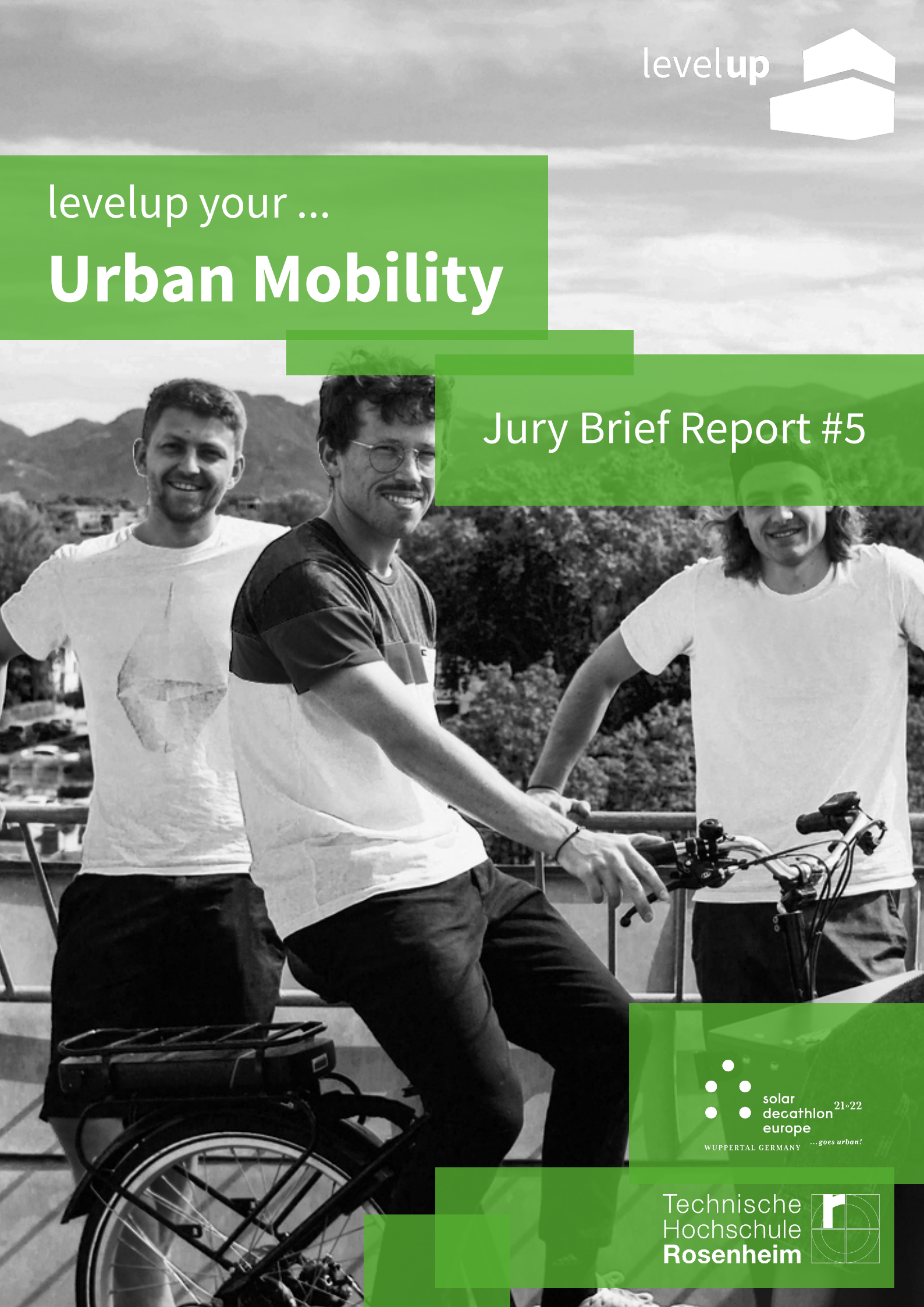
levelup

levelup your ...

Urban Mobility

Jury Brief Report #5



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Technische Hochschule Rosenheim

General vision

The goal of the levelup mobility concept is to provide incentives and opportunities for sustainable living and to promote interaction and a sense of community among residents. The concept is suitable for every single resident, regardless of age, social milieu, purchasing power, and family status.
The concept combines measures in different areas. Sustainable individual transport is to be made available for the residents through a broad-based vehicle sharing offer, which they can use at low cost and thus refrain from owning a vehicle. In this context, there is a mobility and sharing app, which also makes it possible to exchange goods and services with each other. This reduces the consumption of goods and increases the exchange among the residents. The vehicles of the sharing pool are located in a specially planned parking garage, which offers the residents more than just parking spaces. Public transport is being readapted to minimize the frequency of departures and distances to stops for residents.

Target group

One aspect of great importance is that the entire concept is tailored to the residents in the best possible way. In order to implement the vision in practice, it is necessary that the needs of the target group are met as well as possible. Otherwise, there is a risk that the residents will reject the offer. In the existing building, there is a very heterogeneous picture. With regard to different age groups and family statuses, everything is given. Therefore, it is clear that the concept must be suitable for a broad target group. In particular, the selection of a suitable vehicle pool comes to the fore here, as this is where the different needs are most relevant.
Figures 1 and 2 show an excerpt of the selection criteria. Figure 1 first clarifies the motives of the Nuremberg residents. Thus, the purposes of work, shopping, leisure, and companionship for which the residents need vehicles have been determined. In the next step, vehicle requirements are derived from these motivations. Figure 2 shows, for example, that for the purpose shopping, space and the flexibility of the vehicle play a major role. In contrast, distance, number of seats, rental duration, and frequency are rather irrelevant for this purpose. The final selection of the type and number of vehicles is based on a complex calculation based on statistical movement data of residents. This is explained in more detail in the Viability Report.

Mobility Offer

The analysis of the needs described above finally leads to the following vehicle selection for the sharing fleet, whereby 400 residents of the existing building are assumed for the calculation. In order to cover all their needs for individual mobility, a total of 53 vehicles is necessary. These include 8 bicycles, 6 e-bikes, 3 cargo bikes, 3 cargo tricycles, 15 small cars, 15 mid-size cars, and 3 large cars.

Part of the needs assessment is to identify necessary additional equipment for the fleet in order to provide the maximum benefit to the residents. The additional equipment is included in the price of vehicle use for the residents. For motor vehicles, the following equipment is to be included: Dog transport boxes, child seats, navigation systems, and automatic opening tailgates. For bicycles, users will benefit from bicycle helmets, locks, mobile phone holders, transport trailers, child trailers, child seats, saddlebags, bicycle baskets, air pumps, and spare batteries.

Using Nuremberg's car density average of 41 cars per 100 residents as the basis for the calculation of the existing building with 400 residents, 164 people own a private vehicle in the building. With its 33 cars, the sharing offer is scaled and tailored to the needs of the residents in such a way that none of the residents is dependent on a privately owned car. This results in a potential saving of 133 cars in the existing building alone, and thus reduces the car density per 100 residents from 41 cars to 8.25 cars.

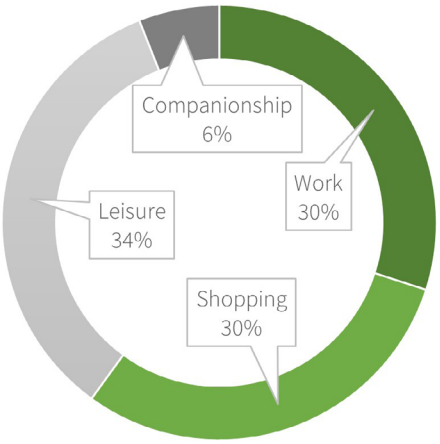

Figure 1 - Motivations for mobility

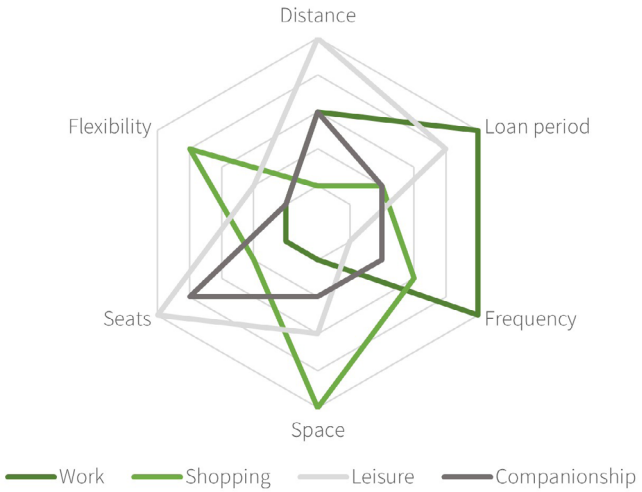

Figure 2 - Vehicle requirements

Public transport

In addition to the vehicle sharing offer, the public transportation is to be better adjusted to the residents' needs either. Two criteria play a decisive role: firstly, the frequency of departures, which indicates at what minute intervals the means of transport depart from a station and are thus available to the residents, and secondly, the distance to the nearest station where the means of transport is available. Since residents can reach public transportation in the vicinity on foot, the distance from this point is measured in „Walking minutes". The green dots in the matrix of figure 3 represent the current availability of bus, tram, and suburban train stops in Ludwigsfeld. For each line or mode of transport, the closest station to the existing building was selected. The X-axis indicates how far the station of the respective means of transport is from the existing building. The Y-axis shows the frequency with which the means of transport depart from a given point.

From this actual state, a target state has been developed that specifies a suitable distance and departure frequency for each means of transport. This ideal condition is shown by the red dots and black arrows in figure 3. The arrows indicate what improvements in distance and frequency certain modes require (e.g. down arrow means higher departure frequency desired). The red dots are the associated recommendation to achieve this. Both the reduction of frequency and distance is possible with only one additional bus route for short-distance targets within the district, one additional night bus, and an adaption to the schedule of an already existent suburban train. The result is that during the day the maximum waiting time for any means of transport is only ten minutes maximum, and the walking distance to the next station is no longer than two minutes.

Figure 3 - Public transport actual and target state

Apart from the changes in public transport, other measures help to motivate residents to use sustainable mobility options and thus further reduce the volume of traffic. Providing residents with an incentive to use electric vehicles, parking spaces in front of the existing building are to be designated as free-of-charge but 'electric vehicles only' parking spaces. Although a Park & Ride car park is not a sensible solution in the district of Ludwigsfeld, the neighbouring area around the Dutzendteich offers great potential due to the trade fair car park and the fairgrounds. Because both offer extensive parking facilities and are well connected to public transportation, an area is to be made available free of charge to commuters and residents, which is expected to curb traffic density in the city centre. Apart from that, the speed limit in the district will be limited to 30 km/h to minimise the impact of exhaust fumes and noise. This will also make public transport more interesting. Finally, in order to reach people who do not want to give up their own vehicle, the introduction of carpool-only lanes is an effective measure.

Mobility and sharing app - framework

The core of the concept is a particular developed "sharing- and mobility" web application. It allows residents not only to book the vehicles of the sharing fleet but also to exchange goods and services with each other.

To get everyone involved the application is multilingual, for free, and accessible by every web-enabled device. Illiterate or disabled persons can access via voice control and residents without internet access can enter via public terminals in the entrance hall or parking garage.

The app follows a non-profit principle in order to counteract misappropriation and to ensure that the idea of social togetherness is not lost through commercial endeavors. The app is financed by income (rental of vehicles from the sharing pool) to cover costs such as insurance of vehicles and bikes as well as the maintenance work of the app. Surpluses that arise at the end of a period are reinvested and the prices for the user are accordingly adjusted.

The currency that the app uses to assign a value to goods and services are the so-called "points". Here, 1 point corresponds to 1 cent. These points can be earned by renting your goods, or by completing various services. Points can also be purchased in the app by bank transfer, but they cannot be cashed out again. The prices for products and services are set among the residents. However, the prices for the sharing pool are precisely calculated to ensure the cost coverage of the concept. The cost of bicycles is determined by the time system (cost per minute), whereas distance (cost per kilometre) and time determine the price of the rental period for cars. (for more information on profitability, see the Viability report).

Mobility and sharing app - functionality

The app is divided into five sections. The home page (figure 4) lists news, future events, and current requests from fellow residents. The bottom navigation bar in figure 4 includes the other four sections: mobility (car icon), offers (tools icon), requests (magnifier icon), and activity (calendar icon).

In the mobility section, users can access the sharing fleet. They can view the different vehicles, request information, and book their desired vehicle via an integrated calendar. In the offers area, items or services can be offered among the residents. For example, if someone owns a screwdriver, they can post it in the app and share it with other residents. The requests section works the other way round. If someone is looking for an object or a service, they can advertise the request there. The activity area contains all upcoming, current, and future bookings. This includes fleet vehicles and services as well as borrowed or lent goods. Here, rentals can be terminated and settled.

Apart from these core functionalities, some extended functionalities will be implemented in the app in further releases. Their aim is to support the residents in making their lives even more sustainable, but also easier, in a playful way. Therefore, the first step is to make the initial authentication and access to the app as uncomplicated as possible. For first use, an access code is to be automatically generated for the app based on the master data recorded by the property management, as well as a username according to a defined scheme. Both will be provided to the resident by email (or post). When the user logs in for the first time, he or she can determine a new password, check the stored personal data for correctness, and adjust it if necessary. From this point, the user can log in with their „credentials“ in the app or in the web browser.

Since the target group also includes older people, it must be assumed that not every user has internet access. For this purpose, a tablet PC is to be installed in the entrance area of the existing building as well as in the parking garage to enable all residents to access the sharing app. These terminals come with analog click-by-click instructions. In addition, the app offers a ‘guided tour’ of its functions after each new log-in.

The implementation of an integrated map system in the app helps users to find the most suitable mobility option. The vehicles from the sharing pool as well as the local public transport are considered. By selecting a means of transport, surrounding stations are marked on the map. By clicking on the markers, the resident receives information on the distance and frequency of departures.

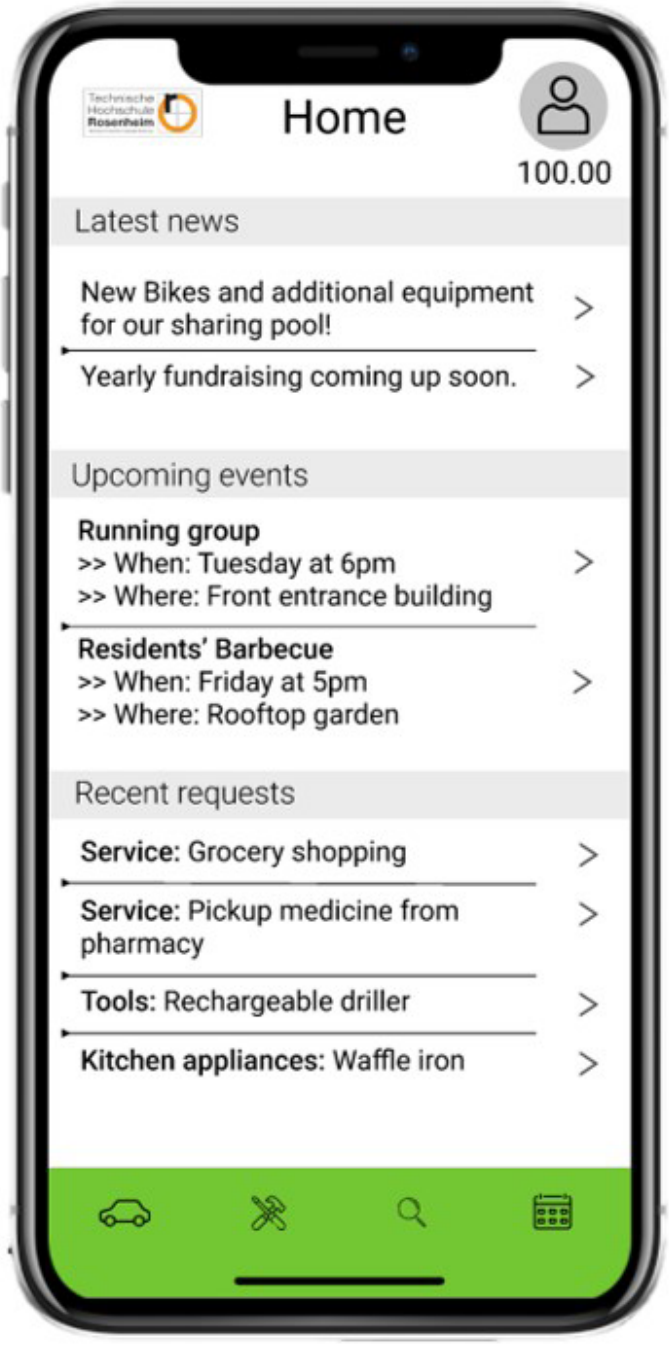

Figure 4 - Mobility and sharing app home screen

After successfully booking a vehicle, the resident can unlock the vehicle‘s lock with the app at the beginning of the rental period. The central locking system of cars and the spoke locks of bicycles can be unlocked in this way. In addition, all battery-powered vehicles transmit their battery and kilometre status to the app in regular cycles, which enables users to determine whether a vehicle is sufficiently charged for a certain distance or rental period. Moreover, the app can tell users to connect a vehicle to the charging station after returning it, and the administration can keep an eye on user behaviour in order to better adapt the sharing pool to the residents’ needs in the long term.

For residents who are dependent on a car, there is the option of forming carpools. Resident A, who drives to work in his own vehicle, can enter his daily destination and the radius along his route in which he is willing to drop off people. Conversely, if resident B is looking for a ride, he can enter the location of his work. The app checks whether the location is along resident A's route. If this is the case, the app shows Resident B the applicable option and allows him to contact the driver.

For offers and requests, multiple additional functionalities are helpful. First of all, there is the function of recurring advertising. This means that a person who needs someone to do the shopping for them every Monday has to create the request only once by choosing in which frequency the request is to appear again. The same applies to billing. In addition, there is a categorical cost recommendation for offers and requests, which is intended to prevent users from offering their products or services too expensively or from enriching themselves from the concept. The app also prioritizes requests to ensure that urgent requests are seen more quickly by the residents.

The app is scalable. This means that its structure allows the functions to be easily extended to the entire district or even the entire city. This results in a significantly increased offer for users. To increase environmental awareness residents can document their electricity and water consumption in the app. If smart meters are used, this happens fully automated. The app shows the respective resident at which time he/she has the highest consumption and documents the values in a timeline. This is the basis of the reward system for residents, which awards the residents with the lowest CO2 emissions from vehicle use, water consumption, and electricity consumption on a monthly basis. As a reward, residents receive free rides in sharing vehicles, for example

Parking garage

In Ludwigsfeld, a new multi-storey car park is currently being planned close to the existing building. This parking garage is to become a building that does not only serve one purpose. Combining all added-value: parking, communication, and leisure in one place. Until now, residents have not had any residents parking spaces of their own and the existing parking spaces along the street are severely limited. The multi-storey car park offers the solution to this. There will also be special parking spaces for families, senior citizens, and handicapped-accessible parking spaces.

The first floor houses a workshop for car repairs and is accessible from the outside as well as from the inside. An additional workshop and storage facilities for bicycles and accessories are also planned, as well as barrier-free toilets. Charging columns for cars and bicycles of all kinds are included and the possibility of retrofitting additional charging columns in the future is guaranteed.

On the roof, there are green areas with sufficient seating facilities. The electricity for charging columns and lighting is partly generated by integrated PV surfaces. The façade consists of a lamellar façade made of larch, and resembles the planned elevation of levelup's addition to stories. The parking garage's façade is fully recyclable and is connected with steel dowels and screws. The primary structure consists of laminated beech veneer lumber and precast reinforced concrete elements for the floors/ceilings. The system allows the parking garage to be expanded and reduces maintenance or costs for renovation measures.

Figure 5 - parking garage driveway and ramp

Figure 6 - parking garage southwest perspective

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