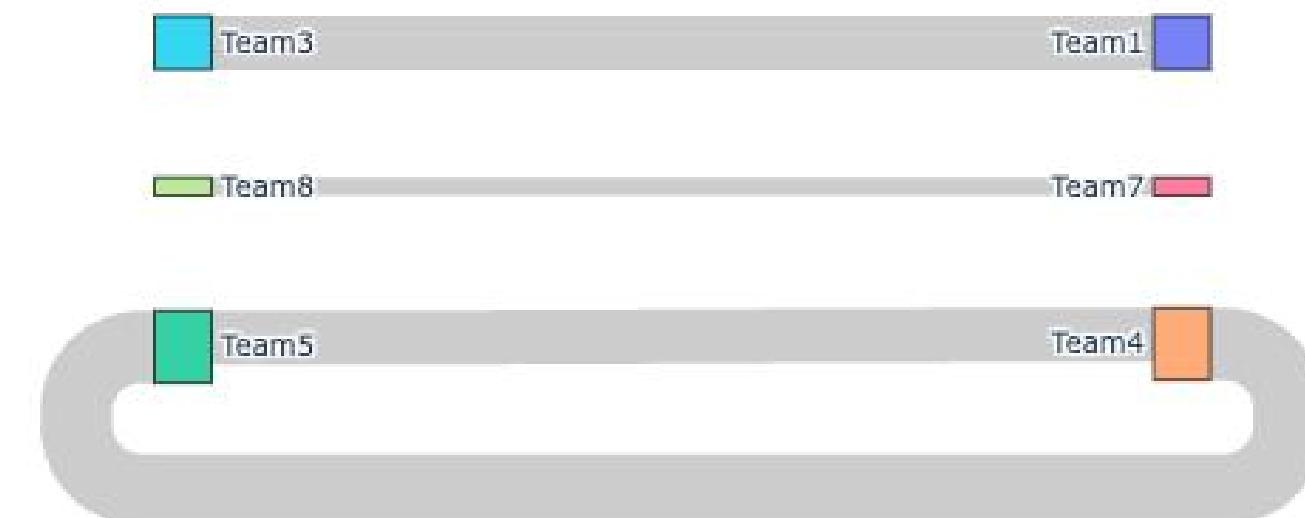
In the given dataset, Phylix observes key trends and patterns:

- **Team Evolutions:** The structure and composition of teams, such as Team 2 and Team 3 to the Team 1, the cycle between Team 5 and Team 6 in season 2021 compare Team 5 and Team 4 in season 2022, have evolved over the seasons, showcasing the club's adaptive strategies.
- **Transition Cycle:** Players frequently move from Team 4 to Team 5, and from Team 5 to Team 6, indicating a dynamic relationship or strategic adjustments within these squads.
- **Temporary Assignments:** Team 7 and Team 8 served as a temporary team during the 2022–23 season, reflecting flexibility in team management.

Player Movement between Teams
(2021-07-01 to 2022-06-30)



Player Movement between Teams
(2022-07-01 to 2023-06-30)



Club KPIs Overview

Phylix can compare various weekly KPIs across selected teams within the club over any given timeframe, which provides a high-level overview, reveals macrocycle trends, and identifies any abnormal situations that need attention.

In the given dataset, Phylix observes trends and patterns:

Weekly Attendance Per Team:

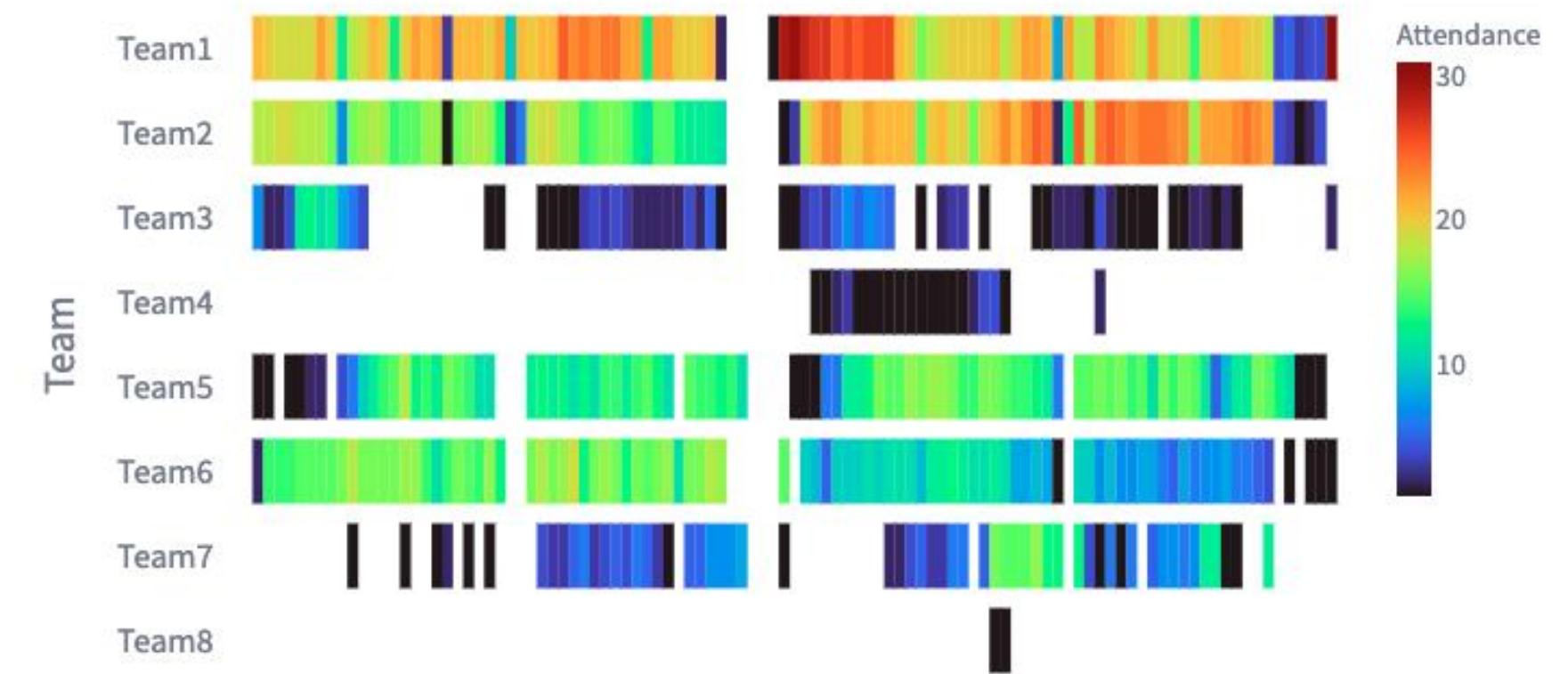
- **Team 1, Team 2, and Team 5:** Regular teams with consistent attendance of more than 10 players per session across both seasons.
- **Team 6:** Regular team in the 2021/22 season, but attendance decreased in the 2022/23 season, suggesting potential issues with player availability or team dynamics.
- **Team 1:** At the beginning of the 2022/23 season, attendance exceeded 25 players, posing a risk to maintaining training quality due to the high headcount.

Weekly Load Per Minute Per Team:

- **Team 5 and Team 6:** Both teams exhibit overall high-intensity training sessions, indicating intense training phases or a specific functional role within the club.
- **Team 1:** Maintains a steady load per minute, ensuring balanced and well-managed training intensity despite high attendance.



Weekly Attendance Per Team



Weekly Load Per Minute Per Team



Leaderboard

Phylix provides a leaderboard to showcase selected metrics across various teams and positions within a given timeframe, and monitor each player's performance over the past 30 days.

This powerful tool allows you to [identify top performers](#), track the dates [when records were achieved](#), and encourage healthy competition [among players](#), motivating them to push their limits and strive for excellence.

Case Study – Maximum Velocity:

Player 9: As the Champion of the leaderboard with an impressive maximum velocity of 10.33 m/s on July 28, 2022, Player 9 is a key asset with exceptional speed to break through defences on the pitch.

Player 9 Recent Performance: A closer look at his recent velocity performance reveals a slight downward trend. Additionally, his weekly player load shows a significant decrease, triggering the EWMA ACWR warning. This indicates a potential risk that needs to be addressed to prevent injury and ensure sustained high performance.

Overview

Session Metric: Maximum Velocity(m/s)

Team: Team1, Team2, Team3, Team4, Team5, Team6, Team7, Team8

Date: 2021-07-01 to 2023-06-30

Position: Central Midfielder, Centre Back, Winger, Full Back, Attacker, Goal Keeper

Player	Team Name	Position	Date	Maximum Velocity(m/s)	Last 30 Days of 2023-06-30
Player9	Team1	Winger	2022-07-28	10.03	9.17
Player10	Team1	Full Back	2022-07-24	10.03	
Player27	Team2	Central Midfielder	2021-08-18	9.94	
Player129	Team5	Centre Back	2022-11-08	9.89	
Player67	Team1	Attacker	2023-02-03	9.83	
Player93	Team6	Attacker	2022-08-20	9.81	
Player9	Team1	Winger	2022-03-15	9.81	
Player51	Team2	Centre Back	2021-10-28	9.78	
Player18	Team2	Attacker	2022-11-08	9.78	
Player18	Team2	Attacker	2023-04-06	9.78	

Total Player Load vs EWMA ACWR (Player 9, Weekly)



Thank you!

Phylix – Actionable insights, collaborative platform, empowering performance improvement for your team's success.

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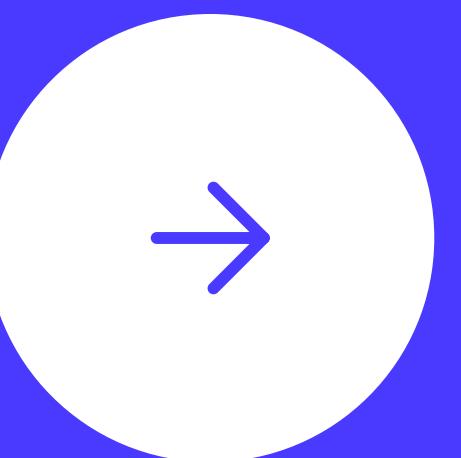
(+44) 0751 0969 708

Appendix

Glossary

Data Limitations

How to Build Phylix



Glossary(1)

Duration: The duration of the session.

Total Distance(m): The total distance of player movement during the session.

Total Player Load: Defined by Catapult, Player Load is the sum of the accelerations across all axes of the internal tri-axial accelerometer during movement. It considers instantaneous rate of change of acceleration and divides it by a scaling factor. The scaling factor is used to reduce the total value of the accumulated player load thereby making it easier to work with during analysis.

Sprint Distance(m): The total sprint distance during the training session.

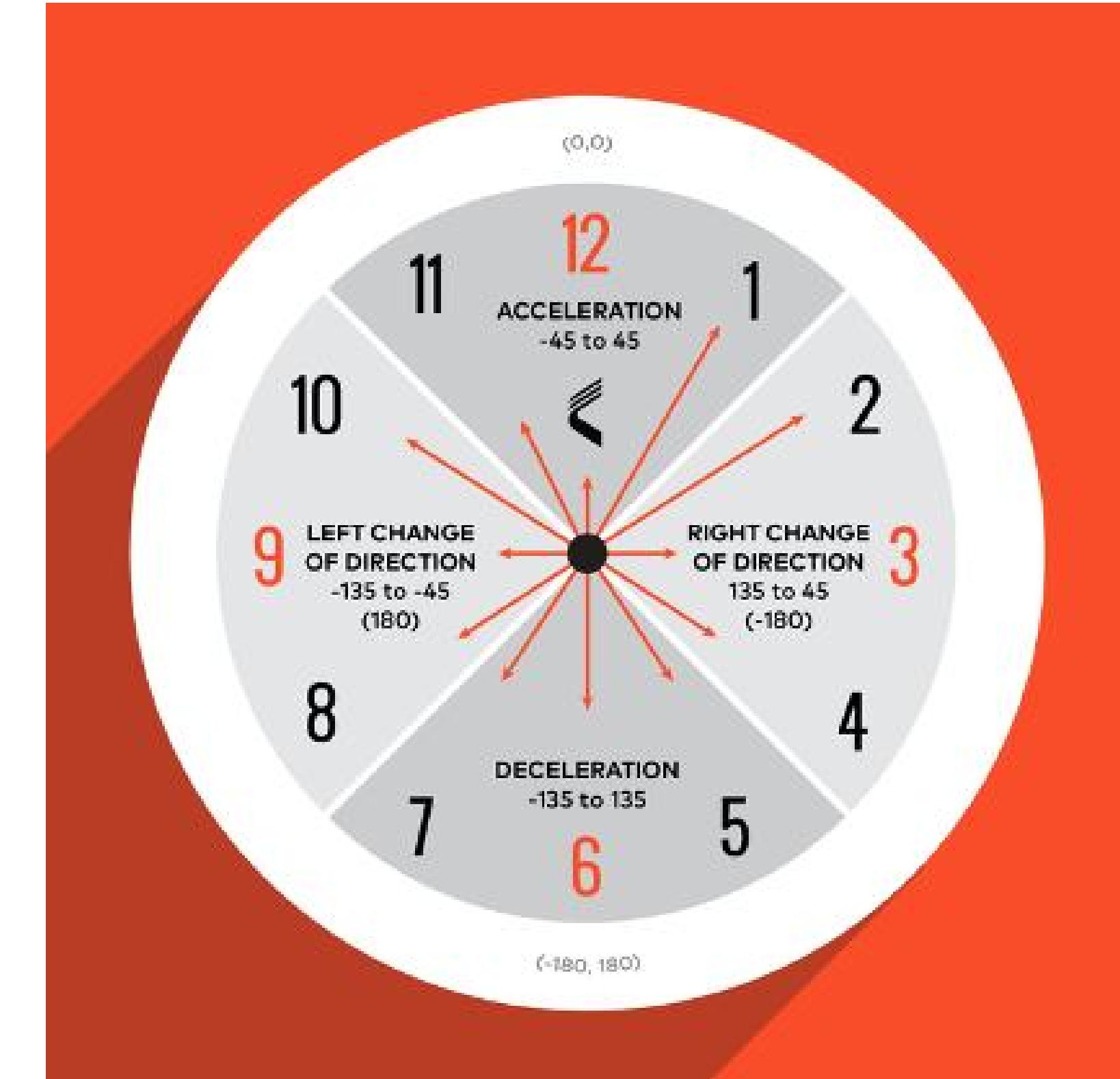
High Intensity Distance(m): The distance covered by repeated high intensity efforts(RHIEs). RHIEs are the successive high intensity velocity efforts, such as acceleration, deceleration, and high speed.

Maximum Velocity(km/h): Maximum velocity recorded during the session.

Acceleration/Deceleration 2/3 m/s² Total Effort: when the velocity is above 5km/h (or pre-defined low speed threshold), The number of Acceleration/Deceleration Efforts counted in the specified intensity band(s). **2 m/s² is more reliable** based on the poor reliability of accelerations/ decelerations with increasing intensity threshold when calculated from the rate of changes in speed.

High Intensity Distance(m): The distance covered by repeated high intensity efforts(RHIEs). RHIEs are the successive high intensity velocity efforts, such as acceleration, deceleration, and high speed, that are repeated based on the pre-defined thresholds of count and value, without adequate recovery in a pre-determined timeframe.

IMA COD(Left and Right): Inertial Movement Analysis (IMA) is a set of metrics that measures athlete micro movements and direction. It has been classified into acceleration, deceleration, left change of direction and right change of direction. These 2 metrics are specifically tracking Change of direction (COD) count - left and right.



Acceleration, Deceleration and COD(from Catapult)



Glossary(2)

ACWR: Acute Chronic Workload Ratio. A measure of training load that compares acute workload (short-term) with chronic workload (long-term) to monitor injury risk and optimize performance. [Phylix set the short-term window size to 7 days](#) and the long term window size to 21 days

EWMA ACWR: Exponentially Weighted Moving Average ACWR. An advanced version of ACWR that uses exponentially weighted averages to provide a more sensitive and accurate analysis of training load variations and trends.

Acc-Dec-COD: Acceleration-Deceleration-Change of Direction, a metric that sums up the total count of acceleration, deceleration, and change of direction movements, crucial for evaluating an athlete's dynamic performance.

IMA Imbalance: Inertial Movement Analysis Imbalance. A measure of asymmetry in inertial movements, helping to identify potential injury risks and areas needing targeted training to improve balance and stability.

Load Per Minute: The amount of physical exertion or workload an athlete experiences per minute, used to assess the intensity of training sessions and match performance.

Distance Per Minute: A metric that measures the distance covered by an athlete per minute, providing insights into their pacing, endurance, and overall movement efficiency during training and matches.

Acc-Dec-COD Per Minute: The frequency of acceleration, deceleration, and change of direction movements per minute, indicating the intensity and dynamism of an athlete's performance.

MD: Match Day. The critical day when official matches are held, representing peak performance periods that require strategic training and recovery planning to ensure optimal athlete readiness and performance.



Data Limitations

Conceptual and Data Limitations

- **Lack of Consensus:** The concept of GPS metrics based on thresholds has not yet reached a consensus in the scientific literature.
- **Situational Variability:** Physical performance is random and influenced by situational factors such as score, match location, and opponent.

Measurement Accuracy

Directional Changes: While the current study confirms the accuracy of IMA cuts for 45 and 90-degree left changes of direction with an error of 2% and 4% respectively, there is [a research](#) shows that accuracy for right direction cuts is less reliable, with errors of 13% and 18% for 45 and 90 degrees respectively.

Data Context and Completeness

- **Missing Contextual Data:** No context of training or match per day, limiting the understanding of workload and performance. Some guess-works has been applied to this analysis.
- **Player Status Data:** Lack of player-specific data such as gender, height, weight, age, and ethnicity.
- **Internal Training Load:** No measurement of internal training load, such as heart rate, to provide a comprehensive view of player exertion.
- **Velocity and Acceleration Relationship:** No data on the relationship between velocity and acceleration/deceleration, crucial for understanding movement dynamics.
- **Team Role Context:** No context regarding the role of the team, which shows significant changes over two seasons.

Conclusion

The limitations primarily stem from the absence of comprehensive data, making it essential to consider these factors when analysing and interpreting GPS metrics. Understanding these limitations is crucial for effectively using GPS data to monitor and improve athletic performance effectively.



How to Build Phylix

Data Filtering and Transformation

- Filtering Data: Based on specific criteria such as date ranges, team names, and player metrics. This was crucial to ensure that only relevant data was used for analysis.
- Grouping and Aggregation: The group-by operations has been used to aggregate metrics by different categories such as player, team, and date. Common aggregation functions included mean and max.

EWMA ACWR Calculation

The function to calculate EWMA ACWR, providing a ratio between acute workload (last 7 days) and chronic workload (previous 21 days). This technique helps in identifying spikes or drops in player workload, which is essential for injury prevention and workload management.

Advanced Metrics Analysis

- Acc-Dec-COD Metrics: The Acc-Dec-COD metric was used to track the count of acceleration, deceleration, and change of direction movements, providing insights into player workload and physical stress.
- 3 intensity metrics (Load Per Minute, Distance Per Minute and Acc-Dec-COD Per minute) has been introduced to measure the session intensity.

Visualisation Techniques

Altair and Plotly for creating interactive and informative visualisations, including bar charts, line charts, and Sankey diagrams.

Dashboard Development

- Interactive Dashboards: The comprehensive dashboards is developed by Streamlit to visualise team KPIs, player performance, and training periodisation. These dashboards provided a high-level overview as well as detailed insights into specific metrics.
- Customisable Views: The dashboards allowed users to customise views based on selected metrics, teams, and positions, making it easier to focus on specific areas of interest.

The repo of Phylix can be accessed by [this link](#). Please email cshuyaox@gmail.com to request the access.

