

# **IVU.rail** FOR EFFICIENT RAIL TRANSPORT

# IVU.rail

# SYSTEM SOLUTIONS FROM A SINGLE SOURCE SO THAT COMPLEXITY REMAINS MANAGEABLE

VISUAL/ACOUSTIC PASSENGER INFORMATION

Rail companies master complex tasks every day: creachanges. At the same time, train drivers receive up-toting timetables, planning routes, organising services, date trip information on their tablet. Important docucontrolling trains, managing data and much more. To ments such as duty schedules, manuals and forms are cope with all this, they need trained specialists - and available at the touch of a button. the right tools. IVU.rail fully maps all the work proces-On the trains, the on-board computer controls all passes of a rail transport company.

IVU.rail integrates all resource management tasks into a single software program and creates entirely digital workflows. As soon as timetable planning has been completed, trips created and train paths booked, run scheduling develops suitable vehicle workings, on the basis of which the duty rosters for personnel are created. The system automatically transfers changes to all related areas - meaning nothing gets lost.

Directly linked to this is the dispatch for efficient vehicle and personnel deployment. Disruptions are iden-



senger information, including displays and voice output, and establishes contact with the control centre. In payroll accounting and controlling, the actual hours worked by drivers and the services provided are recorded and analysed for quality management purposes.

IVU.rail is the configurable standard system for all railway companies and is quick and easy to implement. Whether regional railway, freight or long-haul transport:

# IVU.rail **ALL-ROUND SOLUTION** FOR RAIL TRANSPORT

Integrated and from a single source – IVU.rail supports railway companies in all operational tasks: from driving and run scheduling to the scheduling of rolling stock and personnel, fleet management and passenger information through to the invoicing of transport contracts. IVU.rail orders train paths, optimises vehicle workings and duty rosters, schedules train drivers and on-board personnel, provides support in rectifying disruptions, organises cancellations, informs passengers, collates data and increases efficiency. Whether long-distance, regional or freight transport, whether urban or underground railway -IVU.rail was developed specifically for rail transport and covers all requirements.



#### IVU.trainpath

manages all train paths and route data and supports the entire planning process through to publication, including ordering and management of train paths. Pages 6-7

### IVU.pool

consolidates timetable data from the entire range of different planning systems across companies and standardises the data to create the basis for integrated passenger information.

#### IVU.run

IVU.duty

workloads.

Pages 10-11

supports full route planning as part of daily deployment through to multi-day vehicle scheduling including maintenance and service times. Effective optimisation ensures efficiency. Pages 8-9

uses smart optimisation to

create efficient duty rosters

for personnel. A flexible rule

system and numerous au-

tomation functions alleviate

vehicle deployment, from line allocation to the planning of workshop visits and rapid response to operational disruptions. Pages 14-15

plans and controls the entire

#### IVU.crew

IVU.vehicle

supports the entire personnel planning process and schedules all employees where they are needed. Effective optimisation ensures efficient personnel deployment. Pages 16-17

IVU.pad

ling. Seamlessly integrated used to monitor and control bus replacement services.

is the digital workplace for mobile personnel. The web app contains all the important information such as duty rosters and manuals and improves communication with employees. Pages 20-21

#### IVU.controlcentre

forms the interface between rail transport and scheduinto IVU.rail, IVU.fleet can be Pages 22-23

### IVU.incident

IVU.pad

forms the interface to immediately process changes and faults that occur at short notice and ensure seamless information. Pages 22-23

#### IVU.cockpit

runs on the on-board computer in the train. The software displays scheduling changes, communicates with the control centre and informs passengers.

#### IVU.fare

IVU.cockpit

manages sales processes from setting fares through to settling ticket sales (paper or e-tickets) within networks and individual companies.

IVU.box IVU.ticket.box

IVU.validator

#### IVU.ticket

is the software used on sales and inspection equipment. It handles ticketing, from ticket printing to the sale and validation of e-tickets.



#### IVU.box, IVU.ticket.box + IVU.validator

IVU devices make use of IVU software in vehicles communicate with the control centre and perform ticketing tasks. Thanks to intuitive user guidance, they are easy to operate.

#### IVU.realtime + IVU.journey

provides real-time information to passengers across all channels. Directly connected to the control centre, the system generates a consistent flow of data from the train to the passenger. Pages 22-23

#### IVU.data

collects and curates operational data so that it can be used for any type of data analysis or for deployment of artificial intelligence (AI). Pages 26-27

#### IVU.control

records target and actual data, merges it and prepares it for further processing, for example for invoicing transport contracts or for evaluations and analyses. Pages 28-29

# **IVU.**trainpath **RELIABLE TIMETABLES**

All basic and infrastructure data in one system with IVU.trainpath, routes, vehicle workings and trips can be perfectly harmonised. From setting up the route network and creating timetables to publishing the service and supplying operations control and passenger information systems, IVU.trainpath supports the entire timetabling process. Railway companies benefit when train formations are planned in detail, for example, strengths, weaknesses and movement of vehicle formations. Orientations are calculated automatically.

The integrated train path management and planning tool makes it easy to handle route resources. Ordered train paths can be easily combined with planned trains and scheduling can be modified in the event of any changes. IVU.trainpath warns if conflicts arise during train path changes. Planners can also flexibly postpone timetable deviations, such as a construction sites. The system ensures consistent planning information - from trips and vehicle schedules through to duties.

Regardless of whether you just want to create your own routes or integrate data from a different operator or subcontractor, IVU.timetable has all the information to hand at all times. Assigning infrastructure restrictions, storing specifications such as seat capacities and trip sequences or designing timetables - IVU.trainpath makes it easy.

### IVU.trainpath at a glance

- Integrated train path management Manage and plan train paths and trains in a standardised way: IVU.trainpath makes it easy to manage track resources
- Detailed train formations The strengths, weaknesses and movement of train formations can be planned extensively
- Intelligent check algorithms Small change, big impact: IVU.trainpath automatically ensures consistent planning statuses
- Automatic conflict warnings IVU.trainpath warns if there are infrastructure restrictions
- TAP TSI-compliant interface Current route information can be exchanged with the infrastructure operator interface in accordance with the standard



The line graph in IVU.trainpath clearly displays the timetable and any conflicts that occur

# **EUROPEAN STANDARD**

structure operator directly from the



# SERVICE PLANNING



# IVU.run **EFFICIENT ROUTES**

Efficient daily routes create and optimise vehicle requirements: IVU.run supports the entire route scheduling process, from one-day vehicle workings to multi- week vehicle working series, including maintenance and service times. Numerous automated functions and well- developed rule systems make workflows much faster.

IVU.run takes the timetables from IVU.trainpath and includes all relevant information when linking trips to form vehicle workings: vehicle type, service intervals, turnaround times, train strengths. IVU.run calculates the position and orientation of vehicles within the vehicle formation automatically, just as it does with changes in direction. For maximum efficiency, IVU.run suggests suitable following trips for each trip on request. There are internal control mechanisms in place to ensure that the final vehicle working schedule meets all operational requirements and regulations.

IVU.run's powerful optimisation core performs complex tasks. It creates and optimises multi-day vehicle schedules, which in turn support efficient vehicle parking. The integrated track occupancy planning function automatically assigns the relevant tracks if required - detailed rule systems make this possible. Optimisation also allows extensive variant planning to calculate various different scenarios and their costs, for example when railway companies are applying for new concessions.

1.84	1744	1.84	1 74	1.00	and the second s
Contract of	(L. 100. 30)	E	1	Contraction of the local division of the loc	
-		1	Di sea di	Concession in the local division in the loca	9.0
(Case of a		(Land, in)	-		
D and the		(Constant)	Contract of	C.	
1	The same little	1		P. son of	
C Stores To	D. saw 1	and the second second	al line a	A	
Case of the	(Water Vil	(t	17 mar 14	-	
Green St.	Contract of	in the second	(5. mm 2)	and the second	
	The second second		100 mm		-
	1. max 10		A	(1. mar.)	
		N			

IVU.run links train trips to run schedules

# IVU.run at a glance

### Powerful optimisation

Sophisticated algorithms help to create efficient routes and save resources

### Automatic suggestion system

IVU.run incorporates relevant information into the vehicle working scheduling and automatically suggests the best possible vehicle workings

Flexible rule editor

Whether it's to do with maintenance intervals or vehicle restrictions, planning specifications can be stored flexibly

# Charging and energy consumption prediction for battery trains

From the current recharge status and infrastructure to the charging time – IVU.rail supports comprehensive forecasts for battery trains

Track-focused stabling planning

Stabling and shunting movements can be planned effectively with the integrated track occupancy planning function

Comprehensive variant planning

A new transport contract or changes to the service -IVU.run helps with the planning of scenarios and costs

# SBB CARGO SWITZERLAND

The freight transport subsidiary of Swiss Federal Railways replaced several individual systems with IVU.rail in order to plan and schedule around 500 locomotives and 2,000 employees in an integrated manner. IVU.rail supports SBB Cargo in optimally utilising all resources and adapting planning to changing transport requirements, even at short notice.

# **RESOURCE PLANNING**





# IVU.duty PERFECT DUTY SCHEDULES

The optimum duty schedule at the touch of a button – IVU.duty creates efficient duty schedules for the entire personnel team, from train drivers to service employees and maintenance workshop employees. Small and even large teams can be planned without any problems – the intelligent suggestion system and powerful optimisation make this complex task comfortable and easy.

Fully integrated with IVU.run, IVU.duty obtains all relevant data directly from vehicle working scheduling. The system considers any changes to individual vehicle schedules immediately and suggests amendments to duty schedules where required. Thanks to its flexible rule editor, IVU.duty automatically takes all operational, collective agreement and legal requirements into consideration. Optimisation algorithms automate the entire planning process on request. Within a few minutes, they compile thousands of duty elements, crewing guidelines and qualifications into an optimised duty schedule that can be used immediately – without manual revision. IVU.duty adapts to the respective corporate goals, for example to minimise costs or to carry out duties that are as balanced as possible. Special adjustment optimisation helps to transfer timetable changes made during the year with minimal changes to existing duty schedules.

IVU.duty's variant planning facilitates strategic decisions, for example to identify potential for increasing efficiency and lowering costs to assess the consequences of regulatory changes or to prepare bids for new concessions.



IVU.duty shows planned duties with their components in a clear graphical representation



VIA Rail operates rail-based passenger transport in eight of the ten Canadian provinces. On a route network of around 12,500 kilometres, there are around 500 trains per week in circulation. IVU.duty helps to centralise time-consuming service planning and optimise deployment of resources.

# **RESOURCE PLANNING**



# IVU.duty at a glance

### Intelligent optimisation

Thousands of duty elements are combined to create an optimal duty schedule and thus ensure efficiency

# Integrated suggestion system

For a faster planning process, IVU.duty automatically adds activities and joins them together in accordance with the rules

# Adjustment optimisation

IVU.duty largely retains existing duties even in the event of short-term changes in the duty schedule

### Flexible rule editor

Duty guidelines, labour laws, collective and company agreements: rules can be stored and adapted flexibly

# Comprehensive variant planning

A new transport contract or changes to the service – IVU.duty calculates the impact on personnel and the associated costs

# **OPTIMISATION** IS THE DRIVER OF EFFICIENCY

Planning vehicle workings and duties is demanding - optimising the use of all resources according to the rules is a challenge. But the potential is high: railway companies can achieve major savings with vehicle workings and duties that are just a few percent more efficient.

IVU uses state-of-the-art optimisation algorithms and was able to draw on the expertise of the renowned Zuse Institute Berlin (ZIB) in the development of these mathematical optimisation processes. This makes it possible to create duty and vehicle working schedules that fulfil all legal and operational requirements in a short space of time. This frees up resources that can be utilised, for example, to provide additional services. At the same Automatic personnel scheduling (APD) time, duties become more balanced and employees more satisfied. Thanks to optimisation, dispatchers can react directly to disruptions or construction sites and adjust duty schedules and vehicle workings in a matter of seconds with only minimal changes.

### Route optimisation

products make it possible to coordinate routes and services. Route optimisation always finds a needs-based and cost- minimised solution for the number of trips to be planned. The powerful optimisation core automatically creates vehicle working schedules according to individual requirements - taking into account maintenance cycles and uniformity criteria, for example - and minimises the number of vehicles required.

### **Duty optimisation**

The duty schedule optimisation function then ensures that all vehicle schedules and resulting activities are optimally covered. Thanks to powerful optimisation algorithms, it can combine thousands of duty elements, crewing guidelines and gualifications into an optimal duty schedule within a few minutes. With the help of variants and adjustments, planners can also react quickly to changes at short notice, with duty rosters remaining largely unaffected.

With APD, IVU.rail optimises the allocation of personnel. The system determines duty rosters and assigns the appropriate employees to them. Depending on the company request, it can, for example ensure fair allocations or balanced working time accounts. In addition, APD automatically takes qualifications, holidays, training and requests into account -To maximise efficiency, IVU.rail planning and thus increases the flexibility of driving personnel.

> In addition to day-to-day operations, the optimisation also supports business decisions, such as when applying for tenders. This enables a balance to be struck between an attractive offer for drivers and operational efficiency. In addition, the optimisation can be used to calculate scenarios for routes that have not yet been won and use them as the basis for an efficient tender in order to stay one carriage length ahead of the competition



# **IVU**.vehicle OPTIMAL FLEET DEPLOYMENT

IVU.vehicle brings rolling stock onto the rails in an efficient, resource-saving and cost-saving manner. The system helps to plan deployments, maintenance workshop stays and shutdowns and to optimise the use of locomotives, multiple units and carriages.

Links to the vehicle working scheduling of IVU.run or another system give IVU.vehicle an extensive suggestion system, which supports the allocation of vehicles to schedules. The clearly arranged display of available and suitable vehicles is a helpful advantage, particularly when a replacement service needs organising at short notice. In addition, the automatic conflict checker prevents errors and ensures that all rules are observed. At the same time, the system records the current operating situation and indicates disruptions so that dispatchers can act in good time.

Integrated track occupancy planning makes it possible to monitor and control arrivals and departures in real time, as well as to plan shutdowns and shunting movements. Dispatchers can also create maintenance workshop orders directly in IVU.vehicle or transfer them from other systems and block the corresponding vehicles for dispatching.

The intuitive interface clearly displays all important information, including planned and current vehicle workings, routes, vehicles and employees deployed, service intervals and conflicts. IVU.vehicle makes railway companies ideally equipped for every operational situation.



All dispatch information is displayed at a glance on the graphical track plan in IVU.vehicle

## IVU.vehicle at a glance

### Intelligent suggestion system

IVU.vehicle knows which vehicles are available and makes the right suggestion for each movement

### Powerful conflict check Comply with all rules and speed up processes:

the automatic conflict check protects against errors

### Integrated disruption management

To enable dispatchers to act quickly, IVU.vehicle displays all information on the current operating situation and provides support in the event of disruptions

### Control battery train movements

IVU.vehicle calculates the charging forecasts for the battery trains when allocating the routes and automatically schedules the charging processes as well

### Clear track occupancy planning

IVU.vehicle provides support for available track occupancy according to the timetable situation in real time as well as for shunting movements

### Automatic dispatch

Automatic dispatch from IVU.vehicle speeds up vehicle deployment and ensures efficiency



# **RESOURCE DISPATCHING**







DB Long-Distance controls all trains with IVU.rail's trip, vehicle working, and construction site planning and vehicle scheduling. The rail transport company can thus flexibly plan 1,400 train trips per day in just one system and schedule them in real time.



# IVU.crew FAIR SERVICES

The right employee in the right place at the right time: IVU.crew supports the entire personnel scheduling process and brings all employees to where they are needed – whether in the driver's cab on the train or on the lifting platform in the workshop.

IVU.crew contains the right tool for every procedural step, from long-term duty rostering and holiday planning to medium-term scheduling and short-term steering, through to correct billing and evaluation. The continuous flow of data ensures consistency. IVU.crew automatically transfers every change to the integrated payroll accounting system, whose flexible rules simplify the evaluation of benefits.

All planning phases benefit from powerful optimisation algorithms. When creating weekly schedules and duty rosters, IVU.crew calculates the optimum result according to operational specifications: a robust duty schedule, satisfied employees and cost-effective operation. The scheduling optimisation also takes into account the wishes and qualifications of the employees, pays attention to restrictions and ensures fair and balanced duties.

## IVU.crew at a glance

## Powerful optimisation

IVU.crew's highly complex algorithms always achieve the best result for operations and personnel

Refresh in real time

IVU.crew warns if employees are not available so that delays do not turn into operational disruptions

Integrated payroll accountin

Overtime, sickness, replacement services: IVU.crew records every change immediately

# **RESOURCE DISPATCHING**







IVU.crew's configurable set of rules checks assignments of activities to employees and reports conflicts







**KEEPING** COMPLEXITY MANAGEABLE.

# IVU.pad SATISFIED EMPLOYEES

The IVU.pad is the digital companion for drivers, service employees and stationary employees. The mobile app keeps you in the loop – any time, any place. Important documents such as duty schedules, manuals and forms are available at the touch of a button. At the same time, the IVU.pad supports the most important processes: from duty signon to damage reporting to duty exchange. With the IVU.pad, heavy file bags full of paper are a thing of the past.

# IVU.pad at a glance

# Communication

Directly on the screen

Communication with the control centre via text or voice message, push messages for priority messages

Stay in touch

Digital notice board, e.g. for news from the company

Mobile recording on the go

Report duty sign-on and sign-off, acknowledge duty orders, confirm duty activities e.g. refuelling, brake testing, etc.

Plan duties online

View duty rosters and changes, request preferred shifts and holiday**s** 

Swap duties

Online with colleagues in accordance with the rules

# Information

Everything to hand

The IVU.pad keeps mobile employees up to date and speeds up processes

Timetables, duty rosters, vehicle information, manuals, rules and regulations, forms

Intranet to go View the employee port:

View the employee portal on the move: e.g. timesheets, payroll accounting, etc.

- Always up-to-date
  Current information on construction, disruptions or speed limits
- Clear protocols
  Report accidents, faults and damage, work through checklists
- Effective learning Access to training portals and materials for e-learning

# SJ Sweden

The Swedish railway company SJ manages all its trains and more than 4,000 employees with the integrated standard system IVU.rail. In addition to using IVU.pad, SJ also relies on other IVU.rail products to manage train paths and track orders.



# **RESOURCE DISPATCHING**





# **IVU.**controlcentre EVERYTHING IN VIEW AT ALL TIMES

The integrated rail control centre with **IVU.controlcentre**, IVU.incident and IVU.realtime bundles all functionalities to make rail transport reliable for transport operators and passengers. As an integrated standard solution with an end-to-end digital workflow, work processes in rail operations can be optimised and consistent information is available at all times. IVU.controlcentre continuously monitors operations, recognises disruptions and critical events and provides information about the effect they have on the current timetable situation.

The personnel control centre, as part of the integrated rail control centre, ensures quick and easy processing of duties, duty components/trips and allocations in the event of issues or faults. Personnel and vehicle data are continuously synchronised and visualised in the software. The effects of changes in employee deployment are directly visible in relation to vehicle dispatch. Con-

flicts are displayed and options for resolving them are suggested. All rules such as rest times or the link knowledge of the train drivers are taken into account.

**IVU.incident** enables a fast and smooth disruption management by bundling all relevant information – without duplicate data maintenance. Faults can be entered manually in IVU.incident or recorded automatically via interfaces. Preconfigured categorisations and task lists facilitate complete and error-free processing. All actions performed are automatically and securely logged.

Up-to-date and correct passenger information on the station display as well as on the smartphone – **IVU.realtime** informs customers on all channels in real time. The dynamic passenger information system, which is directly linked to the control centre, generates a consistent flow of data from the vehicle to the passenger.

The IVU.rail personnel control centre visualises personnel deployment in real time

# FLEET MANAGEMENT



# IVU.controlcentre at a glance

- Continuous flow of information
  Efficient disruption management and comprehensive communication in the vehicle control centre
- Comprehensive passenger information
  Consistent and integrated information in all systems involved right through to the passenger
- Comprehensive integration
  Short-term changes and disruptions can be processed and resolved quickly and smoothly with all parties involved – all work processes, including those relating to deployment of alternative propulsion, are mapped
- Fast processing of duties Coordination between vehicle and personnel in the personnel control centre
- Smooth disruption management in IVU.incident
  Fast, efficient and coordinated action
  by bundling data
- Consistent data flow in IVU.realtime
  Open and standardised interfaces ensure the same information on all channels – from stop displays to websites and data hubs to apps

# COMPLETE INTEGRATION OF RAILWAY OPERATIONS

# From planning to the control centre to the passenger

From timetable planning and scheduling to disruption management and realtime information, IVU provides a fully integrated standard solution with an end-to-end digital workflow with the new rail control centre from IVU.rail. This means that passengers can be provided with consistent passenger information on all channels at all times.

Transport operators must consider numerous factors within the control centre. In addition to everyday challenges such as personnel falling ill at short notice, vehicle restrictions, high passenger volumes or damage to travel routes, decisions by the infrastructure operator can also have an influence on scheduling and the further progress of the trip. IVU's integrated disruption management provides support in the event of faults with a simple service and standardised documentation in the control centre diary. In the vehicles, the comprehensive integration with the background system ensures the organised interaction of on-board specialist components such as passenger count, interior monitoring and passenger information.

IVU.rail's control centre ensures uniform data flows that harmonise different sources of information. The integration includes applications from planning to personnel and vehicle dispatch through to the on-board software in the trains. At the same time, the system transmits all real-time information directly from the scheduling department to passengers. This ensures trust, planning reliability and shorter waiting times – and therefore satisfied passengers.



# Integrated disruption management

Clear view: with IVU.incident, disruption management is controlled centrally. All faults are visible at a glance and can be processed directly.



### Seamless communication

IVU.controlcentre automatically forwards scheduling changes to the trip to the trains, so that the personnel and passengers are always kept up to date.



## **Consistent data flow**

Open and standardised interfaces ensure the same information on all channels – from the display screen website and apps to the data turntables.



### Powerful on-board software

The on-board software monitors all communication with the railway control centre, processes all incoming and outgoing data, monitors the vehicle status and secures connections.



### Reliable real-time information

Whether 10 or 10,000 connections, IVU.rail processes and distributes unit real-time data in fractions of a second.



## Precise occupancy level display

Better etter capacity utilisation for more comfort – the occupancy level display shows both the dispatcher in the control centre and the passengers on the outside the respective capacity utilisation of the carriages.



## Alternative propulsion

Whether electric or with hydrogen, IVU.rail maps all work processes relating to the deployment of alternative propulsion.



# Integration services for vehicle manufacturers

Everything from a single source – IVU takes care of the complete vehicle equipment with the corresponding hardware and software for vehicle manufacturer and railway transport companies.

# IVU.data CLEVER DECISIONS BASED ON GOOD DATA



Optimising operational processes, increasing efficiency and improving customer service at the same time – in order to meet these challenges in the long term, sound data analyses and continuous optimisation are essential for transport operators. With IVU.data, there is now a tool that enables and simplifies the analysis of historicised data. IVU.data is a data warehouse solution that collects, curates and centralises operational data from IVU.rail and other applications. With integrated, technically complex data aggregation, IVU.dataenables comprehensive business

analyses to be carried out using algorithms – with IVU ready for AI!

With IVU.data as part of the IVU.suite, our customers can meet the optimum prerequisites for continuously optimising their operational processes. In future, automated forecasts and optimisation proposals can be created for planning, scheduling and the control centre.

IVU.data is the right tool for all current and future challenges.

# INFORMATION AND ANALYTICS





The runtime analysis creates suggestions on how to resolve delay hotspots

# IVU.data at a glance

### Al-ready

IVU.data is designed for machine learning and AI applications, e.g. for a dispatch assistant

## Specialist expertise

IVU.data contains the know-how from more than 45 years of technical and specialist experience in the transport sector

### Free scalability

IVU.data is hosted in the data-as-a-service model and changes, such as larger fleets, can be incorporated at any time

## High performance

Operation in the Cloud guarantees maximum availability, a continuous data flow and data security

# **IVU.control** SYSTEMATIC MONITORING AND INVOICING OF TRANSPORT CONTRACTS

Transport contracts are complex sets of rules that also define the consequences of non-compliance. For example, subsidy requirements, reductions or penalties must be calculated and documented. The complexity of the contractual regulations to be taken into account, the interactions between different quality parameters and the enormous volumes of data from various sources require a system specially tailored to this task – IVU.control.

For over twenty years, IVU has been continuously developing the system with its customers and users and integrating changing or new requirements as quickly as possible. Thanks to regular releases, users receive updated and extended software versions and are therefore always up-to-date.

IVU.control adapts: the required functions can be selected from a modular "toolbox". The individual configurability of the transport contracts ensures that the relevant regulations are accurately taken into account. This enables precise and contract-specific target/actual comparisons at the touch of a button.

With the help of flexible analysis tools, users can also quickly and easily find answers to almost any question, from the smallest detail to highly summarised key performance indicators (KPIs). Automatic data imports and report generation ensure efficiency and a reduction in manual effort.



Punctuality probability for arrival trains in IVU.control

# Advantages with IVU.control

### For transport operator

Performance control

IVU.control continuously monitors the volume of traffic to be provided and the fulfilment of specifications for the quality

Automatic reports

Reports and data deliveries to public transport authority can be quickly and automatically created and their contractual consequences determined in advance

Internal quality assurance

In order to avoid subsidy reductions and penalties, an internal Quality assurance system can be set up to check the quality of operations and the effectiveness of measures

# **NASA** SAXONY-ANHALT, GERMANY

NASA GmbH plans, orders and finances short-distance rail passenger transport in Saxony-Anhalton behalf of the state. The company uses IVU.control for financial controlling of the transport contracts.



# CONTROLLING

# For public transport authority

## Automated target/actual comparison

Transport contracts with different transport operator and individual regulations can be mapped and monitored in detail

# Efficient accounting

Monthly and annual accounting is significantly accelerated with precisely delimited analyses for the respective area of responsibility

# Systematic reporting

IVU.control enables systematic and automated reporting, for example to compare the operating quality in different transport contracts

# Document the use of public funds

The use of public funds can be documented in detail (subsidies, reductions, penalties) and provided to auditing bodies for proof

# **IVU.**cloud EVERYTHING FROM A SINGLE SOURCE

IVU.cloud extends the IVU.suite software and hardware offering to include application management and the takeover of technical operational management.

With IVU.cloud, IVU takes over the entire technical operational management for the IVU.suite – from hosting and maintenance to the installation of updates. Powerful, highly available, secure and reliable: IVU.cloud re-

mains fully scalable, for example when new links or routes are added. This ensures flexibility. The IVU.cloud team provides professional and technical support. The advantage is that customers are supported by our experts who take care of just one system – the IVU.suite.

In terms of performance, availability and data security, IVU.cloud is on the same level as a locally installed version of IVU.suite. It fits seamlessly into the existing IT landscape. Fully encrypted protocols ensure data security. Your data is hosted in C5-certified data centres. Thanks to our large network of experts, potential threats can be recognised early and effectively defended.





# IVU.cloud at a glance

# Smooth operation

Processes without interruptions: we use highly available servers to ensure that operations never come to a standstill

# Secure data storage

Always protected: connections are encrypted via VPN/Citrix and data is only stored at certified data centres

# Fully scalable

Whether you're facing increasing challenges or changing requirements, IVU.cloud adapts dynamically

## Always up-to-date

With hosting, we take responsibility for the installation and take care of maintenance and updates



Over 365 trains and 4,600 employees are coordinated by the Trenitalia subsidiary. IVU.rail is used for planning and scheduling.

ILSA is the first private railway iryo company with high-speed trains in Spain. ILSA relies on IVU.rail for the planning and scheduling of all vehicles and personnel.

The passenger information system of the Polish train route from Warsaw to Grodzisk Mazowiecki is run using IVU.realtime.



The subsidiaries from Germany and Sweden rely on IVU.rail solutions for the world's largest mobility provider.



Planning and scheduling of vehicles and personnel with IVU.rail in Karlsruhe. Around 600 employees work with IVU.pad.

# SBB CFF FFS

Swiss Federal Railways relies on IVU.rail for the planning, optimisation and scheduling of its 3,000 vehicles and 7,500 employees.

# **Keolis**

Keolis determines the vehicle and personnel requirements for the rail and tram network with the help of IVU.rail and calculates scenarios for planned service changes by Adelaide Metro.



For the Bangkok metro lines MRT Blue Line and MRT Purple Line, which carry over 400,000 passengers a day, IVU provides the timetable, routing, track occupancy and duty scheduling as well as the personnel planning.

# **GETTING THERE TOGETHER**

There are many steps between winning the concession and commissioning the first vehicle. IVU is on hand as a reliable partner for its customers and helps them to keep all requirements manageable and fulfil their tasks as effectively as possible, including when operations are up and running.

With IVU solutions, transport operators can achieve more: they establish an end-to-end digital workflow and integrate all areas of operations, from planning to personnel. Whether they use the end-to-end IVU.suite or stand-alone products, all data remains in a single system. This ensures efficiency – on the road, on rail or in the control centre. We know that the tasks

of transport operator are as individual as the routes they operate. Which is why IVU.suite inherently contains everything that is required for successful bus and rail operations. IVU.rail is the IVU.suite tailored to the needs of railway companies. One standard system for everything making it quick and easy to implement.

We don't leave our customers to fend for themselves here. Whether it's a question of interfaces to configure, implementing projects quickly, hosting the IVU systems or providing technical support – together we find customised solutions for every requirement so that buses and trains run reliably.



"Our user meetings are a great format for exchanging ideas on an equal footing. Together, we are advancing IVU.rail."



# **IVU.**suite

The IVU.suite is IVU's standard solution. Thanks to its modular design, it can also be customised precisely to individual requirements. Exactly what is needed is always used.



# **IVU.**integration

In a networked world, softgoods products never exist in a vacuum. IVU.integration ensures that all systems interact optimally and data flows seamlessly – from correct timetable printouts and connection of onboard 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 a predictable project process - from the start of the project to the system design and the final roll-out



# **IVU.**cloud

With IVU.cloud, IVU takes over the entire technical operational management for the IVU.suite from hosting and maintenance to the installation of updates. Powerful, highly available, secure and reliable: IVU.cloud remains fully scalable, for example when new links or routes are added. This ensures flexibility



# **IVU.**service

Successful IT projects are based on trust. IVU attaches great importance to this. Whether urban or regional transport, IVU supports customers through the entire project - and beyond. After successful commissioning, customer service is always available as a point of contact to ensure that all vehicles always reach their destination

Oliver Grzegorski, Head of Rail Division



# **IVU.**consult

The IT consultancy IVU.consult supports transport operator in the targeted planning, introduction and optimisation of software. From consulting to the complete provision of services: IVU.consult GmbH customers benefit from expertise in all aspects of the processes and special features of IT systems in public transport.

Headquarters

IVU Traffic Technologies AG Bundesallee 88 12161 Berlin

T + 49.30.85906-0 contact@ivu.com www.ivu.com