MAN_06: Concepts and instruments to improve mobility in peri-urban areas

Description of the measure and main outcomes expected

This measure aims at the development of concepts and the testing of instruments to improve mobility in peri-urban areas for various user groups. The overall objective is to improve the availability and quality of mobility services in peri-urban areas through improved PT services and an additional focus of connecting PT services with additional mobility options.

Measure outputs:

- Concept for improved integrated bus & on-demand services in peri-urban areas of Mannheim
- Implementation and testing of improved integrated bus & on-demand services in peri-urban areas of Mannheim
- Feasibility study on PT services beyond administrative boundaries between Mannheim's peri-urban areas and neighbouring communities
- Incorporation of the connected mobility concept developed in MAN_07 with a focus on the specific peri-urban context and its challenges.

Preparation of the measure

Concept & Implementation

First, the area and potential use cases for the service were defined through an evaluation of the geographical surroundings as well the existing PT services. Mannheim is located at the heart of the Rhine-Neckar metropolitan area in between the cities of Ludwigshafen and Heidelberg. Also, Mannheim is located on the border of the three federal states Hesse to the north (s. figure 27, purple area), Rhineland-Palatinate to the west (green areas) and Baden-Württemberg (blue area).

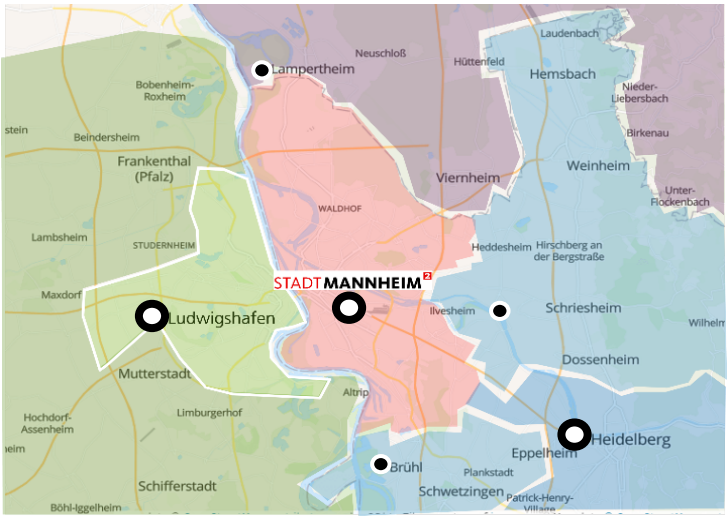


Figure 1 Map of Mannheim city limits and neighbouring counties.

Source: OpenStreetMap contributors, own figure

The general focus for this measure are peri-urban areas within the city of Mannheim (s. figure 28, shaded areas) as well as neighbouring counties for the part of the feasibility study. Those areas were chosen not only by their geographical distance to the centre, but also with regards to the availability of PT-services in the area, considering its quality (frequency, no. of lines, possible directions/ connections, travel time etc.). This stage revealed several areas within the city, that did not provide any PT offer at all or no offer for the most part of the day.

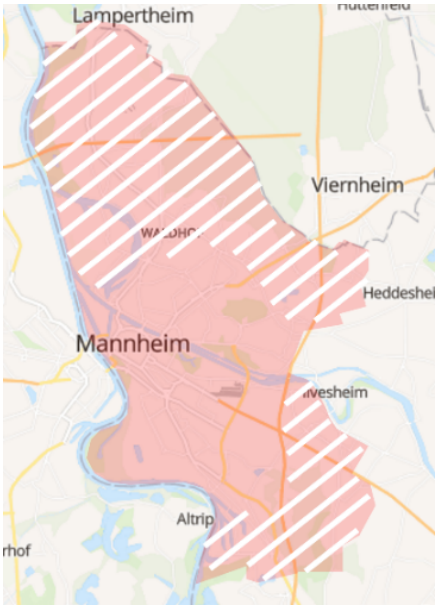


Figure 2 Map of Mannheim's peri-urban areas
Source: OpenStreetMap contributors, own figure

These areas were than further analysed and subsequently divided into two main categories: low density residential areas (s. figure 29 orange) and industrial zones (blue). This differentiation was necessary, as mobility patterns and behaviour vary strongly between those categories of (peri-) urban areas.

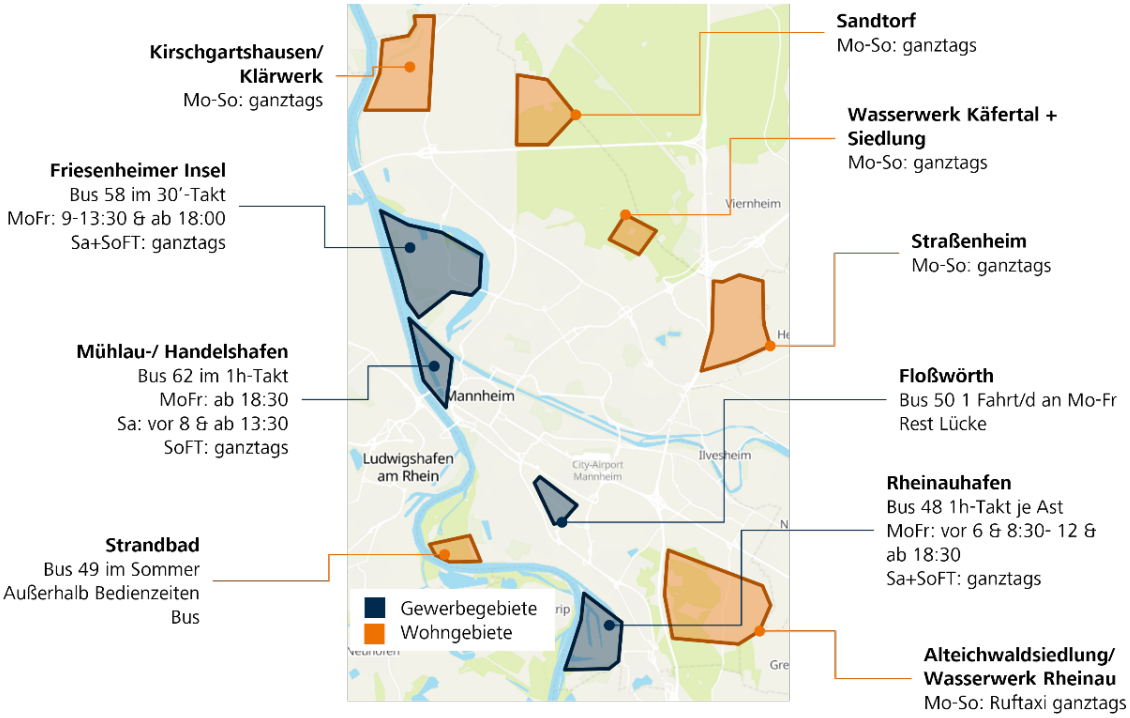


Figure 3 Areas with (times of) no PT-service
Source: OpenStreetMap contributors, own figure

Regarding the strategic alignment of the new transport service, it was clear to rnv that this service must complement the existing, high-capacity lines with about half a million passengers per day in total. The new service was to complement the existing public transport network and offer in Mannheim in terms of time and space and to take over the coverage in low-demand areas and on low frequented relations.

Specifically, three use cases were outlined:

1. As a feeder to main public transport lines on the 'first/last mile', from the bus stop to the destination or at home to the S-Bahn & tram

2. For small-scale direct journeys, routes within a district not covered by the line offer or between them for shopping, doctor's appointments, etc.

3. As a faster alternative to transfer connections via the city centre on less popular tangential routes

On this basis, rnv has developed five objectives for the new service:

I. Improving the availability and access to public transport for all target groups

II. Contribution to environmental and climate protection

III. Increase in the number of users and intensity of use in public transport

IV. High efficiency & quality of on-demand service

V. Efficiency in operation & handling of potentials

Data collection & Online Survey

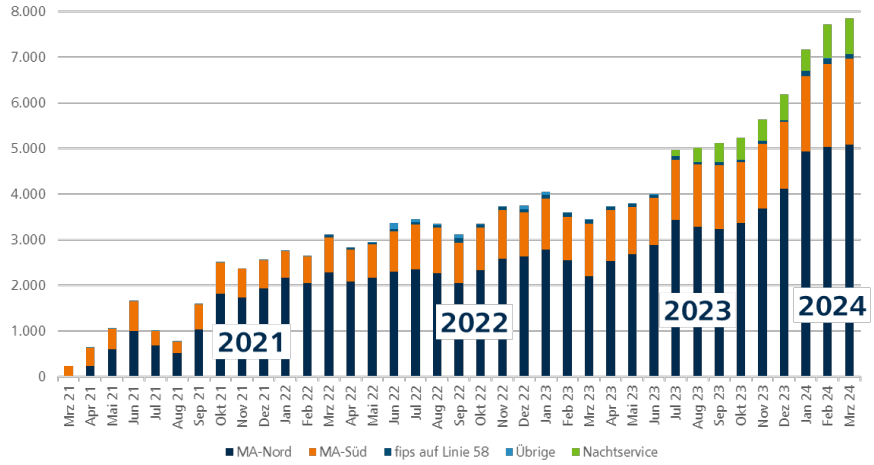


Figure 4 On-demand passenger numbers per month per service

For the analysis and design of the new integrated services, a variety of data sources were identified and utilised. Most importantly, there are more than three service years of data from the on-demand-services in Mannheim, providing amongst others a detailed picture of the geographical and temporal demand for such a service or validated approximations on the percentage of each use case.

Another relevant source of data is the passenger counts of the fixed bus lines. As rnv has equipped almost 100 % of its fleet with automatic passenger count systems, very detailed data is available on historic passenger numbers on the fixed line services. The analysis shows for example a potential in several fixed line tours, mostly on weekends and during off-peak hours, with very low passenger counts, that could be taken on by the on-demand service with regard to cost efficiency. Other insights highlight the relevance of fast, tangential connections, bypassing the time needed go into the city centre or next major interchange, to reach the connection and move on to a destination in a peri-urban area.

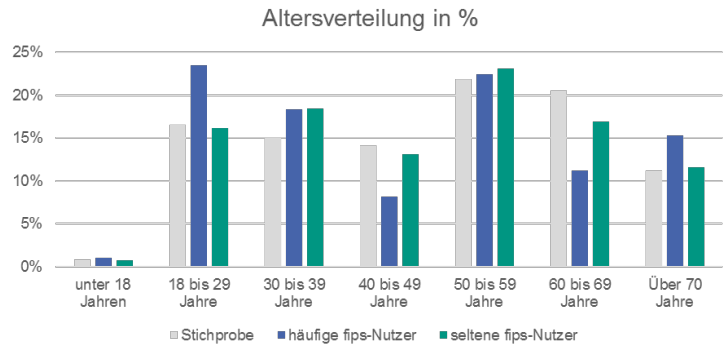


Figure 5 Age distribution among on-demand users

Finally, an online user survey and qualitative interviews were conducted within a mixed method approach. Receiving more than 600 usable replies, the results showed a wide spread in age distribution both among regular (blue) as well as among occasional users (green). Most notably, the age group of 70 and above makes up 15% of regular users, showcasing once success with regards to goal one, “improving the availability and access to public transport for *all target groups*”.

The retrospective analyses of all the data above showed two central aspects, that summarize the overall effect of the new on-demand service.

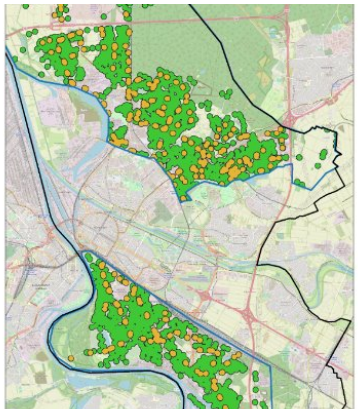


Figure 6 Visualisation of PT availability with on-demand service

- Getting anywhere, at any time: the on-demand service serves as a temporal and spatial completion of public transport. This can be seen in the historic data with regards to actual rides taken, places and time of demand, etc. But this is also true for the passenger perspective, as the survey and the interviews showed. With the on-demand service available (and know), users feel they have an 'always available' mobility option, lowering the need for an own car.
- Mobility for everybody: the on-demand service enables participation for people with limited mobility such as senior citizens, people with impaired mobility or people who cannot drive themselves. This is clearly shown by the number of people with disabilities among passengers. While their percentage is less than 4% on fixed line services, it is around 15% within the on-demand service. As the overall percentage is 12% among Mannheim's inhabitants, the on-demand-service clearly provides mobility for people, who did not have the option available to them before.

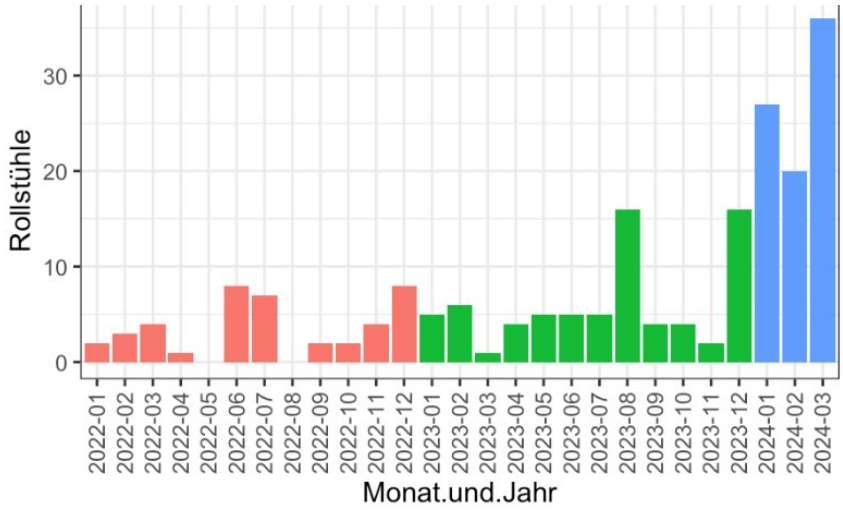
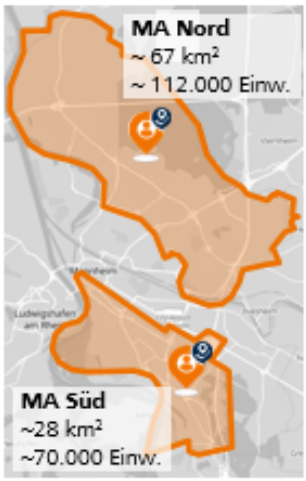
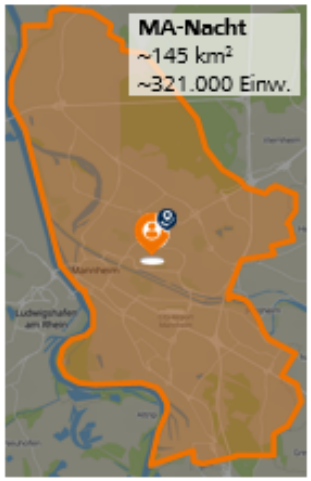


Figure 7 No. of wheelchair bookings per month

Growing Database & use-cases nighttime traffic



Mo-So
5 – 24 Uhr



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22-5 Uhr

Figure 8 DRT operating areas and hours

Currently, fips operates in daytime traffic in Mannheim in the North and South service areas seven days a week between 5 a.m. and 12 p.m. The northern service area covers approx. 67 km² with 112,000 inhabitants in eleven city districts. The southern service area covers approx. 28 km² with approx. 70,000 inhabitants in nine districts. On the nights from Friday to Saturday, Saturday to Sunday and before public holidays, the fips night service can be booked in the entire city of Mannheim between 10 p.m. and 5 a.m.

The expansion of the service areas and the introduction of night traffic have met with a great response from passengers, as seen by the growth in the number of users. Technically, the introduction of combined information - as a transitional solution until integration by VRN - was an important step that has significantly simplified the use of fips in combination with rnv

scheduled services. Technically, more and more detailed evaluations could be created based on the successively growing data base. Since then, this basis has enabled continuous fine adjustments to the offer and the system. As a result of these optimisations, the proportion of shared journeys has been significantly increased over time from approximately 5% in the early phase of operation to almost 40% in recent months. Furthermore, the proportion of empty kilometres has been greatly reduced and the number of passengers served per vehicle-hour has been increased. The flexibility of the system and the advantages of integrated operation have been tested through a variety of additional applications.

On the one hand, these are use cases in regular public transport, such as e.g. short-term or planned replacement services, the takeover of individual scheduled services, the service of individual stops during construction work or the regular addition of line 58.

Challenges & Mitigations

Implementing the project will potentially face specific, technical challenges such as accurately interpreting user data for effective service design or navigating complex integration with existing PT systems. The major challenge of the integrated concept will be ensuring a successful start with the passengers through effective communication and information. As the data analysis also showed, new PT-services take some effort and time to become known to users.

Next steps towards implementation

Once the groundwork is finished, a new connected concept including fixed line as well as flexible public transport offers will be developed and discussed with key stakeholders such as the city of Mannheim and the regional transportation authority. Once the concept is approved, preparation of the implementation will start, including a communication strategy to inform residents and PT users about the upcoming changes or necessary adaptations to the infrastructure. Furthermore, key results of this measure will also be transferred to MAN_07 to be incorporated into the connected mobility concept, which will be part of the implementation phase of the related measure.