



## THE DIGITAL JOURNEY

Transport companies on the way to a new era

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**In the age of digitalisation, nothing stays the same, including public transport. Planning and deploying resources, managing operations, informing passengers, settling services – every task and process benefits from the possibilities of digital systems. The digital transformation provides the opportunity to link departments, use data extensively and achieve a lasting acceleration of workflows.**

Transport companies perform highly complex tasks day in, day out. They have to devise efficient timetables, vehicle schedules and duty rosters, organise ticketing and set fares. The deployment of vehicles and staff must be coordinated, and disruptions need to be overcome. Passengers expect up-to-the-second, real-time information, and public transport authorities expect precise settlement. With digitalisation, these processes can be structured leaner and more efficiently and transparency can be improved.

#### The future is digital

In the digital transport company, everyone in each role knows exactly what is going on elsewhere. Planners set up schedules and staff rosters, personnel dispatchers use these as a basis to prepare duties for each employee, with

due consideration of preferences stored in the system, daily dispatching responds to breakdowns and disruptions, drivers and passengers are informed automatically, payroll accounting receives the accrued overtime, and controlling communicates the work actually performed to the transport authority. Everything runs seamlessly, the whole process is completely transparent.

“If data is actually available across the board, it can also be used”, said Perry Prust, Head of the Public Transport Division at IVU. “In

### IN THE DIGITAL TRANSPORT COMPANY, EVERYONE IN EACH ROLE KNOWS EXACTLY WHAT IS GOING ON ELSEWHERE

integrated digital systems, everything communicates with everything else. Each procedure benefits from a common data pool and a continuous flow of information.” This results in an entirely digital workflow – from the scheduling and dispatching of vehicles and staff, operational control, ticketing and passenger information to the settlement of transport contracts.

#### Using potential

Optimisation is a key element of the digital process. It helps transport companies to deploy resources optimally and use all potential. This creates scope for new features and savings. With its powerful algorithms, IVU.suite optimises staff rosters and vehicle working schedules,





Martin Müller-Elschner, Member of the Executive Board

**Dear readers and IVU customers,**

Digitalisation is a megatrend that is bringing about a lasting change in how we live, communicate and work. Whole industries face far-reaching transformation. For public transport, this means that instead of shying away from the trend, we must actively move it forwards.

Digital systems provide transport companies with numerous opportunities for providing even better and more efficient services in future. If vehicles communicate independently with the control centre, where dispatchers respond to disruptions in a matter of seconds and inform passengers and drivers at the click of a button while payroll accounting processes changes duties immediately, everyone benefits: customers, employees and operators.

Our lead story describes the elements of a digital transport company and what opportunities the integrated IVU.suite already provides. On page 5, our Head of Software Development explains the finer points of the complex optimisation process. Also, you can read the latest news on our projects worldwide.

IVU has been a prime mover in digitalisation of public transport for 40 years. We will be presenting our latest solutions for mobility of the future once again this year at InnoTrans in hall 2.1, stand 404. I look forward to seeing you there!

Best regards,

Martin Müller-Elschner

ensuring that staff and vehicles are deployed as effectively as possible.

Following optimisation, the system passes on all data directly to daily dispatching and the control centre. In addition, IVU.suite handles informing drivers and passengers as well as processing the vehicles' real-time data. All changes are reported to the staff and vehicle dispatching teams as well as controlling. In this way, the data for payslips and the management of transport contracts is always up to date.

### DIGITALISATION IS CHIEFLY ABOUT INCREASING EFFICIENCY

"Digitalisation is chiefly about increasing efficiency", said Perry Prust. "If all parts of the company receive relevant information immediately, transport operators can streamline workflows and focus on what really matters: providing the best possible service for their passengers."

**Involving mobile employees**

Entirely digital processes also consistently involve mobile employees. Tablets now enable totally new digital communication channels. With the IVU.pad, for example, mobile employees can see personalised notifications regarding trips and vehicles and gain access to the employee

portal and staff rosters while they are on the move. The tablet documents all tasks and reports the results to the control centre or the dispatching team – which can then see this information directly in the system and process it. This results in a totally digital information loop that benefits the entire company.

However, digitalisation is also about new service technologies making the systems easier to handle. For instance, the IVU system is easy to use in line with the "software as a service" principle. "Instead of operating the essential servers themselves, transport companies just hire the necessary computing capacity from IVU using the IVU.cloud", explained Perry Prust. "They no longer have to handle technical operations management themselves, and they gain extra flexibility." After all, the system grows at the same pace: any extra capacity can be booked temporarily as required, e.g. for CPU-intensive optimisations.

In this way, the digital transformation covers all areas of a transport company. Processes can be simplified and resources can be used more effectively at all levels. With IVU.suite, IVU provides the system for the digital transport company of the future. ■



# IVU.XPRESS AT NATIONAL EXPRESS

In December 2015, National Express took over its first two lines in Germany. With 35 trains and around 130 employees, the company now provides reliable rail transport on the regional lines RE 7 and RB 48 in North Rhine-Westphalia. Prior to this, IVU had implemented its integrated standard solution IVU.suite in record time.

The special IT process IVU.xpress meant that there were just six months between commencement of the project and the start of planning. This was possible because a clearly structured procedure ensures short implementation periods – a particularly important aspect when there are tight schedules and firm deadlines. IVU started work in January 2015 and ran the first training sessions in April, enabling National Express to commence planning with real data in June. This ensured that reliable run schedules and staff rosters were in place by December.

### Seamless integration

National Express also chose IVU.suite for day-to-day dispatching, operational control,



passenger information and reporting. IVU’s all-round solution thus ensures seamless integration of all operational tasks and standardises the workflow between departments.

“With the IVU system, we are getting everything from a single source”, said Wolfgang Schuster,

Managing Director of National Express Rail GmbH. “We are particularly impressed by the software’s wide range of functions and modular structure. This allows us to expand the system flexibly and easily adapt it to the requirements of our growing network.” ■

# PLANNING FOR BUS AND TRAIN TRANSPORT AT TRANSDEV

The Transdev Group is the largest private public transport provider in the German rail and bus sector. In total, around 250 million people travel on vehicles of its 40 active subsidiaries – bus and rail companies – throughout Germany each year. The operating companies plan their resources uniformly with the systems of IVU.suite.

### WITH NUMEROUS AUTOMATION FUNCTIONS, IVU.SUITE HELPS PLANNERS AND DISPATCHERS IN THEIR WORK

Transdev operates the standard software centrally on its own servers, which the regional companies access via a client. This significantly reduces the complexity of technical operations management. Maintenance, system modifications and configurations can be performed and rolled out centrally.

With numerous automation functions, IVU.suite helps planners and dispatchers in their work – regardless of whether they plan buses, trams or railways. Depending on the requirement,

the optimisation algorithms of IVU.suite calculate efficient vehicle working schedules and run schedules, thus helping to ensure optimum deployment of vehicles and trains. The system also allocates duties to staff in line with the rules. Track occupancy plans and functions for vehicle parking are available to the dispatchers of rail companies as required.

With the standardised system for all operational areas, Transdev does not just benefit from low operating and organisation costs. Harmonisation of planning processes in all subsidiaries as well as at bus and rail companies also enables more flexible deployment by planners and dispatchers, who can easily switch between the different operations. ■





# IMPROVING EFFICIENCY

Digitalisation primarily means faster processes and greater efficiency. Optimisation plays a key role in the fully digital workflow. It helps transport companies to deploy their resources as effectively as possible and use their full potential. Lower vehicle requirements, more satisfied employees, more stable timetables, better preparation of offers – optimisation makes

all this possible. It is not immediately obvious that complicated mathematical calculations lie behind this. To ensure that IVU customers always get the best results, we work closely with the renowned scientists from LBW, a spin-off of the Zuse Institute in Berlin. Its algorithms keep public transport moving.

## GROUP-WIDE PLANNING SYSTEM FOR BLS

Precision and efficiency are of utmost importance in Switzerland. BLS, the largest independent private railway company in the country, also stands in this tradition. The company has now ordered the IVU.rail integrated planning system from IVU so as to deploy all its railway and shipping resources and its stationary personnel as effectively as possible.

BLS is one of the leading railway companies in Switzerland and operates the standard gauge section of Bern's S-Bahn (commuter railway), the western section of the Lucerne S-Bahn and multiple regional transport lines in seven cantons. The company is also active in rail freight transport and operates an extensive bus network and navigation on Lake Thun and Lake Brienz. In future, BLS will be using the IVU standard solution to plan, optimise and dispatch a total of more than 550 railway vehicles, coaches and ships, as well as roughly 2,000 mobile and stationary employees.

### Homogeneous system environment

BLS is replacing several legacy systems and developing a centralised, homogeneous system environment. The integrated IVU solution provides a uniform workflow for all operational areas. Sophisticated automation and optimisation functions ensure that rolling stock, ships and



personnel are deployed efficiently. BLS will also use IVU.control to perform evaluations and invoicing services.

"We were convinced by the concept from IVU: It offers a system solution that optimally satisfies our requirements. Moreover, IVU will be at our

side as a strategic partner throughout the entire implementation phase and beyond", said Peter Fankhauser, Head of Rail Operations and member of the Executive Board of BLS. ■

# “OBTAIN BETTER PLANS MORE QUICKLY”

Oliver Grzegorski, Head of Software Development at IVU

**Mr Grzegorski, optimisation plays an essential role in the efficiency of transport companies. What is the aim of optimisation and do transport companies benefit from it?**

Every company itself determines what is “optimum”. In general, you can say they obtain better plans more quickly. In addition, optimisation frees up resources, so companies can offer better services. Thanks to optimisation, planners can respond quickly to disruptions or road works and adjust duty schedules with minimal changes very quickly. Duties are generally more balanced and thus employee satisfaction greater. Another major advantage is the benefit for invitations to tender: with optimisation, it is possible to calculate scenarios for lines that have not yet been acquired, and to prepare a suitable bid on this basis.

**The conditions for buses and trains are very different. How does this affect optimisation?**

Major differences apply to vehicle planning in particular. Trains are always bound to one track. The possibility of adding or removing auxiliary vehicles to trains must also be taken into account. Often, trains are on the move for days at a time, and then time limits and maintenance limits have to be complied with. These conditions make planning incredibly complex. As far

as I know, IVU is the only producer to date that actually offers optimisation for vehicle working scheduling for trains.

**What happens if the theoretically optimum outcome is totally infeasible? In regional bus transport, for example, a driver cannot always be relieved when it might be appropriate.**

IVU has developed integrated duty and vehicle working scheduling optimisation for cases like this. It synchronises the vehicle working times with the break and relief opportunities, thus avoiding potential conflicts.

**IVU also enables the optimisation of staff allocation with automatic personnel dispatching. How exactly does that work?**

APD stipulates personnel roster layouts and allocates the corresponding employees to them. Depending on the operational requirements, it considers aspects such as fair allocations or balanced accounts. In addition, it automatically takes qualifications, holidays, training and similar things into account. The finished plans can usually be transferred to production on a one-to-one basis. However, planners and dispatchers can still make subsequent changes, of course.



**Oliver Grzegorski**  
Head of Software Development  
Berlin

As head of development and a member of the management board, Oliver Grzegorski knows IVU's software inside out. He has been with IVU for 17 years now and has actively accompanied the development of the optimisation components of IVU.suite and IVU.rail from the beginning – at first as a software engineer and later as project lead.

## MTR OPTIMISES STOCKHOLM COMMUTER RAIL SYSTEM

A year after the reallocation of the Pendeltågen network contract, MTR Pendeltågen AB is taking over operation of the Stockholm commuter rail system in December 2016. Like the previous operator Stockholmståg, the company will be using IVU.rail for scheduling, optimisation and dispatching of its trains and employees.

Consisting of four lines that serve Stockholm via a radial route, the commuter rail network covers a total of 241 kilometres and 53 stations. Each day, around 300,000 passengers use this service to commute from the suburbs to the capital and back. MTR will ensure reliable, customer-friendly transportation from

11 December 2016. The contract between MTR and the Stockholm transport authority, SL, will run for an initial ten years, with the option of a four-year extension. IVU.rail has been chosen as the planning software.

### Extensive options

Before making its decision, MTR compared various systems in a stringent selection procedure. IVU.rail came out on top. The planners were particularly impressed by the wide range of functions of the IVU solution. “IVU.rail enables us to optimally deploy our rolling stock and staff,” said Niklas Grünbaum, Chief Architect at

MTR Pendeltågen AB. “The system provides us with extensive options for vehicle planning and dispatching in particular.” Another factor in the decision was the high-performance optimisation engine of IVU.rail, which achieved outstanding results in the comparison tests.

MTR Pendeltågen AB is a subsidiary of the Hong Kong-based MTR Corporation, a multinational group that operates railway networks in countries including China, Australia and the UK. In Sweden, MTR already runs the Stockholm metro as well as the MTR Express high-speed rail link between Stockholm and Gothenburg. ■



# 40 YEARS OF IVU

1976

A group of highly qualified young researchers from the Technical University of Berlin establishes IVU GmbH. Its aim: to develop software systems that optimise operations in public transport.

1990

In conjunction with Berliner Verkehrsbetriebe (BVG), the fully integrated operations planning system BERTA is created. Development of a staff dispatching system starts at the same time. It goes on to be supplemented by vehicle dispatching. The business segment for logistics solutions gains more and more importance.

1984

Wolfsburg Public Transport introduces MICROBUS. The IVU system is the first planning and dispatching software package to run on a normal personal computer. This opens up the opportunities of modern IT to small and medium-sized transport companies.

1997

MICROBUS 2.0 is launched. The system is entirely based on graphic user interfaces in Windows and is a technological pioneer in the use of database systems. In subsequent years, the IVU solution becomes the market leader in planning and dispatching systems.





## 2004

A growing number of international transport companies are interested in the German-made systems. In addition to Austria, Switzerland and Italy, IVU also gains customers in the UK, Sweden and Thailand. Railway operators and logistics companies are also increasingly recognising the possibilities of the IVU solutions.

## 2016

Revenue of over EUR 50 million, 15 offices and more than 400 employees – IVU is now one of the leading providers of integrated IT systems for public transport and logistics. Its expertise makes it a sought after contact for companies all over the world.



## 2000

In the millennium year, IVU takes a significant step towards internationalisation and growth. In June, it opens its first large branch office in Rome. Just a few weeks later, IVU Traffic Technologies AG is floated on the stock exchange. This lays the foundations for the international expansion of the next few years.

## 2010

IVU has become established as a global player in the transport sector. Its standardised systems ensure vibrant cities worldwide. A new arrival emphasises the diversity of IVU's products. MICROBUS is succeeded by the IVU.suite. In subsequent years, new offices in Europe, South America and Asia are added.





# ACCELERATING PROCESSES

Order it, then receive it in next to no time – just a few years ago, that was the dream of online shoppers. Today, it has finally become reality. In urban areas, customers can get their packages on the same day on request – at a time of their choosing. Integrated digital processes make this possible. And where drivers no longer have

to come to the depot to obtain duty information, this is also due to smart IT systems. All over the world, IVU's products are helping companies to accelerate their processes and improve their services, from construction of a metro system or deployment of a driver tablet to same-day parcel delivery.

## DHL DELIVERS AT PREFERRED TIMES

As online retail grows, the delivery business is changing with it. DHL Paket Germany (DHL) is responding to these increased requirements and also offers same-day delivery and a preferred time window alongside its conventional delivery options – this was recently introduced on an all-day basis in some urban areas and in the evening throughout Germany.

IVU.locate makes this new service possible. The system calculates and optimises dynamic delivery routes, thus ensuring that parcels arrive exactly when the customer wants them. The main factors in smooth processes here are flexible, dynamic

route calculations and flawless communication between all systems and components. Since 2011, DHL has been using IVU's integrated system to plan optimum, precisely timed routes automatically. The highly flexible software package can be easily adapted to various requirements. "IVU.locate enabled us to establish a completely new service very quickly", said Thomas Königs, Head of Convenience, Packaging & Last-Mile Solutions at DHL Paket Germany. "Dynamic route planning allows us to integrate same-day and preferred-time delivery into our delivery processes easily."

### Optimum delivery routes

IVU.locate obtains relevant data via automated interfaces and triggers autonomous sorting systems in the mechanised delivery sites. From the order details such as address and preferred time, the powerful optimisation engine of the IVU solution finally calculates efficient delivery routes – all within strict time frames that particularly apply to same-day delivery. For instance, it takes only around 30 minutes to calculate all routes throughout Germany. ■





# TABLETS FOR DRIVERS

The future is digital for drivers at AAR bus+bahn. All the drivers of the Swiss public transport company are set to be issued with tablets. In doing this, AAR bus+bahn aims to make information more accessible, while streamlining and accelerating workflows. This is enabled by the new IVU.pad. The app from IVU acts as a central communication platform and assists drivers with the most important mobile processes.

The IVU.pad contains all information that the approx. 170 bus and train drivers need for their duty: it displays up-to-date, personalised messages about forthcoming journeys and vehicles and automatically synchronises all key documents. In addition, the IVU.pad gives drivers optimum support in their day-to-day work with a dynamic timetable (for rail operations), damage assessment and an e-learning module. In future, AAR bus+bahn's drivers will be able to use the IVU.pad to enter their working hours on the move, submit holiday requests and view current messages from the dispatching unit.

## More-efficient processes

"With the IVU.pad, we can digitalise the entire workflow of our drivers," said Andreas Kleiner, Head of Dispatching and Planning at AAR bus+bahn. "All the key information is available in a fully electronic format. This saves lots of time



and paper and ensures more-efficient processes and up-to-date information." Marc Schaffert, Head of Sales and Key Account Manager of IVU for Switzerland added: "Our integrated approach – particularly in combination with our IVU.plan planning system – is attracting a positive response. This is also clear from the numerous enquiries from our customers about the IVU.pad."

AAR bus+bahn is the umbrella brand of Wynental- und Suhrentalbahn AG (WSB) and Busbetrieb Aarau AG (BBA). With 23 trains and 36 buses, the two companies ensure reliable, regular public transport in the city and region of Aarau. Each year, around 14 million passengers use AAR bus+bahn's services. ■

# BANGKOK'S PURPLE LINE PLANS WITH IVU.RAIL

In August, Bangkok's new metro line opened. To ensure a smooth start, the operating company Bangkok Expressway and Metro Public Company Limited (BEM) had already begun planning its resources in April. To this end, they used our integrated standard system IVU.rail.

The first test trains had been running on the newly built Purple Line in the Thai metropolis since December. A total of 16 stations serve the 23-kilometre route between Bang Yai in the north-west and Tao Poon in the centre of Bangkok. IVU.rail is in place to ensure efficient planning of all transport operations. The system is fitted with a standardised railML

interface, guaranteeing an optimum connection with the Bombardier Cityflo 650 train control system.

## Integrated planning

The planning module of the IVU solution enables BEM to perform integrated planning of the network and timetable. It maps the routes between the network points down to the last detail and takes into account attributes such as the expected passenger volume. BEM also uses IVU.rail for duty and vehicle working scheduling. On the basis of flexibly configurable rules, the system automatically suggests duties and

vehicle schedules and calculates changes of direction, empty runs and maintenance times, ensuring that all resources are used efficiently.

BEM has been performing all planning processes for the Blue Line, Bangkok's first metro railway service, with the IVU system since back in 2003: "We are very proud also to be taking on the planning for the new Purple Line," said Frank Nagel, Head of Business Development for Asia-Pacific at IVU. "This contract extension demonstrates the quality of our system and underlines how important good customer relationships are to our business." ■



# PROMOTING COMMUNICATION

Mobility is constantly changing. From horse-drawn carriages to the metro, the main aim has always been to get from one place to another as quickly and easily as possible. Consistent innovation is a key characteristic of public transport. Manufacturers and transport companies work together to keep on adapting the systems in

buses and trains to new requirements. With its expertise, IVU plays a major role in advancing technical standards for the digital age. In this way, it helps transport companies to provide optimum services and ensure that cities remain vibrant in the future.

## IVU AND ILMENAU UNIVERSITY OF TECHNOLOGY: INSPIRING STUDENTS

Students from Ilmenau University of Technology spent a week in March delving into the topic of public transport information systems. In the context of a compact course, transport experts gave practical insights into the technical processes at transport companies, from the control centre all the way to the mobile app. IVU was also involved.

What is timetable, schedule and staff roster planning all about? How do fleet management and depot management work? Which databases and communication systems are used, and how are the systems integrated? These are some of the questions the postgraduate students of "Media Technology," "Electrical Engineering and Information Technology" and related subjects at Ilmenau University of Technology looked into. The aim was to get an insight into the connection of information systems, digital networking and

mobility, and to thereby obtain a comprehensive overview of public mobility services. The event was initiated by the Association of German Transport Companies (VDV) and organised by Prof Heidi Krömker, Head of the Media Production Department.

Starting out from the ITVU model (IT systems for public transport, see p. 12), IVU developers

### **THE STUDENTS WERE VERY INTERESTED IN OUR TOPICS AND HAD ANIMATED DISCUSSIONS**

Dr Olaf Föllinger, Martin Stiel and Peter Dörfler provided technical insight into the basics of software systems for public transport in their respective lectures. They explained the complex requirements of personnel dispatch as well

as the records that are necessary to ensure smooth collaboration between passenger information systems, the control centre and vehicle systems. The IVU experts also gave detailed information on how service planning, vehicle and staff planning, and vehicle dispatching are performed.

In addition to the participants acquiring technical knowledge, a further aim of the event was to arouse the students' enthusiasm for the topic of public transport and to help them establish contact with potential employers. Dr Föllinger offered a positive summary: "The students were very interested in our topics and had animated discussions. I think they got a good impression of the technical challenges of public transport, and I hope to see some of the participants apply for a job at IVU." ■



# THE STANDARD OF THE FUTURE: IBIS-IP

In autumn 2015, IVU won the ITCS Innovation Award of the Association of German Transport Companies (VDV). The association has thus honoured the driving role played by IVU in the development and introduction of the new standard for vehicle communication, IBIS-IP. It particularly praised IVU's courage in putting the new protocol into practice early on and thus promoting its propagation. IVU was the first company in the world to actively roll out IBIS-IP with customers.

IBIS-IP? The abbreviation stands for integrated on-board information system – Internet protocol. The enhancement of IBIS – a standard introduced more than 30 years ago – significantly improves communication between the devices on board modern buses and trains. “Quite simply, the old IBIS was no longer suitable for modern requirements”, said IVU Product Manager Torsten Franke, explaining the reason for the new standard. “The data rate was still at a level from well before the Internet, and was just far too slow for many functions.”

## High bandwidth

On-board computers, passenger information, digital displays, ticket machines, GPS, radio data transmission and numerous other services now have sufficient bandwidth for reliable data exchange through IBIS-IP. Developers use

## DEVELOPERS AND TRANSPORT COMPANIES CAN LINK DIFFERENT SERVICES CREATIVELY AND CREATE INNOVATIVE APPLICATIONS

modern, widespread technologies from the outset. This increases the stability of data exchange and makes it easier to develop applications. The common standard recognised by the VDV ensures that devices from different manufacturers can communicate with each other seamlessly. This reduces costs and complexity in the implementation process.

The new standard provides a host of further advantages for transport companies. For instance, even highly complex passenger information can now be provided easily. “Previously, even multilingual displays or non-Latin character sets stretched data transmission to the limit”, relates Torsten Franke. This is no longer the case. Pictures or even videos on interior displays? IBIS-IP provides sufficient bandwidth.

## Service-oriented architecture

Furthermore, IBIS-IP is future-proof: “The service-oriented architecture provides totally new possibilities. Developers and transport companies can link information from different services creatively and create innovative applications”, said Torsten Franke. “I am sure that in the future, we will see many IBIS-IP-based services with attractive added value for passengers and companies.” ■

## IBIS-IP IN THE FIELD



### Superbus Israel

The first transport company in the world to deploy IBIS-IP in a significant vehicle fleet is Superbus Ltd., a nationwide bus company in Israel. As well as the software, IVU supplied the on-board computers, which control the interior displays and other components. In addition to an LED display that shows the next stop, the buses have a TFT display that provides information on the next four stops. Just a few months after publication of the IBIS-IP standard, IVU equipped a fleet of more than 150 buses with a system geared towards the new protocol.



### RET Rotterdam

IVU supplied the on-board computers for the Rotterdam metro (RET). For the first time, it will use IBIS-IP services to monitor and manage the passenger information displays and to retrieve the position data of the train in the vehicle network there. The use of IBIS-IP will provide passengers with real added value: as they approach a stop, passengers will be told about the options there for connecting to buses, other metro lines or regional and long-distance trains. To this end, in real time, a background system will also record the data of all other vehicles that serve this stop and pass it on to the on-board computer.



### Nahverkehr Schwerin

In August 2016, Nahverkehr Schwerin GmbH received 32 new Mercedes-Benz Citaro buses. All buses come with factory installed network technology and components conforming to the IBIS-IP standard. The manufacturer EvoBus commissioned IVU to supply the communications technology and implement the protocol in the vehicles. Using IBIS-IP, the IVU.ticket.box links all the peripheral equipment on the bus and controls the exterior and interior displays. The box employs LTE to ensure optimum connectivity of the control centre to receive real-time data, messages or other live information.





## SAVE THE DATE

### APTA Annual Meeting

11.9. – 14.9.2016, Los Angeles

### InnoTrans

20.9. – 23.9.2016, Berlin

### Where Camp

3.11. – 4.11.2016, Berlin

### CUTA Fall Conference

8.11.2016, Vancouver

### German Equity Forum

21.11.2016, Frankfurt/Main

### IVU User Forum

9.3. – 10.3.2017, Berlin

## SHARING KNOWLEDGE

With 40 years' experience, IVU is a sought-after contact for transport companies when it comes to public transport and IT. In countless projects for over 500 customers throughout the world, IVU has built up a vast wealth of specialist knowledge that software engineers and transport experts use as a basis for continuously enhancing the company's complex systems. IVU has always been keen to share its knowledge. For instance, it supports the application and enhancement of standards such as IBIS-IP, and regularly takes part in research projects and seminars for students.

Former IVU director and IT specialist Dr Gero Scholz gathered this accumulated knowledge together in a book entitled "IT Systems in Public Transport". As an introduction to the use of IT in public transport, the book has quickly become a standard text in Germany. With its well-ordered structure and clear definitions, it creates a common language to aid understanding between transport operators and system providers. Now, a full English version of the book is available for the first time.

### Insights into IT processes

In around 500 pages, readers can learn all about the complex software landscapes of modern transport operators and their importance to a fully functioning public transport system. The book provides lots of interesting insights and technical descriptions of day-to-day IT processes for system developers, transport professors and students, as well as the whole industry. From scheduling and dispatching vehicles and staff to operations control, and from passenger information to traffic control, Dr Scholz sheds light on all the tasks of a transport operator and describes the software systems behind them in detail.

The translation also provides a full explanation of the overarching UML domain model for all tasks of a transport company in English for the first time. It also gives international stakeholders and manufacturers of IT solutions a standard model for the development of new applications and systems. The book is emphatically not intended solely for software engineers. Dr Scholz manages to convey the complex interrelationships in public transport in a straightforward, accessible way while maintaining the necessary level of detail. ■

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