APPLICATION MANUAL

Planning, implementing and testing a multimodal mobility node in a peripheral area

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1. Introduction

Peripheral Access, a European project co-funded under the INTERREG Central Europe Program, fosters the development of sustainable mobility options in suburban regions whilst specifically improving efficient and integrated transport systems. In the thematic field of "Multimodality" the project partner *Regional Management Metropolitan Area of Styria* (Regional Management) implemented a multimodal node in a peripheral municipality of the region as a project investment and pilot activity. A measure of major publicity in the city - but also suitable for smaller municipalities in the suburbs?

Baseline of the pilot project idea was the existing concept of multimodal mobility in the City of Graz, which was developed by Holding Graz Linien (public transport operator in Graz) and respective city-departments. The concept, developed in 2015 and funded by the federal ministry, carries the name "tim", which represents an abbreviation of the German words "täglich.intelligent.mobil" (daily.intelligent.mobile).

The first tim-node in Graz started its operations in September 2016, succeeded by seven additional nodes by 2018. Under the project title "REGIOtim", the roll-out of the tim concept into the peripheral-rural area was initiated in 2017 as a cooperation between the Regional Management, the City of Graz and Holding Graz.

The combination of public transport with e-carsharing, public e-car charging stations, bicycle parking and – service infrastructure, micro public transport and additional features should enhance flexible, interconnected mobility within the region and represent an affordable alternative to car ownership in accordance with the daily needs of the local population.

This document sums up the planning and implementation process of this multimodal node in the municipality Hart bei Graz, shares lessons learned and recommendations for public stakeholders dealing with similar issues.

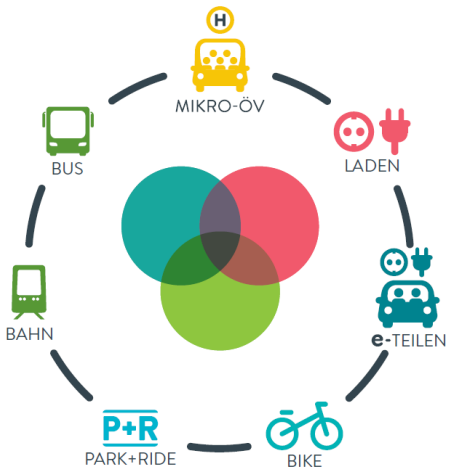

Figure 1: Multimodal mobility measures connected to a "tim-hub". © Holding Graz.

Parallel to the pilot project in Hart bei Graz, ten further municipalities submitted a project for the implementation of a tim node with the support of the Regional Management, funded by the European Union and the Government of Styria. Further information can be found here:

www.tim-oesterreich.at

www.zentralraum-stmk.at

2. Site Selection

In 2017 an analysis for the districts Graz-Umgebung and Voitsberg was undertaken, which aimed a categorization and priority ranking of potential multimodal mobility sites. For the evaluation it was necessary to adapt the location-based criteria from the urban context (tim-Graz) towards the needs of people in the suburban and rural areas. The results of the evaluation were summarized in a guideline, which represented the basis for the subsequent site selection within "Peripheral Access". The municipality of Hart bei Graz emerged as the one with the highest potential and they provided a well-suited site as municipal property (existing P+R, Pachern Hauptstraße 94, 8075).

The following site criteria have been considered and are crucial to analyse precisely:

- **Population density and infrastructure**
  - Catchment area, population density
    - Accessibility on foot and by bicycle for as many residents as possible
  - Demographic distribution
    - Number of employees/trainees/pensioners
  - Commuter statistics per municipality
- **Public transport connections and topography**
  - Public transport connection to the existing network
  - Combination with demand responsive transport
  - Central location of a planned multimodal node
  - Frequency provider in the surroundings of the intended location
    - Community office, restaurants, doctors, local suppliers etc.
    - Preferably public property with option to scale up
- **Car-Sharing potential**
  - Demand for Car-Sharing, needs of the population
  - Existing and planned other offers
- **Suitable location and its equipment**
  - Visibility, perceptibility, safety standard
  - Storage possibility for bicycle equipment
  - Energy supply, grid capacities
  - Wi-Fi availability
  - Space availability for the implementation of a multimodal node
  - Topography of the municipal territory
- **Interest, willingness and financing**
  - Readiness to install a Multimodal Node
  - Willingness to finance the share of own resources
  - Funding after the eligibility period
  - Existing mobility subsidies in the municipal territory

RECOMMENDATIONS - SITE SELECTION

- ✓ Choose a location which is public, visible, scalable, within walking distance of many residents and connected to public transport.
- ✓ Check the technical requirements in advance very detailed, especially if there is sufficient grid capacity for charging infrastructure on site.
- ✓ Gain an impression of the mobility needs of the local population in order to better assess the car sharing potential. Start with 1 or 2 (e)Cars, scale it up later.

3. Market analysis

As in any investment into a new and innovative product or service it is key to look around and search for what is already there to nourish imagination of crucial stakeholders. Especially when it comes to costs, the stakeholders' acceptance of this new product or service will determine the "do or die" of the whole undertaking. In the case of multimodal nodes, it is already difficult to convey the need of a change in implementation of transport services and infrastructure in order to support behavioural change in the mobility of the people. Further, a multimodal node, its function, its characteristics, its target groups and its quality standards are even more challenging to be understood and accepted. Existing examples, benchmarks, role models or showcases are helpful to gain trust and acceptance in the undertaking.

The market analysis for Hart bei Graz was straightforward looking over the border of the municipality finding a functioning network of multimodal nodes in the city of Graz – tim. The corporate identity of the brand is well-known even beyond the borders of Graz. High Quality public transport connects these nodes and work as a backbone. Now E-Carsharing, charging stations for E-Cars and bike-racks complement the hub. At the time of the project developed in Hart bei Graz, tim has already launched its start in a second city in Austria: Linz. Showing tim Graz, referring to its success and explaining function, characteristics, target groups and quality helped.

Brands with higher publicity have higher acceptance in general. Thus, key for market analysis is, to find examples with personal reference for the stakeholders. But where are examples to find?

Mobility options at a multimodal node are complementary on three levels: function, organisation and design. Although public perception and awareness of multimodal nodes is to be considered relatively small, there are numerous existing examples of them. Train stations or bus stops with bike racks are already multimodal nodes by function even though they have no unifying design and they might not be planned in one organisational unit or look like one. The same is true for carsharing services at public transport stops or bike stands.

It is therefore recommended to do market research in two directions: finding the ideal, sample or best-practice multimodal node where all three levels are met (global) and at the same time finding nearby functioning multimodal nodes with a lack in organisational or design-integration (local). It is to up to comprehensive planning to combine all three levels – no matter how many or which module(s) of the multimodal node might already be in place at site.

RECOMMENDATIONS - MARKET ANALYSIS

- ✓ Global market research for best practice for multimodal nodes to increase imagination of the undertaking and explain unified characteristics, target groups and equipment
- ✓ Local market research for finding multimodal nodes which work well already in the municipality or in the region to increase awareness for functionality but show lack in unifying organisation and design
- ✓ Learn from examples out of the market research

4. Detailed Planning

This planning phase included general planning, detailed calculation, procurement of implementation, local construction supervision, coordination corporate design/illustration and implementation support. An external transport planning company was commissioned with this by the Regional Management.

The following components were the subjects of planning:

- 3 e-car charging points
- 1 e-carsharing charging point
- 5 bicycle racks for 10 bikes
- 1 bicycle service station
- 3 small lockers
- 1 pylon
- 1 e-carsharing-car1
- Public transport access (bus-stop)
- stop of demand responsive transport system “GUSTmobil”
- P+R access

Figure 2: Components of "tim- Hart bei Graz". © Holding Graz.

The submission plans where elaborated from the planners in close cooperation with the municipality. The planning process until final implementation of the infrastructure can be structured in three main activities. Figure 3 shows these activities – it is clearly to be stated at that point, that as implementation-projects go, activities do not always go serial but, in many cases, parallel or iterative.

To initiate the process, it is important to understand the goal according to the specifications. The accessibility was analysed locally and with help of geoinformatic tools. Figure 4 shows that almost 1.000 people live within a 10 minutes’ walk from the planned tim site. By inspecting the site and gathering of Regional Management, the municipality (both client and building authority) and the planners first ideas can be created as well as crucial interfaces and important obstacles are identified.

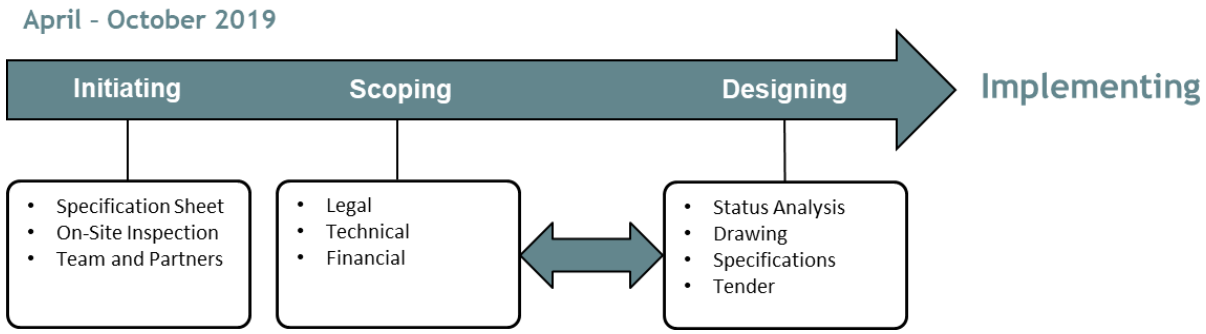

Figure 3: Structure of the planning process. © verkehrplus

1 The purchase of the e-car "Renault ZOE" for the operation of car sharing was not funded by the "Peripheral Access" project but implemented and supported by the Styrian regional development law.

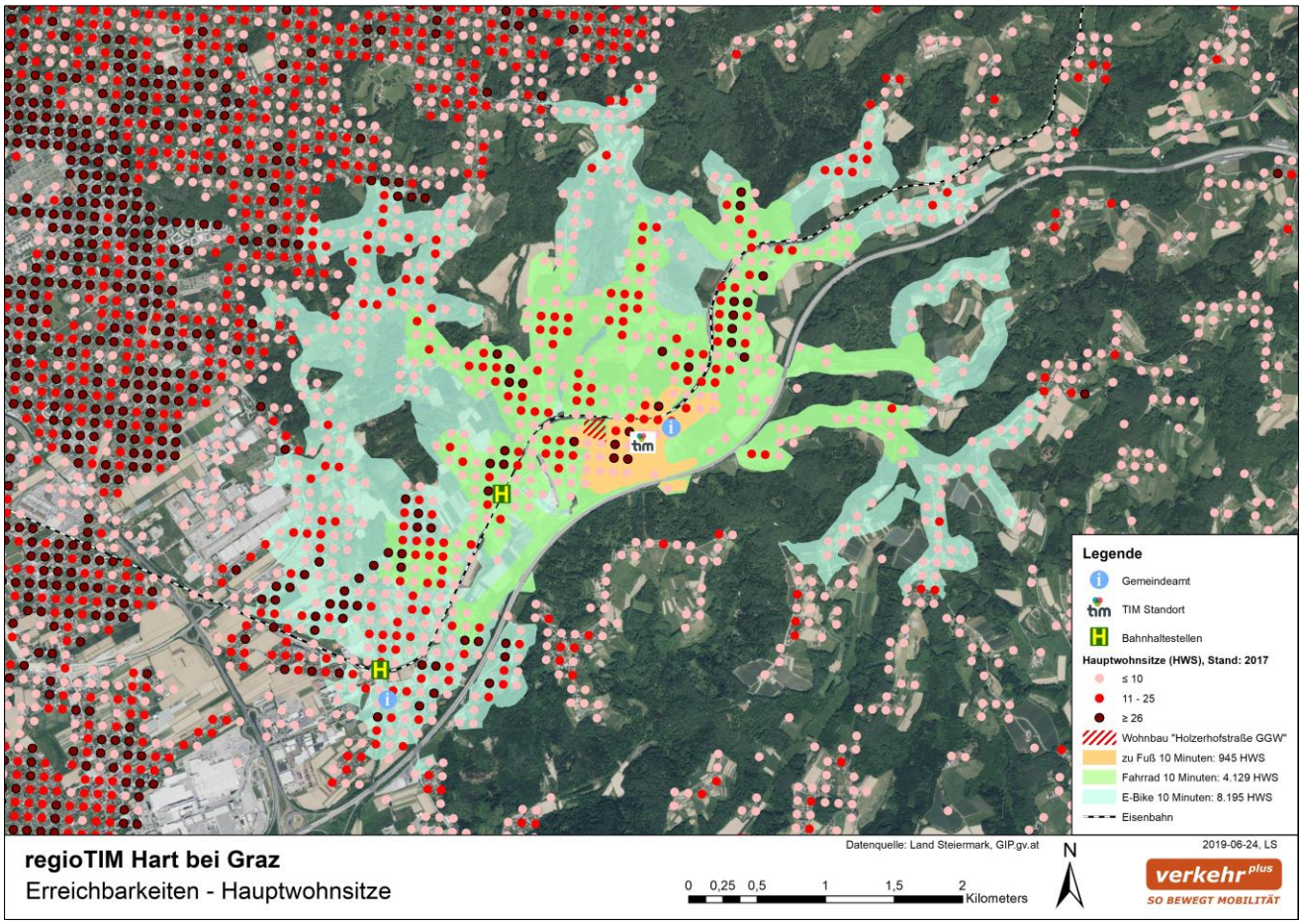

Figure 4: Analysis of the accessibility of the planned multimodal node. © verkehrplus

In the **scoping** activity of the project the boundaries and dependencies had to be identified. They can be clustered into:

- Legal Scope
- Technical Scope
- Financial Scope

4.1. Legal Scope

Municipality was both owner of the property and building authority. Permission for the building was given after formal filing of the undertaking. Building law and subsidizing agreements regarding the P+R were to be considered. The change of the purpose for five P+R spots into exclusive usage for electric cars needed permission. The installation of the pylon (height = 3,50 m) needed permission as it was placed on a building ban zone. All these approvals were given by the Federal State of Styria.

4.2. Technical Scope

In terms of civil engineering the spot was certainly appropriate as the existing P+R including its access roads could withstand loads of electric cars and bikes. In terms of electricity supply, a maximum power supply of 88 kW had to be ensured by the grid operator Energie Steiermark. For that, an upgrade of the nearby transformer station needed to be done. Very importantly the technical requirements of the data-communication between carsharing-customer (online booking), carsharing-operator (prime.mobility) and charging infrastructure (Mennekes) needed

early and thorough attention. Solutions for questions regarding different tariffs for charging tim Carsharing vehicles and privately owned vehicles, access restrictions for different charging points on one charging pole and the booking and billing system itself were initiated early in the process.

4.3. Financial Scope

As the financial boundary of the project, the estimated cost calculation from the Regional Management (project budget PA) needed to be complied with. Building costs and elements for the bicycle parking turned out the be more expensive after implementation while equipment for the charging infrastructure could be acquired to a lower price than estimated. In terms of charging infrastructure, the coordination regarding technical requirements in terms of power supply and data communication was especially time-consuming and therefore cost-intensive.

The designing activity started with requesting and analysing current data such as land surveying, cable trolleys, pipes, drainage, etc. In iterative steps and coordination with the municipality and Regional Management, the drawing was developed to a final design. Special attention needed to be drawn to grounding and drainage of the roof-construction. Specifications of the roof-construction for the bicycle rack were forwarded for a static calculation. Cable and wiring boxes were dimensioned according to specifications from Energie Steiermark. As the coordination process regarding the charging infrastructure was still ongoing, while infrastructure planning was already concluded, it was decided to generate a tender including all components exclusive of the charging infrastructure. By doing so, all civil engineering and steel construction works could already be started during the work on the solution for the charging infrastructure in order to guarantee the completion date. As Austrian law allowed it, selected companies were directly invited to submit offers.

RECOMMENDATIONS - DETAILED PLANNING

- ✓ Review Goal and Technical Specification thoroughly
- ✓ Elaborate technical or organisational interfaces and contacts (e.g.: transport authorities, grid operators, data communication operators, authorities)
- ✓ Clarify the responsibility of the operation of the charging stations – adapt technical specification according to the operator early
- ✓ Find crucial bottlenecks and time intensive activity by creating a schedule
- ✓ Check the legal framework: Which permits are necessary which restrictions are to be considered (water, environmental protection, forest, protection of historical sites, power lines, etc.)? Which tender procedure is allowed?
- ✓ Request and check inventory data: land and/or soil survey, cables, drainage and pipes
- ✓ Design and review with the stakeholders

5. Implementation

The construction phase in Hart bei Graz lasted from 2nd of October until 6th of November. In total four construction meetings took place at the investment site where the quality and correctness got reviewed and documented by the certified planners.

The implementation costs were € 120,000 incl. tax.

The implementing activity started with the contracting of a general contractor responsible for all civil engineering works and the steel construction and separately contracting, grid operator, electrician and advertising agency. Coordination between these companies and scheduling of the construction was done by the construction supervision verkehrplus.

5.1. Charging infrastructure

This was necessary due to the unsolved matter of charging infrastructure. Figure 5 shows they main activities in this process.

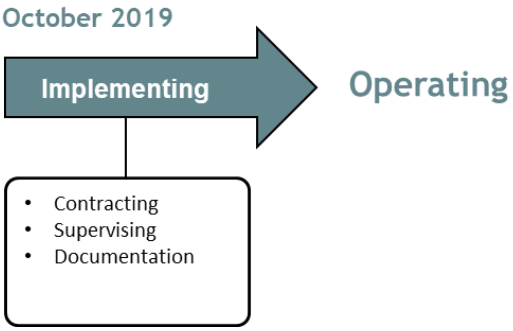

Figure 5: Structure of the implementation process. © verkehrplus

Figure 6 summarises the four challenges regarding the charging infrastructure, which needed solving.

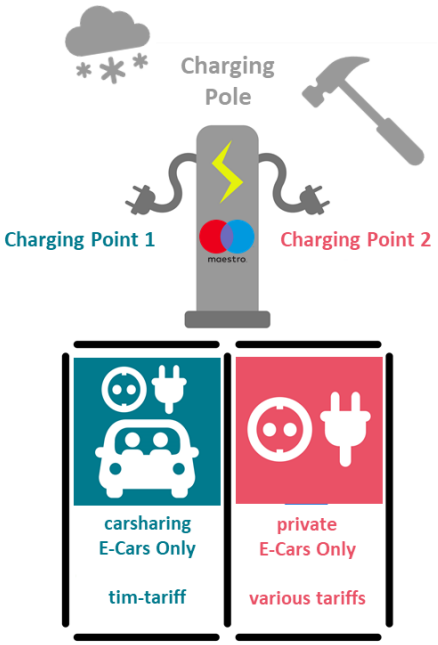

Figure 6: Challenges to be solved regarding charging infrastructure. © verkehrplus

- In total four charging points needed to be installed. According to specifications, three charging points were to be installed for privately owned electric vehicles exclusively leaving one charging point for the publicly available e-carsharing vehicle. Standard charging poles, with two charging points per pole do not foresee such an exclusive usage of the charging points in one pole.
- Further to that, different tariffs for charging were to be integrated into the system. Users with different kinds of already existing charging-cards should have been able to charge their private vehicle for the condition they had been promised by their energy provider.
- Pay terminals, allowing debit and credit cards for paying were to be integrated into the charging pole.
- The charging poles were to be suitable for outdoor operation and withstand vandalism. Plastic casing or fixed mounted cables at the charging poles therefore were to be avoided.

After pointing out the challenges, it was decided to gather a group of experts to lay out options available. To meet the requirements of outdoor operation and vandal proof, a pole with resistant metal case was chosen. Pay terminals for debit and credit cards would have resulted in higher initial and running costs for the operator – therefore it was decided to drop this requirement. In the matter of exclusive usage and tariff-integration it was decided to foresee a data communication cable between the data transmitters of the charging poles as well as two separate sim-cards. It was now possible to control the three charging points for private e-cars with one sim card even though they were not in the same charging pole. The second sim card controlled one charging point for the carsharing vehicle.

Different models and combinations of charging stations are available on this still new market. There is a certain gap of knowledge between building the technical solution and the operations model later on. Charging infrastructure suppliers are not aware about requirements in operating the system for carsharing.

The result was a try and error process over the implementation period to get the know how to define clear requirements for such constellations.

Parallel to solving these matters, construction took place and was supervised. The progress and necessary adaptions were documented.

Once all decisions had been made, the charging poles were ordered, delivered and installed by the electrician. One week prior to the official opening, the charging poles were put into service by the manufacturer and the grid operator.

Pavement marking and the labelling of all elements were the last steps in the implementation activity. The official opening took place on the 08. November 2019.

RECOMMENDATIONS - IMPLEMENTATION

- ✓ Provide clear information about the planned operating model to suppliers of charging infrastructur
- ✓ Award implementation from a single source (general contractor) and avoid multiple small contracts with interfaces and coordination activities
- ✓ Establish open, direct and transparent communication
- ✓ Pay attention to other regional measures with which your project can be connected in order to achieve the greatest regional added value

6. Operation model

Hart bei Graz became the first municipality to implement the tim concept within the scope of the Regional Management's project REGIOtim. The model is based on four different pillars:

1. Operator and customer **support**
2. **IT system** and **booking platform**
3. **Charging** infrastructure
4. **Local service** and maintenance

Regarding the operator and customer support, the Regional Management developed a set of performance criteria, which served as basis for a procurement of external contractors. This company is responsible for the 24/7 customer service and provides the municipalities with support regarding accounting/invoicing, the administration of the system. In context of the IT system, specifically considering the aspects server hosting and -management, a cooperation with Holding Graz was enrolled to guarantee attractive cost sharing for all tim locations in Graz and the region. Furthermore, the current structure of the booking platform as implemented in Graz was adapted and expanded to cover all tim locations in Graz-Surroundings and Voitsberg. This booking system is operated by Holding Graz, in cooperation with IBIOLA Mobility Solutions.

The tim customer card was intended to be used as one card for all functions within the system. tim cards can not only unlock the e-car sharing vehicle, but also connect it to the home base charging station. In addition, it allows energy charging at any charging station within Austria when customers are using a carsharing vehicle for longer distances. The regional energy provider offers a b2b charging tariff at a monthly flat rate to fulfil this demand.

For public charging, a maintenance and billing service can be ordered in addition, which proves its worth if the operator does not have the resources for this himself. Since the municipalities represent the operators of the system, they are responsible for all local service and maintenance activities such as car insurance, maintenance of all structural components at the location and the administration of customer registrations, including the issuing of customer cards.

Before e-Carsharing was put into operation the operator had to register the respective free trade license. This step was directly linked to the correct insurance category of the car.

RECOMMENDATIONS - OPERATION

- ✓ Check all national regulations according to trade, insurance and tax laws.
- ✓ The operation of a multimodal node is very complex and multi-layered. A PPP model is suitable.
- ✓ Define clear requirements for charging the carsharing vehicles including who covers the costs (operator, customer), prior to choosing a tariff model for charging
- ✓ Pay attention about **other regional measures** to which your project can be connected in order to achieve the greatest regional added value.

7. Evaluation

7.1. Qualitative Evaluation

Quality increasing by introducing a new mobility offer cannot measured by numbers and figures alone. Especially after a short period of time in place, evaluating numbers can only be the start of an evaluation process for the long run.

On the other hand, subjective increase of quality in terms of visibility and perception of transport services or the generation of attractive public space can instantly be observed. To find out about how the implementation of the multimodal node effected people and public life, the approach must be broader. Peoples' perception and acceptance towards the measures concerning implementing multimodal nodes are key for its success. Thus, in early stages the qualitative assessment of the nodes is recommended.

- Was the implementation realized by the people?
- Did people think of changing their mobility behaviour?
- Do they know the brand or do people know who is behind the brand?
- Do they understand the reason for the implementation?
- Is there added value to the node, such as quality of stay – is it an appreciated meeting point or shelter?
- Do they understand how the E-carsharing works?
- Can people make use of the roof or the tools provided?
- What could have been done better or what more would people wish for at a multimodal node?

This and more information cannot be put into numbers and figures. Both, mistakes and flawless aspects of the node and its elements can perfectly be described by asking the most sensitive sensors: the people. Thus, planners, operators and municipalities keep on learning and improving. Further, the evaluation is already part of creating awareness for the greater goals of implementing such infrastructure and services in future.

Due to the short duration of the evaluation and the insufficient existing customer base, a qualitative customer survey was not conducted in the context of the project Peripheral Access. This will be carried out for the first time in autumn 2020.

7.2. Quantitativ Evaluation

The main objective for quantitative evaluation is to observe certain figures over time to get information about usage, acceptance of the system and operating costs. The results are an input for adjusting the service either by extending or reducing the offer or possibly changing contracts with contractors.

Important indicators are:

- Active customers - customers using the system constantly and paying for it
- Other carsharing users - internal personnel, service and maintenance
- Carsharing utilization - number and duration of bookings

- Utilisation of public charging points - number and duration of charging processes and amount of energy taken

The following quantitative data analysis will be evaluated in the case of tim-Hart bei Graz in a monthly basis from sections Carsharing & Charging:

Monthly indicators of the Car-Sharing booking platform

- Number of active customers per promoter
- Number of bookings per vehicle and user category
- Number of trips per vehicle and length in km
- Kilometers driven per vehicle
- Utilisation per vehicle in percent

Monthly indicators Charging infrastructure

- Number of charging processes per location
- Number of charged kW/h per site
- Total parking time without loading

RECOMMENDATIONS - EVALUATION

- ✓ Observe the figures constantly and derive measures for improvements (e.g. increase publicity).
- ✓ Pay attention about other regional measures with which your project can be connected in order to achieve the greatest regional added value.

8. About Peripheral Access

In cities and large urban areas innovative mobility solutions such as ridesharing, carsharing, electric mobility, real-time travel information, electronic ticketing with best-price billing, intermodal mobility chains enjoy increasing public attention, outside the cities these concepts are much less used. This is often caused by lower user rates in sparsely populated regions, missing institutional cooperation, or fewer financial resources. Subsequently, in particular in peripheral areas sustainable mobility patterns (e.g. mobility without individual or privately owned cars) are much more difficult to develop.

Therefore, Peripheral Access (PA) focuses with its activities on relevant institutions in peripheral regions, i.e. rural and cross-border areas as these areas commonly receive only little attention in mainstream policies and funding programs. It thereby enhances the planning capacity of the public sector and related entities dealing with regional passenger transport. In order to achieve this aim, the work plan schedules activities in three areas of action:

- WP 1: the integration of transport modes through multimodal mobility points
- WP 2: new ways to employ ITS and ICT in transport/smart mobility
- WP 3: enhanced institutional cooperation by means of transport authorities and cross-border marketing approaches.

The Peripheral Access project partners are:

- German Association for Housing, Urban Development and Spatial Affairs (lead partner)
- Vogtland region (border region Germany / Czech Republic): Authority for local public transport Vogtland
- Region Friuli-Venezia Giulia (border region Italy-Slovenia): Venice International University & Trieste Trasporti S.P.A.
- Region South Moravia (border region Czech Republic / Slovakia / Austria): KORDIS JMK
- Region around the city of Balassagyarmat (border region Slovakia / Hungary): KTI Institute for Transport Sciences Non-Profit Ltd
- Region around the City of Graz: Regional Management Metropolitan Area of Styria Ltd (Austria)
- Region Lubin: Powiat Lubiński (Poland)
- Ljubljana Region: Regional Development Agency of the Ljubljana Urban Region (Slovenia)

https://www.interreg-central.eu/Content.Node/Peripheral-Access.html

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