Reliable
VVS Ticker: custom transport notifications on your mobile

Convenient
NextTicket: flexibility at the best price

Mobile
Bus on demand: booking made easy
MAKING CHANGES EASIER

In February 2017, the German Automobile Club (ADAC) conducted a nationwide survey asking the following question: What needs to happen to get people to switch from driving cars to using public transport? Unsurprisingly, 1st and 2nd place went to cheaper fares and increased punctuality. In 3rd place, with 37 percent of responses, was the desire to have a ‘better range of tickets that meet individual needs’. This was precisely our starting point for the NextTicket Project in cooperation with the VRR. The idea is to issue tickets not before, but after a trip – and at the best price. At the end of the month the trips are recalculated. If it turns out that a weekly or monthly ticket would have been cheaper, passengers are credited with the difference. MENTZ is convinced that there isn’t a better way to accommodate individual needs with regards to ticketing. To find out how the technical details were realised, start reading on page 4.

A tap on the smartphone – and the bus pulls up shortly afterwards. It then proceeds not along a specified route, but rather precisely to your destination. Sound like a dream? It shouldn’t, because it’s already a reality. The public transport of tomorrow is currently being field-tested in the German town of Schorndorf. The software MENTZ developed for this project is detailed starting on page 12.

A personal assistant can make life easier in many ways. It’s also quite practical when it fits in your pocket. The VVS Ticker gets you reliably to your destination. The smartphone app monitors the current travel situation as a personal route assistant. If necessary, passengers are informed about delays and disruptions and immediately offered a plan B. The bottom line: in an urban jungle it is more useful than a butler.

All the products and projects in this issue will be presented live at the IT-Trans in Karlsruhe, Germany, from 6 – 8 March 2018. My colleagues and I look forward to meeting you there personally.

Until then, I wish you happy reading.

Best Wishes
Christoph Mentz

Christoph Mentz
Managing Director
MENTZ GmbH
Jump on the train, get off at any time and always at the best price. A tap in the app and the right ticket automatically appears on your smartphone. The check-in/check-out-system by MENTZ makes using public transport simple, flexible and fair. Data security is guaranteed.

Our goal: passengers should be able to use bus and rail even more intuitively and conveniently – without knowledge of the ticket pricing or having the right amount of cash for a ticket. With Next-Ticket, we are further developing our local transport ticketing system. The fare-innovation is being tested in multiple phases. The project, financed by the Department of Transport for North Rhine-Westphalia, allows the Rhein-Ruhr Transport Authority to offer its customers a simple and fair ticketing model – because our customers only pay for services that they use. As a consequence, we are able to attract new passengers to local public transport (PT) and incentivise existing customers to use bus and rail lines more often.

José Luis Castrillo, Director of the Rhein-Ruhr Transport Authority

Since the beginning of 2019, up to 9,000 test subjects have been testing the new E-ticket-system for the Rhein-Ruhr Transport Authority (VRR). The idea is logical: a customer only pays for the route that they take on a bus or train. For passengers, it’s quite simple. A tap on their smartphone app signifies the start, and a second tap at the destination ends their trip. The user-friendly app also provides the option to book additional passengers and upgrade to first class. For ticket control, the system automatically sends authorisation to a passenger’s mobile that expires when they exit the vehicle at their final destination. The big advantage is fairness: customers are guaranteed to ride for the best price available. At first, they pay for single trips, but at the end of the month the fares are recalculate. If a weekly or monthly pass would have been more cost-effective, the system reimburses the difference. But behind the simple user interface, complex algorithms are at work. MENTZ provides the app, the EFA system to analyse the tracks and calculate the fares, as well as a ticket shop for the check-in/check-out-system (CiCo).

GPS- Signal and Catchment Area

For the VRR-fare system, as is the case for most areas in Germany, a fare is calculated according to the route taken. First, last and intermediate stops define the route. In order to track a passenger’s route the EFA system calculates a range of information. GPS localisation shows a user’s position on the interface. In addition, the immediate areas around stops are defined as catchment areas. If a passenger is within 40 metres of the defined catchment area, the system locates them as being at the stop. For less complex bus stops, circles can be used to mark the position of stops as a catchment area. Particularly at major hubs it is important to calculate the catchment areas so that stops do not overlap.

Tracking Underground

The geography of catchment areas is created using OSM data (OpenStreetMap) that also contains platform areas. The DIVA data are referenced to OSM (DIVA is the MENTZ system that the VRR uses to manage their timetables). GIS snapping works without a mobile phone network connection; the catchment areas are loaded in the app. By stop, the time is saved when a passenger first arrives and then leaves the stop. This sequence of stops and times is called a track.

In the VRR-area there are approx. 115 tunnel stations, many of which have large interchange nodes. Unfortunately, GPS signals are lost when passengers go underground. But despite this, the localisation does not lose the passenger because of the beacons. These devices are only 4 cm in size and have been built into the display cases on underground platforms.

Germany, Rhein-Ruhr metropolitan area

Product
smartphone-based check-in/check-out system

Functions
app, EFA system for tracking and fare calculation, ticket shop

Contact
mentzh@mentz.net

Customer project
No more confusing ticket machines. Passengers always get the best price with the new generation tickets from the Rhein-Ruhr Transport Authority.

MENTZ has developed the smartphone app and backend system for it.
A passenger’s route determines the price

A passenger’s route determines the price. The price is determined by the route taken, and A passenger's route was tracked. The red framed areas indicate where their route was tracked. The blue circles show the stations. The blue circles correspond to the actual location and the stations. The blue circles show the train platforms need to be accurately captured geographically as important catchment areas. The track is sent at regular intervals to the EFA system and determines route sections by comparing it to the timetable data, mapping trips in vehicles from the first to last stop. Using this stop sequence and the sequence fare zones, the fare is calculated along with the required ticket(s). When checking out, the trip is booked to the user’s account and forwarded to the financial service provider. The system needs to clean the information. Every positional update provides a level of accuracy. Data of poor quality are automatically eliminated. But even precise data can be totally wrong. A special phenomenon is the roaming WLAN-localisation. Because mobiles can create their own hotspot, it can move with its owner. During tests in the town of Beckingenhausen, the reported location supplied a coordinate from Düsseldorf Airport. To eliminate this source of errors, the system compares coordinates with neighbouring points in the track. Points that cannot be reached using a normal speed are automatically eliminated. The routing is based on precise timetable data in real-time. Road works can lead to unexpected routes.

Easy Deployment and Billing

Almost no additional information is required in order to provide the tracking. Only the beacons have to be installed on the platforms of funnel stations. For error-free tracking, the bus platform coordinates must correspond to the actual location and the train platforms need to be accurately captured geographically as important catchment areas. The track is sent at regular intervals to the EFA system and determines route sections by comparing it to the timetable data, mapping trips in vehicles from the first to last stop. Using this stop sequence and the sequence fare zones, the fare is calculated along with the required ticket(s). When checking out, the trip is booked to the user’s account and forwarded to the financial service provider. Customer data is secure. The app does not save movement profiles. Personal data and movement data are saved separately and on different servers. Movement data are deleted after a few days, and are only temporarily saved to assist customers if they encounter errors and need to contact support.

Dreaming Big

With CiCo, passengers can travel comfortably. The dream situation for users would be if they could use the system beyond the borders of the fare region as well. Passengers board (check-in) and alight (check-out) somewhere along a route and the app takes care of selecting the right ticket. Ideally, customers would only need to register with the transport authority. This dream may come true as well.

A passenger’s route determines the price
Seizing on the Opportunities of Digitisation

Hendrik Wüst, Minister of Transport for North Rhine-Westphalia (NRW), wants to make the switch from car to rail more enticing – with improved infrastructure and offers that better meet the customers’ needs.

With its NextTicket project, the Rhine-Ruhr Transport Authority (VRR) is at the forefront of digitisation in public transport ticketing. What makes NextTicket so innovative? NextTicket is a good pilot project for an up-to-date and customer-friendly offering. Passengers only need their smartphone and the NextTicket-App for their next trip on public transport. They no longer have to struggle with different fares and transport zones. The app is simple and intuitive to use. Users pay the best and lowest price. I hope the project will run smoothly and that all customers can benefit from it statewide.

After NextTicket, will the digitisation process be over for public transport ticketing in NRW? We are only at the beginning of the process. While the e-ticket and the customer response to it are the focus of the NextTicket field test, the next thing will be to replace the check-out with a be-out. One of our goals is to achieve comprehensive E-ticketing across transport authorities. Today it is possible to go online and book a complete trip to China, including all transfers and a hotel. But if you want to book a trip from Minister to Düsseldorf using public transport, it is still extremely difficult.

Currently, there is a lot of movement in the ticket market for public transport. Among other factors, this depends on the efforts of the EU to fully deregulate public transport ticketing. Which opportunities do you see for public transport and its customers? Competition is generally said to be beneficial because it encourages innovation and helps tailor products to better suit customers’ needs. This is also true for public transport. For example, transport authorities actively engage in cross-border ticketing projects with the Netherlands. There are still some legal barriers to overcome, one of which is the data privacy.

What is your advice to a transport authorities or company that is skeptical about digitisation? My feeling is that transportation authorities and companies are open to this kind of deregulation. Public transport must rise to the challenge in the same way other companies do. It is the customer who decides.

What do you expect from the participating companies? Problem solving is only possible through the close collaboration of all involved. In order to develop the best ideas about joint solutions we need to bring together professionals from a variety of fields. For this reason, we are setting up a new technical department in the Ministry of Transport, where these professional competencies can be brought together.

Public transport needs to offer attractive services. Transport companies will benefit from the rising number of passengers. Ticketing is only one of the many digitisation topics in public transport. What else is on your agenda for this legislative term in NRW?

By declaring the “public transport digitisation offensive in NRW”, which I signed at the end of last year with the unions, the transport authorities and companies, all stakeholders affirmed their commitment to expand the shift to digital technologies and networking of information, fares, sales and value-added services for public transport. Concrete shared goals are better distribution of real-time information regarding delays, improved passenger information in case of disruptions, as well as the provision of accessible trip planning. Overall, we want to make the switch from car to public transport more attractive for everyone.

What challenges will public transport have to face in the next few years? Public transport must seize on the opportunities of digitisation in order to become more attractive to customers. Now we have the chance to do this because younger generations do not assign the same status to cars as before. 98% of public transport customers have a weekly, monthly or yearly pass. This also means that there are not many occasional riders. There is where the potential lies. If our goal is to get more people to use buses and trains, then we must tailor the services to customers’ needs. This also means connecting with other carriers. Multimodal offerings that include train, public transport, bike rental, and car-sharing systems will increase. Public transport suffers from some of the same problems as the infrastructure for cars: the networks are overloaded. This often leads to full trains, less convenience and more delays. We need to work on the infrastructure to expand and modernise existing networks.

What do you expect from the participating companies? Problem solving is only possible through the close collaboration of all involved. In order to develop the best ideas about joint solutions we need to bring together professionals from a variety of fields. For this reason, we are setting up a new technical department in the Ministry of Transport, where these professional competencies can be brought together.
As a personal route assistant, the VVS Ticker keeps an eye on the most important trips and proactively notifies passengers if something changes. The customer defines what is important.

Is my bus on time? Is the tram running as scheduled despite the roadworks? All this and more is saved in the EFA trip planner to provide dependable information on delays and disruptions in VVS mobile app. Previously, customers had to actively request an update to their planned trip. This step has now been eliminated with the new VVS Ticker by MENTZ; the app now notifies commuters on its own.

In the Stuttgart Transport Authority (VVS), comprehensive real-time information and the latest disruption notifications are available for the entire region. Customers can plan trips, access departure and arrival times, and even trace the current locations of buses and trains along their routes. The VVS Ticker acts as a personal assistant. It displays an overview of the relevant messages. The VVS Ticker sends a push notification if any disruptions or delays have occurred.

Maximum Customisation

In order to notify passengers that would like to receive messages for specific stops or routes, information is used from the Event Management System (EMS). So far, the major disruption information in EMS messages has only been communicated using a push service. The EMS messages were used to notify customers about major disruptions. Delays and possible missed connections could not previously be proactively communicated. This is why MENTZ developed the VVS Ticker.

The new functionality enables the saving of route favourites, like the morning commute to work. The app always provides a quick overview of disruptions and delays — without customers having to replan a trip. If there is a message, the system displays detailed information with a simple click and calculates alternatives, if desired. As soon as the saved trips are at risk of delays, possibly because a part of the trip has been cancelled or a connection may be missed, the VVS Ticker sends a push notification.

The information presented on the display is defined by the customer themselves. Values for delay times are presented intelligently and can be customised to fit personal needs. In this way, notification definitions can be made for each route for example, whether they should be displayed at all, or the number of minutes that should trigger them to appear. The customer can adjust the times to be monitored according to their needs. For example, it is possible to monitor the journey to work only in the morning, and not in the afternoon.
In the town of Schorndorf residents are field testing bus trips on demand. MENTZ has developed the smartphone app and the deployment system for public transport with flexible stops.

In the town of Schorndorf, a German town with 40,000 people in the metropolitan region of Stuttgart, an innovative and future-oriented bus concept is in test operation. From Friday afternoon to the end of business hours on Sunday evening and holidays, two small buses provide the southern half of the town with flexible routes, flexible departure times and flexible stops. During these hours, they replace underutilised regular scheduled services.

Passengers can request the buses online – either using a smartphone app (for iOS and Android) or the responsive website of the Stuttgart Transport Authority (VVS). No registration is required for booking using the app – all user data are saved locally on the smartphone. In order to call the bus using the website, users must log in with their personal profile. Trips and reservations can also be made by phone. In this case, the employees at the call centre enter the data into the system.

In contrast to regularly scheduled buses, on demand transport is not wedded to a specific route. The bus picks up the passengers as close as possible to their starting point and then drops them off at or near their desired destination. In addition to the usual stops, the driver also travels to flexible stopping points, so-called virtual stops. This shortens the distance one needs to walk before and after the trip and allows another network to be served. Because the bus does not follow a set route, but rather optimises its schedule according to the needs of the passengers aboard, there are no dead runs. That reduces the number of vehicles required and protects the environment.
The Clicks to the Bus

Passengers can book their bus either with the smartphone app or over the responsive website. They enter their origin, the destination address and the desired time and tap or click on “request”. The system uses this information to calculate four possible trips. Clicking or tapping on the trip displays a detailed view.

In a next step, the number of passengers must be indicated so that the trip can be checked and reserved. In the background, the deployment system begins making adjustments to the route. Clicking or tapping on “book” orders the reserved trip.

Every reservation and booking is saved in “my trips”, where customers can also cancel booked trips or book previously reserved trips.

On demand transport uses the normal VVS zone fare system. Short trip fares apply to trips within a special area for on demand transport. For any trips that go beyond this specified area, the correct fare is calculated by the EFA system based on the number of zones travelled.

Intelligent Trip Planning

The common data for on demand transport with operating times and virtual stops around Schornhof are stored in the EFA trip planner of the VVS. If a customer sends a request using their VVS mobile app or the VVS website, the EFA journey planner automatically offers ideal trips with sections covered by on demand transport.

Unlimited Transport

For trips that go beyond the area specified for on demand transport, public transport stops can be used as transfer points. Normally these are the stops in the region. On Friday and Saturday, the test area is connected to commuter trains by 2 buses that run in half-hourly intervals. On Sunday, they run every hour.

The trip planner also calculates connections for routes that can be covered by conventional regional bus lines. Using the following parameters, the software has to determine: when should a trip with a conventional interchange (via a stop) be preferred over an on demand trip with no transfers? How much can a conventional stop “outshine” a nearby virtual stopping point to be preferred despite a longer walk to the stop?

Future-oriented yet practical

- The bus on demand fills the gaps in public transport offerings. The individually accessed bus system can replace regularly operating services in times of lower demand.
- The concept ensures full and flexible mobility – even regions with low demand, such as rural areas, can profit in many ways.
- Intelligent digital deployment makes it possible to use smaller buses that are more efficient and less expensive than larger vehicles. This solution dramatically reduces traffic volume and enables flexible public transport to replace unnecessary fuel consumption.
- The next step into the future will be: driverless on demand transport.

Automatic Control Centre – It guides the Bus Driver

MENTZ has developed the central components to create a demand-oriented operating concept that does not need public transport stops. For integrated bookings, there is an option to access a web-service-oriented trip centre. The trip centre plans the bus route according to the desires of its passengers.

Until shortly before departing, the software adapts the route to fit each trip request that it receives. New bookings are scheduled in such a way that does not necessitate changes to the calculated times. If this is not possible, the trip can be postponed within a specified time window in order to pick up an additional passenger. Shortly before departure no more bookings are accepted. The route is now set and is sent to the driver.

Passengers receive a scheduled departure and arrival time when booking that may change slightly. The system calculates each trip with a defined flexibility. The bus may drop off a passenger five minutes earlier at a stop. The scenario, that a bus drops them off five minutes late, is not possible.

Overview of the Relevant Data

In the automatic control centre, all relevant data are available to book a trip. For the driver, the stop sequence, the departure and arrival times, and the number of passengers are the most important data. Beyond that, additional information can be accessed from the backend system. For example a list of customers that have booked a trip can be accessed in order to contact them, or to provide additional information if necessary. A trip request consists of a departure and arrival location and the time window in which the trip is to take place. Last, but not least, the overview of trip requests displays when individual users placed their trip requests.

INTELLIGENTLY DEPLOYED

Flexible Route: the bus only goes where it is needed

The technical solution

REST-Web-Service interfaces operate all required client applications.

Applications for a trip planning system with integrated booking via an upstream web service on demand.

Applications for drivers and passengers for displays in vehicles.

The administration and contents of the deployment can be requested via the administrative interfaces.

The map view shows a route option of a vehicle block that contains a trip request. In the example below, the requested stops are marked in green. The red dots are stops that were calculated by the system for the projected vehicle route. They have not been booked. If another trip is requested, the planned route is altered.

The Brain and Control Centre: Passenger Booking Centre

The Clicks to the Bus

Custom Mobility – a tap in the app calls the bus

The Clicks to the Bus
A visionary goal is being pursued in Franklin through the urban development company MWSP GmbH: environmentally sustainable and multimodal mobility is being strengthened and innovatively organised in a new urban district, located on a former U.S. military barracks. Cars are relegated to underground car parks to make space for green areas instead of parking spaces between the buildings. Alongside the development of an electric-vehicle fleet for the general public and restricted usage, pilot projects play an important role for the development of a closely meshed and inclusive street network for all modes of transport. Starting at the end of 2018, this will include an E-bus and the above mentioned electric and driverless mini-bus operating under test.

The implementation will be preceded by an comprehensive design phase during which the course for the customer information system for the entire Swiss public transport network will be set out for the next decade.

The goal: to find the best new operational planning software. During the most intense end-user test none of the strengths and weaknesses of the competitors went unnoticed. The contract was awarded to: DIVA by MENTZ.

The RNV operates the light rail, tram and bus routes in Mannheim, Heidelberg and Ludwigshafen. More than 2000 employees and over 370 vehicles will be incorporated into the new planning system for duty and vehicle scheduling. One of the goals is to further improve efficiency and service quality through high – performance optimisation.

The RNV operates the light rail, tram and bus routes in Mannheim, Heidelberg and Ludwigshafen. More than 2000 employees and over 370 vehicles will be incorporated into the new planning system for duty and vehicle scheduling. One of the goals is to further improve efficiency and service quality through high – performance optimisation.

Useless content removed.
Christmas in Cape Town: in Cape Town the festive season is characterised by parties on the beach, a lively nightlife and lavish shopping in the many shopping centres in and around Cape Town. This constituted an initial challenge for the timetable planners at MyCITI buses. Shopping centres kick off the festive season at different times, so that the months of December and January are filled with planning for timetables, vehicle and duty schedules. Whilst the remainder of the year is planned with the traditional Monday to Friday, Saturday and Sunday daily schedules which are adjusted to take into account roadworks, the festive period is different. The festive season places high demands on both DIVA and the planners using it, but after attending the appropriate training courses the DIVA users were able to cope well with this demand. From the beginning of December to the middle of January, approx. 30 different schedules were planned on four route groups.

While time moves more slowly in the northern hemisphere in the days before Christmas, the festive season starts to kick into gear in the southern hemisphere. It’s the peak season with guests from near and far. A timetable planner from Cape Town tells the story of how she talked to her mother about her new tasks at work. The mother was not quite happy with the job and suggested that, if her daughter really wanted to work as a DIVA, she should stay “down to earth”.

We believe she was able to sort things out, even her daughter, think she had been doing a great job for four years now – with and sometimes as “DIVA”.

To enjoy the view from Table Mountain, one of South Africa’s famous landmarks?

Easy. The buses of DIVA-use MyCITI stop directly at the base station of the cableway.