



2 March 2026

Data-driven fan mobility

Pilot Strategy and Action Plan (PSAP)

KielRegion

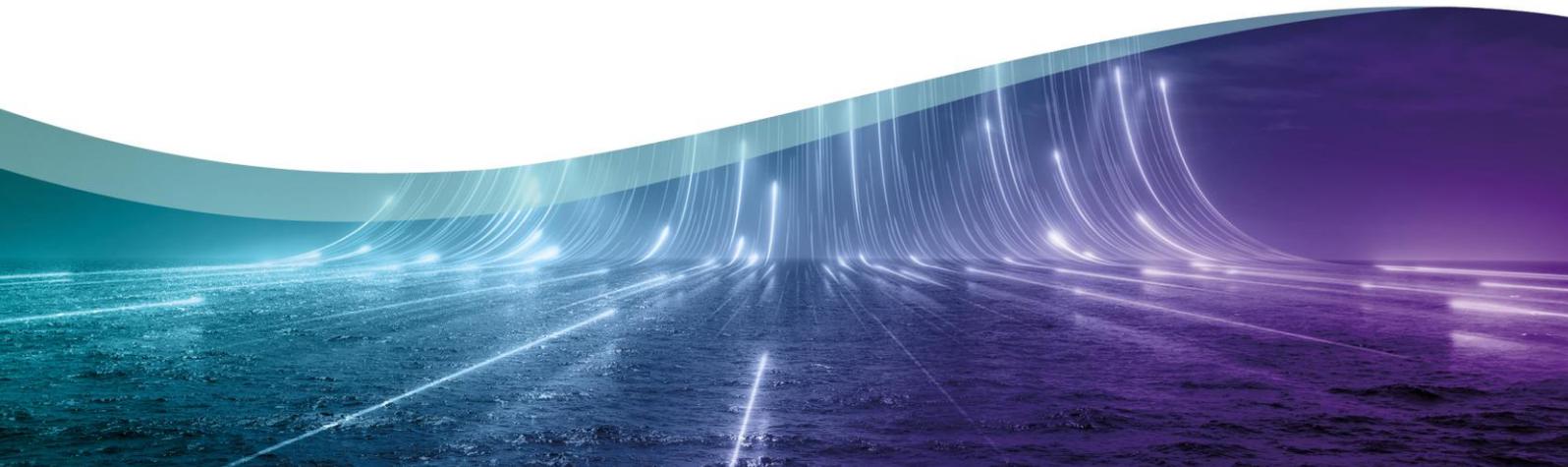
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1 Pilot Strategy

1.1 General Information

Name of Pilot (feel free to be creative!)	Data-Driven Fan Mobility
Name of Author of PSAP	Lasse Kröger + David Manthey + Christian Schönberg + Andreas Winter + Christian Rahmig + Nicolás Ortiz + Martin Guth + Azadeh Jalilian + Dilara Sir
Name of Organisation Leading the Pilot (Original Language)	KielRegion GmbH + Heinrich-Böll-Stiftung Schleswig- Holstein
Name of Organisation Leading the Pilot (English)	KielRegion GmbH + Heinrich-Böll-Foundation Schleswig- Holstein

Partner	Role (Topics)	Involved staff
KielRegion GmbH	Vision and requirements specification	Lasse Kröger, Leon Jamaer
Heinrich-Böll-Foundation Schleswig-Holstein (HBS)	Documentation & Communication, Springer	David Manthey, Max Nettleau, Lasse Trede (Finances), Nina Mumm (PR)
Oldenburg University (UOL)	Research partner (data- interoperability technologies)	Prof. Dr. Andreas Winter, Dr. Christian Schönberg, Azadeh Jalilian
aconium GmbH	Project management, content	Martin Guth, Dilara Sir, Claire Piqueret Rose
Deutsches Zentrum für Luft- und Raumfahrt (DLR)	Research partner (Detailed technical planning, prototyping)	Christian Rahmig, Nicolás Ortíz

1.2 Fundamentals

Summary

The project focus has shifted from improving bike mobility across the Kiel Region to a broader fan mobility use case around the Holstein Stadium (football stadium), which encompasses multiple modes of transport including bike mobility thereby delivering greater impact and more comprehensive benefits.

The pilot aims to promote sustainable forms of mobility such as public transport, cycling, while at the same time making motorised private transport more efficient and environmentally friendly (keyword: parking search traffic). This is done with a particular focus on the football stadium. On Holstein Kiel home match days, a special traffic situation regularly arises around the stadium, because up to 15,000 people have the same destination and an above-average proportion of fans (36–51%, according to different surveys) use their cars to travel to the stadium. This leads to CO₂ emissions, traffic congestion, considerable parking pressure and overcrowded busses and bike lanes in the stadium area. At the same time, there is no central, networked database that bundles heterogeneous traffic information from different data providers in real time and makes it available to users, which means that targeted control and relief have not been possible to date. This underlines the need for targeted planning and traffic management on match days based on reliable and interoperable mobility data. The fan mobility use case shows how data-driven solutions can improve local mobility challenges.

Challenge(s) and positive change

The transport sector accounts for a significant proportion of global CO₂ emissions and contributes significantly to air pollutant limits being exceeded. In Kiel, for example, particulate matter limits were exceeded at several measuring stations in 2019. Motorised private transport is a key contributor to this and despite increasing climate and sustainability efforts, it continues to grow. The transport infrastructure in cities such as Kiel and its surrounding areas regularly reaches its capacity limits, especially at peak times.

A concrete example of this situation is match day traffic around the Holstein Stadium. Between 36 and 51 percent of fans travel by car, which leads to CO₂ emissions, traffic jams, parking pressure and pollution for residents. At the same time, there is currently a lack of networked traffic data and digital control options to respond appropriately to these peak loads and derive data-based mobility measures.

With the help of the fan mobility use case, the KielRegion shows how data-based solutions can contribute to improving local mobility problems in concrete terms. The Mobility Live Access (a live data platform) is used to link relevant real-time data (e.g. on traffic volume, parking space utilisation, public transport use and different mobility services), develop recommendations for more sustainable and efficient travel to and from the stadium and provides a data basis for all involved stakeholders. This improves the traffic situation on matchdays and creates a transferable model for other regional mobility challenges.

For a holistic solution, data from all relevant mobility sources need to be integrated. This leads to interoperability challenges on all dimensions (ethical, regulatory, organisational, technical): Data sources are heterogeneous, meaning that they are owned by different entities, follow different access, retention and privacy rules, and use different formats and protocols.

Previously, the German pilot project also addressed the problem of uneven distribution of rental bikes in the station-based bike-sharing system in the Region of Kiel. The uneven distribution leads to empty stations at busy locations and overcrowding at less frequently used stations. The aim is to optimise redistribution in line with demand using an AI-supported prediction model based on historical usage data, real-time availability, weather and event data. This should improve bike availability, increase user satisfaction and boost the total number of rentals, resulting in more sustainable and attractive mobility in the region.

With the chosen use case on fan mobility, we actively contribute to establishing a data-driven culture in the Kiel Region. The stakeholder analysis showed that while data-driven practices have been limited, there is a strong interest and clear potential among stakeholders to expand and strengthen such approaches. Therefore, a data-drive-culture-shift has started in the Region within regional stakeholders.

Approach and milestones

Approach

- The envisaged approach to designing practical, affordable and sustainable data-supported applications in the transport domain entails the following elements:
 - Interdisciplinary team (5 different institutions)
 - Analysis of the market environment (through events, experts, communities)
 - Exchange with stakeholders, requirements engineering
 - Adjustment of data-interoperability concept (WP1) to Kiel application
 - Prototyping and testing (iterative)

Phase 1: Pre-design phase

Project start

Project Kick-off event

Problem identification

Interviews with stakeholders/ practitioners in Kiel region/ experts in the field (18)

Problem specification (how can we employ data to solve problems?)

Ideation + requirements specification

Internal Brainstorming

Workshop with practitioners on first solution draft (1.stakeholder event)

Formal requirements specification (document)

Phase 2: Design phase

Analysis of market (environment)

Interviews (experts/ communities)

Desk research

Detailed technical planning

Interdisciplinary team

Use case identification

Stakeholderevents: 1 Information meeting and 1 Deep-Dive Workshop

Stakeholderevent: rising public awareness (2 dates)

Concept draft on -> It should consist of proposals regard a technical infrastructure for data integration and access, as well as recommendations for legal and organisational framework conditions. (e.g. Operating concept, evaluation concept)

Final Prototype/ Concept/ Blueprint

Phase 3: Testing phase

Process/ impact evaluation

Internal Roles

KielRegion GmbH: Provides all necessary resources for development of interoperability concept, applies concept to use cases, contacts relevant stakeholders and partners.

HBF: Generates awareness, informs, opens discourse and provides educational opportunities with a special focus on socio-political, ethical and regulatory issues. Functions as Pilot-Lead.

UOL: The Carl von Ossietzky Universität Oldenburg acts as a research partner. Its main focus is a data interoperability concept. The university researches on interoperability challenges, requirements and solutions: what ethical, regulatory, organisational and technical issues arise in a heterogenous smart data environment? What is necessary for a holistic solution? What current solutions exist, and what are their respective up- and down-sides? What is still missing and how can this be addressed? The university also engages students and the scientific community about its findings and approaches.

DLR: Research partner providing overview on status quo in relevant fields, provide accordance of interoperability concept to Gaia-X standards.

aconium GmbH: Supervises the pilot management and partner activities, support in content wherever needed. For example: Support by content creation, participation method, evaluation of findings and moderation during stakeholder events.

Stakeholders and beneficiaries

On a local level, the project engages politics, administration, and the citizens of the Kiel Region.

On the national and European level, it involves various individuals, groups and organizations who are interested in the topic.

Communication takes place through podcasts, events, group-specific media and direct communication, as well as individual discussions.

Regional Use Cases: KielRegion

Mobility Live Access platform/Future Regional Data Platform and Mobil.Live-App

A framework is the existing mobility data platform Mobility Live Access (MLA), which serves as the technical basis for the aggregation and use of regional mobility data. Building on the experience gained with MLA, the platform is currently being further developed into a regional data platform to enable the interoperable provision of data from additional areas such as the environment, urban development and climate protection. This infrastructure will support the implementation of innovative use cases such as fan mobility management. In addition, there is the Mobil.Live-App, which is linked to the MLA and clearly shows users which sustainable mobility options, apart from private motorised transport, are available in real time in the immediate surroundings.

Extension of the Holstein Kiel stadium and Mobility Concept for the stadium extension.

Another point for the fan mobility use case is the mobility concept developed for the extension of the KSV Holstein stadium, which sets concrete goals to reduce motorised individual traffic and instead

promote sustainable modes of transport. This concept is based on the objective of ensuring environmentally friendly, safe and efficient access during major events.

Smarter Leben focus by KielRegion on sustainable mobility.

Another framework for the fan mobility use case is the strategic orientation of the city of Kiel and the KielRegion towards smart and sustainable urban development. This guiding principle aims to combine digitalisation and sustainability, especially in the field of mobility.

Pilot Impact Statement

The end users of our data solution are primarily fans of Holstein Kiel who travel to and from the stadium on match days. For them, it provides a significantly improved information base. By integrating additional data sources into the data platform and using the KielRegion mobility app Mobil.Live, fans can access real-time information on traffic conditions and available parking and mobility options, enabling a more efficient and sustainable journey to and from the stadium. With the integration of the mobility app into the Holstein Kiel app, mobility data becomes directly visible to fans.

Mobility providers can use access to aggregated, interoperable processed mobility data to better plan the availability and services of their fleet and dynamically adapt them to current demand situations and forecast developments. Takers: Institutional and private sector players involved in future mobility services.

The club Holstein Kiel gains valuable insights into fan mobility behaviour, allowing fan services and communication to be tailored more precisely to the needs of visitors.

Residents in the vicinity of the stadium are experiencing noticeable relief from fewer traffic problems and less parking pressure.

Furthermore, the police and security staff can make easier data-driven predictions for potential threats and crowd-management.

The project creates the technical and organisational basis for implementing user-oriented, data-driven innovations in the mobility sector in the KielRegion. This also benefits potential new stakeholders, such as private companies or public entities, that want to create new smart mobility solutions like services or applications.

2 Pilot solution(s)

2.1 What has your pilot accomplished?

As part of the pilot project on fan mobility around the Holstein Stadium, we have succeeded in identifying a specific and socially relevant field of application that can also serve as a practical real-world laboratory for the further development of the regional data platform Mobility Live Access.

In terms of organisation, we were able to establish a structured dialogue with a wide range of stakeholders, including mobility providers, city authorities, fans and the football club. Through joint needs assessments, a broad understanding of the opportunities offered by data-driven mobility was created, laying the foundation for collaboration on data preparation and provision.

Technically, the existing Mobility Live Access data platform has already been applied specifically to fan mobility, demonstrating great potential for further development. The platform is fundamentally capable of processing a wide range of mobility data, such as traffic counts, parking space data, weather information and public transport locations, in an interoperable manner. The aim was to combine these data sources in a targeted manner for fan mobility in the future, for example to generate capacity forecasts or provide user-oriented information services.

The pilot on data-driven fan mobility has been already displayed on the D4A-website through a news article.

2.2 What is (are) the concrete solution(s) developed?

The solution addresses the problem of high traffic volumes and excessive motorised private transport on home match days of Holstein Kiel. Despite existing alternatives, many fans use their cars, which leads to CO₂ emissions, traffic jams, parking problems and nuisance for local residents. At the same time, the mobility behaviour of stadium visitors has only been recorded sporadically to date, making targeted control, demand-oriented services and the derivation of data-driven measures impossible.

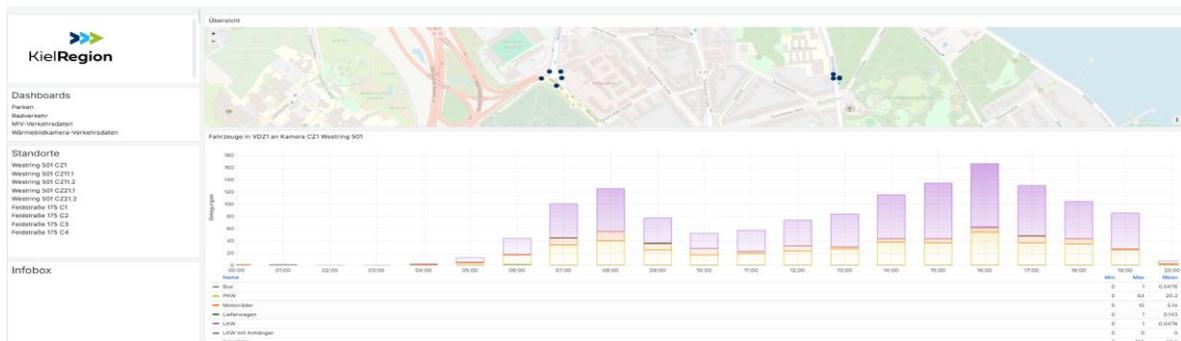
Our solution is to create a data-based information platform for fans, mobility providers and public authorities using the existing Mobility Live Access data platform (and Mobil.Live-App). The platform has been expanded for fan mobility applications so that relevant mobility data sources can be processed interoperable, thereby improving fans' travel behaviour.

The concrete measures include:

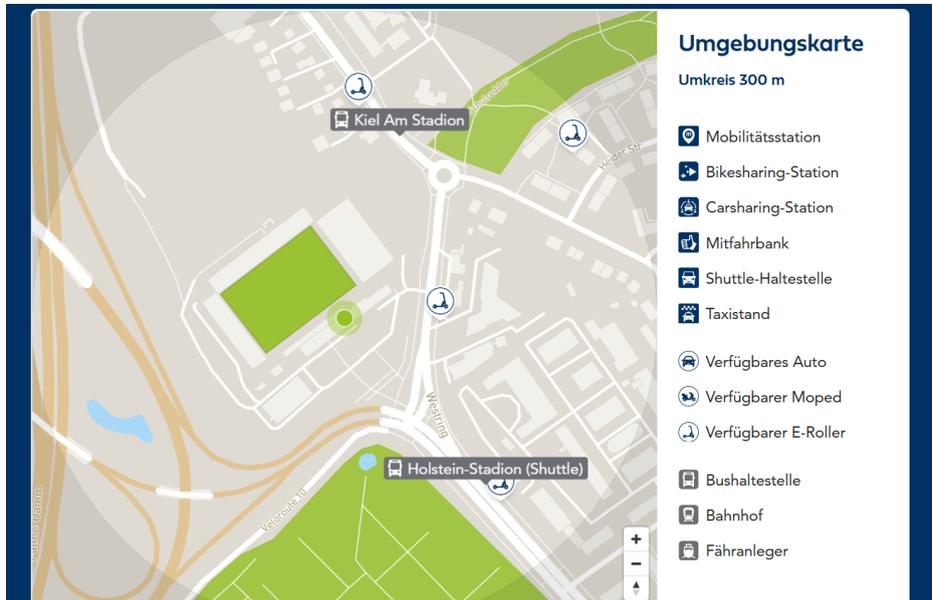
- the integration into the Mobility Live Access data platform of thermal imaging cameras that record traffic volumes directly in front of the stadium,
- a mobile traffic camera that can be flexibly deployed at various locations around the stadium to monitor traffic and fan flows,
- additional parking options in cooperation with the parking platform PEUKA, and the Mobil.Live app integrated into the Holstein Kiel app.

We have also developed a data-based solution for the issue of "rental bike availability", which is based on an AI-supported prediction model. The aim is to solve the problem of unevenly distributed bikes in the KielRegion to avoid empty stations and unused bikes. This will significantly improve the availability of the SprottenFlotte (the name of the bike-sharing system in Kiel) fleet, make it easier for users to find a bike and increase the overall utilisation of the system.

Dashboard of FLIR-Cameras

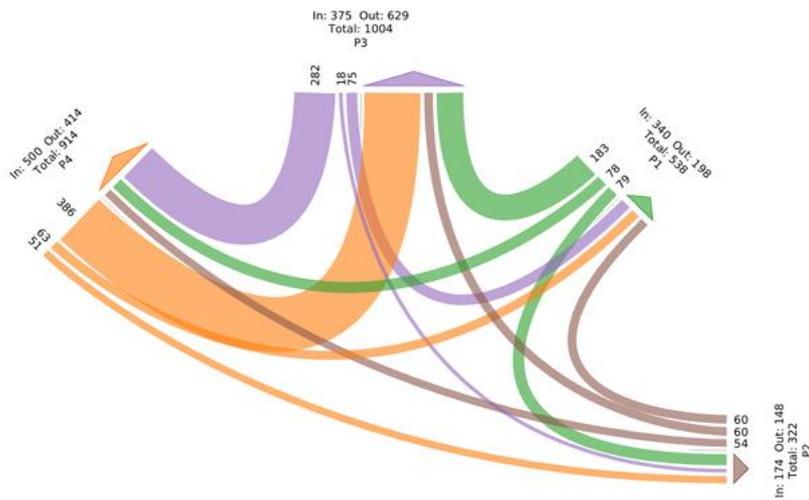


Mobil.Live-App

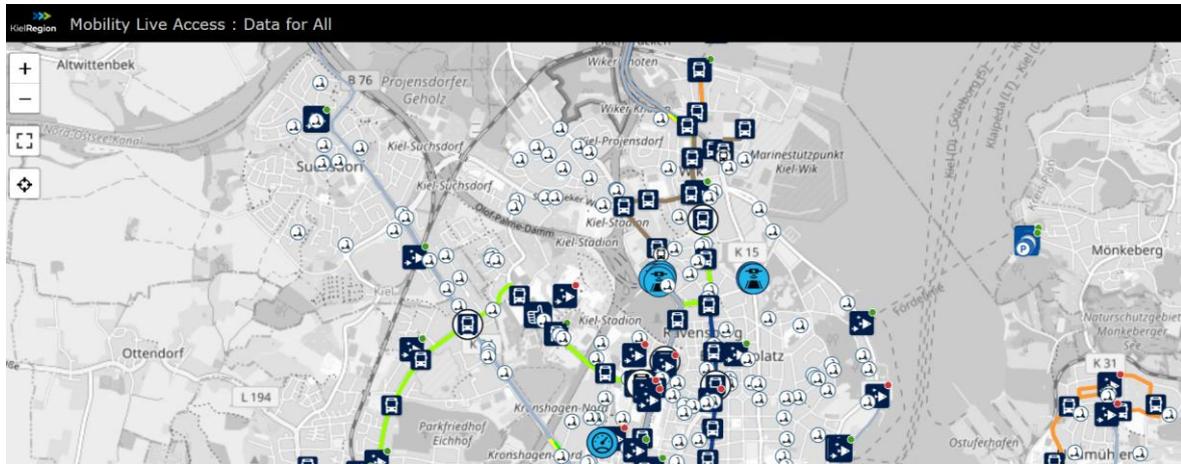


Data from the mobile traffic camera

OVERVIEW INTERSECTION DIAGRAM - PEDESTRIANS



Relevant mobility data related to fan mobility, available on the data platform



2.3 How was it developed?

The development of the solution involved a combination of internal and external expertise. Internally, the project team coordinated the stakeholder analysis, identified needs and defined requirements for the pilot. Externally, the implementation relied on the technical expertise of Addix, who contributed to expanding and adapting the existing Mobility Live Access platform.

The key steps included first: conducting a thorough stakeholder analysis, gathering requirements from fans, mobility providers, city authorities, intercommunal stakeholders, and the football club. Second: translating these insights into functional specifications for the platform. Third: The pilot then applied these specifications to integrate relevant mobility data sources.

The bike availability approach was first developed as a prototype in a student thesis at the University of Oldenburg, and later developed into a usable product by students at the University of Applied Sciences in Kiel.

2.4 When was it (or will it be) fully achieved?

The stakeholder analysis was conducted until mid-May 2025. Afterwards, the pilot team consolidated the insights from the analysis into a defined use case and began identifying and developing measures that directly contribute to and support the implementation of this use case during the final months of the project. The project created a transferable framework and example that can serve as a guideline for applying similar data-driven solutions to other use cases in the future. Therefore, stakeholder events were held with relevant actors at the end of the project to present the solution, share the acquired knowledge and identify additional potential solutions.

Availability of rental bikes: Together with students from Kiel University of Applied Sciences, a functional tool was developed, presented to the Donkey Republic service team and is now ready for use in principle. The findings can also be transferred to other cities and other rental providers.

2.5 By who or what organisation(s) will your solution be taken up?

The solution is or can be used by several key stakeholder groups:

- Fans of Holstein Kiel: They use the mobility app (mobil.Live connected with the MLA platform) to access real-time information on traffic, parking, public transport and alternative mobility options around match days. Fans are expected to use the solution mainly on home match days, with frequent interactions during the travel to and from the stadium.
- Mobility service providers and public transport operators: They use the aggregated and processed mobility data from the platform to adjust their services and schedules according to demand. Usage is primarily operational, particularly in planning and managing services before and during match days.
- City authorities and police/public order offices: They can use the data to monitor traffic flows, plan operations, and coordinate mobility management. Their use is mainly situational, focused on match days and special events.
- Holstein Kiel football club: The club uses the data to understand fan mobility behaviour and to optimise fan services and communication. Usage is mostly analytical and periodic, based on upcoming events.

To inform and enable all users, stakeholder events were held to present the solution, explain its functions, and demonstrate how to access and interpret the data. Additionally, by integrating the mobil.Live app directly into the Holstein Kiel app, fans were actively provided with intuitive, user-friendly access to relevant mobility information, which also helped to raise awareness of the app among the fan community.

Availability of rental bikes: Our solution is mainly used by service employees of the operator Donkey Republic, who are responsible for redistributing rental bikes in the KielRegion. They can use the tool to make data-based decisions on route planning and redistribution. In addition, the solution can also be used by employees of KielRegion GmbH and local authorities, for example to monitor system utilisation, identify bottlenecks and strategically develop the mobility offering.

2.6 How will your solution live on after the end of the project?

Fan mobility: By expanding the underlying technical infrastructure, in particular the Mobility Live Access data platform, we aim to enable its permanent use as a tool for analysing, controlling and communicating mobility data on large events that generate higher attendance and, as a result, require data-based traffic and crowd management. In this context, it is possible that Holstein Kiel and its app could increase the visibility of Mobil.Live and the data platform, accelerating the development of similar services and increasing acceptance of data-driven solutions. In addition, the technical and conceptual foundation can be scaled to other municipal areas of application.

Availability of rental bikes: Our solution is intended to be permanently integrated into the SprossenFlotte's operations. There is potential for scaling up to other regions, forms of mobility or integration into municipal mobility platforms.