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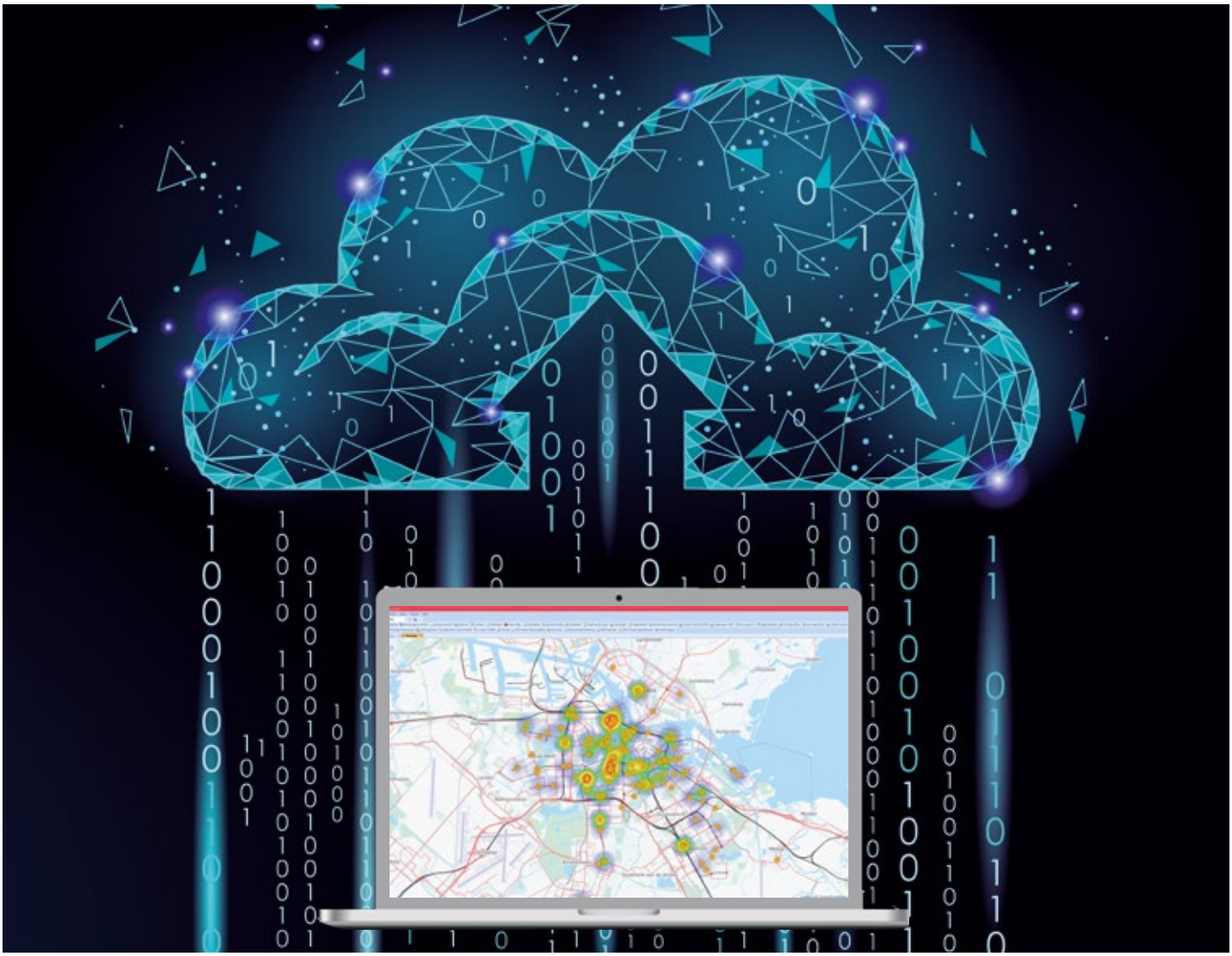

GVB Amsterdam relies on a high-performance automatic vehicle management system

Buses and trams controlled from the cloud

Success Story

All processes in one system
Hagener Straßenbahn AG migrates to a comprehensive Depot and Automatic Vehicle Management System

Product Report

The Depot Management System of the future
Sustainable software concepts for emission-free fleets

Product Report

Mobile communication for transport services
Tablet for the briefcase

PSI

EDITORIAL

Dear readers,

did you know that today, 73 percent of all companies in Germany use cloud computing services? Last year, this was 66 percent. This was revealed by the current Cloud Monitor from Bitkom and KPMG (www.bitkom.org). This isn't surprising – after all, cloud solutions provide significant benefits. So it's no wonder that the GVB, a large and modern Dutch transport company, decided to control their buses and trams through the cloud. PSItraffic/AVMS, which has been in use by the GVB for 13 years, was replaced by a modern, cloud-based solution. Read our cover story about this exciting development.

In Hamburg, mobility is being rethought. Namely: climate-friendly. This May, HOCHBAHN celebrated the opening of the first e-bus depot in Germany. It is planed that it will provide the charging technology and energy supply for 240 buses.

The PSItraffic/DMS, which has automatically controlled processes at the six HOCHBAHN bus depots since 2014, has been extended with an additional module for the charging and load management of the buses.

An interview with our AI expert Dr. Rudolf Felix also sheds light on the significance of AI systems for harmonising processes at bus depots.

Has your transport service not yet been digitized? Then you should read our article on page 14. Because digitalisation has long since found its way into the area of employee communication – thanks to Moveo Software GmbH and its solution Moveo Profahr. More than 22 transport companies, including ÖBB-Postbus, Münchener Verkehrsbetriebe and Bernmobil already rely on the solution.

We look forward to a lively exchange of ideas with you at our user forum in September. Registrations are still open – at www.psitrans.de/forum2019.

We hope you enjoy reading it!

Torsten Vogel
General Manager
PSI Transcom GmbH

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GVB Amsterdam relies on a high-performance automatic vehicle management system

Buses und trams controlled from the cloud

In the Netherlands, public transport passengers stand more in the focus of operators than elsewhere. This is also the case in Amsterdam, where GVB bears the responsibility. Being on time and providing information are the two most important words here. A central element in achieving these goals is the automatic vehicle management system (AVMS). This recently experienced a comprehensive upgrade and was then successfully migrated to the transport company's new cloud infrastructure.

Amsterdam without buses, trams and subways? Anyone who has been to Amsterdam knows: That's inconceivable. In almost no other city does the urban network enjoy such overwhelming popularity. It's no surprise, since using its 43 bus lines, 15 tram lines, four metro lines and six ferry connections, passengers can reach almost anywhere in Amsterdam. Each day, over 900,000 passengers use the bus and tram lines, which are operated by the GVB, as are the metro and ferry connections.

Of course, such a complex network and large vehicle fleet require the support of IT systems. The Amsterdam bus and tram, for example, each operate approximately 200 vehicles. Since 2006, GVB has been using the automatic vehicle management system (AVMS) from PSI Transcom, based on the PSItraffic system platform. The system is the key element for keeping vehicles on-time and the high performance of the passenger information. Because here in the control centre is where all the information comes together. It's clear: More than anything, the love for public transport is related to the reliability and on-time service of the transport system. "In the Netherlands, the passenger is the more than elsewhere focus of the efforts of transport companies," says Johannes Kremp, Project Manager at PSI Transcom. "This means that both buses and trains that are on time, and fast and precise information for passengers about changes have top priority. This was the exact starting point for the introduction of the PSItraffic/

AVMS vehicle management system in 2006. At that time, the people of Amsterdam complained about their city's unreliable public transport system and felt inadequately informed about schedule changes. That's why the GVB introduced a new control centre system and upgraded the entire network with a large number of displays. The initiative also included relaunching the website and introducing a passenger app.

Since then, every control system function has been used, most of which PSItraffic/AVMS already offers as standard. This includes continuous tracking of vehicles and their operating situation, and the display of dynamic passenger information. The result: Significantly fewer deviations from the schedule, significantly better passenger information and, above all, more satisfied passengers.

Around 900,000 passengers use GVB buses and trams every day.

Information every second

In 2016, as part of the maintenance contract, GVB finally requested a comprehensive upgrade to the vehicle management system – with the same functions. This step allowed GVB to establish a modern user interface and a modularised, future-oriented system. In addition to existing standard interfaces such as the VDV, it can be extended to include additional interfaces to systems from other manufacturers – a central measure of quality for modern software solutions.

And one more goal was in the focus of the upgrade: Vehicle tracking needed to become even more precise, and with this, the quality of routing and passenger information should continue to increase as well. To that point, the system only tracked the position of a vehicle when leaving a stop and only provided information in the event of a schedule deviation of 60 seconds or more. The plan was to reduce this to 15 seconds – both to provide dispatchers with an even better overview, for example, for improved reactions to deviations, and to inform passengers even more quickly and precisely. "At GVB's request, we even went a step further and are currently testing a cyclical location report every five seconds in parallel to the 15-second solution. In both cases, the control centre will have an overview almost in real-time," explains Kremp. "In both cases, the solutions will also impose a higher load on the system, which will now have to record and process considerably more data.

In the meantime, until the migration has been completed, the new and legacy systems are being managed and tested in parallel using an intelligent bridge concept. This means that both systems are supplied with all of the data from the connected IT solutions, and entries made using the legacy system are automatically transferred to the new system – and vice versa. "In this way, we can exactly compare how each system behaves and make adjustments if there are unwanted deviations in the new system," says Kremp, explaining the advantages of the solution. He adds: "Above all, dispatchers also have the opportunity to metaphorically 'cross the new bridge' step-by-step. In this way, they can make certain entries in the new system while still working in the old system in other areas. They can decide for themselves when they want to complete the changeover."

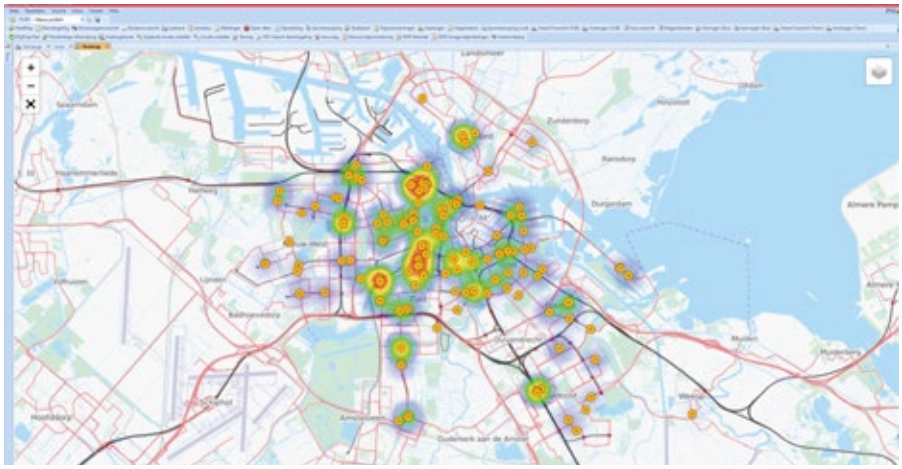
Problem-free migration to the cloud

What's new, however, is not only the AVMS, but also that almost all operations are in the cloud. Because during the upgrade, managers at GVB decided to migrate the entire IT to Microsoft's Azure Cloud – including the PSI operations control system. "The advantages for a public transport company overlap with the general advantages of a cloud-based solution. In addition to the cost savings thanks to eliminating both acquisition and maintenance costs for hardware, scalability is also important," says the PSI project manager.

Although there will be no major changes regarding the size of the vehicle fleet, functional changes, for example for increased message exchange or the performance of the servers used, will be relevant. "It was clear to us that it basically doesn't matter where PSItraffic is running. However, since it is a classic client-server system, there were still naturally some things to consider during the migration," says Kremp. This mean that client systems – and most importantly, all of the interfaces used by dispatchers – run independently of the backend and in any environment. This can range from desktop PCs, to using virtualization (Citrix, Cloud), to smartphone apps. By contrast, the backend system, consisting of the database and application servers, usually runs on an on-premise systems – at GVB, currently independently in the cloud or using Microsoft's remote services.

"The critical point was therefore network routing and establishing the initial connection. When remote access works, the whole system works," says Kremp. This is because it ensures that all of the systems that communicate with the operations control system are reachable. This includes communication with the vehicle fleet, control of the switching system, all of the databases that have not yet been migrated to the cloud, and the data hub through which all displays are controlled. The entire backend system now runs completely in the cloud, and the AVMS client is Citrix-based. For the computationally intensive dispatcher workstations with multiple screens and views, GVB also followed the recommendation of the PSI consultants to continue using physical computers to avoid latency problems. "Looking back, we can really say that the migration was completely "silent," summarises Kremp.

The PSItraffic user interface with different views.



The PSItraffic heatmap shows the punctuality of the vehicles.

It is therefore not surprising that GVB is already beginning with the next stages of the expansion. Planned is the introduction of a new depot management system, the replacement of on-board computers and with it the expansion of vehicle communication – all in the cloud.

A high-performance control system with a future

Amsterdam already has a reliable public transport system. The GVB carries the primary responsibility and is constantly working to improve services, including the IT systems in the background as well. The extensive upgrade of the established operations control system, for example, has given the control centre an even better overview of the current operational situation, contributing to a further increase in the quality of the company's services. Combined with the cloud architecture, GVB now has a high-performance and scalable control system that has optimally prepared the company for future challenges.

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Success story: Hagener Straßenbahn AG migrates to a comprehensive DMS/AVMS

All operational processes in *one* system

As the operator of a municipal bus service, Hagener Straßenbahn AG is faced with the challenge of managing a cost-effective operation that above all guarantees a high level of passenger satisfaction. The IT solutions based on the PSItraffic platform are making an important contribution to this. These include an integrated depot management system (DMS) and automatic vehicle management system (AVMS) – supplemented by a modern sales and subscription management system, as well as complex refuelling optimisation.

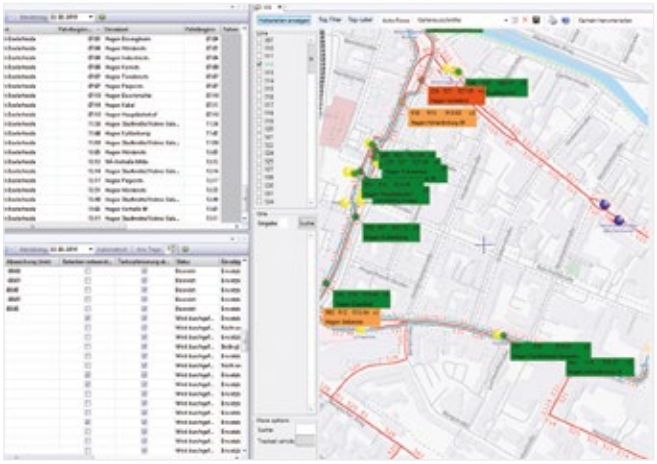
IT systems have long played a key role in complex planning and control systems. However, a look at the real world reveals a great need for action, especially in this area. Because over the years, heterogeneous IT system landscapes have developed in many companies, their maintenance is both time-consuming and expensive. Their lack of seamless integration means that a great deal of potential for efficiency is not being utilised. Hagener Straßenbahn AG (HST), which transports more than 32 million passengers a year in the city of Hagen and the surrounding area using around 140 of its own vehicles and about 25 vehicles from third-party, decided to introduce a combined DMS and AVMS in a similar situation. Not only were the depot management system (DMS), communications technology and radio procedures obsolete – the vehicle equipment had also reached the end of its service life. A sales and subscription management system and a solution for tank optimisation were also introduced as part of the project – with Berlin PSI Transcom as the general contractor.

Project goals of simplicity and uniformity

The overall project objective was therefore obvious: Standardisation and streamlining of operational processes with optimised vehicle use. This was intended to effect improvement in both the quality and the range of services offered.

PROJECT GOALS IN DETAIL

- a reduction in the number of interfaces and system components
- continuous data storage for all parts of the system
- a uniform scheduling system with as little rework as possible in the downstream systems such as personnel planning, AVMS, DMS and ticket printer
- a reduction in the number of devices in order to offer more transparency at the driver's workplace
- the simplification and standardisation of vehicle dispatching
- an improvement in vehicle communication
- an improvement in vehicle tracking in the network and at the depot
- improved data archiving and evaluation
- convenient activation of the company's own fuel station
- transparency for the fuel levels of individual vehicles



Exit and entry list with GIS map.

View of depot Boelerheide.

Real-time passenger information in Hagen city area.

A migration during operation

It was a particular challenge to design a migration concept that enabled the successive changeover of the systems during parallel operation without significantly impacting daily operations. This did include period during which both systems were in operation, which created additional work for dispatchers. However, parallel operation made possible extensive tests and comparisons, allowing conclusions to be drawn about various fine tuning before the go-live.

This means that the old DMS was still running completely independently (and parallel to the new system) during the technical upgrade of the vehicles – an on-board computer for ticket sales and checking of the electronic tickets, and a modern, easy-to-use ticket printer with touch display. This was the case both in the garage and in the control centre. At the same time, the first computers with PSI-traffic were installed. The changeover and familiarisation with the new system then took place during short transition phases.

After all of the vehicles had been fully equipped with the new printers, the transition of the data communication system was completed. During this time, the AVMS supplied the current data server of the Rhine-Ruhr network (VRR) to generate online timetable information. Over the course of just a few days, the dynamic passenger information system was then replaced or switched over to the new technology. The demanding changeover to the new, digital / mobile radio system was ultimately the prerequisite for switching off the old AVMS and for removing the IBIS devices from the vehicles.

Reliable planning thanks to reliable data

A control centre with dispatching workstations for the ITCS and the DMS is now available at the Boelerheide depot and on the route to monitor and dispatch the vehicles. Here, a central control computer operated by the HST assumes control and data supply of the overall system. This system includes all required VDV interfaces. System users are provided with various views of the current operating situation that are relevant for them. Based on this, vehicles can be quickly and reliably dispatched at the depot and on routes.

Today, the control centre and vehicles communicate using the mobile telephone system instead of analogue radio. The main benefits are push-to-talk technology, reduced operating costs thanks to the elimination of radio masts, and increased range. This pays off especially on the outskirts of the network. Drivers can also immediately document damage to the vehicle through the on-board computer using a so-called fault tree. The DMS then automatically creates a workshop order based on the reported damage.

Detour management with defined detour routes is another aspect that contributes to optimised processes in daily operations: These can be inserted as needed into the planned route for a defined period of time or at recurring times. The on-board computer provides the drivers with all relevant information, and passengers are informed via displays in the vehicles and through announcements in the vehicles and at stations. Passenger displays also provide information about connections at central stations and across lines. At bus stops, departure times are displayed in real-time.

10 percent reduction in refuelling procedures

To optimise dispatching and personnel utilisation, as part of the launch of the DMS and AVMS, a solution for fuelling optimisation was also integrated. This replaced the existing, rigid 2-day refuelling process and aims

> *After an intensive introductory period with challenges both large and small, Hagener Straßenbahn AG now has an integrated and robust system – without interruptions.*
>
> **Elmar Göbel**
> Operational manager and system administrator, Hagener Straßenbahn AG

in particular to reduce the number of refuelling operations. The remaining range of vehicles is calculated using various algorithms and compared with open routes. Vehicles continuously send their mileage to the AVMS, which transmits the data to the DMS. Some adjustments had to be made to the vehicle technology, for example in cases where low fuel was indicated very early.

In addition, information from the vehicle file is used in the calculations. This can include average fuel consumption, a risk premium to account for possible tank faults, an additional safety value to compensate for possible spontaneous detours, and the maximum range and current remaining range of the vehicle.

Calculations were based on measurements of actual vehicle consumption on the various routes and include a factor that can be entered for routes with steep gradients. The previous average fuel consumption of the vehicle is also taken into account with a defined percentage. On the basis of the data supplied, the DMS finally decides whether a vehicle needs to be refuelled or whether it can be used for the next route.

Although it required some internal persuasion at first, around 10 percent savings in refuelling operations have now noticeably lessened the daily workload – especially in the garage. By taking other factors into account, such as detailed weather data, managers are now expecting further savings. Thanks to the consistency and transparency of the data, the company also has a wide range of evaluation options at its disposal – even across departments.

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News: Hamburger Hochbahn AG puts depot management system for zero-emission buses into operation

First E-Bus depot in Germany controls fleet with PSItraffic

As part of the introduction of zero-emission buses, Hamburger Hochbahn AG (HOCHBAHN) has opened the first bus depot in Germany designed for e-mobility. It is designed to have the necessary charging technology and power supply for 240 buses.

The depot management system PSItraffic/DMS of PSI Transcom, which has been automatically controlling the processes in the six bus depots of the HOCHBAHN since 2014, has been expanded to include a module for the charging and load management of buses as well as vehicle management-relevant functions. This has now been successfully put into operation at the new E-bus depot in Alsterdorf. In the future, it will control the processes in the E-bus depots throughout the city. Until full E-bus operation, the system will ensure that the required number of vehicles are available refuelled or charged in parallel operation for diesel and electric buses, and that the drivers are available - including their duty rosters. The disposition core used for this is based on PSI's own optimisation software Qualicision, which determines solutions within seconds on the basis of general operating conditions.

The E-DMS continuously checks which vehicles at the depot are best suited to which blocks after how many minutes loading time. This means that not all electric vehicles have to be charged simultaneously, permanently or completely. The load management controls the entire energy requirement and monitors or controls the charging capacity of the individual chargers. This saves costs when expanding the power grid and guarantees stable public transport operation. The system is also designed for a possible mixed operation of electric and hydrogen powered vehicles.

Hamburger Hochbahn AG is Germany's second largest public transport company.

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Grand opening of the E-Bus depot Alsterdorf.

Product Report: The Depot Management System of the future

Sustainable software concepts for emission-free fleets

Experts say there are about 22,000 diesel buses still currently on the road in German cities. And this number is decreasing every day. That is because an ever-increasing number of cities and municipalities are investing in buses with alternative, emission-free drive systems and are striving for completely "green fleets." This development is supported by the deployment of intelligent software concepts that consider and control the new links and processes connecting charging logistics, dispatching and route planning.

Plug-in charging socket of a Solaris bus.

Currently, 45 German cities are testing electric buses (www.lifestrom.de). Their long-term goal is to operate their vehicle fleets everywhere economically. However, there are still reservations about cost-effectiveness, range and charging infrastructure for a large-scale interconnected operation. The fact is: Companies counting on alternative drives for the future face major challenges. Inevitably, this requires changes to their operational processes – including the accompanying IT systems. These can even become a driver for the use of emission-free vehicles and intelligently compensate for the lack of maturity of most alternative drive technologies, in this way already making them economical today.

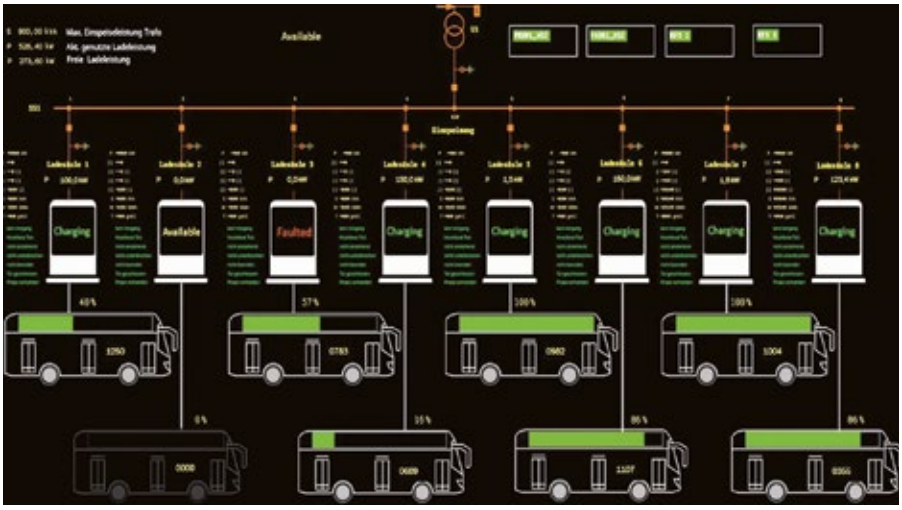
The software supplier PSI Transcom is regarded as a pioneer in the world of service providers. The Berlin-based company has designed a depot management system especially for emission-free fleets (PSItraffic/E-BMS) that has already been used successfully. The system not only factors in the required interrelationships of the different drive types: Since as a rule, fleets can only be converted successively, the integration of different drive types becomes a realistic scenario. It therefore supports both parallel operation during migration and the possibility of mixed operation in the future.

Charging at the depot: A focus on safety and efficiency

When it comes to green fleets, operators must first decide between an overnight charging at the depot and "opportunity charging" along the route. This also impacts the controlling software systems. For example, with a growing fleet of electric buses and a large network, the arguments for overnight charging are obvious.

Construction only affects the depots and not the overall urban infrastructure, changes to which usually requires extensive permits. Citizens are not impacted by time-consuming, extensive road works, which means significantly lower costs for the company. Safety aspects also play a central role – more so for hydrogen fleets than for electric buses, because supplying them economically requires

large tanks. Of course, these cannot be distributed across a city. And even central depots carry risk here. Finally, the power supply required for individual charging stations along the entire network is only available in a few cities – let alone in rural areas. With depot charging, charging the entire fleet can be centrally controlled and the energy supply intelligently managed. This means an additional, decisive cost advantage.



Monitoring and controlling the charging infrastructure in the Smart Power module.

A guarantee for being on time: Correctly calculating battery capacities

In the future, depot management systems will primarily have to balance the interrelationship between the vehicles' state of charge, remaining range and the number of routes that can be travelled – independent of overnight or opportunity charging. For example, PSItraffic/E-DMS automatically determines which vehicles at the depot best match which open routes after how many minutes of charging. To achieve this, vehicles continuously send the corresponding state data to a server. This logic can be applied to any drive type.

This is also the context for so-called charging and load management, which ensures an optimal charging strategy. In PSI's E-DMS, this aspect was integrated into the system as a "smart Power" module.

This module is essential to ensure that not all vehicles are charged simultaneously and – in the case of electric vehicles – are not even charged to full battery capacity, among its other functions. Here, the automatic functions described, such as the continuous adjustment of charge state and remaining range with the open circuits, become active. On the other side of the equations, the amount of energy available from the power grid is also recorded. The advantage: Not every bus needs its own charging station. In this way, the existing charging hardware can be used in a budget-friendly way, and available capacity and resources can be used optimally.

Predicting energy demand thanks to intelligent technology

Charging stations: In PSItraffic/E-DMS, these are automatically controlled by the charging management system according to demand. The system works not only with the current status, but also with forecasts. The module forecasts the total energy required to charge the vehicle fleet throughout the day. Artificial intelligence methods are also used for this purpose. Energy demand is calculated by the E-DMS using all constant master data for individual vehicles. Influences such as outside temperature, battery type and battery age are included in the forecast, since they affect charging capacities. Based on this information, the system then develops a logical charging strategy which allows statements to be made about the number of routes at a certain minimum daily temperature that can be expected, among other things. In addition, the E-DMS also enables projections to be made for energy demand throughout the next day, how and when charging should be performed, and when which vehicles will be ready for operation.

In this way, optimised charging concepts are created that build on the currently available electrical grid capacities. In the future, data for costs and capacities on the energy market could also be included in such calculations .

The fact is: Public transport companies are evolving. There is little time for doubt or waiting for mature drive technologies. IT systems that use intelligent automatisms and algorithms to allow both gradual migration with parallel operation and the perspective of mixed operation appear even more valuable. Corresponding systems are already, and their practicality is being proven in early projects.

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Interview: High-quality forecasts for industry and public transport

Qualitative labelling with Deep Qualicision AI

What is unique about using AI methods in business processes for industry and public transport?

The advantage of using AI methods is that systems can be enriched with capabilities that have until now have only been associated with humans. Well-known examples of this include voice control for our devices at home and the software for driver assistance systems.

Similar to the process through which humans learn throughout life, this software also has to learn to develop its abilities. As an example: The different forms and viewing angles of a traffic light must be learned in order to recognise a traffic light quickly and reliably in the large amounts of collected data.

This type association between data and objects or situations is referred to as qualitative labelling. This can also be carried over to the processes in a depot.

Often, balancing conflicting objectives, such as the use of a certain vehicle type for a certain route or assigning employees to services, is no easy task.

This is something that systems based on Qualicision (PSItraffic), or neural networks which work with qualitative labels, can do very well. They are also better able to explain the calculated decisions.

What must be considered when using AI in industrial applications?

In addition to expertise with all AI methods, the problem-solving skills of the developers of AI-based solutions is important. That's why at PSI, we talk about Industrial Intelligence, which combines methodological AI knowledge with industrial process knowledge. If you possess both, the advantages of AI solutions are far-reaching. However, another important aspect is the availability of labelled data, which has already been mentioned. This is a prerequisite that has so far remained largely outside of public notice in discussions of AI but which in most cases is nevertheless of decisive importance for industrial AI applications.

Dr. Rudolf Felix in an interview.

What is labelled data and why is it so important?

Labelled data is data that has been processed and assigned a meaning before AI training begins. This data can then be used by an appropriate learning AI process to create a model of that data, which can in turn be used to automatically recognise similar patterns in future data. Labelled data represent the bridge between data patterns and their real-world significance, such as that of a business process. In classical AI applications such as image classification or speech recognition, data labelling is usually performed manually. This is only sufficient for these applications because the data patterns which have been labelled do not change substantially over time – the labelled data is valid over the long term. For example, AI-based speech recognition can assume that, in principle, once the speech and word patterns of a language have been trained, they will keep their meaning unchanged in the trained form. What has been spoken remains valid for

months or even years. The situation is completely different for dynamic business process data.

Does this mean that in business processes, the data must be prepared again and again to keep the AI application up-to-date?

Exactly. In the area of business process data, automated data labelling is essential because continuous new data patters are generated by the AI applications when they work in the area of business process optimisation and real-time decision support. Data processing suitable for artificial intelligence must use historical and new data to automatically recognise and visualise correlations in the process data. This takes the form of self-calculated classes of data patterns based on historical and current data, which give it the ability to automatically label raw data. Only in this way can raw business process data be used for self-adapting and learning AI algorithms.

And how are you meeting this challenge?

We have developed algorithms for so-called qualitative labelling in connection with the deep Qualicision AI. Simply put, qualitative labelling leverages the measurement data in the processes that are already collected in business processes. We are talking here about micro and macro KPIs, which the customer identifies as key figures for satisfaction from his perspective or from the perspective of the process. From this minimal, qualitative information, we can derive time series and calculate the qualitative labels for the respective business process without requiring additional knowledge. Once could say that qualitative labels are automatically derived from the self-referential definition of quality inherent in the business process and its own reality. Business process data is automatically prepared for consumption by the AI. Qualitative labelling is an essential component of the industrial intelligence of PSI systems.

Consequently, the use of AI by PSI must therefore already include qualitative labelling. Is this the case?

First, PSI can indeed make a claim for the industrial intelligence of the solutions. Neural networks have been used in some PSI customer systems for over ten years. These are systems based on extended Fuzzy Logic control processes at well-known automotive manufacturers and suppliers worldwide on more than 180 production lines. PSI customers in the metal industry also optimise their processes around the world with AI scheduling algorithms. Maintenance management systems optimise the maintenance plans of electrical network. AI systems from PSI harmonise the processes in bus depots by finding an optimal solution for allocating vehicles to routes (for example) based on any number of constraints, such as vehicle bottlenecks, and qualitative criteria on the order of seconds. In total, PSI has delivered and supported over 50 different AI systems.

And qualitative labelling?

Qualitative labelling is already being used in a number of these applications. Important reference applications include AI autopilots for the optional automatic control of production processes, autonomous learning of system settings in the automotive industry, and processes in the energy industry. Examples include forecasting methods presented for the first time at this year's Hannover Messe for managing energy loads in micro grids and the self-diagnosis of complex machines for predictive maintenance.

What concrete experiences have PSI and customers had with utilising AI?

Diverse and positive. In particular, they've seen that PSI's Industrial Intelligence works. In some applications, Qualitative Labelling works silently, efficiently and inconspicuously. Since the solution is more important than the method, only now is the topic being discussed more intensively. However, since the subject of automatic preparation of business process data is growing in importance, qualitative labelling is also continuing to move to the foreground.

What is your vision for the future use of AI in PSI solutions?

Networking existing solutions to create comprehensive solution scenarios certainly has potential. Combining individual solutions from public transport, traffic flow optimisation, maintenance and grid management to form networked scenarios immediately creates global solution, for example with relevant concepts for modern mobility and electromobility. In my estimation, PSI is unique in its potential.

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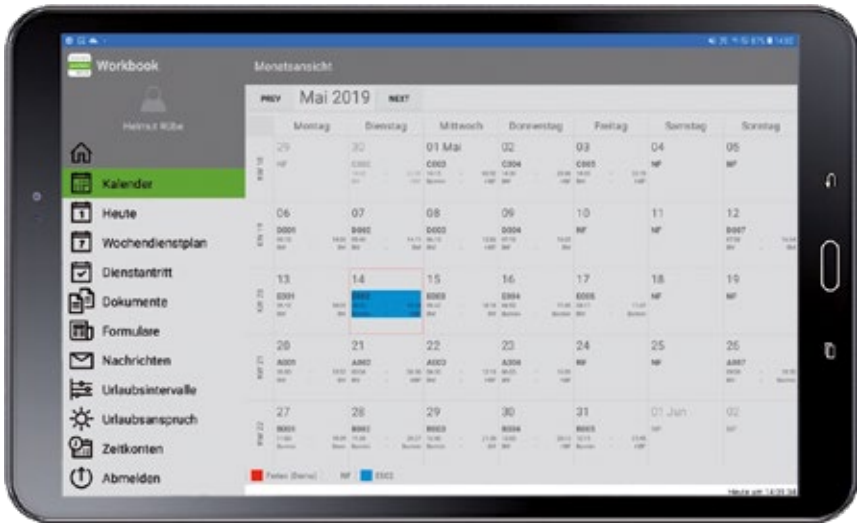
Product Report: Mobile communication for transport services

Tablet for the briefcase

The major trend of digitalisation is rapidly causing lasting change to our world. Even in local public transport companies, software systems are increasingly helping to improve processes and efficiency in a growing number of areas. The appearance of drivers carrying heavy briefcases is all the less in tune with the refreshed image their employers. In fact, they are a sign of the halting modernisation and digitalisation of their workplaces. And yet, stressed drivers can easily be unburdened and flexibly integrated into internal operational planning and communication – with business information and communication solution Profahr BIK from Moveo.

Today, numerous studies have demonstrated the importance of the proper design for workplaces, where the use of the latest technologies or mobile devices should be taken for granted. They are considered central building blocks for a successful, modern employer that values its employees and supports and encourages their creativity and motivation. A glance at public transport companies reveal serious discrepancies between the different areas: For example, modern, digital systems have long been commonplace for dispatching and timetable management. By contrast, the digital connection to drivers is lagging considerably. However, mobile devices and systems could make the day-to-day lives of highly stressed drivers much easier. As a rule, drivers do not have a stable workplaces – or would have to accept additional travel to reach them. At the same time, they must be supplied with a great deal of information and plans, or or they must process them. This includes, for example, current rosters – including changes on short notice – detailed work information such as timetables, stops or work and rest periods, time and holiday accounts, but also accounting statements and the sending of company documents and instructions. And last but not least, as a result of the lack of connection to internal company communication, they are completely excluded from forums – a considerable shortcoming that fuels growing dissatisfaction and contributes to already high stress.

Mobile communication solutions make everyday driving easier.



Calendar view in the Profahr Workbook.

The digital workplace as a satisfaction factor

In fact, the processes found in many places are seriously outdated and anything but contemporary. They are based on the exchange of paper documents, which must be filled in manually and sent by post or personally delivered to the administrative centre. Frequently, drivers fail to provide urgent responses or changes cannot be made with sufficient lead time. The result: A large and inefficient burden of administration and coordination.

In times with a growing shortage of skilled workers, companies can no longer afford such conditions. Not least because employees have long since applied their experiences from their private lives to the working world and expect digital, mobile, intuitive solutions from their employers that efficiently support and facilitate their day-to-day work.

Current rosters with one click

The successful use of Moveo's online module Profahr BIK shows how easily companies can improve this situation. This company information and communication solution was specially designed to integrate mobile employees. These are granted access to internal communication and planning systems – regardless of time and location. More than 22 transport companies, including ÖBB-Postbus, Münchener Verkehrsbetriebe, Bernmobil and RSAG Rostocker Straßenbahn already rely on this solution. Thanks to its responsive web design, it can be used on any end device or operating system – on home computers, smartphones or employee tablet computers. Access is over an encrypted connection and is only possible with a user name and password.

Depending on how the transport company is configured, the system can also access the dispatching servers. For example, duty rosters are clearly visualised. Above all, employees benefit from the simple reply and input options, for example for creating individual rosters, sick leave notifications or annual holiday planning. It is also possible to integrate additional functions, for example, logging on to internal training or discussion forums. Taxis can also be ordered after work – at night or in remote locations – using BIK. The module checks the availability of public transport connections using the online timetable before it submits an order.

Tablet instead of briefcase

With the considerable flexibility that access to planning systems through mobile devices provides, employees eliminate numerous steps and and save valuable time. It is often the first time that drivers have been given the opportunity to actively participate in internal company communication. This especially increases employee satisfaction with their employer – a valuable commodity in times of a "war for talent." And companies also benefit: From a reduction in administrative expenses and associated costs. By eliminating paper-based and error-prone manual processes. As well as noticeably accelerated dispatching thanks to the consistency of internal planning processes.

EVERYONE BENEFITS

Well-trained employees have become a company's most valuable asset. Companies must design their workplaces efficiently and securely. For drivers, this most significantly includes access to mobile terminals, and access to internal planning and communication systems. Employers and employees both benefit from this: They all save trips, time, costs and aggrevation.

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Produkt Report: Merging of dialogue, database and process with clear advantages

Live Dialogues: High efficiency – maximum usability

Today, GUI toolkits make it possible to design user-centric dialogues. However, a continuous connection to the process that provides or modifies data is rare – which can have serious consequences. PSI Transcom is tackling this problem – with clear advantages for its users.

Sorry, someone was faster." This is a sentence that everyone who books trips online or buys through portals has probably seen, to their great annoyance. That is completely understandable. Because it's not uncommon to see this after spending what felt like an eternity clicking through a complex dialogue, entering a great deal of data and information – without any sign that the offer is no longer valid and that the information is a waste of time. This is simply because almost all dialogues are completed offline, i.e. without a live link between the opened data record and the underlying processes. These are continually updated in the background – with possible consequences for the open data record.

A dialogue – also called a dialogue window, dialogue field or dialogue box – is a component of the graphical user interface that is opened whenever information must be collected from the user. However, as a rule, entries can only be made offline, meaning that a comparison of the information entered and the current situation can only be made after the entry has been completed and submitted. Sometimes the data which was entered has become invalid, or desired actions can no longer be performed.

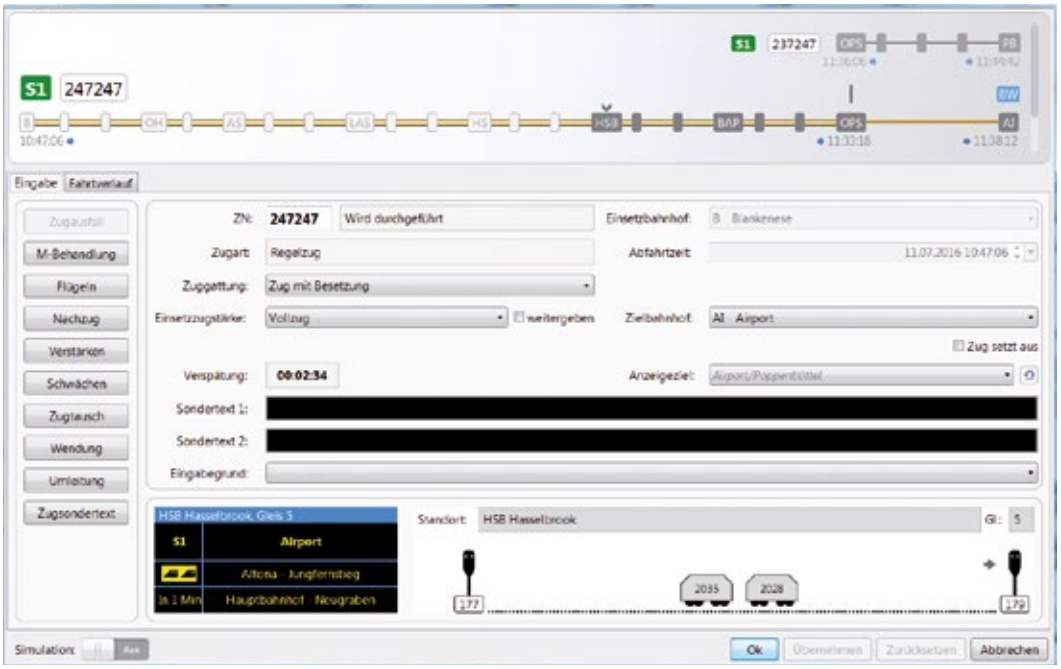
Offline processing leads to frustration

Offline processing is also the norm for industrial planning software and for local and long-distance transport applications. Even worse, planning and control systems today generally either provide many compact individual dialogues that fail to take complex dependencies into account, or they combine necessary individual actions into complex dialogues. If it is not possible to make certain changes after the dialogue has been completed, more than simple frustration can result. Most importantly, the desired goals cannot be achieved effectively and efficiently – and the user will certainly not be satisfied. This is in no way fit for purpose or user-friendly. An application's usability has long since evolved into an essential measure of its quality and a determinant of user satisfaction, and it contributes significantly to the successful utilisation of applications.

For example, dispatchers are required to quickly take the correct steps in the event of unplanned events or deviations – in a way that reflects the current situation. Dispatching systems should support this task – for example by visualising complex relationships, by providing checklists and suggestions for action, or by providing acoustic and visual signals. However, problems always arise when the situation has already changed by the time the dialogue has been completed and individual actions can no longer be performed or have become irrelevant.

As an example: The figure shows an offline dialogue in which the itinerary of a train is to be shortened using a dispatching measure. The dispatcher opens the dialogue and edits the measure. The measure is not implemented until the dialogue has been closed. If the train has already left the station at which the train formation change is to be carried out, the dispatcher only sees this after closing the dialogue.

Similarly, as things now stand, the dispatcher cannot see how the measure is presented to passengers in the passenger information system. In addition to the train driver controlling the train, passengers should be informed reliably and without misunderstanding about changes to the journey.



The open live dialogue shows the current status of the underlying process (here train journey) and is also linked to the passenger information.

Disposition without detours

For these reasons, Berlin PSI Transcom has adapted the PSItraffic platform, merging dialogue, database and process with each other. The company is currently gaining initial experience in ongoing introduction projects at customers in Switzerland and Hamburg.

There is now a constant connection between the dialogues and the database. Through this connection, open dialogues always display real-time information or options for action – throughout the entire dialogue process. Data that is no longer up-to-date is greyed out. In the example described, the selected train journey is continuously updated in the upper part of the dialogue. There, the dispatcher can see which stations have not yet been reached. The train handling is carried out as usual in the middle. In the lower part of the dialogue, a preview of the planned passenger information is displayed. This also enables the dispatcher to adjust the passenger information as necessary.

The advantages of this innovation are obvious: In the open dialogue, the dispatcher maintains a constant overview of the process – in the example described, the train journey – and can take measures based on the current situation. Avoiding invalid entries ultimately ensures significantly more efficient processes and satisfied users. Combining dispatching and passenger information also ensures more reliable passenger information.

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> *The days of offline dialogues and frustrating multiple entries in complex planning and control systems are numbered. The continuous connection between dialogues and database helps dispatchers to take measures more efficiently and provides passengers with more reliable information. With this development, manufacturers like PSI Transcom are not only fulfilling the expectation of a positive user experience for their solutions, they are also increasing the effectiveness of their applications in practice.*
>
> **Torsten Vogel**
> General Manager, PSI Transcom GmbH

News: PSI extends passenger information system for the Gornergrat Bahn

From Zermatt to the Gornergrat – well informed

The Gornergrat Bahn. In the background the Riffelsee, vis-a-vis the Matterhorn.

Since 2012, the Matterhorn Gotthard Railway, which belongs to the BVZ Group, has been informing its passengers on the more than 144 km long rail network in trains and at around 40 stations on the basis of the PSI passenger information system (PIS). In future, the Gornergrat Bahn, also part of the BVZ Group, will also use the system.

PSItraffic/PIS collects information on the operating situation at the control centre of the Gornergrat Bahn in Zermatt and processes it for passenger information and dispatching. Passengers are informed about departures, delays and disturbances via displays at the six stations and in waiting areas. Special texts as well as marketing-specific and tourist information can also be displayed. In addition, travellers receive information about their journeys via loudspeaker announcements.

As part of the system expansion, every display will be upgraded to the state of the art. A particular challenge lies in their weather suitability, as the stations are located at an altitude of over 3000 metres. In addition, the public address system will be modernised and expanded.

Due to its high modularity and flexibility, the PSI system can be easily expanded. It results in a significant improvement of customer information and enables dispatchers to take appropriate measures in the event of a fault.

The Gornergrat Bahn is the first electrically operated rack railway in Switzerland and runs from Zermatt to the Gornergrat across from the Matterhorn. It is the highest outdoor rack railway in Europe.

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News: infra fürth gmbh decides for Profahr Personnel Dispatching System

Moveo receives order from infra fürth

As part of the reorganization of its transport division, infra fürth gmbh has commissioned the PSI subsidiary Moveo Software GmbH with the delivery and implementation of the Profahr personnel dispatching system as well as a module for driver information including taxi ordering. Productive operation is planned for the end of 2019.

In the future, the new system for the nearly 200 infra employees will support all decisions in personnel scheduling, reduce routine work and ensure efficient work processes. This includes the short-term assignment of unplanned services, the resolution of personnel bottlenecks and vehicle deployment planning. Via the Profahr communication module BIK (operational information and communication), mobile employees in particular the driving service, can be informed promptly and comprehensively about changes to the duty schedule or upcoming internal events, regardless of the device and operating system used. At the same time, they are given the opportunity to communicate their personal concerns.

Klaus Dieregsweiler-Grünsfelder, head of the business unit and authorized signatory of infra traffic operations, sums up, "Following the very good experiences with Profahr in cooperation with our previous operator VAG, the decision was easy for us to continue the cooperation with Moveo and to integrate the system into our new system world."

With infra, our Profahr customer base, which already numbers over 60 companies, continues to grow," says Moveo CEO Alvar Schulze. "It is considered one of the most innovative companies in Germany. The order proves once again the quality and modernity of our solution, " adds Matthias Kramp, also Managing Director at Moveo. Perspectively, infra is also reviewing the introduction of Moveo's individual duty planning.

infra fürth is a supply and network service provider for the city of Fürth and some surrounding municipalities in the fields of supply, public mobility and services. The public transport division is handled by the infra fürth verkehr gmbh subsidiary.

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SAVE THE DATE 2019/20

12.–13.09.2019	PSI user and diskussion forum	
03.–05.03.2020	IT-Trans – International Conference and exhibition	
22.–25.09.2020	InnoTrans – International Trade Fair for Transport Technology	

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