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# MOBILITY manager

*Magazine for Public Transport*



Future of Rail

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# EDITORIAL

Dear readers,

Over the past few months, we have had to deal intensively with the effects of the criminal hacker attack. We are therefore more than pleased to report back to you with the MOBILITY manager, right on time after the summer break in the usual way.

This issue once again shows the energy and passion we bring to the ongoing development of our products and internal processes, all aimed at offering you – our customers – even better solutions.

One of our focuses, for example, is on developing new concepts for an integrated rail system that intelligently combines operational control and power control. In our cover article, you can read about the considerations that come into play here and how this holistic solution ena-



bles considerable energy savings as well as significant simplifications in operations management.

This issue also covers a comprehensive scheduling approach in the rail sector, which seamlessly integrates workshop processes into planning, along with two insightful field reports.

Last but not least, we provide you with an early look at the Profahr8 re-

lease, whose new user interface allows for even more intuitive and convenient working.

We wish you an inspiring read.



Torsten Vogel  
Managing Director  
PSI Transcom GmbH

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Future Of Rail

## Integrated Control System For Rail And Power Grid

**To rapidly expand our public transportation network, several concepts are needed to maximize the use of existing capacities. While infrastructure is key, energy is equally important. A promising approach lies in developing intelligent systems that efficiently link the operation and control of rail power grids together.**

**T**o rapidly expand public transportation, concepts are needed that make use of existing capacities – primarily infrastructure, but also available energy. A promising approach is the development of intelligent control systems that efficiently link the operation and control of rail power grids.

### Speed recommendations per vehicle

Rail transport has always been one of the largest consumers of electricity in Germany: the industry consumes about eleven billion kilowatt-hours per year. Energy-saving concepts have existed for many years – both for better climate protection and for cost reasons. They are based on the realization that energy consumption can be signifi-

cantly reduced through energy-efficient speed profiles. Concepts from the first stage of development consider only the energy-saving potential of a single vehicle. Drivers receive speed recommendations via driver assistance systems, mainly for acceleration and braking. However, this approach, as well as subsequently introduced incentive systems, did not achieve the desired results. Drivers rarely and inconsistently follow the recommendations.

### Speed control for multiple vehicles

The next stage of development no longer considers just a single vehicle but multiple vehicles as well as the upcoming track, such as a slower train ahead or a red signal. Additionally, an automatic system,

such as an Automatic Train Operation System (ATO), takes over the driving control for speed regulation as well as acceleration and braking. For example, it regulates a train's acceleration, maximum speed phases, and phases where a vehicle travels at slightly reduced speed over longer distances. It also manages coasting phases and extensively utilizes opportunities where trains do not consume energy. This control system determines the best energy profile for the scheduled arrival and departure times of all trains.

### Avoiding load peaks

However, the electricity needed for the higher frequencies currently planned cannot be saved through these solutions. Especially during peak loads, the capacity of the ex-





*Coordinating train journeys – this offers considerable potential for saving energy.*

isting electrical grids is insufficient, and this is unlikely to change in the medium term. Currently, different industry players, researchers, and transport companies are working on control systems that link the entire operation with the control of rail power grids. A key focus is the energy needed for departures, which is particularly high and therefore expensive. Load peaks significantly affect the electricity price that companies have to pay. For this reason, mathematical formulas are being developed to reduce the number of simultaneous departures, considering all other influencing factors.

### **Refeeding braking energy**

Another focus is the synchronization of arrivals and departures so that the energy released during the braking process of a train entering a station can be immediately fed back into the grid and used to accelerate a departing train. For this,

trains must brake and accelerate at exactly the same time.

By combining energy-optimized driving of trains, reducing simultaneous departures across the entire network, and timing arrivals and departures to use braking energy for acceleration, transport companies could not only expand their services but also save energy costs.

### **Algorithms for driver assistance systems**

Current research projects also suggest that transport companies can save significant energy and immense costs by making schedule adjustments down to the second – not noticeable to passengers – and by using driver assistance systems for real-time train control. This requires the development of algorithms that allow control systems to respond quickly and reliably to disruptions in everyday operations.

### **The solution: control system for operational management and rail power grid control**

So far, the control of rail power and operational management have been conducted in two separate areas – with their own control centers. However, the future will require these organizationally independent areas within the transport company to merge and create a holistic system by linking existing data and using artificial intelligence.

In this context, PSI is working with other partners to develop an integrated rail power management and operational control system. The planned control system aims to combine energy management with train management into a holistic, energy-optimized operational management system.

For this purpose, existing public transport management systems that control rail power grids, along with artificial intelligence will be enhanced and further developed into a continuous control system. In the Netherlands, Denmark, and Sweden, the first interfaces between the PSI control system for electrical energy and the Train Management System have already been established. This has allowed for the first visualization of how many trains are operating in a power supply district.

However, there are currently no Train Management Systems that go beyond this visualization to consider aspects of energy optimi-

zation and incorporate them into train traffic planning. For example, energy-related limits such as grid capacities are unknown because the data needed for planning is managed by external companies. Energy-efficient driving, therefore, is practiced only within the tight restrictions of the finished schedule, which means that additional savings, such as in the case of delays, cannot be realized.

### System requirements

The goal of a holistic control system is to integrate energy management with infrastructure data so that the mentioned energy savings can be considered in all phases of

pre-planning and operational management. The requirements for a system that optimizes both ongoing rail operations and energy consumption are extensive. This raises questions of standardization: How can the electrical infrastructure be integrated into the railML standard so that existing optimization tools can be used for schedule creation (planning) and delay/disruption management (operation)? Which components and interfaces can be standardized in such a system?

The utilization of energy-saving potentials often conflicts with operational goals, such as the quality of service for passengers or the even utilization of rolling stock and infrastructure. For instance, maintaining punctuality as well as optimizing

interval schedules to account for connections require higher energy consumption. The same applies to increasing the stability of schedules against delays.

With access to grid capacity information, an integrated, AI-based control system could manage train control, energy-optimized driving, and energy management holistically. This would enable the full potential of public transport expansion while also reducing energy usage and costs. This added information would allow the system to consider live traffic conditions across the entire network, including deviations, and optimize each train journey to precisely synchronize and control braking and acceleration through Automatic Train Operation (ATO). By incorporating grid capacities into all calculations, the system ensures network stability while maximizing energy and cost savings.

### Harmonizing operations and energy

A shift of goods and passenger transport from road to rail would only succeed if intelligent systems consider and manage the interdependent operational and energy-related conditions. An integrated control system forms the foundation for this. This coupling of currently separate organizational areas is crucial for utilizing the remaining flexibility in schedule creation for energy-efficient optimization while simultaneously considering aspects of operational management and the rail power grid in real-time. 🌐

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Operations and rail power control linked together.



## The Digital Depot For The Railroad

**The increasing complexity in the planning and implementation of a dense public transport network requires innovative solutions that increase both efficiency and the attractiveness of public transport for passengers and employees alike. A key starting point is a scheduling system that incorporates operational and maintenance processes in equal measure.**

**T**he expansion of public mobility services is at the top of the agenda nationwide. After all, climate-neutral transportation can only be achieved with sustainable and efficient public transport. The aim is therefore to encourage more people to switch to buses and trains. To achieve this, the attractiveness of public transport must be further increased by expanding the services. However, implementation is not easy, as many transport companies are confronted with outdated infrastructure in addition to a shortage of skilled workers. For example, rail companies only have limited train track capacities. This means that new lines can often only be put into operation with more frequent train services or a train track occupancy rate of over 80%. The remaining capacities then compete for processes whose frequency and complexity also increase.

### High planning complexity

This also affects production and maintenance processes in particular. This is because growth logically leads to a significant increase in the number of necessary feeds to workshops and causes a further increase in the complexity of the associated processes. The dilemma: while transport companies are required, on the one hand, to ensure operational quality and reduce delays with the limited capacities, they also have to carry out more empty and maintenance runs and cope with a significantly higher level of planning complexity.

### The ability to react quickly

Companies have to make many adjustments at the same time in order to be able to operate reliably and efficiently as they expand their services. This calls for concepts that sensibly limit maintenance

requirements and maintenance costs. Companies must also be able to react much faster in the event of disruptions. This is the only way to minimize disruptions for customers and avoid traffic jams. This in turn requires decisions to be made much more quickly in such situations. After all, the tighter the intervals between trains, the more drastic the effects of deviations: Delays of as little as two minutes can lead to partial cancellations.

### User-friendly systems

Last but not least, a particular challenge is the required growth in personnel. It is well known that the market for skilled workers will remain virtually empty in the medium term. The first step here is to reduce demand by optimizing product efficiency. At the same time, ideas are needed on how to keep jobs in transport companies attractive and minimize staff turnover. Modern software systems are an important solution component here: They automatically visualize complex interrelationships and support decision-making under high time pressure. However, they are only efficient if they are intuitive to use and do not require time-consuming and costly training. In addition, to reduce unattractive night shifts, planning must also place greater emphasis on scheduling maintenance work during the day.



*The digital integration of maintenance and operational processes is crucial.*

## Rapid response to disruptions

Depot management systems such as PSITraffic/DMS from PSI provide valuable support in solving these tasks. At their core, they optimize, digitalize and automate central processes, ensuring the necessary digital integration of maintenance and

lies in the end-to-end digitalization and harmonization of processes between the responsible departments. Ideally, this means that a scheduling system automatically generates a scheduling proposal that directly takes into account the availability of infrastructure, personnel and vehicles.

trip to the depot and adjust the route so that the extra trip ends in the depot. Integrated and inter-linked planning therefore not only facilitates faster decision-making, but also enables the optimized use of resources.



*PSITraffic/DMS generates a scheduling proposal that takes into account the availability of infrastructure, personnel and vehicles.*

operational processes as well as the holistic digitalization of the dispatching processes of railroad undertakings and railroad infrastructure companies. One example: If a detour is necessary due to disruptions, intensive coordination would be required in a direct exchange between the various parties involved in the process. The infrastructure department must provide the required train track, while the dispatching department must provide drivers and vehicles.

These coordination processes are time-consuming, labor-intensive and error-prone. The response time would therefore be considerably too long if public transport were to be expanded further. The solution

## Rapid planning of spontaneous extra trips

Another example relates to additional trips due to spontaneous increase in traffic volume. In these situations, public transport companies would also be required to coordinate all necessary implementation steps with all stakeholders via the operations control center. If, however, the systems involved – including operations scheduling, route planning, personnel scheduling and vehicle scheduling – are seamlessly networked with each other, it would result in significantly greater efficiency. The system would then recognize, for example, when a vehicle is unproductively scheduled for an empty

## Conclusion

With depot management systems, companies digitize, automate and link all relevant operational processes together. There is great potential in automatically incorporating workshop orders into circulation planning, even in the event of operational timetable changes. This holistic scheduling approach not only increases the efficiency of operational processes. Appropriate processes also lead to a high level of operational quality and customer and employee satisfaction. 🎯

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## Rhein-Neckar Verkehr GmbH Masters Complexity

**Expansion of public transport services, decarbonization, digitalization: Rhein-Neckar-Verkehr GmbH, like most German transport companies, is in the midst of radical change. The PSITraffic depot management system acts as an important pillar in this transformation process.**



*At the depots of RNV, over 450 vehicles are scheduled, maintained, cleaned and refueled daily.*

**S**ince the merger of five independent transport companies in 2005, Rhein-Neckar-Verkehr GmbH (RNV) has been one of the largest public transport companies in Germany, making it the strongest partner in the overarching Rhine-Neckar transport association. With Mannheim, Heidelberg and Ludwigshafen, the company operates light rail, streetcar and bus lines in three large areas. To this end, RNV has the largest contiguous meter-gauge network in Germany (208 km), with over 451 vehicles across three depots and parking facilities. The e-buses, streetcars and “last-mile shuttles” as well as the depots are powered by 100 percent certified green electricity. By 2032, RNV aims to be running exclusively on green electricity.

### Planning complexity no longer manageable by analogy

Digitalization is an important lever for implementing the corporate strategy. It helps to optimize work processes, increase efficiency and reduce costs. Dirk Zimmermann, Project Manager in Planning and Operations at RNV explains: “Until now, planning at the individual locations was done using Excel lists. However, as the transport companies from the three cities of Heidelberg, Mannheim and Ludwigshafen grew together, this form of scheduling was no longer optimal and was also no longer feasible due to the increased complexity.” Against this backdrop, the go-ahead was given for the introduction of the PSITraffic Depot Management System (DMS) – one of several digitalization projects that Dirk Zimmermann is managing.

### Software as a prerequisite for further development

By using the DMS, RNV is aiming to coordinate operational processes across locations, which has made it possible to optimize costs in many areas. For example, implementing centralized 24/7 vehicle scheduling has freed up valuable capacity for other, more urgent tasks. “Over 450 vehicles are dispatched, maintained, cleaned and refueled at our depots every day. This involves a lot of interlocking gears. Keeping an eye on all relevant influencing factors and efficiently harmonizing the respective processes would not be possible without the software,” says Dirk Zimmermann. According to the project manager, this applies to not only fault management, but also workshop management especially.



## Operation and workshop in harmony

In Mannheim, the workshops coordinated the supply of vehicles themselves – the requirements of daily operations were not always taken into account. In addition, the feeds were linked to time-consuming coordination. “That was neither up-to-date nor efficient,” recalls the project manager. “The generous vehicle reservations were logical from the department’s point of view. From a holistic perspective, however, this led to unnecessary and expensive downtime for vehicles that were urgently needed in day-to-day operations.” Today, the integration of workshop processes into the DMS provides a high level of transparency for all workshop orders, which optimizes the utilization of resources. If a driver reports a fault, the message is transferred from the SAP system to the DMS and the workshop via an interface. The system immediately checks whether the problem needs to be rectified immediately. If so, it updates the planning in real time and at the same time to ensure punctual driving operations. If there is time to rectify the fault, the software

schedules the workshop supply optimally for all other requirements.

## Rotation allocation for emission free vehicles

The task of every transport company is to ensure reliable transport operations. Sophisticated planning processes run in the background to ensure that every train and bus departs and arrives on time. Essentially, this involves assigning available vehicles to open routes. With the gradual transition from diesel to electric and hydrogen vehicles, planning requirements have become significantly more complex and challenging, particularly in the bus sector. “Without the addition of a module for load and charging management to the E-DMS, this would not have been possible,” says Zimmermann. For instance, the system takes into account the respective charge status of the vehicle batteries when allocating routes and aims to optimize energy use in order to avoid overloading the networks and expensive peak loads. The RNV now uses three generations of e-buses, which, with their different ranges, are not suitable for all or different routes. If the

routes are longer than the electric ranges, the system would plan to use diesel vehicles and, in future, hydrogen buses.

## Utilization of parking spaces

Due to the high capacity utilization of the depots, new requirements for parking space allocation have emerged, which can only be addressed across multiple locations with the help of the software. For example, some depots are now so busy that the allocation of parking spaces in the evening is like a game of Tetris. There is little space available and the aim is to maneuver as little as possible. In the rail sector, 12 different vehicle types with different lengths would also have to be allocated to the lines. In both areas, the DMS identifies the most suitable parking space, taking into account the next round trips, and enables the efficient use of the available space and lines. This is linked to a digital workflow that everyone feels comfortable with: “If a vehicle is parked incorrectly, the system automatically reschedules it or indicates the error to the dispatcher so that they can react in good time.”

## Autonomous in the future

For RNV, centralized automatic vehicle dispatching with PSITraffic has proven highly beneficial. The software has made work much easier for dispatchers in particular. “Much of what has to do with the development of RNV would not have been possible without the DMS,” summarizes Zimmermann. “This applies in particular to our newly planned depots and support for autonomous driving.” The DMS is the basic prerequisite for this. 🔄

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*The integration of workshop processes into the DMS leads to high process transparency.*

## Scheduled Updates And Better Performance

**Since 1998, we have been developing our Depot Management System in close cooperation with our customers based on their requirements. Now it is time to technically structure the system so that our customers could enjoy the functional enhancements brought by the new version of the system. In short: a product-oriented solution has emerged from numerous individual project installations. Improved testing options and faster system updates are just some of the benefits for you.**

### How have DMS updates worked so far?

Alvar Schulze: Previously, each version of the DMS that was delivered represented an individual project. The specific customer requirements were fulfilled and only any bug fixes or adjustments were made in the long life of the software. If a request was made for a major new feature, this feature would simply be integrated into the frozen software version of the project and no software update would be carried out. In development, this is known as "cherry-picking". This had some disadvantages that made feature updates extensive and expensive.

We therefore decided to introduce a release management system. We started preparing this process some time ago and brought the history of project and customer-specific versions over the last few decades to a uniform level. At the end of the second quarter of this year, we successfully completed the first software release and began to introduce it step by step.

### What does the release process look like now?

Alvar Schulze: There are no longer project-specific versions, but standardized releases that contain a clearly defined scope of new developments and software changes. These releases always contain the complete functional scope of the DMS, but depending on the license of the individual customer, only licensed functions are activated. In order to guarantee the quality and stability of such a release, each version is fully tested in a standardized process, including with a standard test case catalog, before publication and any errors that occur are rectified. The implementation of short-term extra requirements is incorporated into the publication of the next release. This guarantees the stability of the system.



*Alvar Schulze, Head of Product Management*

### What advantages do the releases offer our customers?

Alvar Schulze: There are several. For example, depending on the license agreement, our customers gain access to new functions and optimizations that improve their user experience and make their work more efficient. In addition, errors that occur with individual customers are rectified for all customers thanks to a uniform software version. Scheduled and regular updates make maintenance easier to plan and minimize the risk of errors occurring. A standardized test case catalog also guarantees the stability and availability of the system. Training and updates are easier to manage and a defined end of support ensures an appropriate transfer of knowledge for users and support staff.

Overall, it can be said that our customers get the best out of their software thanks to the releases and can in turn ensure smooth, secure and efficient operation for their customers. 🟢

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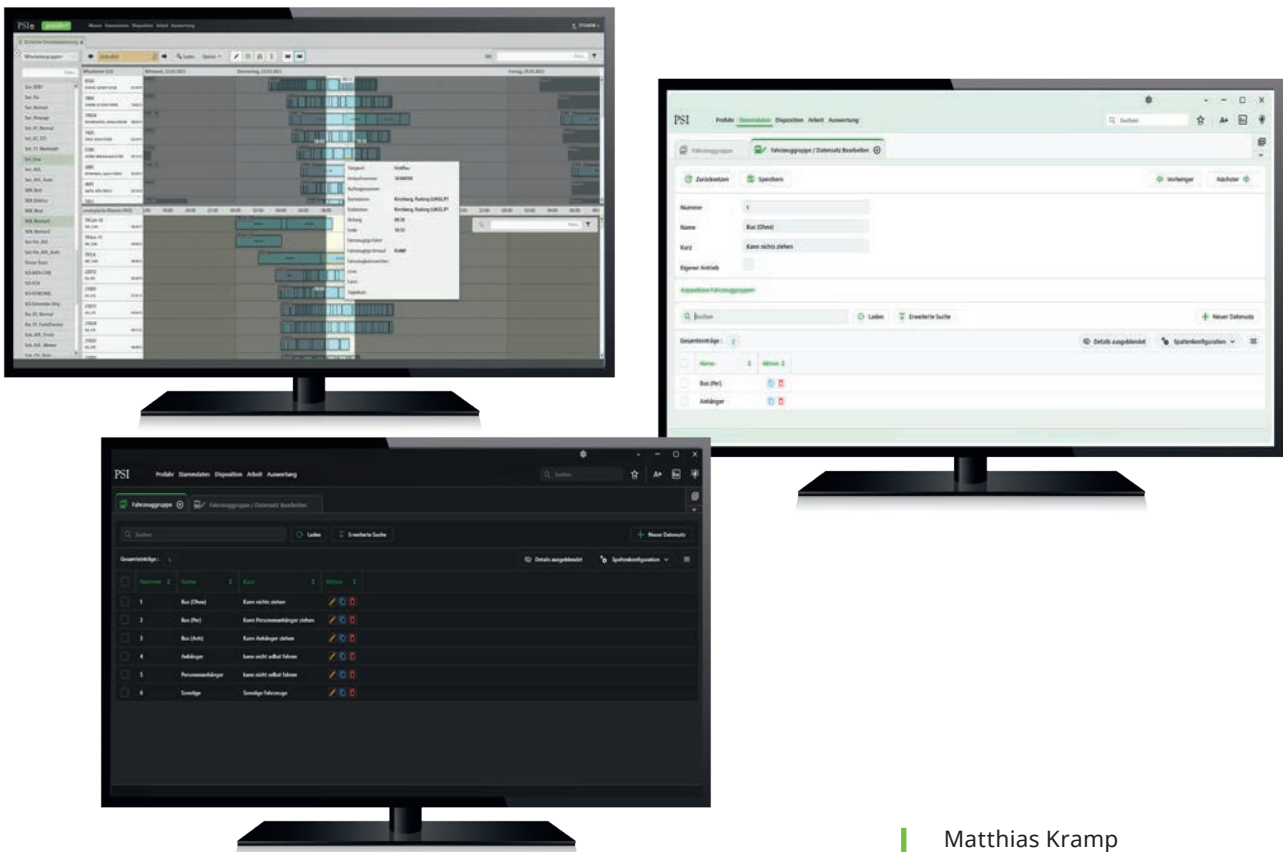
## Modern And User-Friendly

Users of our personnel scheduling system Profahr can look forward to a comprehensive update of the user interface. Visitors to our stand at InnoTrans in September 2024 can take a first look at the new layout and the modern, user-friendly operation.

The new user interface offers our Profahr customers numerous advantages: content can be accessed more quickly thanks to simpler and user-friendly navigation – so new employees, for example, can quickly familiarize themselves with the software. This saves time and increases work efficiency. Last but not least, the susceptibility to errors in scheduling is reduced. An improved user experience leads to greater employee satisfaction. The rollout of Profahr8 will take place in 2025. 🕒

### What's new?

- ✓ Option to switch between light and dark mode
- ✓ Change the font size with just one click
- ✓ Change the language with just one click
- ✓ Option to move tabs to change the order and/or grouping
- ✓ Display data record details by mouseover
- ✓ Button for resetting actions
- ✓ Textbox search for quick access to tabs
- ✓ Delete button for quick deletion without positioning the cursor
- ✓ Display of the number of all data records
- ✓ Option to mark and select data records



Many new functions simplify working with Profahr.

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## Flexible Software For Demanding Shift Planning

**Rapid growth in a company requires IT systems that can support this development. Umbrella City Lines GmbH has chosen to implement a new workforce scheduling system as part of this growth. The new solution focuses not only on operational needs but also keeps the employees' needs in sharp focus.**

**U**mbrella City Lines GmbH (Umbrella) is not an unknown entity. As one of FlixBus's key partners in Europe, it covers over 25 million kilometers annually and has made a name for itself in Germany. Following requests from various German transportation companies, this subsidiary of the Czech firm Umbrella Mobility SE expanded its operations to include public transportation, rail replacement services and bus replacement services. In Germany, Umbrella operates bus routes for Deutsche Bahn in the Görlitz district, for the Hamburger Hoch-

bahn, and for Verkehrsbetriebe Hamburg-Holstein, among others. The company is also set on further expanding its operations. Currently, Umbrella coordinates a total of 214 shifts and over 300 drivers across five locations in Germany, with 98 vehicles. The volume of data and its dependencies have increased with each project and will become more complex as growth continues. "We have increasingly reached the limits of our old workforce scheduling system and started searching for a solution that consistently aligns with our needs and resources while offering max-

imum flexibility to our employees," explains Axel Meske, who, as Head of Operations Planning at Umbrella, oversees many of these processes.

### Essential planning

While the rough planning across locations is done at the headquarters in Hamburg, local employees handle the detailed scheduling. The fact that the old system lacked a VDV interface was a growing burden, requiring manual transfer of vehicle schedules and last-minute changes into the scheduling system. This process was labor-intensive and time-consuming, making



*Umbrella City Lines GmbH coordinates over 300 drivers, 214 services and 98 vehicles.*



optimized long-term shift planning impossible amid increasingly complex structures. "Planning is essential for our employees and for us as a transportation company. If we cannot provide this, we will lose valuable skilled workers in the long run," says Meske. The challenge for Umbrella is not only managing the different locations with their own operating agreements and billing requirements but also giving special consideration to the diverse needs of all drivers.

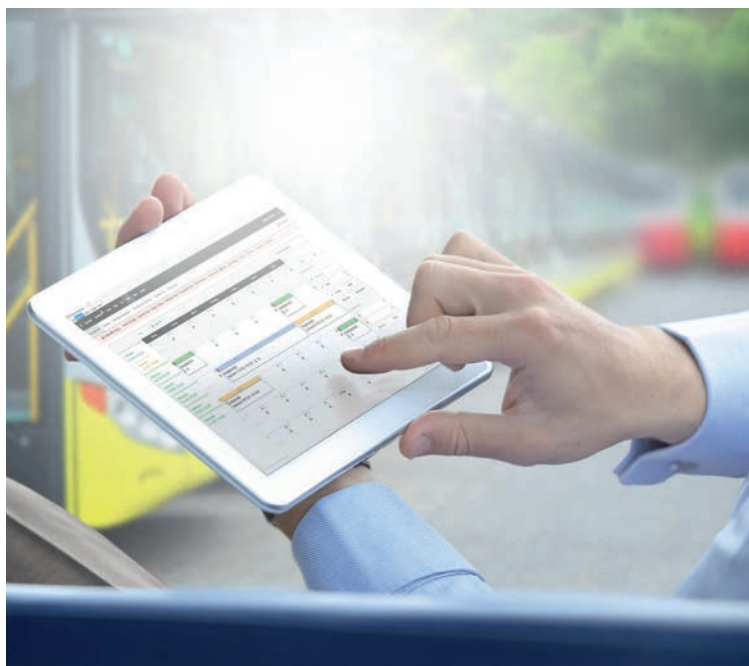
### Choosing from seven shift patterns

After a brief market screening, Umbrella chose the Profahr workforce scheduling system from PSI Transcom, which was implemented and became operational at all four locations within just six months. The system enables both long-term planning and a high degree of flexibility. Via the VDV standard in-

terface, Profahr automatically receives all schedule and change data. Based on this and after comparing the stored shift patterns, it creates duty rosters that comply with all legal regulations, operational agreements, and collective agreements. It also flexibly supports the various billing methods required by each client. "Today, we can react quickly to all kinds of changes, providing enormous planning security. Additionally, drivers can now choose from up to seven location-specific shift patterns, leading to high employee satisfaction," says Axel Meske.

### Start of duty with a click

The integrated operational information and communication solution from Profahr is also indispensable for Umbrella. Employees can access duty programs and sign in for shifts via an internet-enabled device, such as a smartphone or tablet. "Where we used to rely on phone calls or text messages, our dispatchers can now instantly see where someone is missing and needs to be reassigned," describes



Drivers register for the service via a mobile device.

the Head of Operations Planning. This has also positively impacted documentation quality. In the past, dispatchers had to manually enter information received from drivers over the phone or through other means into the system. This was often only possible after finding replacements or making reassignments under significant time pressure, leading to delayed, error-prone, and incomplete data entries. Today, relevant data is automatically and fully documented in Profahr through the integrated communication module.

### Shift swapping

The mobile solution is popular among drivers because it allows them to view their duty rosters and flexibly swap shifts based on transparent criteria, regardless of location and time. The module uses all relevant information stored in the workforce scheduling system, such as qualifications, duty, and vacation schedules. "Our employees can directly swap a shift they've agreed upon with a colleague or

post a swap request via the search-offer function," says Axel Meske. If the system's plausibility check reveals no violations, employees can save the swap proposal and forward it to the swap partner and the dispatcher for approval. Once the dispatcher approves, the module updates all relevant information in the main system, which then adjusts the duty rosters accordingly. In the search-offer function, an employee posts a

swap request, which a colleague can accept flexibly. The subsequent steps follow the direct swap procedure. According to Axel Meske, the swap market is well-received by both drivers and dispatchers, providing further work relief and planning flexibility.

### Minimal trip or staff shortages

Profahr provides Umbrella with a unified personnel dispatching system for all locations, allowing the company to manage high planning complexity. This is evident in the quick and transparent payroll pro-



With Profahr, Umbrella manages the challenging balancing act between planning security and flexibility for employees.

“ Thanks to Profahr, we can react quickly to all kinds of changes, providing enormous planning security. Additionally, drivers can now choose from up to seven location-specific shift patterns, leading to high employee satisfaction.”

**Axel Meske, Head of Operational Planning, Umbrella City Lines GmbH**

cessing and the significant reduction in trip or staff shortages. According to the Head of Operations Planning, the company particularly benefits from the creation of binding and long-term duty rosters. “In combination with the mobile operational and communication solu-

tion, the system leads to noticeably high employee satisfaction, reducing the risk of turnover and making us a more attractive employer,” says Meske. Further expansion plans are already on the company’s agenda, including introducing a module for automatic driver’s license checks.

### Responsibly on a Growth Path

With its new driver-related personnel dispatching system and mobile communication solution, Umbrella City Lines is also well-prepared for its growth path on the IT side. It fulfills all legal, operational, and contractual requirements of various clients, as well as the demands of being a modern, responsible employer. 🌱

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## Management Of Buses And Charging Infrastructure

ÜSTRA Hannoversche Verkehrsbetriebe AG and Regionale Verkehrsgesellschaft Dahme-Spreewald GmbH (RVS) currently employ on the PSImartcharging load and charging management system respectively the PSITraffic/DMS depot management system to control the charging infrastructure and depot processes. These systems will significantly enhance vehicle availability and reduce complexity as they transition to electrification.



ÜSTRA buses will be emission-free by 2035.

In the future, the ÜSTRA depots and "on-the-go charging points" equipped with modern charging infrastructure will be efficiently monitored and controlled using PSImartcharging. The system ensures the availability of electric vehicles and, if necessary, postpones charging processes or reduces the charging power to avoid bottlenecks in the energy supply. Charging processes are controlled in a cell-friendly manner to ensure a long battery life. The charging target is set by the user in the depot management system and is automatically transferred to the charging management system.

PSImartcharging can be expanded to include additional depots and charging points and can be connected to the charging technology of various suppliers. It also has in-

terfaces to third-party systems – such as depot management or ITCS systems – and supports access to vehicle data in accordance with VDV interface 261. The system structure meets all the necessary requirements for KRITIS-compliant operation.

This will not only ensure the availability of the electric buses, but will also help to minimize energy costs and optimize maintenance and fault processing. This way, PSI is significantly supporting ÜSTRA in its goal of operating all local transport in the region exclusively emission-free by 2035.

### RVS starts with basic DMS

Regionale Verkehrsgesellschaft Dahme-Spreewald mbH (RVS) will soon use the PSITraffic/DMS in the future to manage its buses in the depot. The system will initially be delivered as a basic version with all the necessary functions for monitoring and controlling the mixed fleet of RVS. In subsequent phases, additional depots and further electric buses will be integrated into the system.

The basic DMS enables RVS to digitalize its depot processes end-to-end and visualize central processes such as vehicle parking, supply and scheduling. Timetable and roster data are transferred from the existing systems via interfaces and they form the basis for scheduling. A connection to PSI's existing ITCS will also be implemented. The necessary charging processes are monitored via an interface to the external charging management system and varying energy consumption is taken into account in order to create charging plans for the e-buses in advance. In a further project phase, additional modules will be added to the system and scheduling will be gradually automated further. By 2035, the entire RVS fleet is to be converted to electromobility.

The basic system enables RVS to get started quickly and easily with emission-free bus operation. The modular expandability reduces the complexity of digitalization and enables reliable operation of its mixed fleet. This will reduce operating costs and ensure the availability, reliability and cost-effectiveness of the vehicle fleet. 🌱

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## All Autonomous?

**Three current research projects shedding light on what depots and local transport could look like in the future – and what still needs to be done before then.**

The importance of local public transport in Germany will continue to grow, mostly thanks to ongoing urbanization and the growing demand for sustainable mobility. These emerging tasks pose significant demands on transport companies and research and technology firms, making a future-oriented development of local public transport essential to meet these challenges. PSI Transcom is therefore currently involved in three research projects together with other stakeholder representatives: "Automation of the Hamburg on-demand service with integration into public transport" (ahoi), "Innovative depot automation" (IDEA) and "Data governance and standardization for vehicle data platforms" (STAPL). These three research projects focus on technologies and scenarios suitable for application for autonomous or semi-autonomous driving, both with and without passengers as well as the development of a standardized reference architecture for vehicle data platforms. This architecture aims to ensure legal certainty in handling vehicle data.

### Automation of depots: Autonomous driving and automatic supply

The depots of public transport companies, whose infrastructure and processes are also explicitly the subject of current research projects, are inseparable from public transport. Here, too, efficient solutions must be created to counter-



*Depot automation through radio-based communication between vehicles and DMS..*

act the shortage of skilled workers and rising costs – above all through the (partial) automation of operational processes. The "IDEA - Innovative Depot Automation" project deals with this topic. It shows how depot automation can be innovatively and economically implemented using 5G campus networks and minimal automation of vehicles. In this specific case, radio-based positioning and communication between driverless buses and a depot management system via a 5G campus network is being developed and tested in a real laboratory. The PSITraffic/DMS depot management system serves as the test environment, which is being expanded to include functions for controlling and monitoring automated driving maneuvers and supply processes. This is associated

with the standardization of corresponding vehicle interfaces for tracking and vehicle control. It ensures that future commercial applications are interoperable and can be used economically.

### Using vehicle data efficiently: standards and legal certainty

If transport companies want to continue to use their vehicles economically in the future and further improve their carbon footprint, they must be able to record and reuse vehicle data intelligently. Currently, there is a lack of legal framework conditions and standardized interfaces for data processing. Platforms that can be used across the board for cross-user data usage are also lacking. The European research project "STAPL - Data Gov-



ernance and Standardization for Vehicle Data Platforms" aims to create a standardized reference architecture for vehicle data platforms and formulate binding data governance guidelines. Research is also being conducted into data access to diagnostic and sensor data in the vehicle as well as AI-based applications for data analysis. PSI Transcom is coordinating this research project and is working – together with the Association of German Transport Companies (VDV) and the non-profit organization Information Technology for Public Transport (ITxPT) – on the expansion and harmonization of vehicle data standards in Germany and Europe.

### Hamburg on-demand shuttles: automation and integration into public transport

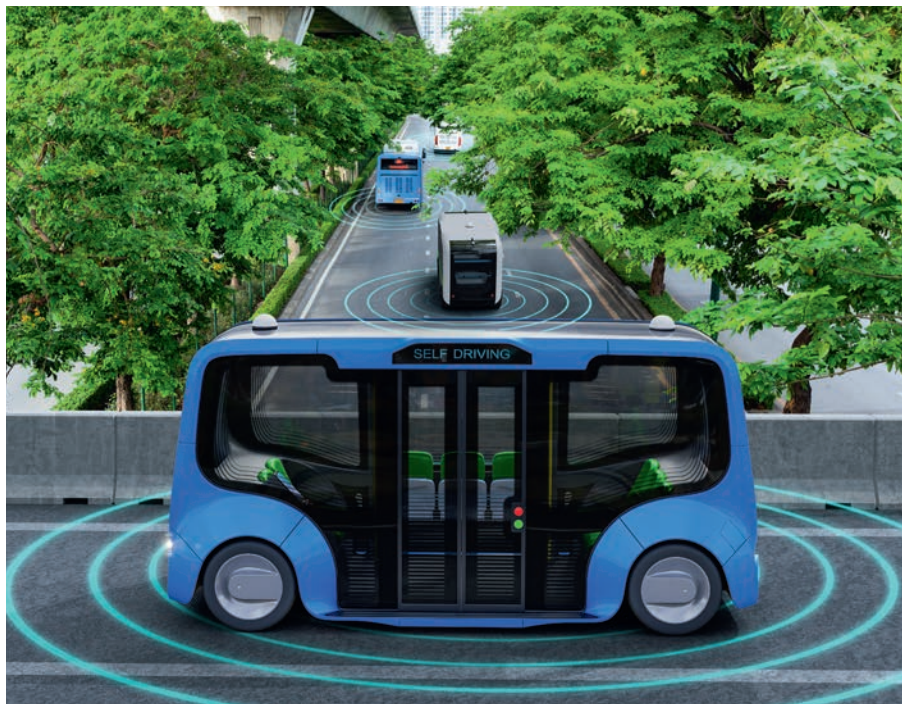
On-demand services and autonomous driving are regarded as key topics for the public transport of the future. On-demand services represent a sensible form and supplement to public transport, particularly in rural and suburban areas. However, the number of drivers required for this is considerable in relation to the number of passengers transported and requires a high degree of flexibility in personnel planning. Against the backdrop of a shortage of skilled workers and the continuous expansion of public transport services as part of the mobility transition, recruiting sufficient drivers for buses, trains and on-demand shuttles has become a critical factor. It is therefore logical to work on solutions with autonomous vehicles for on-demand systems. Finally, yet importantly, valuable experience and data will be gained that can also be used in other areas of public transport to

implement autonomous systems in the future.

In the ahoi project, the two approaches are combined to create a unique use case. The innovation project is based on the "HVV hop" on-demand shuttle service operated by Verkehrsbetriebe Hamburg-Holstein GmbH (VHH), which has been an integral part of the passenger services offered by the Hamburg Transport Associa-

They are therefore not designed to compete with public transport, but rather to complement it. A key task of the innovation project is to further develop the PSITraffic/DMS depot management system used by VHH into an integrated control center. This center will enable the coordinated operation of the traditional manually controlled vehicles with the autonomous vehicles in the future.

To this end, the team is develop-



*Autonomous electric bus.*

tion (hvv) in Harburg since January 2023. The aim is to develop an on-demand operation with a mixed fleet of autonomous and manually controlled vehicles in the near future and to put it into operation after extensive tests on public roads. The autonomous vehicles are to take over fine-tuning tasks and be used in particular on the so-called last mile. They are integrated into the HVV fare and in particular take on a feeder function to the existing public transport network in order to offer even more people an alternative to the private car.

ing functionalities for autonomous driving as well as for the planning and scheduling of on-demand traffic. The focus is on processes such as technical supervision and vehicle scheduling, vehicle preparation and follow-up (set-up and dismantling) as well as reacting to hazardous and disruptive situations. 🟢

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## (New) Look-And-Feel: Our New Website

With the change of our Executive Board in 2023, the ambition to develop PSI into an innovative and integrated software group was raised to a new level. A first example of this is our completely redesigned website. We present ourselves in a fresh, new digital look. Why the new website?

### Snackable content: "light and crisp"

We know you have a lot to do in your day-to-day business: Researching through long text deserts is not one of them. Our aim is to be your trusted partner with valuable digital content and resources and to act as a source of inspiration and experts for you.

We keep a close eye on your time requirements. The content on the new website also helps you to receive important information and topics quickly, snackably and whenever you are ready for them.

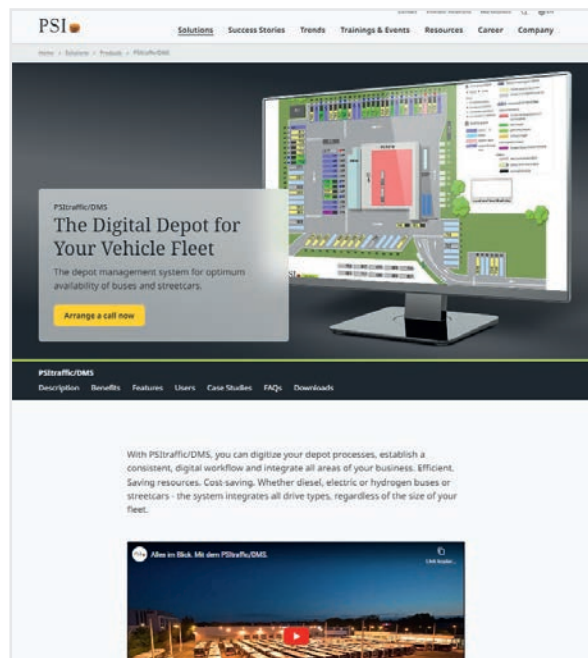
### Customer centricity: from listener to source of inspiration

Our visual upgrade is driven by you and your daily challenges. We see ourselves as listeners and initiators. Therefore, in the first step, we "listened" to you carefully. Extensive analyses, feedback rounds and sur-

veys in advance have shown which information and functions are the most important to you and what you need to solve your challenges. The result: a clear and concise website structure that makes it quick and easy for you to find the information you need online.

### PSI service promise: right from the initial digital introduction phase

Our service promise starts as early as the digital introduction phase, not just after you have purchased a product from us. You and your challenges are our top priority here too. If you prefer to get in touch with us in person, you are very welcome to do so. Use the specially created options




The PSI website in a new look.

on the website to tell us personally about your concerns, express your wishes or obtain expert knowledge from us.

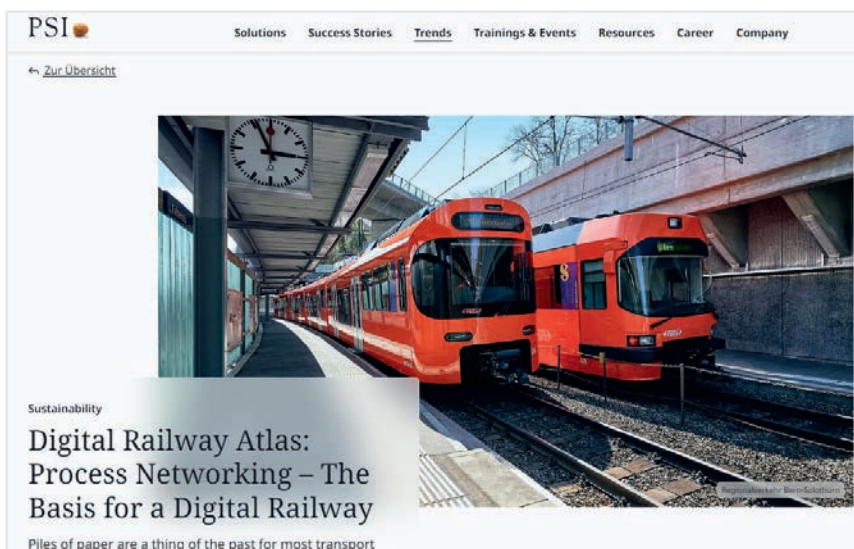
Another important aspect that we consider in our service is our joint Group presence, which ensures you the greatest possible flexibility in addressing your challenges. Curious about the new look?

Try it out now at [www.psi.de](http://www.psi.de).

### Your feedback: suggestions and comments are more than welcome!

We look forward to your clicks, downloads and, above all, your feedback. Please send your comments and suggestions to [info@psitranscom.de](mailto:info@psitranscom.de). 

Anne Becker  
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Clear and concise page structure.



News: New key account for load and charging management

## “I Like To Improve Processes!”

**Karol Michalowicz joined our team in July 2024 as Key Account Manager for the PSImartcharging load and charging management system. We asked him four questions.**

**Karol, how did you find out about PSI?**

I first heard about PSI in 2019 as part of the implementation of a project that we carried out together with PSI at my former employer Ekoenergetyka. After this was successfully completed, there were many other collaborations between us and PSI Transcom.

**You studied again and successfully completed your diploma in the field of energy technology. How did the second degree, which is more technical and less sales-oriented, come about?**

I have always been interested in future energy sources, renewable energies and electrical engineering. In addition, selling measuring and control devices for process automation or high-performance chargers requires the salesperson to have sufficient technical knowledge to understand the product, its possibilities and, above all, its limitations. I started in 2020 and completed the 3.5-year course with a very good result.



Karol Michalowicz

**From a professional perspective: What makes you tick?**

I think I'm good at arousing people's interest. I also like to describe and improve processes so that I can make things more efficient. I like to complete tasks and milestones to move projects forward.

**And what moves you?**

That can be summed up in just two words: team spirit! 🎯

### Are you already following us?

Whether product news or trade fair news: you can find everything there is to report on our social channels.



In the PSI blog you will find more interesting and in-depth articles on mobility, production, logistics, AI and energy.



You can also read the Mobility Manager and other Group customer magazines online.



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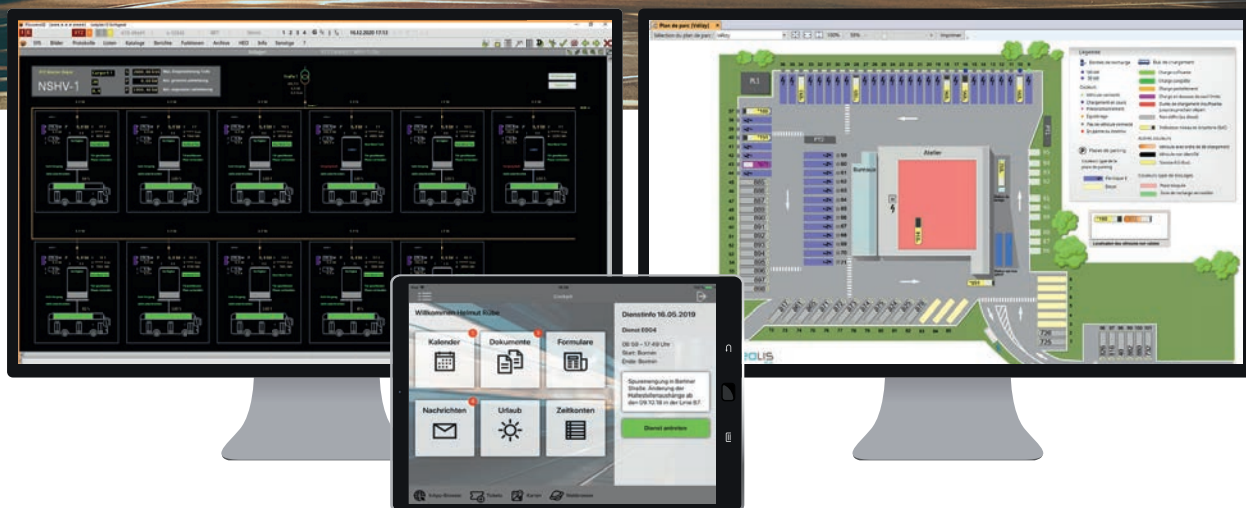
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Systems from PSI

# Maximum Availability of Vehicles and Personnel



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Software for Sustainable Mobility