IVU TRAFFIC TECHNOLOGIES

Integrated

The magazine for IT systems in public transport

CONTROLLING **COMPLEX FLEETS**

Efficient, innovative, and digital – on the fast track to the mobility transition

Integrated IT systems
for complex fleets

Large transport fleets swiftly and reliably transport millions of people around the world to their destinations every day. They are the heart of the world's metropolises and the backbone of rural regions. Public transport ensures liveable cities, economic growth, and sustainability by connecting people and locations with each other.

Transport operators' fields of activities are highly complex: They must face many challenges to guarantee their passengers reliable, comfortable, and modern public transport – and rely on the integrated complete solution IVU.suite to overcome them. In our brochure we present five of these complex fleets.

Despite differing requirements and preconditions, these five companies are united by their confidence in IVU.suite: Connect Bus in Norway, De Lijn in Belgium, Wiener Linien in Austria, BVG in Germany, and Grupo Polo in Peru.

As an IT specialist, IVU leads the development of integrated standard products for public transport. We support complex fleets worldwide, helping them offer convenient, fast, and environmentally sound mobility for everyone, now and in the future.

IVU. SYSTEMS FOR VIBRANT CITIES.

Overview

Photo: jamesteohart (Shutterstock)

Ann Schoubs has been Managing Director of De Lijn since January 2021. Previously, she worked in various positions at the railway company NMBS for a number of years, as well as spending three years in the federal civil service. She completed her studies at the University of Leuven.

Fleet management from the North Sea to Maastricht

Photo: De Lijn

Whether along the North Sea coast, as beautiful as it is rugged, or through exciting cities such as Ghent, Bruges and Antwerp – De Lijn transports nearly 500 million passengers per year to their destination in the Flemish provinces in Belgium. The Belgian transport company operates around 2,300 buses and 425 trams in Flanders. The most famous of them all is the Kusttram – the longest tram line in the world, which runs along the picturesque Flemish coast for 68 kilometres. Each of the region's five provinces has its own fleet management. This makes it challenging to smoothly coordinate transport and reliably provide passengers with information about the current departure times.

In 2014, De Lijn and the comissioned industrial consortium THVProfa resolved to restructure the existing systems for fleet management and passenger information in order to speed up timetable planning and increase customer satisfaction. A new central operational control centre would support the various independent regional control centres and focus data management in one place. De Lijn also wanted to comprehensively modernise passenger information across the whole region.

Standardisation of fleet management across different regions

Due to the high level of standardisation, De Lijn opted for the integrated IVU.suite solutions to implement a new fleet management system with central data management and real-time information. To achieve this, IVU assembled a complete system for all of De Lijn's operating regions based on the IVU.fleet control centre system.

Since its introduction, the multi-tenant background system has ensured a continuous flow of data from the vehicles to the control centre, and keeps the dispatch managers up to date about the current traffic situation and any disruptions at all times. A comprehensive range of dispatch functions helps dispatch managers to swiftly rectify problems, ensure connections, and capture the movement profile of all vehicles.

→

> "With the IVU.suite we now have a single system for all data transmission.
>
> **ANN SCHOUBS**
> MANAGING DIRECTOR | DE LIJN

Modern passenger information at stops

De Lijn has also introduced the stop computer software IVU.realtime.stop to modernise the passenger information across the entire region by supplying up to date information to more than 450 display screens at central interchanges. The system a llows bilingual output and the audio output can provide automatic text-to-speech announcements to up to 16 stop points simultaneously. IVU.realtime transmits all departure information, which is precise to the minute, to display screens, websites, and apps at the same time. In addition, IVU.fleet monitors trip punctuality and cancellations, allowing De Lijn to analyse performance data and have more flexible disruption management.

Centralised data and reliable information

IVU.suite solutions made it possible for De Lijn to implement requirement-orientated fleet management. This means it is possible, for example, to centralise planned run data from previously separately-managed control centres, allowing optimal coordination across the boundaries of the different provinces. By switching from an analogue to a digital reporting system, De Lijn could also improve data quality. At the same time, the IVU solution ensures that the process of forwarding information about the trip itinerary to the controlling department is optimised, which is crucial for the statistical evaluation of operations. De Lijn's customers also benefit from a reliable information pool: always up to date bus and tram departure times on more than 450 stop display screens make life much easier for passengers in Flanders and help them to plan their trips more reliably.

Photo: IVU Traffic Technologies AG

Vehicles: **2,294 buses, 425 trams**
Employees: **7,927**
Route network: **206 mil. km**
Passengers per year: **approx. 500 mil.**

Three questions for **Ann Schoubs**

How do you rate Belgium's public transport compared with that of its European neighbours? What specific advantages does the country have to offer, and where does it still have some catching up to do?

One particular country-specific aspect is the poor land use planning in Belgium compared with other European countries. Transport operators have to factor in a significantly greater number of stops for a main through-road, for example. At the same time, the flow of traffic through these villages is restricted. This results in buses travelling at a low speed, which compromises the attractiveness of public transport compared with individual transport. That is why we are in talks with the towns and communities to see if we could set up separate bus lanes, for instance. But we are also looking to our northern neighbours. for example, with regard to regional development regulations, as I mentioned. For public transport, however, the Netherlands has opted for a concession model, which in our view is not without its disadvantages. In Flanders it has therefore been decided that public transport should remain the responsibility of the public sector.

The Flemish region has set itself the target of reducing CO2 emissions by 35% in comparison with 2005 levels by 2030. What contribution can public transport make, and what do the specific measures look like?

We are focusing primarily on electric mobility for now, but hydrogen propulsion technology is still an appealing prospect for us as well. However, the latter is still exceptionally costly to manufacture and should still always be generated in a "green" fashion. We have already taken the first steps in terms of electrifying our bus fleet. By the end of the year, we will receive our first 60 electric buses, and by 2035 we are planning to electrify our entire fleet of over 2,000 buses.

What changes has De Lijn seen since introducing IVU.suite for its fleet management and passenger information systems? What plans and strategies do you have to continue driving forward the digitalisation of public transport in Flanders?

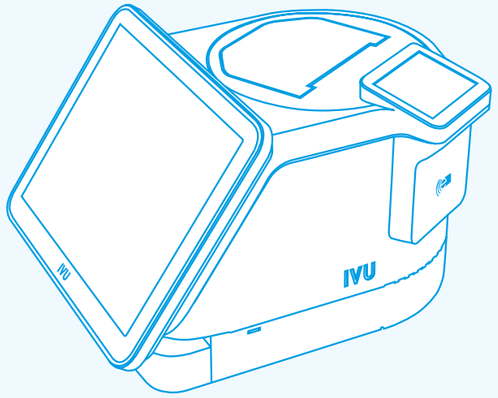
The most important aspect for us is to continue expanding passenger information across all channels – in the app, on displays, and at stops in the event of diversions. IVU is already making a very important contribution here with IVU.realtime. Another scheme for greater digitalisation is our "IT aan bord van het voertuig (ITaB)" in-vehicle IT programme. Our vision of the bus of the future is almost a "tablet on wheels". The on-bus communication flows are an important consideration for us here so that we are able to offer things like entertainment or local news on board. Autonomous driving is also going to become ever more important in the years to come.

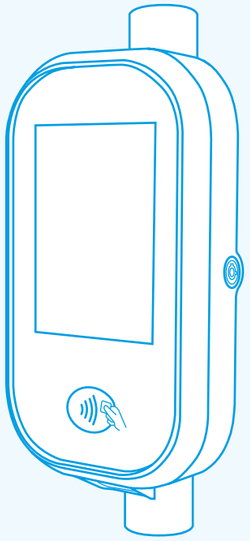
News
from IVU

Software and hardware from a single source – the interaction of all components from the control centre to the on-board technology creates a future-proof service that benefits passengers and transport companies alike.

IVU.ticket.box and IVU.cockpit

The on-board computer prints tickets, scans barcodes, validates e-tickets, and controls peripheral devices. The payment terminal accepts credit and debit cards, both contactless or with PIN entry. Thanks to the touch display, drivers can operate the interface quickly and intuitively, even in hectic everyday situations.



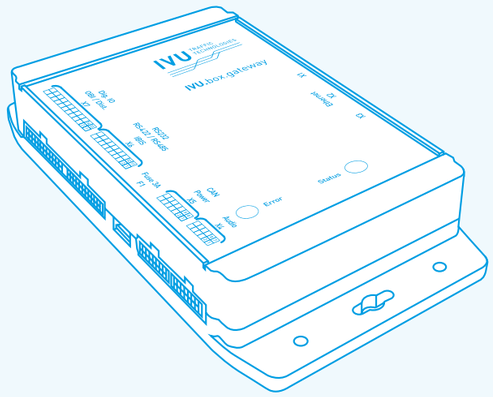


IVU.validator

Whether used exclusively as a scanner for the boarding check or as a user-operated sales terminal with the optional screen – IVU.validator is the optimal extension to IVU.ticket.box. When the device is installed by the second door it speeds up boarding and means less work for the driver.

IVU.box.gateway

IVU.box.gateway makes every end device into an on-board computer that is flexible, cost-efficient, and has all the relevant interfaces. Android tablets, for example, can function as fully comprehensive on-board computers with IVU.box.gateway.



IVU.suite for the fully electric Mercedez-Benz eCitaro

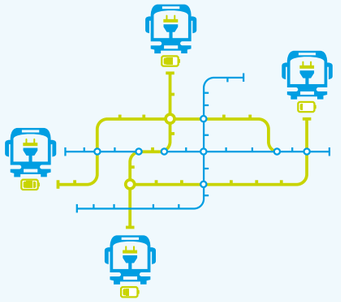
Photo: Daimler Buses

Daimler Buses and IVU Traffic Technologies have concluded a comprehensive framework agreement in order to jointly develop innovative solutions for the public transport of the future. The combined expertise of the two companies ensures that hardware and software are integrated into a uniform and complete eMobility system, thus supporting transport operators on their way to electromobility. This means that fully electric Mercedes-Benz eCitaro buses, including the customised IVU.suite software solution, can be ordered from a single source and efficiently deployed on the road.

Three steps to load management, charging management, and depot management

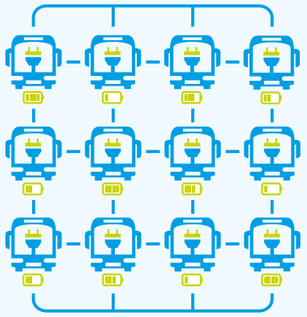
First electric buses: Load and charging management

A direct line to the charge point: the IVU.suite charging management system creates the optimal charging plan for arriving vehicles that need to be parked.



Growing electric bus fleet: Range-based charging

IVU.suite's intelligent charging management ensures that all electric buses are charged with the necessary amount of electricity for their next trip.



Zero-emission fleet: Integrated depot management for electric buses

Powerful algorithms automatically determine the optimum parking space and charging plan based on the current situation at the depot.

Photo: Grupo Polo

Polo Peréz is president of Grupo Polo. The mechanical engineer worked his way up from bus driver to president of the transport company El Rápido and in 2007 bought Consorcio Vía with 25 buses – one of the six companies of Grupo Polo. With this, Polo Peréz laid the foundation for his company, which now comprises more than 500 vehicles.

Sustainable city transport in Lima for 8.5 million people

Three questions for **Polo Peréz**

Some time has passed since the IVU.suite's ITCS was introduced in more than 500 Grupo Polo buses. How has the fleet management in the whole Sistema Integrado de Transporte (SIT) changed since then?

Thanks to IVU.suite we were able to significantly improve our service via automatic dispatch actions and direct interventions from our control centre. Our conformity rates have increased by about 30% in the last few months, resulting in better service for our customers, and increasing confidence in the routes we operate.

The fact that we can save information about our processes with the control solution IVU.fleet.statistic at any time has also helped us to continuously improve our processes. This leads to lower operating costs and maximisation of our profits.

You have very ambitious future goals for Grupo Polo. How do you want to expand your service in the future, and what role does the partnership with IVU play in it?

The Grupo Polo vision is built on two pillars. The first pillar is constant growth through new national and international projects. The second pillar is based on constant innovation, which is supported by the deployment of modern technologies such as IVU.suite. We want to be a driving force for change in Lima's city transport.

We entered a strategic partnership thanks to the international reach, quality, and advantages generated by IVU. We can now manage all our routes and our operation as well as make a huge contribution to the multi-modal integration of the transport network in Lima – and continue our development to a smart city.

As pioneers in the development of sustainable urban transport we are also trying to improve the quality of life for our passengers. For example, we are shortening the wait times at the bus stops, and display the arrival times of our buses reliably and in real time for our passengers. This improves productivity and the development in our society and in our country.

In South America, metropolises like Lima are growing at a rapid pace, and local public transport is becoming more and more important. Where do you see Peru's public bus transport in ten years?

Peru was a pioneer in the development of public transport in South America. Unfortunately this leadership role was lost to a degree between 1990 and 2010 due to the political decisions made in this time. As a group, however, we are fully convinced that we are back on the path to sustainable, high quality public transport thanks to the implementation of the integrated transport system. The schedule we envision for 100% implementation of all phases is expected to take about ten years. SIT will guarantee a service that is multi-modal, well connected, operated with clean energy, and from which the passengers benefit above all.

Vehicles: **515 buses**
Employees: **1,272**
Routes: **112**
Passengers per year: **3.12 mil.**

> Thanks to IVU.suite our conformity rates have increased by about 30% in the last few months, resulting in better service for our customers, and increasing confidence in the routes we operate.

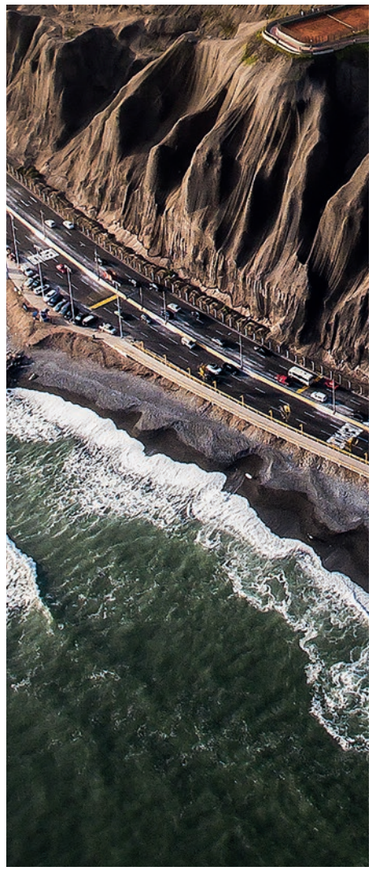
POLO PERÉZ
PRESIDENT | GRUPO POLO

Peru's capital city Lima is one of the largest cities in South America, with more than 8.5 million inhabitants, and is the cultural and economic centre of the country. The transport authority Autoridad de Transporte Urbano para Lima y Callao (ATU) ensures the metropolis's inhabitants stay connected with each other, using the transport system Sistema Integrado de Transporte (SIT) for bus transport that is as customer-friendly as it is environmentally-friendly. Four different operators serve SIT's routes, including transport companies from Grupo Polo and Modasa.

Multi-tenant system in more than 600 buses

Halfway through 2021 the operators of the transport system in Lima successfully introduced the on-board computer software IVU.cockpit and control centre IVU.fleet for over 600 buses, enabling them to seamlessly communicate with drivers at all times, as well as receiving consistent data via tablets. This allows all bus companies involved to avoid fixed built-in on-board computers and take care of everything they need to do for vehicle operation via tablets. The Colombian company SmartTT started the initial operation of the system as IVU's on-site partner.

Now that the software has been introduced, the bus drivers automatically receive information on their tablets – for example about delayed connections or if the headway becomes irregular. At the same time, cross-tenant passenger information can be published for the whole of Lima, and consistent data for performance assessment is sent to the transport authority ATU. IVU.cockpit is closely connected with the control centre software IVU.fleet, which supports the dispatchers with numerous automations and functions to increase ease of use.



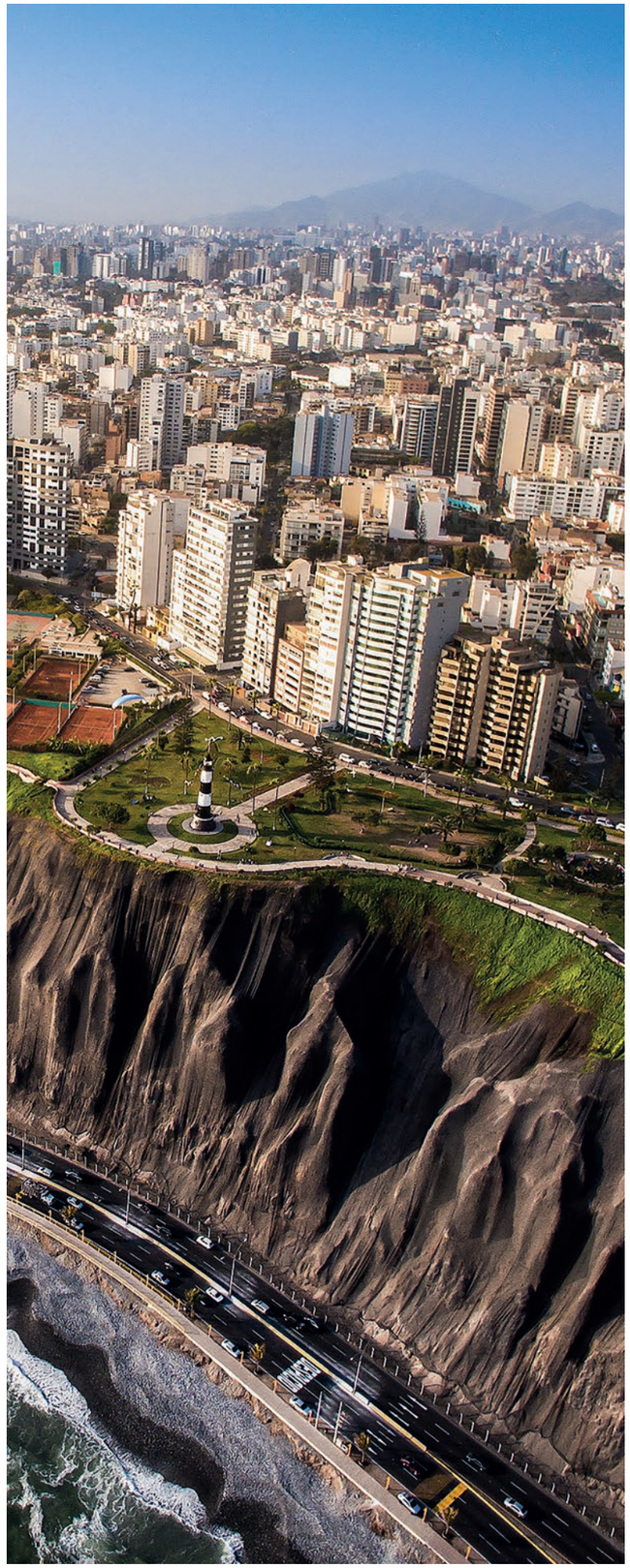


Photo: Christian Vinces (Adobe Stock)

Optimisation
as a driver of efficiency

Planning vehicle schedules and duties is a demanding task. The ability to deploy all resources properly and as effectively as possible poses a real challenge. But the potential here is significant: bus operators can make big savings with vehicle workings and duties that are just a few per cent more efficient.

To achieve this, IVU relies on the optimisation algorithms of its fully owned subsidiary LBW Optimization GmbH. LBW, a branch of the renowned Zuse Institute Berlin (ZIB), specialises in the development of new mathematical optimisation methods and develops the world's leading optimisation algorithms in the transport sector. This makes it possible to generate duty and vehicle working schedules that meet all legal and operational requirements in next to no time. Resources can then be utilised to provide additional services, for example. At the same time, duties become more balanced and employees more satisfied. Optimisation allows dispatch managers to instantly respond to disruptions or engineering works and adapt duty schedules and vehicle workings in a matter of seconds with only minimal changes.

Maximum efficiency

Duty and Vehicle Working Optimisation

For maximum efficiency, the planning products of the IVU.suite enable you to coordinate duties and vehicle workings. To do this, the vehicle working optimisation always finds a requirements-orientated and cost-minimising solution for the set of trips to be scheduled. The high-performance optimisation core then automatically creates vehicle workings according to individual requests – for example taking charge cycles and charging spaces into account, and thereby minimising the number of vehicles needed.

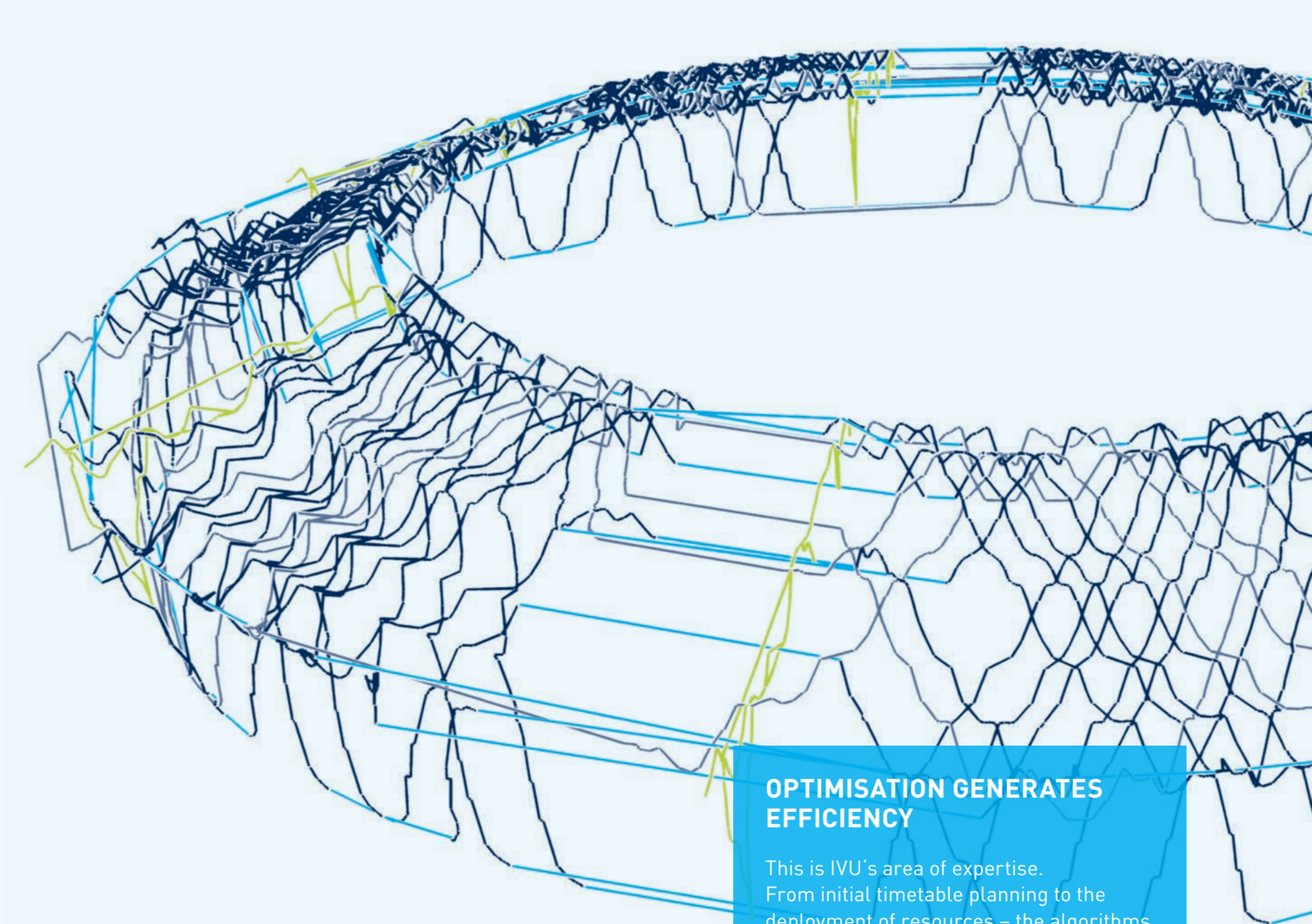
Subsequently, the duty schedule optimisation ensures that all vehicle workings and other required activities are optimally covered. Thanks to high-performance optimisation algorithms, the optimisation can combine thousands of duty elements, crewing guidelines, and qualifications into an optimal duty schedule within a few minutes. With the help of variants and adjustments, planners can also quickly react to sudden modifications, leaving duty schedules broadly unchanged.

In regional transport in particular, the creation of vehicle working schedules and duty schedules must be carried out simultaneously. With the integrated duty and vehicle working optimisation, transport companies can reach the best possible results in this environment as well. The system starts with a timetable and then creates a comprehensive, optimised, coordinated vehicle working schedule and duty schedule. The assignment of vehicle workings and duties to the vehicle and personnel depots can be specified in advance – including when part of the schedule is to be operated by sub-contactors.

Automatic Personnel Dispatch (APD)

With the APD, IVU.suite optimises personnel allocation. The system sets roster layouts and allocates the corresponding employees to them. Depending on the operational requirements, it focuses on fair allocations or balanced working times, for example. Furthermore, the APD automatically takes qualifications, holidays, training days, and requests into account – and thereby increases the flexibility of the drivers.

As well as everyday operations, the optimisation also supports economic decisions, such as whether to apply for a tender. This allows you to achieve the balance between an attractive offer for the driving personnel and operational efficiency. It can be used to calculate scenarios for routes that have not yet been acquired and as a basis for an efficient offer, in order to stay one step ahead of the competition.



OPTIMISATION GENERATES EFFICIENCY

This is IVU's area of expertise.
From initial timetable planning to the deployment of resources – the algorithms of IVU systems solve highly complex problems.

Photo: BVG

Dr Rolf Erfurt has been Chief Operating Officer at Berliner Verkehrsbetriebe (BVG) since October 2019. The business graduate studied at the University of Mannheim and the Norwegian School of Economics and Business Administration in Bergen. He holds a doctorate from the University of St. Gallen (HSG).

Dr Rolf Erfurt and BVG

Interview with the Chief Operating Officer of Berliner Verkehrsbetriebe

Towards a clean future – with the EU Clean Vehicles Directive (CVD), the German federal government is pursuing the climate policy goal of converting public bus fleets to emission-free propulsion to the greatest possible extent in the next few years. Berlin is already paving the way for electric mobility in bus transport: the city's transport operator BVG is committed to having a fully electric bus fleet by 2030. What measures are planned to achieve this target?

BVG operates Germany's largest bus network, with 1,500 vehicles. To complete the transition by 2030, we heralded the era of electric buses back in 2019 as part of the electric mobility launch phase.

The next stage of the transition is under way as part of the "Berlin Initiative for Large-Scale Procurement of Electric Buses – BIG 2025" funded by the German Federal Ministry for Digital and Transport. This involves buying up to 350 electric articulated buses as well as the associated charging and depot infrastructure. Next, a third of the BVG bus fleet will be electrified, resulting in around 580 electric buses – that is many times the fleet size of most transport operators in Germany!

So far, we have been operating the electric buses through the partial conversion and construction of four fast-charging points at final stops. However, we will need to convert six existing depots and build at least two new fully electric bus depots by 2030. Alongside this, we are currently planning a city-wide network of fast-charging points at final stops in order to manage Berlin's complex bus network, which has some very long vehicle working schedules, as flexibly as possible.

We need to involve lots of stakeholders in the transition. To this end, there is regular coordination on improved planning with the grid operator Stromnetz Berlin, the Berlin fire brigade, road and park agencies, conservation authorities and others. However, one of the most important tasks in the transition is to involve operating personnel. After all, the electrification of bus fleets entails changes to day-to-day processes, job profiles and working environments.

The transition to an emission-free public bus fleet requires careful consideration and planning in tandem with the charging infrastructure. Emission-free vehicles include electric buses and hydrogen-powered buses. What technologies does BVG have in mind when buying environmentally friendly vehicles, and how will you ensure smooth operations in the future?

Converting a fleet involves lead times for analyses and planning. That starts with the design of the battery for the electric buses and the charging infrastructure. The complexity of our bus network means that we can only determine the ideal combination on the basis of simulations. For instance, that is the only possible way to draw up product requirement documents and depot plans.

With the advances in battery development, the application potential of electrical buses has increased rapidly in just a few years. Consequently, electrifying the largest "vessels" in bus transport is no longer an impossible task. In studies, we have already developed a technically and operationally feasible vehicle concept for electrification of Berlin's trademark double-deckers.

Along with the double-decker, we also see potential for use of another great vessel in Berlin: a bi-articulated bus could usefully bridge the gap between the articulated bus and the tram.

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> BVG operates Germany's largest bus network, with 1,500 vehicles. To complete the transition by 2030, we heralded the era of electric buses back in 2019 as part of the electric mobility launch phase.

DR ROLF ERFURT
CHIEF OPERATING OFFICER | BVG

Of course, communication between electric buses and the charging infrastructure also has to be regulated. In addition, operational processes and scheduling are changing considerably. Therefore, these wide-ranging demands on the operation of electric buses in terms of vehicles, charging infrastructure and the requisite planning and processes require the development of an "e-bus system" – a highly digitalised system comprising various coordinated system components for the operation of electric buses.

Despite all the setbacks caused by the coronavirus pandemic, the further goal of doubling passenger numbers on public transport by 2030 has been set with a view to protecting the climate. Is this realistic in the current circumstances? And how will BVG make its services even more attractive to passengers in the future?

Berlin already has relatively low levels of car use and high rates of public transport use. However, the trend towards public transport has stagnated in recent years, due to coronavirus and a shift in population growth away from the city centre.

One key finding from the period of the 9-euro ticket is that our services need to be simplified. This applies to the tickets as well the sales process. Future fare products should be based on a handful of straightforward fares, even if they are not necessarily applied nationwide. It is also important to structure the fare limits transparently, including across transport associations.

Of course, we also need to make access to public transport easier for occasional customers. With this in mind, we are currently testing a check-in, check-out system with best pricing. Customers no longer need any fare knowledge here. In the background system, the cheapest combination of tickets is calculated and settled based on the trips taken.

Of course, we are continuously working to enhance our services. We have concluded a transport contract with the state of Berlin that includes an agreement to grow our transport services. Frequency on nearly all underground railway routes is to be shortened to 3.3 minutes by 2030 – on the back of the biggest vehicle procurement programme in BVG's history. Frequency improvements, use of larger vehicles and expansion of the route network are the main focal points in terms of trams. Over 30km of new tram sections will go into service by 2030. In the bus network, in addition to electrification, we are focused on improving the service.

BVG

Employees: **15,800**
Subways: **1,266**
Buses: **1,600**
Trams: **365**
Passengers per year: **700 mil.**

Photo: Artem Sapegin (unsplash)

Alexandra Reinagl studied law in Vienna. After various positions in the city administration and her work as Managing Director of Verkehrsverbund Ost-Region (VOR), she joined Wiener Linien in 2011 as the first female member of the management board.

Public transport for one of the most liveable cities in the world

Wiener Linien, Vienna's public transport network, is an Austrian institution that has been an important connector for public life in the capital city for well over a century. Whether it is the Viennese trams, the buses in the national red and white colours, or the underground trains – local public transport in Vienna makes a decisive contribution to it being one of the most liveable cities in the world.

In order to shape public transport in the future to be as environmentally-friendly and customer-friendly as possible, Wiener Linien now wants to extend its trams into the surrounding regions, ensure comprehensive accessibility, and place renewed focus on alternative drive systems. In addition, the local transport company was one of the first companies in Europe to introduce an annual ticket for €365 in order to gain more customers for public transport and reduce the amount of traffic on the roads.

Operational control with IVU.suite since 1995

Wiener Linien has been using IVU.suite's integrated standard products for the operational control of their buses and trams since 1995. In order to be able to continuously monitor the most important aspects of a trip – from the vehicle status and timetable situation to the current vehicle deployment – Wiener Linien relies on the complete ITCS, IVU.fleet.

The dispatch managers have an overview of the entire vehicle operation. If there are disruptions, IVU.fleet adjusts the timetable accordingly. This is particularly useful for the many large events in Vienna, as it enables a more vehicle-controlled and demand-orientaed operation. Communication with the operations personnel is easily achieved in the control centre via mouse click. IVU.fleet informs the drivers and dispatch managers if a pick-up trip is delayed, and automatically ensures that connection assurance takes place – without any interventions from the control centre.

Real-time information on all channels

IVU.realtime, IVU's real-time information system, is also in use in Vienna, keeping passengers continuously informed on all visual channels – from the stop display screens to the data hubs. VDV-compliant interfaces additionally pick up the departures of other Vienna public transport operators. IVU.realtime individually controls around 1,000 display boards. To provide this information, the system is supplied with the current positions and departure times of the vehicles, processes them, and makes them available on display screens.

Using this as a basis, Wiener Linien also developed its own solutions tailored to the company's individual needs. For example, the "Local Temporary Timetable" (LTT) and the "Local Temporary Interval Modification" (TLIM).

Photo: Luiza Puiu / Wiener Linien

> "Wiener Linien and IVU are linked by more than 20 years of successful partnership that pays off in daily operations.

ALEXANDRA REINAGL
MANAGING DIRECTOR | WIENER LINIEN

Photo: canadastock (Shutterstock)

If a vehicle on a route fails and there is temporarily no replacement vehicle available, then the TLIM supports a more equally distributed service at the stops as a dispatch action. This makes it possible to smooth over the gap caused by the vehicle failing until a replacement vehicle is available to close the gap completely. If there is no vehicle failure, then the LTT enables gaps to be closed by automatically displaying dispatch-related early arrivals to the vehicles before the delayed vehicle.

With the IVU.fleet.statistics controlling solution, Wiener Linien also receives comprehensive statistical evaluations relating to punctuality and regularity, as well as the provision of services by third-party operators.

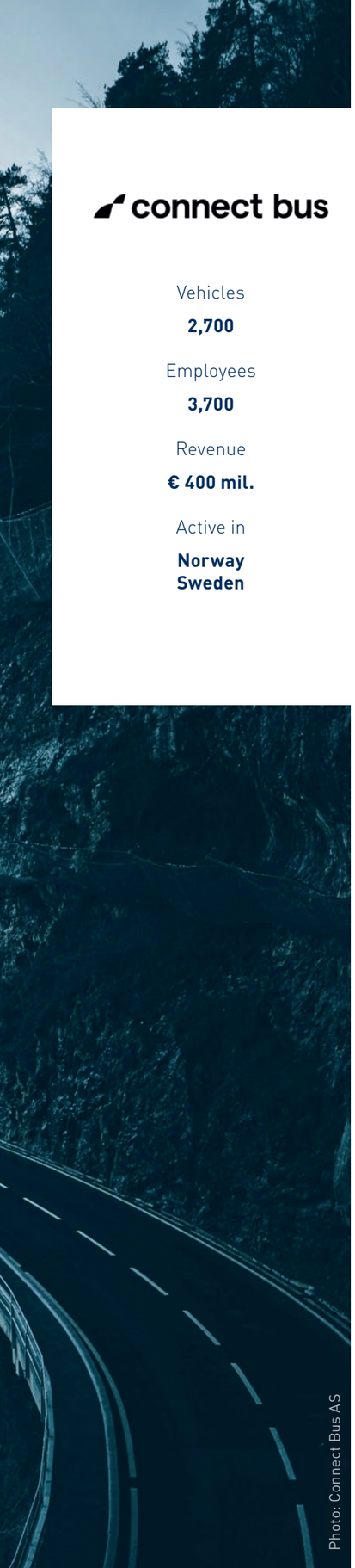
Efficient transport, satisfied passengers

The Vienna system runs smoothly. It reacts quickly and can both re-route services and compensate for cancellations. IVU.suite operates behind the scenes, while the customers of Wiener Linien receive all the information they need at the same time – ensuring efficient transport and satisfied passengers.

WIENER LINIEN

Vehicles: **nearly 750 buses, 500 trams, 150 subways**
Employees: **8,700**
Route network: **1,185 km**
Passengers: **2 mil. every day**

Bus service covering every inch of Norway from the glaciers down to the fjords



connect bus

Vehicles
2,700

Employees
3,700

Revenue
€ 400 mil.

Active in
Norway
Sweden

> IVU.suite's excellent optimisation core has allowed us to make some considerable savings. It was an easy decision to standardise scheduling and dispatch across the group as a whole using the IVU system to leverage synergies and make the best possible use of our resources.

ATLE RØNNING
CEO | CONNECT BUS AS

After graduating as a chartered accountant, **Atle Rønning** first worked in finance in various companies. In 2004, he joined Norgesbuss AS as CFO and held the position of CEO there since 2009. In the course of the acquisition by CBRE Investment Management, he was appointed CEO of Connect Bus AS in 2022.

Photo: Knut-Martin Løken/Ruter

Photo: Connect Bus AS

Connect Bus AS, one of Norway's largest bus operators, provides reliable means of getting its passengers to the very furthest reaches of the country. Connect Bus subsidiaries include Norgesbuss, which operates city and regional buses in Oslo, Viken and Rogaland as well as express buses to Oslo Airport. Norgesbuss started scheduling and dispatching around 700 buses and 1,000 employees using IVU.suite back in 2001. Having seen some consistently great results, the then parent company Torghatten decided in 2018 to introduce IVU.suite to its other three subsidiaries as well, altogether totalling around 640 buses and 780 drivers in these companies.

By migrating to IVU.suite, Torghatten cut down on the number of different systems used within the group and established standardised processes across all its constituent companies. Optimisations in particular made vehicle and personnel deployment more efficient. Outsourcing hosting to IVU.cloud also enabled the transport operator to reduce the workload involved in technical software maintenance.

An entirely digital workflow for scheduling and dispatch

IVU's integrated all-round solution makes it possible to establish an entirely digital workflow. The IVU.run and IVU.duty planning systems help with generating efficient vehicle working and duty schedules, while numerous automated functions and a smart suggestion system make life easier for the schedulers at Connect Bus.

IVU.vehicle and IVU.crew, both dispatch products, also offer suggestion functions that enable features such as automatically deploying the appropriate vehicle for working and matching it with a driver who has the right skills. An integrated conflict check also helps to avert errors. All changes are carried over directly to dependent areas, for example when duties change as a result of alterations to vehicle working schedules.

Effective optimisations for diesel and electric buses

The powerful optimisation algorithms used by IVU.suite ensure efficiency. For example, integrated duty and vehicle working scheduling makes it possible for vehicle schedule times to be synchronised with the working hours and break times of drivers and to be optimised in a single step. To achieve the best possible results, Connect Bus can set out legal regulations and operational targets in detail in the system.

The subsidiary Norgesbuss is also using IVU.suite for the optimisation of over 100 electric buses. The product factors in charging processes automatically and takes into account factors such as the remaining range, recharge status and charging time required. The optimiser's sophisticated mathematical approach enables Norgesbuss to model the complexity of battery discharging and charging in detail while optimising its mixed fleets in an integrated way.

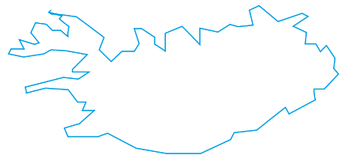
An employee portal completes the digital workflow. The mobile application directly involves Connect Bus employees in dispatch and allows them to view their work time accounts, access payroll accounting and submit duty or day-off requests at any time.

IVU.xpress, a special introduction process, meant that it was possible to provide the standard system quickly and smoothly, enabling all subsidiaries to handle their complete scheduling processes with IVU.suite after a project term of only about a year.

Standardised scheduling and dispatch in the cloud across Norway

Since IVU.suite was introduced, operational workflows in scheduling and dispatch have been significantly streamlined and standardised across the entire company. Optimisation is also paying off, with scheduling efficiency having risen by a few percent at the various companies since 2018. This is allowing Connect Bus to submit some very competitive quotations in tender processes. The group secured no less than three new concessions and entered the Swedish market for the first time, all within the first year of switching to IVU.suite.

Made in Germany
used internationally



transdev
MOBILITY INSPIRED BY YOU

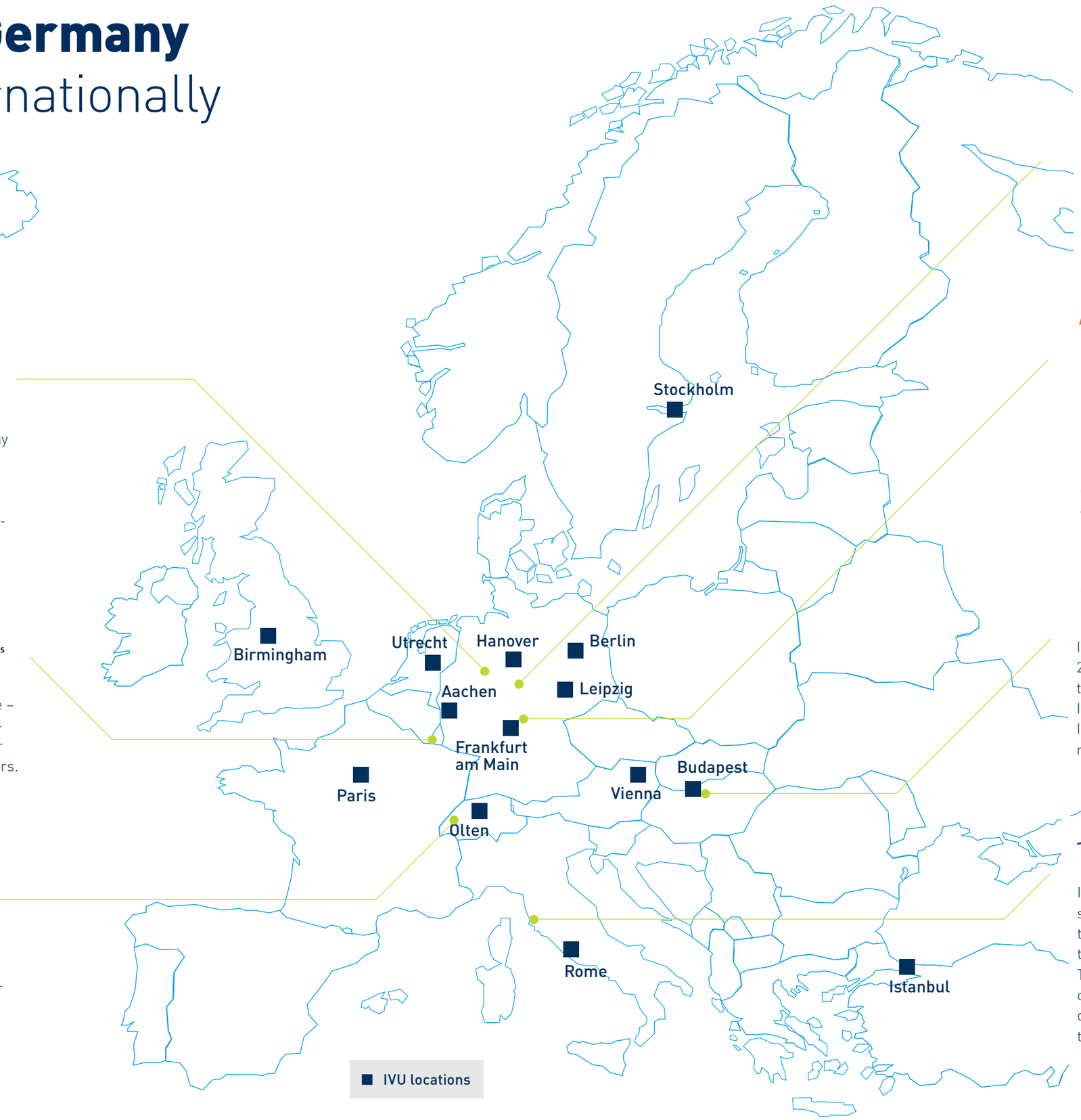
Transdev transports around 133 million passengers across Germany every year. The transport operator uses IVU.suite for standardised planning and dispatch for all its subsidiaries, as well as for centralising operational control.

CFL SOCIETE NATIONALE DES CHEMINS DE FER LUXEMBOURGEOIS

CFL operates nearly 30 bus routes in Luxembourg. CFL uses IVU.suite – including hosting in the IVU.cloud – to plan, dispatch, and manage their entire bus fleet as well as the drivers.

PostAuto

With close to 2,400 vehicles, **PostAuto** transports around 135 million people across Switzerland every year. PostAuto uses the standardised IVU.suite solutions for all its planning and dispatch tasks.



DB DB Regio

With more than 720 million passengers, **DB Regio Bus** is the largest bus operator in Germany. DB Regio Bus is introducing IVU.suite to enable the use of a single system for the entirety of its planning and dispatch activities in all operational regions.

ESWE VERKEHR

ESWE Verkehr transports more than 61 million passengers annually with a bus fleet that will be totally comprised of electric buses by 2023. With the help of IVU.suite, ESWE can take advantage of an integrated dispatch for all of their electric buses – from vehicle working scheduling to depot and charging management.

BKK BUDAPESTI KÖZLEKEDÉSI KÖZPONT

In Budapest, **BKK** equipped around 2,300 vehicles with the IVU.box and the on-board computer software IVU.cockpit. The company also uses IVU.suite for fleet management and real-time passenger information.

RATP DEV

In 2021 **Autolinee Toscane,** a 100% subsidiary of the French **RATPDev** took on the responsibility for all public transport in the central Italian region. The public transport operator relied on IVU.suite to efficiently plan and deploy vehicles and personnel from the very start.

The end-to-end solution for public transport

Every day is filled with complex tasks for transport operators: creating timetables, organising duties, setting fares, managing fleets, administering data – and much more. To do all this, they require specialists with the right training – and the right tools. IVU.suite maps a transport operator's operational processes in their entirety, offering a suitable solution for every task.

With IVU.suite, transport operators can achieve more. They can establish an end-to-end digital workflow and integrate all operational areas – from planners through to drivers. Whether they use an end-to-end solution or standalone products, all data remains in a single system. This ensures efficiency – on the road and in the control centre. We know that transport operators' tasks are as individual as the routes they operate. This is why the IVU.suite already contains everything that is required for successful bus and rail operations. One standard system for everything – which makes it quick and easy to implement.

On a daily basis, IVU.suite products help over 500 transport operators worldwide to deploy tens of thousands of buses and trams, put employees in the right place at the right time, provide information to millions of passengers, and settle traffic data.

Three questions for **Bastian Dittbrenner** and **Timo Kirst** Managing Directors, Public Transport

Which challenges do large fleets have to manage on a day-to-day basis in order to guarantee reliable and convenient public transport every day?

BASTIAN DITTBRENNER: The fleets that we look at in detail in the magazine are unbelievably complex, just as the name says. This starts at the very beginning with timetable planning: which routes do I need headway for, and how do I achieve this? How do I ensure connections are as efficient as possible whilst taking different requirements into account? How can I provide an attractive service for passengers?

Transport operators of this size also have to plan vehicle workings as efficiently as possible – from daily deployment to multi-day vehicle workings that include maintenance tasks and service times. During the trip itself someone has to maintain an overview of all vehicles and make optimum use of them.

Of course we can't forget the most important resource: the employees. Creating duty schedules for drivers as well as service and workshop employees is highly complex, as well as being subject to changes at little notice, to which the personnel dispatch has to respond as swiftly as possible.

Aside from planning and dispatch what are other important aspects of a seamless transport operation – during the trip, for example?

TIMO KIRST: Constant communication with the drivers is essential – the control centre needs a direct line to the vehicle at all times, so that both sides can stay informed.

Another important factor is that transport operators have to act economically. From setting the fares to settling the ticket sales, fleets need sales and inspection devices as well as standardised evaluations with automatic data import and report creation. The most important thing here is to enable passengers to buy tickets flexibly and under the same conditions – even across different transport associations.

These days customers also expect precise information provided in real time to be available – wherever they are. Customer satisfaction often stands or falls with correct passenger information provided in good time.

How exactly does the IVU.suite support transport companies in all these tasks on their way to digitalisation?

TIMO KIRST: Transport operators need an integrated standard system that also meets individual requirements and demands. IVU.suite offers the right solution for each individual task. It unites the entire planning process with all aspects of the operational business, thus ensuring a uniform system landscape throughout the entire transport company.

BASTIAN DITTBRENNER: If you want to plan and control complex fleets with hundreds of vehicles and thousands of employees you need a system that is just as complex, but at the same time easy to use and compliant with all safety standards. The IVU.suite makes complexity manageable.

Photo: IVU Traffic Technologies AG

IVU TRAFFIC TECHNOLOGIES

Founded: **1976**
Stock market launch: **2000**
Employees: **more than 800**
Clients: **500 worldwide**
Locations: **17**

> " Since its foundation, IVU has been a fundamental part of European transport. Our systems move Europe and its fleets.

Achieving success **together**

Software and services
from a single source

There are many steps between winning a concession and starting up the first vehicle. IVU is on hand as a reliable partner for its customers, and helps them to keep all requirements manageable and complete all the necessary tasks as effectively as possible, including when operations are already up and running. The IVU.suite is one standard system for everything – which makes it quick and easy to implement. We don't leave our customers alone to face their challenges. Configuring interfaces, delivering projects in good time, connecting with other IVU customers from across the world in user groups or at the User Forum, hosting IVU systems or providing technical support – whatever your requirements are, we work with you to find customised solutions that ensure reliable bus and rail services.

IVU.suite

The IVU.suite is IVU's standard solution. Thanks to its modular structure, it can be customised precisely to individual requirements. What is used is always precisely that which is needed.

SERVICE PLANNING	RESSOURCE PLANNING	DISPATCHING	FLEET MANAGEMENT	TICKETING	PASSENGER INFORMATION	CONTROLLING
IVU.timetable Network and timetable planning	**IVU.**run Vehicle scheduling	**IVU.**vehicle Vehicle dispatch and depot management	**IVU.**fleet Control centre	**IVU.**fare Tariff management and fare collection	**IVU.**realtime Dynamic passenger information	**IVU.**control Accounting and reporting
IVU.pool Data integration	**IVU.**duty Duty scheduling	**IVU.**crew Personnel dispatch	**IVU.**cockpit On-board software	**IVU.**ticket On-board ticketing	**IVU.**journey Integrated journey planner	
		IVU.pad Digital workspace	**IVU.**box On-board unit	**IVU.**validator E-ticketing-terminal		

IVU.integration

In an integrated world, software products never run in isolation. IVU.integration ensures that all systems can interact as easily and effectively as possible, and that data flows seamlessly – from correct timetable printouts and connecting on-board computers and external products to evaluations and statistics.

IVU.xpress

Every transport operator has its own identity and its own ways of working. With the IVU.xpress implementation process, IVU.suite can be run quickly and efficiently in all environments. This ensures plannable project execution from the start of the project and system design to the final roll-out.

IVU.support

Successful IT projects are based on trust. This is something that we value. In both urban and regional transportation, we provide our customers with support throughout the entire project – and beyond. After successful initial operation, IVU.support is always available to contact afterwards, so that all vehicles always reach their destinations.

IVU.cloud

IVU.cloud allows IVU to take on full technical operations management for IVU.suite – from hosting and maintenance through to installation of updates. Powerful, highly available, reliable, and in line with the newest security standards: IVU.cloud remains fully scalable, so new links or routes can be easily added. This ensures flexibility.

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VERSION 1 (2022)