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Magazine for Public Transport



Intelligent Mobility

What Does Public Transport Have To Do With AI?

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EDITORIAL

Dear readers,

Are you still googling or are you already interacting with Chat GPT & Co.? I have to admit that I've been using various AI applications more and more lately. Whether it's to quickly find a suitable phrase, edit a picture or get answers to various questions. There is hardly an area of life in which artificial intelligence has not yet found its way. This is also the case – as you might have guessed – in public transport. How can transport companies benefit from AI? This is the subject of the cover story in this issue of MOBILITY manager.

Another interesting article awaits you starting on page 6. Hamburger Hochbahn AG has been using our Depot Management System for many years. With the arrival of electric buses, it was supplemented by load and charging management. You can read about how it now navigates the buses through the Alsterdorf depot in a guest article by HOCHBAHN.

In Mainz, too, the focus is on digitalization. And all along the line. Not only the buses, but also the driving personnel are dispatched with PSI software.



In our article starting on page 8, we describe how this makes the processes in Mainz more efficient and improves the availability of personnel and vehicles.

There is also news from our Swiss customers: At the Rhätische Bahn, trains are partially running in split-train operation. To inform passengers accordingly, there has been an update to our PSITraffic passenger information system. Read more about this starting on page 12.

You already know that we can not only handle buses and trains, but also personnel. How the Sächsisch-Oberlausitzer Eisenbahngesellschaft is making a unique piece of transport history available to future generations thanks to Profahr is also part of this issue.

Enjoy the reading.

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Torsten Vogel
Managing Director PSI Transcom GmbH

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Intelligent Mobility
What Does Public Transport Have To Do With AI?

The topic of artificial intelligence (AI) has been on everyone's lips, at least since ChatGPT appeared in the media some time ago. The possibilities and capabilities of AI seem limitless – whether it is applied to artificially generated texts, generated images, composed music or edited photos. But is there a practical benefit for the daily operations of a transport company?

Using artificial intelligence in their operations opens up a wide range of opportunities for bus and rail operators to improve the range of their mobility services. An important aspect is the optimization of timetables and route planning. Intelligent algorithms integrated into the control systems analyze large amounts of data, such as traffic data, passenger flows or historical timetable data, to create optimized vehicle rotations and timetables. It enables the optimum use of existing vehicles and shortens or minimizes waiting times as well as delays.

Dispatchers are given considerable support in their work and gain more room to maneuver in the strategic control of processes.

In addition, many operators are adding AI components to their systems in order to improve on inspections and maintenance of their vehicle fleets and make the process more economical. For this purpose, sensors in the vehicles continuously collect data that is analyzed using intelligent algorithms with the aim of detecting potential malfunctions or maintenance requirements at an early stage and being able to react quickly. The results: Increased vehicle availability and fewer operational failures.

Transport companies are increasingly utilizing data to use their vehicles efficiently. Appropriate AI-supported systems continuously collect and evaluate the massive amount of information and find optimized

ways to control passenger flows or determine how to best use the vehicles during busy as well as low-load times.

The importance of data

All scenarios provide information about the significance of data. Their availability is the basis for using artificial intelligence. Fortunately, data is already available in large quantities, for example, in the form of sensor data and characteristic values from the vehicle control system, in the form of location and punctuality data from AVMS and passenger information systems, or from driver assistance and monitoring systems.

The task is to collect, analyze, and intelligently process this data so

that discrepancies and trends can be identified accurately and in the shortest possible time. This provides the foundation for avoiding trip cancellations and for being able to react quickly in the event of a system failure. This makes public transportation more attractive without driving up costs to no end.

At present, the question regarding the rights of disposal, protection and use of vehicle data remains unresolved. The European Union has already drafted the EU Data Act to address this subject.

Benefits for the passengers

The use of artificial intelligence can also bring numerous advantages for the passengers. Sophisticated algorithms integrated into apps ensure, for example, that flexible travel options are available to passengers, i.e., by bus and train and that they can make their connections. Real-time information on punctuality, but also on the utilization of buses and trains is now a

matter of course. Dynamic real-time timetables not only take into account operational disruptions, but also weather data.

Another benefit for passengers is the personalization of services. Artificial intelligence can collect information about individual preferences and travel habits and provide personalized recommendations for timetables, connections or additional services. This is also an important aspect that makes public transportation more convenient and attractive for passengers.

For PSI, Artificial Intelligence is one of the core topics

We have been exploring for many years how PSI software can improve our customers' experiences by using AI. Many of our systems therefore have integrated one or more AI components for some time. This also applies to depot management (DMS) and load/charging management (LMS). The basis for the AI is our own software PSQualicision. The software prioritizes finding

solutions quickly – according to the specified criteria. This collaboration has been used successfully by our customers for years and helps them to stand out from their competitors. Compared to other algorithms, PSQualicision is significantly faster (in the range of seconds) and can be flexibly expanded. While the first aspect is crucial to continually finding new solutions to meet operational requirements and changing operational processes, the latter is the foundation for further growth and adaptability.

As a result, the DMS/LMS not only includes a wide range of functions, but also allows our customers to activate and deactivate individual modules during active runtime and configure them individually for each depot as well as specifically for the type of day and time of day. Even if vehicle bottlenecks cannot be avoided, the optimization component automatically detects them and adjusts the allocation in such a way that unsolvable open vehicle

rotations are located far into the future. This creates sufficient time to address the situation, for example, by having the workshop make vehicles available earlier than initially scheduled.

New challenges from electromobility

With the introduction of electric buses, new factors will influence the operation of reliable public transportation for the future. These include, among others, the limited battery range, the charging infrastructure on the line or in the depot, the outside temperature or the connected load. All these factors and dependencies are taken into account by the integrated DMS/LMS to ensure that the vehicles are supplied and ready to go on their allocated routes. The AI-based system determines an optimized charging

strategy for each individual vehicle by combining data from the preliminary planning (operational planning data, vehicle and AVMS data as well as weather forecasts) with the data from the electrical systems (feed points, transformers, charging stations) and also taking into account the contractual framework conditions of the energy supply. Charging processes only get as much power as they actually need. In the event of an imminent overload or restrictions in the energy supply, the power is redistributed in such a way that the grid status is stabilized again. Last but not least, this saves costs for power supply and grid connection.

Companies particularly benefit from the fact that they can run their refueling optimization for conventional engines in parallel with

charging optimization for electric vehicles during the changeover process. The system will continually align all associated requirements with the next upcoming tasks.

Fact is: Public transportation is changing. More than ever, transport companies are required to adapt their infrastructures accordingly and to digitalize and automate their processes – step by step if necessary. Machine learning and artificial intelligence are important tools in the process and will drive the efficiency of mobility solutions.

By the way: The cover of our issue was created with AI. 🌀

PSI Transcom GmbH
Torsten Vogel
Managing Director
tvogel@psi.de
www.psitranscom.com

News: Depot and charging management system will improve vehicle availability

regiobus Hannover Chooses PSIEbus

regiobus Hannover GmbH (regiobus) has commissioned PSI Transcom to supply the PSIEbus depot and charging management system, including an energy management system and vehicle location. The system will digitalize and future-proof the processes at the regiobus depots and support the company's goal of making bus operations even more sustainable and efficient.

The system will coordinate and schedule the electric and diesel buses at five depots and ensure that all buses are reliably ready for operation at the start of their trip. All depot processes will be mapped digitally. The fully automatic dispatching of the vehicles takes place within a few seconds and is based on PSI's own optimization software Qualicision AI.

For an optimized result, time-relevant variables such as daily weather data are taken into ac-

count in addition to vehicle and route characteristics. The system incorporates factors such as the remaining range, the state of charge and the required charging time into the charge planning.

The integrated load and charge management monitors the entire charging infrastructure, controls the preconditioning of the vehicles and ensures that the available electrical power in the depots is sufficient and optimized for the e-bus fleet. The automation and optimization of

the processes in the depots will significantly improve the workflows, communication and transparency between dispatch, control center, driving service, workshops and service. This will enable regiobus to make optimal use of its vehicles and charging infrastructure and ensure the best possible vehicle availability. 🌀

PSI Transcom GmbH
Susanne Renner
Marketing Manager
srenner@psi.de
www.psitranscom.com



AI is also used in the PSIEbus depot and charge management system.

To The Workshop, Please!

For many years, PSI Transcom’s Depot Management System (DMS) has been controlling the buses in the now eight depots of Hamburger Hochbahn AG and ensuring that they are supplied and ready for use at the required time. Since 2020, electric buses have also been part of the fleet. Stefan Tintera, team leader for electric bus depot management at Hamburger Hochbahn AG, uses the example of the Alsterdorf depot to provide an insight into the complex processes and describes how the PSIEbus depot management system controls all vehicle-specific processes – from the entry of an electric bus to its exit.

In our eight bus depots spread throughout the city, we charge, clean, maintain, repair and park around 1100 diesel and electric buses – and always in such a way that they can optimally start the next passenger journey assigned to them. At peak times, buses pull into the depot at intervals of sometimes just a few seconds and are directed to the right place without blocking other vehicles. This management at

Stefan Tintera, a computer scientist, has worked for many years as a project manager and product manager in software development for various companies specializing in public transport customers. Since 2022, he has been responsible for the electric bus depot management system at Hamburger Hochbahn AG as team leader of the DMS team.



top speed is based on sophisticated processes and a high degree of digitalization and automation, which we achieve by using our PSIEbus bus depot and charging management system (DMS).

The multi-layered processes of a bus depot, the complex interdependencies and how PSIEbus quickly and reliably „pulls the strings“ in the background are shown by the example of a bus on its way to the depot: The bus has passed the last stop on its route; the last passengers have disembarked; the driver drives back to the depot. Shortly before entering the depot, the tracking system detects the bus and reports its arrival to the DMS.

Repair and Supply

In a matter of seconds, PSIEbus determines the next steps for this specific bus. In our example sce-

nario, the system recognizes that a planned repair is pending and the bus needs to go to the workshop. The driver recognizes the determined destination on the display at the entrance to the depot and drives the bus to the specified waiting position (see graphic: green path). The vehicle is parked there and connected to the charging station. As soon as the vehicle is connected to the charging management system, the DMS registers its position, displays it in the operating screen and updates the internal data, e.g. the state of charge and mileage.

This means that the bus now also appears in the list of vehicles available for repair at the workshop. If a suitable time slot is available, the bus is picked up from its location. Once the repair has been com-

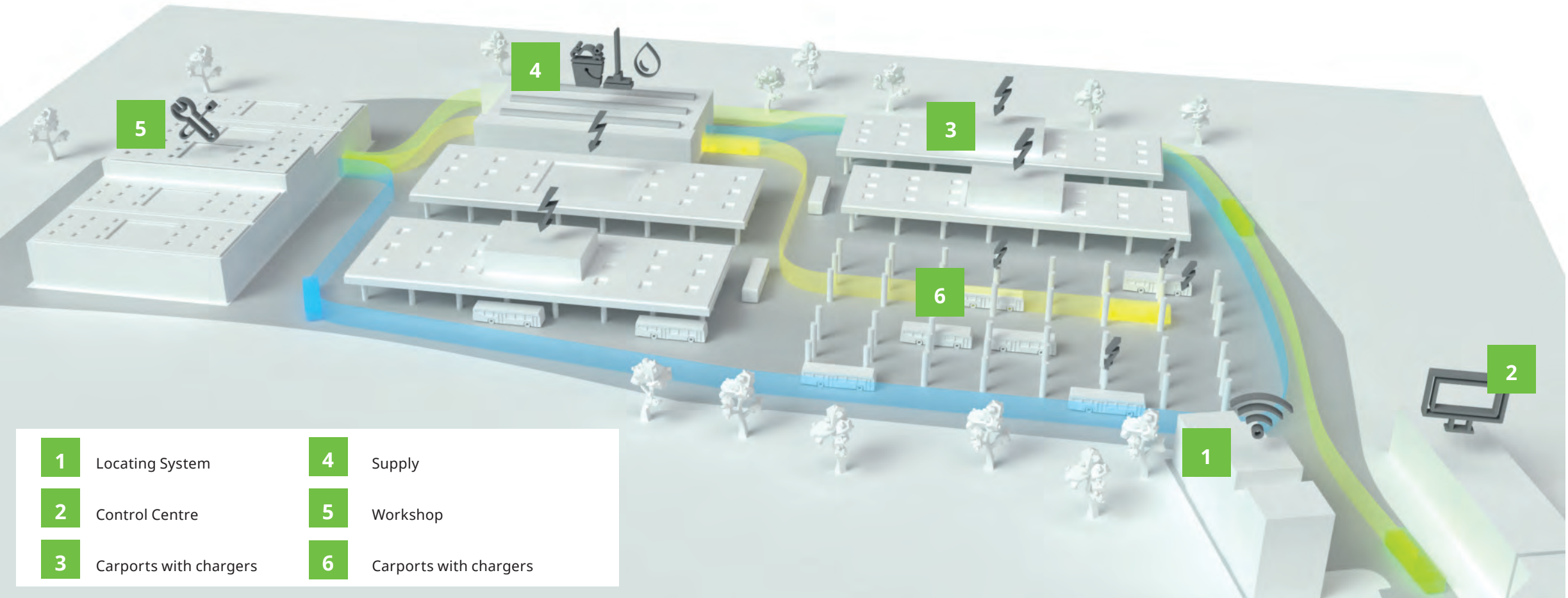
pleted, it is reported to the DMS as completed. If the system indicates that cleaning is required, it moves the vehicle to the supply (graphic: blue path) – again to a waiting position assigned by the DMS. For this, he has to drive around the carports. All further steps correspond to the workshop management.

Vehicle scheduling and charging management

After cleaning has been reported as completed, the DMS updates the status of the vehicle as ready for use again. At the same time, it detects any free blocks for which the bus is eligible on that day. Taking into account the current state of charge, the available charging time until exit and the resulting range, the DMS assigns a suitable round trip to the bus and determines a suitable parking space including charging station. The disengagement position is shown on the display of the supply exit so that the employee can park the bus there and connect it to the charging station (graphic: yellow route).

As the pick-up time approaches, the parking position of the vehicle is shown on the display in the administration building, clearly visible to the driver. Once the driver has reached the bus, he or she logs on to the on-board computer and leaves the depot. When the bus leaves, the tracking system detects it and transmits this information to the DMS, which in turn registers the start of the journey. The bus thus arrives at its first stop in Hamburg on time and drives the passengers to their destinations. 🟢

Hamburger Hochbahn AG
Stefan Tintera
www.hochbahn.de/en



Exemplary route of an e-bus through the Alsterdorf depot of Hamburger Hochbahn AG. The depot, which was built specifically for e-buses, has the charging technology and power supply for 240 buses.

Personnel And Vehicle Disposition From A Single Source

Mainz Mobility (MM) transports an average of 175 000 passengers on weekdays in Mainz and the surrounding areas by bus and streetcar. In order to operate efficiently and use resources in an optimized way, the company has digitalized and automated numerous processes both in personnel disposition and depot management.



The Mainzer Verkehrsgesellschaft has digitalized key processes, thereby increasing the efficiency and transparency of its operations.

550 drivers transport more than 130 million passengers annually to destinations in Mainz and its surrounding areas in a total of about 53 diesel and 27 electric buses and 41 street cars. Responsibility for this lies with the Mainzer Verkehrsgesellschaft, which now communicates under the Mainz Mobility brand. To improve their profitability, efficiency and transparency of operations and workshops, the transport company relies on digitalized processes in both vehicle and personnel disposition, and with the PSITraffic depot management system and Profahr personnel disposition system on solutions by PSI Transcom.

Industry standards with many benefits

MM benefits from the industry standards of both solutions.

Depending on the day of the week, the personnel disposition system plans between 123 (Sundays) and 296 (Fridays) duties and automatically takes into account statutory driving and rest times, the qualifications of the driving staff and special operating conditions, such as multi-qualified drivers who have the qualification to drive a bus and a street car or drivers, which are restricted from certain operations for various reasons. In addition, the transport company manages vacation time planning via Profahr, maintains work hour accounts and calculates supplemental pay and flat rates for payroll accounting at the push of a button. Especially during peak times, an easy and fast duty login with integrated driver's license verification via specially set-up terminals is particularly important for the Mainzer Mobilität.

Fast login and visualization in the control center

When a driver starts a shift, reserve or stand-by duties included, all they have to do is hold the driver's license with an RFID chip attached to one of two terminals with an integrated reader. The number of the RFID chip on the driver's license is stored in the personnel master file as a second selection number. As soon as the device has read the chip, a short confirmation appears on the monitor and immediately the login screen shows again, so that the next employee can log in. This is very simple and above all, it takes place with the necessary speed. In turn, a web service of the PSITraffic depot management system requests all duty login messages recorded via Profahr in real time and displays the current data immediately for the employees in the control center.

More digitalization in the future

With Profahr, MM fulfills all legal, collective bargaining and company agreements on driving and working hours as well as payroll-relevant aspects such as supplemental pay and flat rates. If there are changes, they can be easily configured or adapted. The company is planning several extensions for the future and with that is aiming to digitalize and make even more processes easier to work with. At the top of the list, for example, is the shift swap market. It is designed to allow the driving staff to swap shifts at any time and anywhere, taking all necessary aspects into account, without having to contact a dispatcher. The same applies to the publication of open duty slots via a digital „Marketplace“. The company also sees great potential in a digital vacation time request log and optimized, automatic vacation time allocation. With the introduction of the 'desired duty schedule' module, MM wants to create an opportunity for co-design. This means that drivers can enter desired shifts and rest days, which are checked against the duty needs by applying a system-based optimization run, and then are adapted and implemented as fairly as possible for all employees.



41 streetcars carry passengers in Mainz.

Block planning including optimized workshop utilization

In vehicle management, the use of the PSITraffic depot management system (DMS) improves all work processes and information flows for and between the departments of vehicle service, workshop and transport service information. Due to the mixed operation of buses and trains as well as a diverse and partly topologically challenging vehicle lineup in an underground parking garage, this requires a particularly sophisticated disposition of vehicles and train allocation. It is essential for Mainz Mobility that the system schedules routes to vehicles in such a way that the workshop is also optimally utilized and that refueling and cleaning intervals are carried out according to schedule and with minimum downtime. In addition, the DMS is designed in such a way that MM can also expand its fleet to up to 300 vehicles in the future.

Significant relief for all user groups

From MM's point of view, the benefits of PSITraffic can be summarized in three areas. The system optimizes operational processes and digitalizes and automates essential information and the exchange

thereof, including schedules and duty rosters, fault signals, workshop orders, supply orders, current vehicle locations, and report generation for the evaluation of operational analyzes. Furthermore, the digital representation and automation of information and processes within the system reduces extra routes and phone calls and thus ensures significantly faster processes. And in third place is the high level of acceptance and satisfaction among users in traffic control, workshop, driving staff and the supply services. Above all, they are the result of the noticeable daily relief that the digitalization of many operationally relevant functions created. Since both systems now are sourced from PSI, Mainz Mobility benefits from the resulting synergy effects – from better communication to system adaptations, such as the introduction of digital RFID login for the driving staff.

Ready for digitalization and growth

The solutions from PSI Transcom for personnel disposition and depot management made it possible for the Mainz Transport Company to digitalize and accelerate essential processes, thus increasing their effectiveness, efficiency and the transparency of their operations. With the expansion options and scalability of the systems, the company is well positioned for further digitization and growth. 📍

PSI Transcom GmbH
Peter Rosenheinrich
Key Account Manager
prosenheinrich@psi.de
www.psitranscom.com

Load, Charging And Energy Management In Bus Depots

The electrification of bus fleets is an important step toward sustainable and environmentally friendly mobility. But the switch to electric buses also brings new challenges for transport companies. How can the buses be charged efficiently and reliably? How can costs and energy consumption be reduced? How can the batteries be conserved? And how can bus depots support and relieve the load on the power grid?

To answer these questions, more and more transport companies are turning to the modern software solutions of PSI Software AG, which offers the load, charging and energy management system PSISmartcharging for electric bus depots. The system monitors and controls the charging infrastructure, it interacts with various IT systems of the transport company and the network operator. It optimizes charging operations to meet mobility requirements, reduce costs, conserve batteries and support the grid. It takes into account dynamic electricity tariffs, local depot loads and specifications from the grid operator.

The system uses the flexibility of the depot to adjust charging power during times of grid congestion or instability. For example, the distribution grid operator's traffic light concept, shown below, can be implemented in the future, where charging power is shifted to times when the grid is less stressed in grid-critical situations.

Since a large part of the cost of an electric bus is on the battery system, PSISmartcharging optimizes charging processes to minimize battery aging. By avoiding high charging powers and high states of charge, battery systems are operated more gently and can therefore be used longer. PSISmartcharging is based on the control system PSI-control, which has already been used by PSI Software AG for a long time by network operators in KRITIS environ-

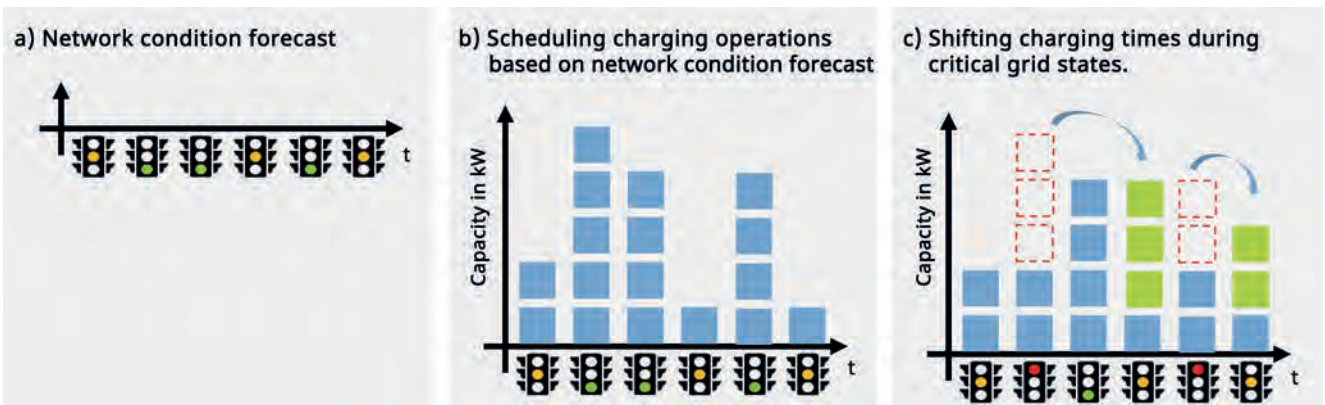


PSISmartcharging optimizes charging processes.

ments (critical infrastructures) and thus offers the best prerequisites for public transport to meet the increased IT security requirements with growing electromobility.

With PSISmartcharging, transport companies can not only realize efficient, economical and environmentally friendly mobility in cities and municipalities, but also contribute to the implementation of the energy transition and the solution of the energy crisis. 🌱

PSI Software AG
Business Unit PSI Energie EE
Holger Siewert
Project Manager PSISmartcharging
hsiewert@psi.de
www.psienergy.de/en



Planning and control of charging processes with PSISmartcharging using a traffic light concept.

Automation On The Road And In Bus Depots

In spring 2023, PSI Transcom was awarded two further research projects. Both the AHOI project (automation of the Hamburg on-demand service with integration into public transport) and the IDEA project (innovative depot automation) focus on automated functions or autonomous driving in the bus sector – on the one hand on non-public terrain in the depot, and on the other in public transport areas with passengers. Both use cases will work together seamlessly in the future. The focus of PSI's work in each case is on researching and implementing the necessary interfaces and standardizing them in an international environment. Both projects are funded by the German Federal Ministry of Digital Affairs and Transport (BMDV).

AHOI - Automation of the on-demand service with integration into public transport

In Hamburg-Harburg, a mixed fleet of autonomous and manually controlled vehicles is to be put into operation and tested under the leadership of Verkehrsbetriebe Hamburg Holstein GmbH (VHH). PSI Transcom's task is to explore how the existing Depot Management System (DMS) at VHH can be extended in an integrated control center with functionalities for autonomous driving and planning and dispatching of on-demand transports. The goal of the project, which is scheduled to run for a total of three years, is to commission on-demand operations with a mixed fleet of autonomously and manu-



Handover of the funding decision by Federal Minister of Transport Dr. Volker Wissing.

ally controlled vehicles on public roads by the end of 2025 and to test them under real conditions.

IDEA - Innovative Depot Automation

In the IDEA project, the automation of depots of public transport companies is researched by means of radio-based communication between autonomously moving vehicles and a Depot Management System via a 5G campus network and tested in a real laboratory. PSI Transcom will provide a test instance of the DMS and extend it with functions as a control and monitoring center for autonomous driving movements and automatic supply operations. The topic of standardizing appropriate vehicle interfaces for tracking and vehicle control is also being driven forward by PSI in the process. IDEA is part of the „InnoNT“ program to promote innovative network technologies in mobile communications 🌱



Project outline.

PSI Transcom GmbH
Michael Preusker
Innovation Manager
mpreusker@psi.de
www.psitranscom.com

In The Right Train Section To Your Desired Destination

Since October 2022, anyone traveling with the Rhätische Bahn may have been sitting in a so-called split-train, meaning, in a train that travels to two or more destinations. Optimal interaction between the dispositioning and passenger information system ensures that passengers get on the correct section of the train and arrive relaxed at their desired destination.



Interregio of the Rhätische Bahn on the Landwasser Viaduct.

Long trains – half empty: This image is not uncommon on less frequented routes and holds great opportunities for many transport companies. They only need the entire train length up to a certain station, which makes the use of personnel, rolling stock and infrastructure hardly economical in view of the low utilization past that point. The famous Swiss railway company Rhätische Bahn is very familiar with this situation, for example on the lines from Landquart to Sankt Moritz and Davos. Passengers to these stations often start

their journey on the popular route between Landquart and Klosters, which makes the utilization rate on this section particularly high. The Rhätische Bahn therefore used to schedule trains to Scuol and Davos every hour and in short succession, which put an enormous strain on the infrastructure. Sometimes travelers to Davos also had to change trains and tolerate longer travel times. „In addition, our passenger numbers are growing continuously and we want to further improve our route offerings with new connections at the junction stations,”

says Reto Zünti, specialist for rail systems at the Rhätische Bahn. „In view of these developments, we have decided to introduce and gradually expand the use of a split-train system.”

Efficient operation for all lines

While trains normally travel from one station to another, split-trains start as a composition of multiple motor train units. At a particular station, they then divide into two to four separate trains, in order to reach their different final des-

tinations. On their return journey, the train sections are reunited at the same junction station into one train. Since the end of 2022, the Rhätische Bahn have been operating a train scheduled from Landquart, which then splits in Klosters into train sections, heading toward St. Moritz or Davos. The benefits are obvious: Travelers with destinations beyond Klosters no longer have to change trains. Furthermore, the Rhätische Bahn can service the route to Klosters in short cycles with the full train length and thus offer more seats, while it serves the sections past Klosters with shorter trains. High-traffic routes as well as routes with fewer passengers can be operated more efficiently this way.

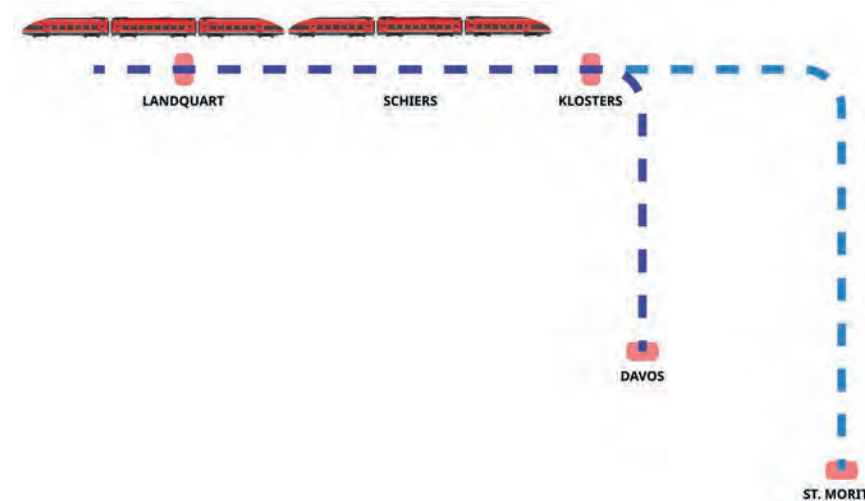
In the right place from the start

In addition to challenges for scheduling, including the exact assignment of train sections to their final destination, the splitting puts particular demands on the passenger information system. This means that passengers must be navigated to the correct section of the train in order to remain comfortably seated while they are traveling to their destination. Passengers must therefore be carefully steered and precisely informed. It must be clear to the passengers, at a glance, in which train section their car is located. To accomplish this, the Rhätische Bahn relies on its PSI-traffic integrated passenger information system from PSI Transcom. The system has been providing stable processes for many years, even before and independently of the split-train operation, and reliably steers travelers to their desired destinations – plus it does so in several languages.

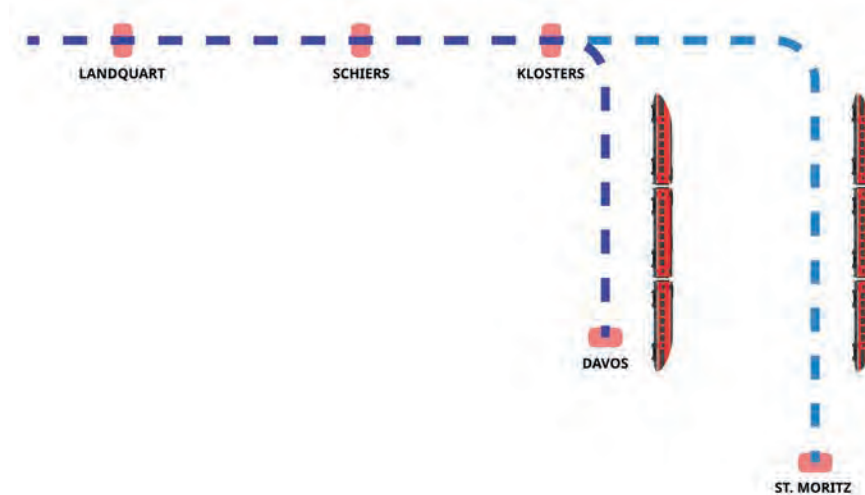
Section-specific information in all media

Modern displays are used in the operation of a split-train; they are designed for the processing and presentation of large amounts of information and complex operational relationships. This includes the section-specific visualization of the trains in all media used, including overhead displays at stations, in the passenger app or on screens on the trains. Standardized symbols that are easy to understand regardless of origin, age or possible impairments to the traveler are used. For example, the symbol for a split-train configuration

shows a dot from which two arrows originate. The Head of Corporate Customer Information, Tobias Perini, also points out the importance of displaying the sections separately or individually for different objectives: „If the train travels to St. Moritz and Davos, for example, there is a separate display for both destinations and their respective route, with corresponding ‘Via’ stations and special information. This type of display is clear and makes all passengers get on their train with a feeling of assurance.” Passengers also see on the station displays, in addition to the sector in which they have to stand, the different vehicle



The split-train starts in Landquart as a composition of several multiple units.



In Klosters it splits into train sections heading for Davos and St. Moritz.

| Abfahrt | Linie | Ziel | Hinweis | Gleis |
|-------------|-------|---|--|-------|
| 14:25 +5 | PE | Zermatt Chur Disentis M. Andermatt Brig | Hielt auf Verlangen Zug fällt aus | 1 BCD |
| 14:41 +0 | RE | St. Moritz Schiers Küblis Klosters Platz Zerneus Zuoz | Grund der Verspätung: Fahrleitungsstörung | 2 AB |
| 14:41 +0 | RE | Davos Platz Schiers Küblis Klosters Davos Laret Davos Dorf | Grund der Verspätung: Fahrleitungsstörung | 2 CD |

Der Bahnverkehr zwischen Klosters Platz und Davos Platz ist unterbrochen. Grund: Fahrleitungsstörung. Es verkehren Bahnersatzbusse zwischen Klosters Platz und Davos Platz. Dauer: unbestimmt.

If the train wings its way to St. Moritz and Davos, there is a separate display for both destinations with corresponding via stations and special texts.

class(es) and features of the train composition, e.g. location of dining cars, children's sections or bicycle accommodations. In the train sections themselves, the passengers also find displays of the respective destination publicized everywhere, so that if in doubt, they can still switch to the right train section in time during their journey.

Fully automatic collaboration

From a technical point of view, passenger steering is based on the seamless interaction with the control system. It receives information about the performance characteristics as well as technical data, e.g. the

length of the individual wagons, via an interface to the wagon management system. Based on this, the system calculates the stopping point at the respective platform, which in turn is the starting point for calculating and displaying the occupancy of each section. The split-train operation works smoothly, not least because the visual and acoustic passenger information is fully automatically adapted in the event of modifications in the disposition, e.g. in the event of travel shortcuts, trip cancellations or missed coupling of a train section.

On the way to Strategy 2030

The introduction and expansion

of the split-train operation as well as other planned operations are important levers with which the Rhätische Bahn wants to accomplish the goals of its „Strategy 2030“. This includes continuous improvements to their range of services, the development of new customer groups, further frequency increases, and improved availability. Last but not least, in the long term, split-trains will above all contribute to a more efficient use of personnel and an optimized use of infrastructure, and provide the Rhaetian Railway with valuable economic advantages.

Efficiency on all routes

Optimized service of popular routes as well as for less frequented routes: The Rhätische Bahn succeeds in this balancing act through the split-train operation. The Swiss transport company can rely on its proven PSItraffic passenger information system and it benefits from automated interaction as well as barrier-free communication via all media. 📶

PSI Transcom GmbH
Christoph Schiller
Project Manager
cschiller@psi.de
www.psitranscom.com



Red trains that travel through imposing mountain landscapes of the Alps, over historic viaducts and through historic tunnels: The Rhätische Bahn (RhB) is world-famous and one third of its route is a designated UNESCO World Heritage Site. The smooth running of RhB's rail operations is also due to a complex technical system, which includes the PSI Transcom's integrated positioning and passenger information system PSItraffic. With the introduction of the split-train system, the Swiss company has taken another step toward making the best use of staff and infrastructure, while at the same time improving the range of services available to travelers. Here too, PSItraffic plays an important role and contributes to ensuring that travelers can reach their desired destination reliably and that the Rhätische Bahn uses its resources efficiently and sustainably, even on less frequented sections.



News: Membership in Swiss Railway Industry Association

Increased Commitment In Switzerland

Since June 2023, PSI Transcom has been a member of Swissrail, the association of the Swiss rail industry. The association unites industrial companies in the field of track-bound transport. It represents the interests of its members vis-à-vis politicians, authorities, operators and the public and promotes the image of the industry at home and abroad.

As part of the Swissrail community, PSI Transcom is now a member of a dynamic network of around 130 companies committed to the development of the rail industry. With its membership, PSI aims to strengthen collaboration and networking among individual transportation companies and their suppliers. „We look forward to contributing our expertise and working together to improve the efficiency, safety and sustainability of rail transportation,“ says Robert Baumeister, responsible for TMS/ITCS. In June 2023, PSI introduced itself as

a new member to the association at an evening event in Berlin. As part of the Day of the Swiss Railway Industry, there was then a meeting at the

Swiss Embassy after a high-profile meeting, as well as company tours at Stadler Pankow and the ABB training center. 📍



Visit to Stadler Pankow.

PSI Transcom GmbH
Robert Baumeister
Managing Director
rbaumeister@psi.de
www.psitranscom.com

News: PSI supports S-Bahn Hamburg with further digitalization

Display Of The Real-time Occupancy Of The S-Bahn

S-Bahn Hamburg GmbH uses a sensor technology developed in-house to display live train occupancy on its S-Bahn trains. The corresponding information at the stations is provided to the displays by PSI's information and messaging system (IMS), which has been controlling the Hanseatic city's S-Bahn operations for more than 20 years and continuously adapts them to new requirements.



Display of occupancy at the platform.

Sensors scan the passing trains, collect information on the occupancy of the individual cars and send it to the PSI control system via an interface. Using journey data from the IMS, this information is linked within seconds and forwarded to the displays at the corresponding station. The occupancy display on the platform uses triple traffic light logic for the respective carriages. In this way, passengers can position themselves specifically on the platform to find free seats on the

train. This leads to fewer delays when boarding and disembarking and to more punctual operation. Also, the flow of passengers becomes transparent and allows predictions to be made about the occupancy of trains. Dispatchers will be able to better coordinate train traffic in the future. 📶

PSI Transcom GmbH
Robert Baumeister
Managing Director
rbaumeister@psi.de
www.psitranscom.com

Cultural Heritage Meets Digitalization

The Sächsisch-Oberlausitzer Eisenbahngesellschaft (SOEG), as the owner and operator of the Zittauer Schmalspurbahn, preserves a valuable cultural heritage of Saxony. Principles of efficiency in management are the basis and this requires well-organized processes, including in personnel disposition. The company has digitalized precisely this sector with the introduction of Profahr, thereby saving time and resources.

Daily route from Zittau via Bertsdorf to Oybin or Jonsdorf: Since 1890, passenger trains of the Zittauer Schmalspurbahn (narrow-gauge railway) have been running through the picturesque Zittau mountains on a track gauge of 750 millimeters. Today, the railway, with its historic, steam-powered trains, is not only popular with commuters as a public transport service in southeastern Saxony, but is also a tourist magnet. It is operated by the Sächsisch-Oberlausitzer Eisenbahngesellschaft (SOEG), which was founded in 1996 specifically to preserve this cultural heritage. On weekends, the trains even operate in three-train mode; in addition, there may be special trips for events and on public holidays. To this end, SOEG employs approximately 50 employees, including train and locomotive drivers,

locomotive firemen, technicians and mechanics, as well as employees in administration and in the hotel industry of the region. Planning all services with optimum efficiency while simultaneously taking into account short-notice changes or wishes has begun to place high demands on the company – also because many employees have multiple qualifications and can be used in different areas.

Wanted: Flexible personnel disposition system

Until now, SOEG had accomplished its personnel disposition and payroll accounting using Excel spreadsheets. „This manual approach simply pushed us to our limits and we knew that we needed to find another way,” says Danny Lehmann, who also covers a wide range of functions, as most of his colleagues

do. Among other things, he is responsible for sales and supports marketing, takes care of scheduling and turnaround plans, as well as payroll accounting, or serves as a train and locomotive operator. Therefore, he was the right person to find a suitable personnel disposition system. „The Profahr personnel disposition system from PSI Transcom, has turned out to be a solution that meets our demands for flexibility on the one hand, and on the other hand also reflects the specifics of our train service on a regular basis,” says Lehmann.

Phased out: Excel lists and bulletin board

Since its introduction, Profahr has supported all processes of personnel disposition from a single source in just six months and under coronavirus conditions – from the assignment of duties to the determination and updating of staff schedules, to payroll accounting data via a Datev interface. The schedule optimization system automatically assigns any unplanned services to available staff according to the stored shift positions. It takes into account, among other things, required qualifications, considers work hours and rest periods. In this context, the Saxon company has abolished official paper notices along with the bulletin board. The Profahr modules „Electronic Duty Roster” and „Mobile Communication” take over their functions.



The Zittau narrow-gauge railroad is above all also a tourist magnet.



Valuable cultural heritage of Saxony: the Zittau narrow-gauge railroad.

“As much as we as operators and employees of the Zittau Narrow Gauge Railway love historic technology and operating equipment, we are also required to work efficiently and run the operation economically. This is the only way we can sustainably safeguard this unique piece of transport history and make it an experience for future generations as well.”

Danny Lehmann, Head of Sales, SOEG

Transparent: Duty rosters, work and vacation accounts

The TV screen displays the current (electronic) duty roster for the employees, plus, information about changes as well as unscheduled duties. Based on this data employees can also contact the staffing manager and inform them about possibly assuming one of the duties that are still open. According to Danny Lehmann, the before-after effect is particularly clear here: „Prior to the introduction of Profahr, we kept paper change lists, which we had to update and replace time and time again. Sometimes, due to a short-notice changes, this may be

the case just shortly after the last posting, which was obviously not very efficient.” The communication module also gives employees access to relevant operating programs via smartphones. Regardless of location and time, they can, for example, receive operational instructions, view their work hours and vacation accounts, and retrieve and report back information about their duties.

Efficiency: Digital processes for historical railway

Overall, according to Danny Lehmann's conclusion, SOEG's digitalized and optimized processes

save a lot of time. This not only enables scheduling, but also retrieval of workforce metrics with just a few clicks. And the company soon also wants to record working hours digitally by adding a corresponding module. The Chief Marketing Officer: „As much as we, as operators and employees of the Zittauer Schmalspurbahn, love historical technology and resources, we are expected to work efficiently and run the operation economically. This is the only way to sustainably safeguard this unique piece of traffic history and make it possible for future generations to experience it.” The personnel disposition system Profahr is an important piece of the puzzle for resolving this task and a good example of how „Old” is not necessarily supplanted by digital means, but digital sometimes even helps to preserve it. 🌱

PSI Transcom GmbH
Peter Rosenheinrich
Key Account Manager
prosenheinrich@psi.de
www.psitranscom.com

Flexible Vacation Time Planning For Drivers

In many transport companies, vacation allocations for the drivers staff are based on fixed vacation periods or rotating vacation groups. These procedures are complex and if they have to be manually implemented, they are far from popular with employees. But an automated vacation optimization function integrated into the personnel disposition system can change both.

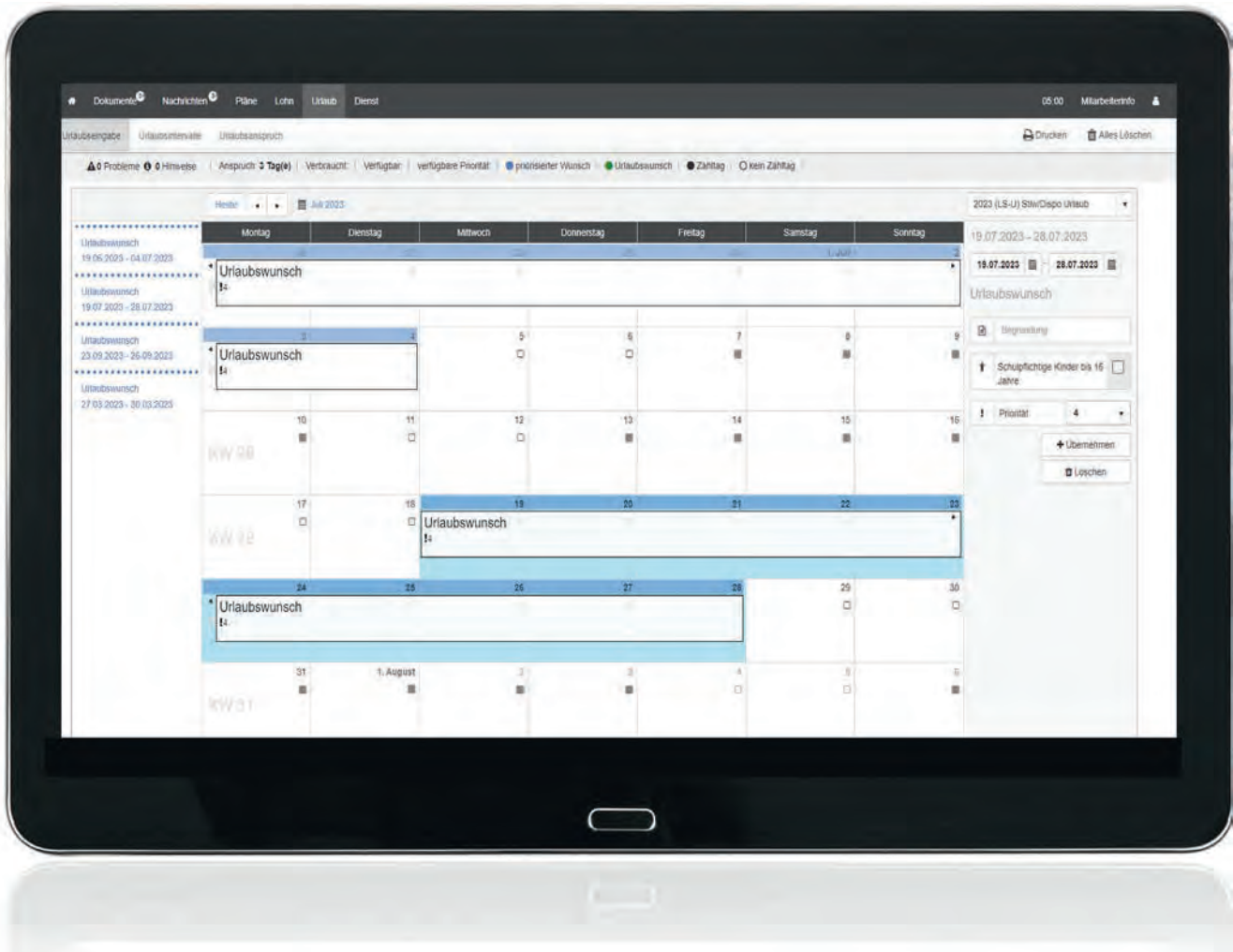
Rotating vacation groups no longer meet today's needs. Many planners, responsible for allocating vacations for the "most beautiful time of the year" know how emotionally laden it can be. They have the task of considering the vacation time requests of all employees with a wide range of qualifications and to do this as equitably and socially acceptable as possible. To make the allocation of vacation days easier and at the

same time safeguard the operation, fixed vacation periods or rotating vacation time groups had been introduced in the past for the transport service industry. This creates far-reaching ability to plan ahead, but individual requests are not taken into account, to the disappointment of the staff.

Given today's shortage of skilled workers, no transport company can and will afford the resulting dissa-

tisfaction. In addition, a look behind the scenes shows that this procedure is neither simple nor efficient, even from an organizational point of view. Because the planning is manual, companies with large teams of drivers can take several months to complete the schedule, and it can tie up one employee's entire time.

Both perspectives show that this way of vacation time planning and allocation is no longer appropriate.



Profahr automatically calculates an optimized vacation schedule.

Stadtwerke München and Verkehrsbetriebe Luzern rely on flexible vacation time allocation

At the same time, it is clear: Anyone who wants to take into account the diverse requests and rights of numerous drivers when allocating vacation time slots has to depend on software support, because these complex dependencies cannot be handled manually. For this reason, transport companies such as the Münchner Verkehrsgesellschaft (MVG) or the Verkehrsbetriebe Luzern (VBL) have opted for a digital, automated vacation time allocation system that can be added to their Profahr personnel disposition system by PSI Transcom.

Walter Jenny, Head of Human Resources and Organization at VBL: „We were dissatisfied with both our rotating vacation planning and a vacation point system we had introduced. Plus, since the individual allocation of duties in Profahr has already proven its worth, we also decided to introduce individual vacation time planning.“ Similar reasons existed in Munich: „Through automation, we are able to realize fair and balanced vacation time planning for all driving staff,“ says Andreas Pass, Head of Route and Staff Planning at MVG.

Defining and weighing rules and criteria

The core of individual vacation time allocation is the IBM ILOG CPLEX Optimization Studio. It optimizes target outcomes with numerous constraints using various optimization methods and complex algorithms. The calculation basis creates a set of rules that each company stores in their system. These include, for example, the maximum possible number of employees with

a certain qualification who may be on vacation at the same time, the inclusion of an acceptable substitute, the consideration of vacation days granted during school vacation and holidays in the previous year, taking into account school-age children or a partner in the same company. In addition, the requests submitted can be weighted in various ways.

In principle, many transport companies highly prioritize, for example, school-age children. However, a longer-term view is also an option. For example, if a driver was granted vacation time during the summer break in the previous year, a corresponding request in the current year is prioritized lower. This does not mean that it is fundamentally impossible for them to receive vacation time during the school break, but the request is given lower priority.

Mobile access for mobile workers

Another central component of this form of vacation time allocation is mobile access for drivers, who usually do not have a PC workstation provided to them. They can access the utility regardless of location and time via a suitable communication module and an Internet-enabled device, e.g. a smartphone or tablet, and can enter their requests conveniently and easily as well as view vacation plans. This way, the driving staff are spared additional trips to the company headquarters. In addition, the pre-assigned fields or input restrictions eliminate unnecessary rounds of reconciliation: If an employee wants to input a request, the software automatically takes into account all relevant award criteria and prevents the input of requests that do not comply with the rules.

85 percent of requests are granted

If all employees have entered their vacation requests by the cut-off date specified by the transport company, the software automatically calculates an optimized vacation plan and finds the greatest possible intersection between the rules-framework and the employee requests. On average, the software is able to process about 85 percent of the assessed vacation time requests. If requests cannot be granted, the tool automatically suggests the best possible alternatives. Here, a look into practice shows that about 7 percent of the proposals are accepted by the employees as suggested, so that those responsible only have to work manually with about another 7 percent. The same numbers hold true at VBL: „With just a few rules, we can achieve a good overall outcome,“ said Walter Jenny. According to Andreas Pass, the responsible parties in Munich are also satisfied: „The results show that we are on the right track.“

Employee satisfaction

Transport companies that allocate vacation time automatically, fairly and transparently do not only relieve the planners, they increase the attractiveness of their workplace and above all, they achieve a high level of satisfaction for their employees. The degree of freedom required for this can be provided by a mathematical optimization in conjunction with the Personnel Disposition system Profahr. 📍

PSI Transcom GmbH
Peter Rosenheinrich
Key Account Manager
prosenheinrich@psi.de
www.psitranscom.com

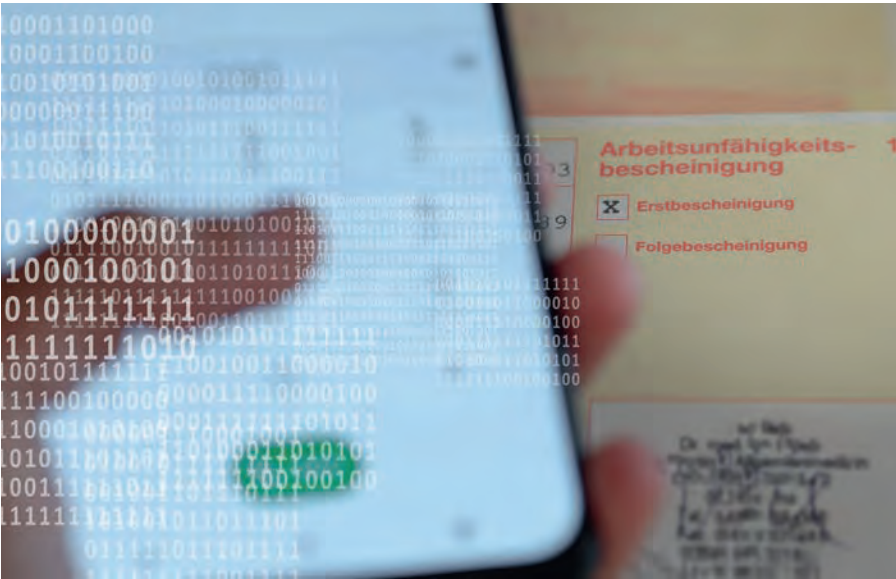
eAU Procedures In Profahr

Since 1 January, all companies have been obliged to access the attestation of incapacity to work (eAU) data electronically from the respective health insurance fund if employees report in sick and are covered by the statutory health insurance. The Profahr personnel disposition system is not directly integrated into the new mandatory procedures. However, mapping the possible communication channels can noticeably simplify the implementation of the eAU mandate for many transport companies.

Since January 1, 2023, it has been binding for all employers: the eAU procedure. According to this procedure, employees only have to inform their employer of the start and expected end of their incapacity to work, no forms are necessary. The obligation to submit the paper attestation to the employer or to deliver it in person is no longer required. Insured persons can receive a single printout for personal use, upon request.

Calling up of the eAU dataset at health insurance companies

Employers are now obliged to electronically retrieve the corresponding eAU dataset of the employee calling in because of illness from a communication server of the respective health insurance company. The doctors' offices transmit the respective information there. There are two possible ways for companies to call up the records: Via a certified extension of the payroll accounting software used or via sv.net – an electronic form completion aid developed by the ITSG (IT service center for statutory health insurance) on behalf of all health insurance companies. The aim of eAU is to simplify and accelerate processes through end-to-end digitization, the networking of all parties involved, and to avoid unnecessary trips for sick employees.



Attestations of incapacity to work must now be retrieved electronically.

Integration of further attestations

This regulation initially concerns only attestations from network physicians and network dentists, about work accidents and inpatient hospital stays. Further attestations, e.g., from out of network physicians, doctors abroad, pediatric illnesses or rehabilitation services, are to follow in the short to medium term.

What is Profahr's contribution?

Profahr offers options that further simplify and accelerate the company-internal procedures required for the eAU process (see graphic). They always come into play when employees – e.g., from the transport service – report absences not to the HR department, but to the disposition department:

Step 1: After sick leave has been granted, employees record their absence via the mobile communication solution BIK (subject to license), regardless of time and location, via tablet, smartphone or PC. They specify both the start and end of the sick leave and select the option "sick without attestation" from the drop-down menu, for example. The absence of the employees is taken into account by dispatch immediately, while their absence cannot yet be assessed in payroll accounting. In companies that do not have a BIK license and sick leave is also reported via dispatch, e.g., via telephone or e-mail communication, the dispatchers take over the steps described above directly in Profahr

Step 2: Profahr transfers the now planned absences via a licensed

export/import interface to the HR system in the company, which usually also takes care of any inquiries to the statutory health plan.

NOTE: Doctors' offices have until midnight on the day of treatment to transfer the eAU data to the health insurance companies. It is therefore advisable to wait until the next day to call up the dataset from the health insurance companies.

Step 3: Profahr retrieves the dataset via an automated daily request and transfers the absentee status from "sick without attestation" to "sick". In addition, the system compares the originally created information with the eAU dataset and automatically adapts it and the duty roster if necessary.

Integrated eAU business processes

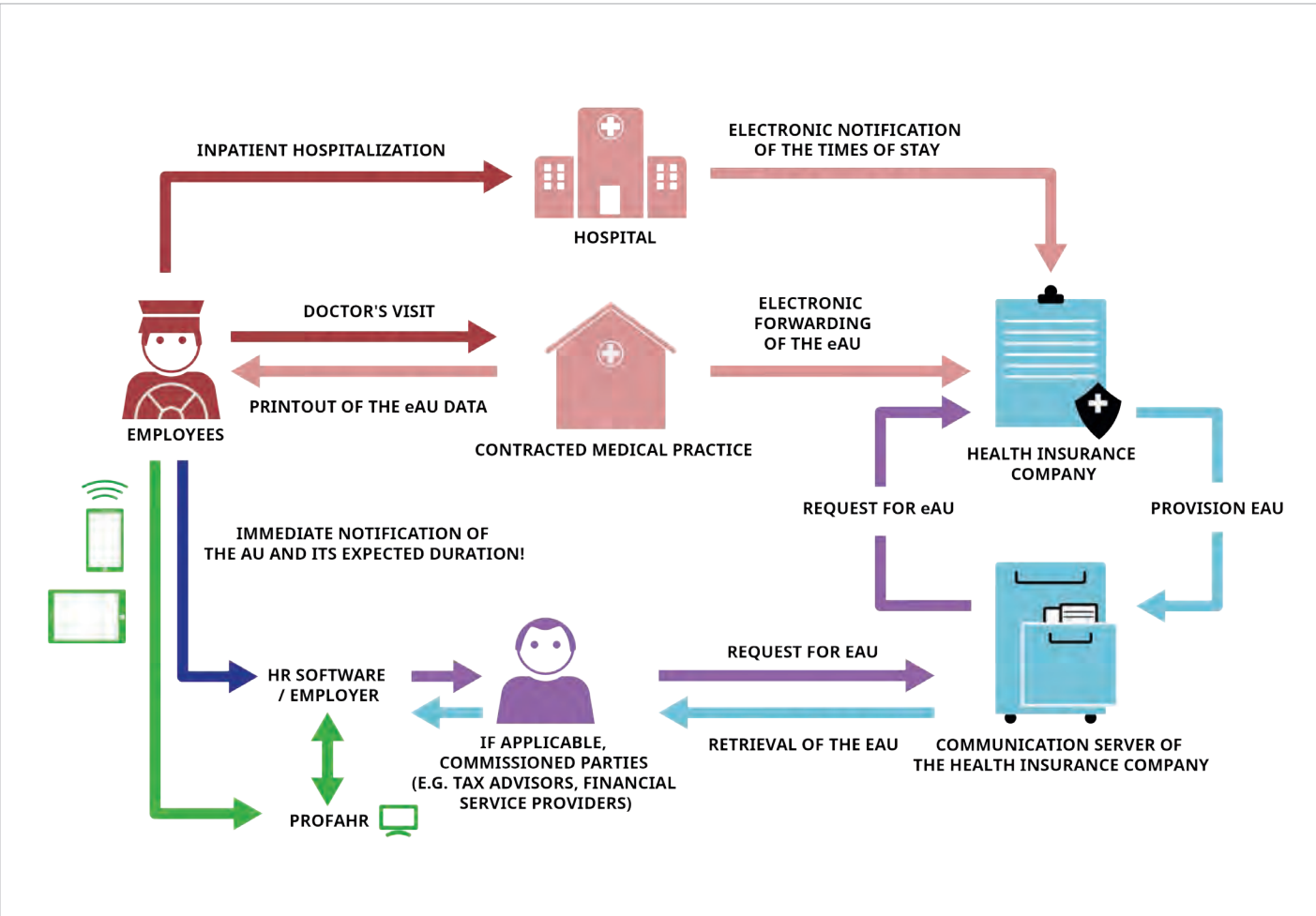
At first glance, the eAU mandate does not affect disposition systems such as Profahr. In practice, however, it turns out that the transport service in particular reports absences to the scheduling department and not to the personnel department. By mapping the associated processes in Profahr, companies can maintain proven communication channels and implement the eAU process quickly and efficiently.

PSI Transcom GmbH
Peter Rosenheinrich
Key Account Manager
prosenheinrich@psi.de
www.psitranscom.com

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YOUR BENEFITS

- Employees can report their sick leave order via the BIK mobile communication service
- Planners record sick leaves by phone in Profahr
- Absences are immediately included in scheduling
- Notifications of illness via the scheduling department are transmitted to the HR system
- Updating absentee statuses in collaboration with HR system
- Automated data adaptation and scheduling
- End-to-end, accelerated business processes



Profahr simplifies and accelerates internal company processes.

Successful Implementation Within Four Weeks

Umbrella City Lines GmbH has awarded PSI Transcom with the delivery of the personnel dispatching system Profahr. The system was successfully put into operation after an implementation phase of only four weeks.



Profahr simplifies and accelerates internal company processes.

Profahr will schedule services to 37 drivers on a daily basis. Short-term changes will be scheduled automatically and in compliance with legal requirements. Profahr includes modules for mobile communication, payroll accounting, the management of occasional services and the creation of duty rosters. With the help of the integrated operational information and communication solution, drivers can use mobile devices to view their duty roster, register for duty, use

the duty swap platform and write messages.

With the implementation of Profahr, the company is taking a major step towards digitalization and will create significantly more efficient and transparent processes.

Hamburg-based Umbrella City Lines GmbH, a member of the Umbrella Mobility Group, took over scheduled services in the district of Görlitz on behalf of DB Regio AG,

Bus Business Unit, Region East, on July 1, 2023. The fleet, consisting of 25 buses, serves a route network of approximately 1.4 million kilometers. Umbrella City Lines GmbH operates as a subcontractor at further locations in Germany.

PSI Transcom GmbH
Susanne Renner
Marketing Manager
srenner@psi.de
www.psitranscom.com

+

EVENTS

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Management expanded

In mid-July 2023, Robert Baumeister was appointed as a further managing director of PSI Transcom GmbH. He has known the company for many years and is responsible for the Train Management/ITCS division.

In recent years, PSI Transcom has experienced impressive growth and established itself as a market leader in the public transport software industry. This success reflects the company's relentless dedication to innovation, quality and customer satisfaction. In order to maintain this course in the future and achieve its ambitious goals, the management has decided to expand its management team. Robert Baumeister initially worked for years in the energy sector as a project manager for network control systems. He has been employed at PSI Transcom since 2016.



Robert Baumeister

Robert was initially a project manager in the railroad sector and has been responsible for the area of train management systems and ITCS solutions for around three years.

“During my time at PSI Transcom, I have had the chance to experience the collegiality, commitment and excellent work of my colleagues. It has impressed me time and again how we work together as a team and deliver top performance together. As Managing Director, I would like to continue on the path we have already taken and build on our successes.”

Robert Baumeister, Managing Director PSI Transcom GmbH

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PSI Transcom GmbH
Dircksenstraße 42-44
10178 Berlin
Germany
Phone: +49 30 2801-1608
info@psitranscom.de
www.psitranscom.com

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Susanne Renner

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