



**MARA**

Mobility and Accessibility  
in Rural Areas

# Report WP.2 of tourists and citizens mobility needs and existing transport solutions in rural areas

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**DISCLAIMER**

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## Introduction

At present, the Baltic Sea region faces a challenge in a growing gap between urban and rural areas. People migrate to urban centres, which leads to a decrease in population in a large number of rural areas. This rural exodus is a pan-Baltic phenomenon. The drop in the number of population and demographic changes lead to growing costs per capita associated with satisfying (socio-economic) needs, including the public transport. This phenomenon causes lower quality of life among residents of a village. Simultaneously, this limited accessibility within rural areas, a lack of cost-effective solutions in terms of mobility and the exclusion of the inhabitants of secluded areas from “basic social services” are reflected in the implementation of EU’s cohesion policy aimed to reduce “disproportions between specific regions”. Therefore, VASAB long-term perspective towards the territorial development of the Baltic Sea region supports measures towards the improvement of the accessibility of rural areas and their territorial development in order to counteract the above-mentioned exodus. In particular, transport should be adjusted to the needs of residents so as to provide them with free access to basic social needs and other diversified demands (decreasing population and growing demand diversification). In order to minimize these problems, it is necessary to undertake measures that may allow to obtain full information on the needs of residents in terms of mobility. This information will assist local authorities in undertaking measures within the growth in the efficiency of transport systems by implementing innovative solutions which, in turn, should contribute to improved accessibility of these areas. The MARA Project (Mobility and Accessibility in Remote Areas – a new approach to developing mobile expressions in remote areas) aims to partially minimize these deficits.

This document summarizes the results of the partners towards WP2. The purpose of this document is to crosscheck of tourists and citizens real demand with current mobility offers of remote areas in Baltic Sea Region. The Report is divided into six parts. The first part presents specific problems of remote areas mobility. Next chapter contains the characteristics methods and procedure of citizens and tourists mobility needs research. The third part is a presentation of synthetic research results in the field of mobility services for inhabitants and tourists of analyzed regions. Next (fourth) chapter presents cases of the individual partners. The fifth part of the report is summarizing and showing gap technical and thematic mobility between inhabitants’ and tourists’ mobility needs and its current state. The whole document was completed by detailed and general conclusions. General recommendations were also specified.

The aim of this WP2 is to equip public authorities with analytical and participatory tools for measuring the real mobility demands of residents and tourists in remote areas and to crosscheck real demand with current mobility offers.

GoA 2.1 is identifying appropriate participatory tools to involve the main stakeholders (residents, tourists, transport actors) in planning mobility solutions. Their involvement is the first prerequisite for public authorities to plan and implement a demand-driven and efficient transport system. The partner regions exchange on their good practice and integrate methods of stakeholder participation, in particular with the help of digital tools.

GoA 2.2 aims to develop methods to map real mobility patterns and needs. The partners will make use of two sources of input: The results from applying the stakeholder involvement tools in GoA 2.1. and scientific methods for mapping mobility patterns such as mobile phone data.

In parallel to GoA 2.2 an overview of the already existing mobility solutions in remote areas is compiled in GoA 2.3. This GoA is assessing mobility solutions also from other remote areas (as well as from other Interreg projects). This comprises individual or collective, classical or alternative transport modes.

## 1. Cases of individual Partners

**Region Mecklenburg-Vorpommern, Ludwigslust – Parchim district (Germany):** The district of Ludwigslust-Parchim (LUP) was created in 2011 in the course of a district area reform from several districts. It covers 4,767 km<sup>2</sup> and is the second largest district in Germany in terms of area (after the Mecklenburg Lake District). The district is located in the south-west of Mecklenburg-Vorpommern and borders the federal state of Schleswig-Holstein to the northwest, the federal state of Brandenburg to the south and the federal state of Lower Saxony to the south-west.

In 2019, the rural district of LUP had about 211,800 inhabitants. Compared to Germany as a whole (approx. 230 people per square kilometre) and to the average population density in Mecklenburg-Vorpommern (69 people per square kilometer) the area of Ludwigslust-Parchim is sparsely populated (45 people per square meter). It's a rural region with almost 50% of the population living in villages (compared to a mere 15% on average in Germany and 35% on average in Mecklenburg-Vorpommern). The other half of the population lives in cities, which mostly have some 5,000 inhabitants with the biggest city being Parchim with 17,700 inhabitants.

The population development in LUP is characterised by a declining trend. While the number of inhabitants declined by almost 10% between 2000 and 2010, population development has stabilised in recent years (-3% between 2010 and 2020 with no significant change since 2016). This development is not uniform across the region. Especially in the eastern and southern parts of the district, significant population losses have been recorded. In the north, this development was less dramatic due to the proximity to the state capital Schwerin. In the west, on the other hand, some municipalities are benefiting from the immediate proximity to Lower Saxony and the Hamburg metropolitan region and are recording population growth.

But the population is not only shrinking, it is also getting older. In 1990, Mecklenburg-Western Pomerania was the federal state in Germany with the youngest population. By 2015, the average age had increased from 36 to 46. The share of people over 65 will increase from 23% (2015) to over 32% (2030). This development on the state level applies analogously to the district of LUP where it is particularly relevant for the southern and eastern part due to its rural character.

**Hajnówka Region (Poland):** The Hajnówka County is an agricultural and industrial region. The pillars of the economy of the district are the wood industry, machine industry and tourism. The brand of the Białowieża Forest, on the UNESCO list, attracts many tourists from abroad and from Poland. Region due to its location and natural conditions, is a place conducive to the development of rural tourism and services – catering, medical, equipment rental, etc. The close vicinity of the natural Białowieża Forest, clean climate, a developed network of tourist routes and the availability of services make the Hajnówka County a perfect place for the development of rehabilitation tourism. Hajnówka County it is an agricultural land – approx. 39% of the region area, a characteristic feature is the fragmentation of farms.

The advantage of the district is its border location. The phytosanitary crossing in Siemianówka, which has been operating since 2014, and the modern, modernized border crossing in Połowce, servicing car traffic, buses and trucks, make it possible to establish non-standard contact with the East.

Main challenges faced in the area:

- With a GDP per capita that represents 71.1% of the Polish GDP (€7,900 per person while the average in Poland is €11,130), the region is one of the poorest in Poland.
- The region of Podlaskie has the lowest population density in Poland (59 inhabitants/1 km<sup>2</sup>; the average in Poland is 123 inhabitants/1 km<sup>2</sup>).

- It faces a systematic decrease in the number of inhabitants – since 2002 almost 2% and a predicted further decline of 17.8% by 2050.
- The region has an inadequate transport network.

**Setesdal Regional Council (municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):** The five municipalities, Evje and Hornnes, Åseral, Bygland, Valle and Bykle, make up the region Setesdal and Åseral. All together 7.857 inhabitants reside in the five municipalities. 44 per cent of the inhabitants live in Evje and Hornnes municipality, which decidedly is the largest municipality of the region. All the municipalities are situated within the ambit of district-targeted investment support. This field of application is valid for several areas of the country that struggle with certain challenges that can be met with district political measures. The characteristics of such municipalities within these areas, are (source: Ministry of Local Government and Modernisation (KMD)):

- Reduction of or no increase of the population.
- Vast distances.
- Challenges in employment, labour market and living conditions.
- A growing portion of the population is ageing.

**Vidzeme Region (Latvia):** Vidzeme Planning Region (VPR) lies in the North East of Latvia and borders with Latgale planning region in the South East, Zemgale Planning Region in the South and Riga Planning Region in the West. Vidzeme Planning Region is the biggest of the planning regions according to its territory. It covers 15 257 km<sup>2</sup> or 24% of the territory of Latvia.

VPR comprises the former district municipalities of Aluksne, Cesis, Gulbene, Madona, Valka and Valmiera. There are 25 local municipalities (novads) and one city – Valmiera. The region's population is around 184 thousand (January 2020).

Vidzeme area is a predominantly rural and remote region with distinct signs of economic and demographic depletion. VPR has the lowest density of population in Latvia – 12 people/km<sup>2</sup> (on average 34 people/km<sup>2</sup> in Latvia), and the biggest share of the rural population – 56% (the national average 36%). Around 22% of inhabitants are older than 65.

Main development challenges are:

- Population decline due to low birth rates and out-migration (from remote rural areas to Riga and other urbanised areas),
- Growing social, economic, and regional disparities,
- Shrinking local market,
- Increasing costs of maintaining and delivering of services while public funding for infrastructure improvements is being reduced.

**Republic of Karelia, Zaonezhye area (Russian Federation):** The focus territory within the MARA project in the Republic of Karelia (RUSSIA) is the Zaonezhye area, which includes the large Zaonezhsky peninsula and the adjacent archipelago of the Kizhi skerries (about 500 islands), covering the area of 560 km<sup>2</sup>. The northern border passes through a natural watershed north of the Zaonezhsky peninsula. It is a single unique historical and cultural complex with a historically established settlement system, which is administratively part of the Medvezh'egorsk municipal district of the Republic of Karelia. A large number of shallow rivers and deep-water lakes characterizes Zaonezhye relief. The frequent alternation of elongated bays, lakes and long narrow rocky ridges with strict orientation from north-west to south-east. Historical transport routes for the Zaonezhye area are inland waterways (Lake Onega). Residents of Zaonezhye have created a particular type of boat – "kizhanka", popular on Lake Onega even nowadays. The road network is poorly developed due to the complex relief and water obstacles.

The territory of Zaonezhye is famous by its' wonderful nature, historical and architectural monuments, the pearl of which is the UNESCO monument Kizhi island.

The State Historical, Architectural and Ethnographic Museum-Reserve "Kizhi" was established in 1966. In 1990 Kizhi was included into the UNESCO World Heritage List.

Accessibility of the area is very limited both for the locals and tourists and has a very clear seasonal character – during the spring and autumn periods, due to weather conditions and bad road infrastructure, the possibilities for coming and going are very limited as well as unsafe.

**Birštonas municipality and Druskininka municipality (Lithuania):** The territory of Birštonas municipality is located in the eastern part of the regional park Nemunas Loops. Birštonas is oriented on a tourism service and is the regional significance centre. The development of Birštonas Regional Park of river Nemunas Loops and Birštonas Resort City is closely interlinked. Perspective provisions and specified solutions for their improvement should be harmonized mutually.

Druskininkai is also one of the largest tourist, holiday attraction centres in Lithuania, located in a convenient geographical location, with deep recreational, and sanatorium traditions, preserved natural health resources, and formed a modern attraction infrastructure.

At the beginning of 2019, 4,117 people lived in the whole Birštonas municipality, of which 2,369 (57.5%) were in Birštonas town, and 1,748 people (42.5%) were rural residents. During 2014–2019, the population of Birštonas municipality decreased by 252 people or 5.77%. The number of people in Birštonas decreased by 106 people (4.28%). The rural population decreased by 146 (7.71%).

According to the data of the Department of Statistics of Lithuania, at the beginning of 2019, the population of Druskininkai municipality reached 19,360, most of which (about 63%) lived in Druskininkai town. It is the largest resort in Lithuania in terms of population, ¼ surpassing Palanga city municipality, and 4–5 times – Neringa and Birštonas municipalities. However, as in the whole of Lithuania and in the absolute majority of the country's municipalities, the population of Druskininkai has been decreasing for a long time.

Comparing the area, the town of Druskininkai is almost twice as large as Birštonas (24 km<sup>2</sup> and 13 km<sup>2</sup>, respectively). Between municipal areas, the difference is even greater – more than 3.5 times. Assessing the population density in the resort area, Birštonas is also less densely populated than the Druskininkai town. However, from the perspective of hard paved roads per 100 km<sup>2</sup>, it can be seen that Birštonas has a better-developed road network of this type (72.6 km / 100 km<sup>2</sup> in Birštonas and 47.6 km / 100 km<sup>2</sup> in Druskininkai municipality).

The mobility challenges:

- connectivity is not solved correctly with other Lithuanian regions and biggest cities Vilnius and Kaunas;
- suburban public transport is not sufficiently developed or does not exist at all.

**Kymenlaakso Region (Finland):** Kymenlaakso is a region in South-East Finland. The region has two main cities, Kouvola and Kotka and smaller city Hamina. Kymenlaakso was among the first industrial regions in Finland, but nowadays it suffers from industrial recession. The region has shared border with Russia.

Kymenlaakso region has railway connections to Helsinki metropolitan area, to St. Petersburg and to Eastern Finland. The city of Kouvola is the national railway hub that partly grew up because of the railway.

The region is located at the Gulf of Finland. The harbour Kotka-Hamina is the biggest general port in Finland, and also the biggest export port.

The region characterise urban concentrations, rural areas between them and the sparsely populated lake area in the north.

Most of the Finnish regions face population decline and so does Kymenlaakso. The Regional Council of Kymenlaakso is trying to find ways to get the most out of the possibilities the area offers. One key target is the development of low-carbon transport, also in rural areas.

**Sälen/Trysil and the Åre areas (Sweden):** The Swedish case has the destinations Sälen-Trysil as main object of study with the destination of Åre as a follower case. The Sälen-Trysil use case is the number one winter tourism area in Sweden in terms of guest nights. Roughly 5 million guest nights on a yearly basis.

As of 31<sup>st</sup> December 2020, the local population in Malung-Sälen was 10,177 according to Statistics Sweden (SCB, 2021).

Geographically, there are several ski areas and residential quarters, but they are rather separated from each other. The distance is about 40 km between the two end points, Kläppen ski resort and Stöten. It is possible to go by train to Mora and then take a bus from Mora to Sälen-Trysil a distance of 100–150 km depending on where in the ski area one wants to go. There are also direct buses from Stockholm and other bigger Swedish cities. The strength from an attractiveness point of view is that the Sälen-Trysil area offers a great variety in ski experiences with slopes that cater to all types of skiers. In the follower case Åre, the population as of 31<sup>st</sup> December 2020, amounted to 12 049 (Statistics Sweden, 2021). To note, Åre municipality has had one of the sharpest percentage – increases in population in Sweden in the last 5 year, + 11 percentages. Pre-corona numbers on commercial guest nights for Åre are estimated to 1,1 million, out of which more than 7 out of 10 are taking place during winter season (JHT 2020).

Geographically, the Åre the ski area is integrated around a central village in which also the train station is located.

Trafikverket has a need to improve methods, models and processes in the early phase of infrastructure planning for remote areas with an extensive tourism industry. Trafikverket's approach in MARA is to develop the dialogue between municipalities, other public organisations, business and citizens in winter resorts in the Sälen/Trysil area (main case) and the Åre area (follower case). These areas have the common goal to further develop their tourism industry in a sustainable direction. This implies developing and improving public transport solutions to access these areas.

## 2. Problems of remote areas mobility

**TABLE 1.** The main problems of mobility and accessibility of MARA project partners/regions/districts.

The summarizing of mobility needs in rural and remote areas according to each Project Participant (partner) was presented in **TABLE 1**. The detailed descriptions for each participant are present in separate Regional Action Plan documents.

REGION	THE MAIN PROBLEMS OF MOBILITY
Region Mecklenburg-Vorpommern based on case study of Ludwigslust – Parchim district (Germany)	<p>Mobility needs in Ludwigslust – Parchim district may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ public transport with buses (including the public call-a-bus service) are limited to the administrative area of the district and therefore restrict mobility in places situated close to LUP's borders (where for the people there is no border). The challenge is to link (timetables, information, tickets &amp; offers) the district's public bus transport to mobility offers (not only public buses) of the neighbouring districts / federal states;</li> <li>→ the call-a-bus system has the capacity for much wider usage. The challenge is to further improve the system (e.g. complete electronic workflow, i.e. information, order, payment, payment of subcontractors) but also to provide more and better communication/information about the service;</li> <li>→ LUP is partly benefiting from the location in the wider metropolitan area of Hamburg. The challenge is that in the course of the further differentiation of the spatial division of labour, the volume of commuters is increasing;</li> <li>→ changes in the public service infrastructures (a medical centre closes, a supermarket opens in a different place or school hours change) require subsequent changes in public transport. The challenge is to detect the change in mobility flows and adjust the transport offers accordingly;</li> <li>→ tourism sights and offers are not sufficiently interconnected. The challenge is to improve public transport and regional rail accessibility of tourist attractions within the district and across the district borders (e.g. from Hamburg and Berlin);</li> <li>→ the integration of transport systems (intermodal mobility concepts) could be further improved. The challenge is to bundle the timetable information in one place (website, App etc.) and to promote this info widely. Here the needs of tourists should be taken more into account e.g. by including also information on local mobility offers such as shipping, bicycle and canoe rentals and shuttle services of hotels and restaurants;</li> <li>→ a revision of the planning approach could be considered. So far the state plan sets the frame for the local / regional plans. This order could be reversed. As the responsibility for public road transport rests with the districts, who also know their people and needs best, they could be the starting point of the planning approach. If then the mobility concepts of the municipality/district are the starting point the challenge is how to still ensure an integrated state and national transport plan.</li> </ul>
Bialystok University of Technology based on case study of Hajnówka Region (Poland)	<p>Mobility needs in Hajnówka Region may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ poor quality of road infrastructure;</li> <li>→ poor connection with other regions of Poland by means of mass transport (lack of developed offer of direct long-distance connections);</li> <li>→ low accessibility in terms of individual transport (low motorization rate, low expenditures on road maintenance, long distance from a network of express ways and motorways);</li> <li>→ poor offer of the public road transport (insufficient network of bus connections, large disproportions within the frequency of buses at specific routes, insufficient number of direct connections);</li> <li>→ lack or insufficient integration of transport systems (connections between trains and buses) which leads to a prolonged waiting time for transfers;</li> <li>→ insufficient development of bicycle infrastructure (poor number of marked bike routes, parking shelters, self-service bicycle mending stations, lack of self-service bike rentals, including electric bikes);</li> <li>→ unsatisfactory system of publishing timetables by road carriers on websites (lack of Internet service with such a local range that ensures uniform publication of collective timetables of all carriers, outdated or incomplete data), which hinders travel planning for tourists.</li> </ul>

REGION	THE MAIN PROBLEMS OF MOBILITY
Setesdal Regional Council (intermunicipal public body consisting of the four municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway)	<p>Mobility needs in Setesdal may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ renovation of the roads network, including to aim for «yellow parting strip to Hovden» and renovation of county roads network;</li> <li>→ increasing the number of kilometres of walk and cycle paths;</li> <li>→ improved public transport facilities, including more departures and reduced fares;</li> <li>→ solutions that address demographic changes (ageing population);</li> <li>→ solutions that reduce carbon gas emissions.</li> </ul>
Vidzeme Planning Region (Latvia)	<p>Mobility needs in Vidzeme Planning Region may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ growing social, economic, and regional disparities;</li> <li>→ shrinking local market;</li> <li>→ increasing costs of maintaining and delivering of services while public funding for infrastructure improvements is being reduced.</li> </ul> <p>There are also specific challenges faced by the private investors and/or companies in the Vidzeme area:</p> <ul style="list-style-type: none"> <li>→ low accessibility while the economic sectors in the region are highly dependent on ground transportation,</li> <li>→ ineffective supply-delivery chains make the region an unfavourable location for business development and leads to missed opportunities to integrate in wider international business networks in the BSR;</li> <li>→ high costs of logistics;</li> </ul> <p>These challenges require a coordinated public and private response. This, however, is hindered by several organisational capacity challenges:</p> <ul style="list-style-type: none"> <li>→ insufficient competence of the stakeholders, especially at local level (architects, planners, engineers, decision-makers) – lack of in-house expertise in transport planning approaches that would take into account mobility needs of residents and businesses + lack of working models how to combine multimodal transport solutions with land-use planning + weak awareness of supply chain management and logistics;</li> <li>→ inefficient inter-municipal cooperation and integration between different administrative levels (regional and local) in transport planning,</li> <li>→ weak coordination and exchange of information among ministries, planning regions and other relevant institutions.</li> </ul>
Tourist Information Center of the Republic of Karelia on the case of Zaonezhye area (Russian Federation)	<p>Due to the limited capacity of vehicles in the winter period, tourist attendance on Kizhi Island from November to April (6 months) does not exceed 6 thousand people. While in the navigation period from May to October (6 months) the number of visitors and tourists reaches 200 000 people. Other mobility needs in Zaonezhye area may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ there are no ice class vessels for passenger transportation in winter in Onega Lake water area;</li> <li>→ regular communication with Kizhi and Bolshoy Klimentevsky islands (Sennaya Guba village) is provided once a week by Mi-8 helicopter. The helicopter's passenger capacity is 20 people;</li> <li>→ high cost of transport services by water during navigation (2950 rubles (during the 2019 summer season it was appr. 42 Euro)/ person. travel "back and forth" Petrozavodsk – Kizhi Island – Petrozavodsk with a 4-hour stay on Kizhi Island or 2300 rubles (appr. 33 Euro) / person. one way when buying tickets for different dates);</li> <li>→ there are no alternative transport and excursion routes to the water transport in Zaonezhye;</li> <li>→ tourism infrastructure along the route R-17 Medvezh'egorsk – Velikaya Guba is not developed.</li> </ul>
Transport and Logistics Competence Centre, Vilnius Gediminas Technical University (VGTU) based on case study of Birštonas and Druskininkai municipality (Lithuania)	<p>Mobility needs in Birštonas municipality may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ private cars domination and quite intensive traffic along the town forms an unattractive image of the resort, increases noise and air pollutions, deface the background of surroundings of the resort town;</li> <li>→ insufficient connectivity with the large cities and international airports. Limited choices of transport modes to reach the resort – only intercity buses and private cars;</li> <li>→ challenge of the touristic seasonality with the peaks on Easter, Christmas, New Year and other Holiday celebration; insufficiently developed network of bicycle paths (tracks);</li> <li>→ lack of efficient integration of bicycle transport with public transport;</li> <li>→ no public transport in the town.</li> </ul>

REGION	THE MAIN PROBLEMS OF MOBILITY
Finnish Environment Institute SYKE based on case study of Kymenlaakso Region (Finland)	<p>Mobility needs in Kymenlaakso Region may be recapitulated as such:</p> <ul style="list-style-type: none"> <li>→ private car dependency;</li> <li>→ new building activity is located outside of the existing spatial structure. There're no services or workplaces nearby, which causes need to get them from elsewhere;</li> <li>→ number of population in villages is low which makes it difficult to arrange public transport;</li> <li>→ lack of services or workplaces in villages and rural areas, which causes trips made mainly by cars;</li> <li>→ ageing population. No driving licenses, but everyday mobility needs;</li> <li>→ sparse population structure. Arranging public transport for many areas is impossible and/or expensive;</li> <li>→ negative population trend and declining demand for public transport. No change to invest in public transport as the most money goes to maintenance of the existing mobility;</li> <li>→ long distances for walking and cycling.</li> </ul>
Sälen/Trysil and the Åre areas (Sweden)	<ul style="list-style-type: none"> <li>→ models and processes in the early phase of infrastructure planning are weak;</li> <li>→ sustainable destination development – more sustainable travel;</li> <li>→ car dependent for travel to and within the destination;</li> <li>→ crowded roads in the destination as well as on main access roads during peak days when “change of lodging” takes place;</li> <li>→ real estate developers doesn't take responsibility for overall sustainable destination development (only Åre).</li> </ul>

Considering the above-mentioned problems allowed to distinguish a few typical issues related to mobility in the analyzed areas:

- Road infrastructure quality problems (Hajnowka District, Setsedal and/or lack of the alternative and frequent connections (Karelia region);
- Privat car dependency and lack of or poor offers of public and privat transportation services due to specific social, economic and spatial conditions (Kymenlaakso region, Birštonas municipality and Druskiennikai municipality, Hajnówka district);
- Problems with ageing population and availability of transportation services for elder people (Kymenlaakso region, Hajnówka district);
- Need for integration/adjust mobility flows with current transport offers (Ludwigslust – Parchim district, Hajnówka district);
- Need for development or improvement of specific bike/car sharing as well as payment solutions systems (including websites/Apps) and their integration with current transportation public/privat offers (Ludwigslust – Parchim district, Hajnówka District, Birštonas and Druskinnikai municipality).

### 3. Description of the methods and procedure of citizens and tourists mobility needs research

Below the short presentation of research methods used by all Partners was listed. The detailed descriptions for each participant are present in separate Regional Action Plan documents.

#### Ludwigslust – Parchim district (Germany):

- Desk research: analysis of policy documents contained information on the underlying challenges for the region / the transport systems and the related needs of the population in Ludwigslust-Parchim. Each program / plan / concept included in its elaboration process also a stakeholder involvement in the form of workshops / focus groups or interviews.
- The stakeholder involvement strategy that was elaborated by the Ministry of Energy MV in the framework of the MARA project named the following groups of stakeholders: local residents (and tourists), the regional authority/administrative body of the region, the public transportation company in LUP ("Verkehrsgesellschaft Ludwigslust-Parchim mbH – VLP, the county council's committee responsible for traffic and public transportation enterprises, experts and professionals of public transportation and of the conditions of the region, other transportation companies (train operators, public transportation providers from neighboring regions)
- Expert Interviews: interviews with experts and professionals of public transportation and of the conditions of the region have been conducted. Most of them are summarized in the publication "MARA Mobility Expert Report".
- Accessibility analysis with dynamic maps: The project made use of the very comprehensive accessibility portal of the Hamburg Metropolitan, of which LUP is an (peripheral) part. The accessibility portal, which is publicly accessible on the web ([https://geoportal.metropolregion.hamburg.de/mrh\\_erreikbaarkeitsanalysen/](https://geoportal.metropolregion.hamburg.de/mrh_erreikbaarkeitsanalysen/)), was completed in 2016 and the underlying data was updated in 2019 in parallel to the analytical phase of the MARA project. The accessibility portal was used in identifying parts of the district LUP where specific challenges remain, i.e. where the access of people using public transport to services and public service infrastructures is excessively difficult.
- Last but not least two analytical tools that have been developed in the framework of the MARA project. Their application (and piloting) is the main subject of the MARA case study in LUP, which is completed only after the submission of this Regional Action Plan. As such their application is one of the actions that is proposed in this report.
- The Population Mobility Monitor is used to crosscheck the existing public road transport offers with the real mobility streams of the population (local residents and tourists) – regardless of the transportation means that they are using.
- The GIS Mapping Tool is used to review the existing bus routing in order to assess whether a modification could increase the access of more local residents and tourists to the existing system, e.g. by adding an additional bus stop or by re-routing a bus line to a parallel street.

Originally more face-to-face events with stakeholders were planned but had to be cancelled or re-scheduled as virtual / telephone meetings due to the Corona Pandemic.

**Hajnówka Region (Poland):** To identify tourist and inhabitants mobility needs diagnostic survey method with using “face to face” and CAWI research techniques were conducted. In both cases respondents or interviewers will be able to download the survey questionnaire on their mobile appliances (smartphone, tablet) by means of scanning the QR code. From the perspective of the “face to face” technique, the respondent will have access to the paper version of the questionnaire and be able to provide answers in the questionnaire or to the interviewer that will record them in an electronic version

**Setesdal Regional Council (intermunicipal public body consisting of the four municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):** For analyzing the status-quo of the mobility situation in region a survey was conducted among the inhabitants (Bykle and Bygland municipalities) of the region, and, also a mapping of existing national and regional plans concerning mobility and transport issues.

**Vidzeme Planning Region (Latvia):** To identify mobility needs in the region, a desk study was performed reviewing conducted studies and analyzing results of the pilot projects (transport on demand and e-bike rental). Analytical methods were used for selection, compilation and analysis of statistical data from various databases (road administration, road transport administration, bureau of statistics and others). Also, a number of experts were interviewed about the local mobility options, the level of service and necessary improvements.

**Republic of Karelia, Zaonezhye area (Russian Federation):** The collection and processing of data on the study of accessibility in Zaonezhye as part of the project “Mobility and Accessibility in Rural Areas – New Approaches to Developing Mobility Concepts in Remote Areas (MARA)” was organised in two stages.

The first stage of the work was carried out in summer 2019 together with the Kizhi Museum-Reserve and the “Kizhi Ozherel’e” (necklace) and “Karelia Excursion Bureau” travel companies as part of a survey aimed at identifying the motivation of tourists from different regions of Russia and foreign countries to visit Kizhi Island.

The second stage was organized during the summer 2020 when the research expedition aimed to conduct a survey of residents and tourists to identify the motivation to visit these places and the accessibility of the area, as well as to process the data obtained. In 2020, the interviewers were interested in the purpose of the trip, the availability of transport services, the services demanded in the remote areas of Zaonezhye. The survey was conducted in the village of Oyatevshchina, Velikaya Guba and on the islands of the Kizhi skerries. This is the first time such work has been done in the territory of Zaonezhye in the last few decades

The field phase of the study was organised in June-September by the Centre of Social Tourism Development at the request of the Tourist Information Centre of the Republic of Karelia. “Zaonezhskaya Izba” NGO and the Sailing Federation of Karelia were involved in collecting information. Tools development, data processing and analysis (data entry, data processing and analysis, report preparation) were carried out by sociologist A.G. Chukhareva (Sociological Laboratory of PetrSU). The quantitative data obtained was processed and analysed in SPSS in October – November 2020.

**Birštonas municipality and Druskininka municipality and Transport and Logistics Competence Centre, Vilnius Gediminas Technical University (VGTU):** To identify the mobility saturation with transport services – whether and how the current offer of transport services meets the residents’ and tourists’ expectations when it comes to commuting to financial facilities, administrative needs of tourists and residents of remote areas, individual partners used a diverse set of research methods. Within the methods used, three groups were distinguished, i.e. quantitative methods (Pen-and-Paper Personal Interviews (PAPI) and Computer-assisted Web interviewing (CAWI)), qualitative methods (In-depth Interview (IDI), Case Studies and Desk research method).

**Kymenlaakso Region (Finland):** SYKE has developed a transport model (SYKE transport model) and population and housing prediction model (KASSU), of which SYKE transport model is applied in regional use for the first time in Kymenlaakso. Also, the use of KASSU is in the very beginning and developing.

The aim of the use of the models are following:

- SYKE transport model was a tool for discussion and identification of the usability of different policy instruments related to achieving the future GHG levels. The use of the model supports the implementation of Carbon Free Kymenlaakso Programme.
- KASSU model is a tool for estimating the future and potential of different parts of Kymenlaakso. KASSU enables making regional and local population predictions and scenarios. It helps in finding out the most efficient land use planning strategies. In Kymenlaakso KASSU is used for:
  - Estimating the effect of changing the attractive shore locations for summer house use to permanent housing. One question is whether this will attract new inhabitants to those locations. If so, this would enable also better public transport, as well as new immigrants.
  - Scenarios made with KASSU are directed to rural areas and currently include two scenarios:
    - Trend scenario: The population trend during the last five years continues similarly from 2020 onwards.
    - After covid-19: Increased telework opportunities and digitalisation of work will increase the attraction of villages and other rural areas in Kouvola especially within families with small children and people in working age. The in-migration of these age groups begin to rise in rural area types from 2020 onwards.
  - Assessing future potential public transport demand especially in rural areas based on the above population scenarios.

#### **Sälen/Trysil and the Åre areas (Sweden):**

- To date, there has been data collection within the case focusing the specific purpose to analyse mobility and accessibility for Sälenfjällen. A separate report (Alarcon et al. 2020) presents on a data collection that took place in the Sälenfjällen, during week 9–13 in 2020. Data collection was made on-site using a questionnaire and Public Participation Geographic Information System (PPGIS) adapted for the Sälenfjällen case area. A total of 162 responses entered the final analysis. Results of analysis find that the trip characteristics influence the transport mode choice. Also, there are differences in the tourists' perception of the mobility situation depending on transport mode chosen. Moreover, the perception of the mobility situation has a link to the overall satisfaction visit to the area, however, the relationship is weak.

The core methodology is to use models as tools for enabling the region to find out land use and transport system strategies and plans that enable more sustainable development: less car traffic, better services, high quality living environment, vital region and fluent daily life for everybody. A detailed list of the research methodology used in the project is presented in **TABLE 2**.



The Population Mobility Monitor (PMM)<sup>1</sup> is an experimental data management and visualization tool for showing realized mobility flows and needs based on digital data sources. The tool enables to understand the spatio-temporal dynamics of human mobility and thus supports public authorities, transport service providers and other interested parties in their decision-making. The tool is developed by the Mobility Lab at the University of Tartu.

As a proof-of-concept, the PMM uniquely integrates a range of digital mobility data sources to comparable spatial and temporal units. The anonymous data are aggregated to origin-destination flows at the level of neighborhoods in urban settings or territorial units in sparsely populated areas. The temporal accuracy of the data ranges from hourly flows to monthly statistics. The users can download the aggregated data sets for further analysis. The PMM is an open-source development to enable transparency, further development, and replication. The code is accessible from the repository of the Mobility Lab at [gitlab.ut.ee/public-pmm](https://gitlab.ut.ee/public-pmm).

The current version of the PMM presents mobility flows in Tartu City and Tartu County, Estonia. The data are available for fixed periods without real-time updates. The tool covers the following mobility data sets:

- Daily regular movements in Tartu county based on passive mobile positioning data – the original data set includes call detail records data from one major mobile network operator in Estonia. The population flows are extrapolated to the whole population covering January 2017 until March 2018. Aggregated origin-destination flow data belongs to The Mobility Lab of University of Tartu.
- Tartu county bus ticketing data – PMM covers the start and end stops of the bus trips made in Tartu county during 2017–2019. The data is based on the Ridango ticketing system and originate from the Estonian Transport Administration. Tartu city public transport data – since July 2019 the city of Tartu has a new improved bus network. PMM utilizes the bus ticketing data from 2019 until the end of the year. Access to data was provided by Tartu City Government. Tartu city bike share data – in June 2019 Tartu city launched a bike share system with 69 parking stations over the city. The information about the starting and ending points of the rides are saved. PMM uses the first six months of bike-share data. Access to data was provided by Tartu City Government.

## 4. Main findings and results

Below is a brief description of the results obtained by each Partner. The detailed results of each partner are presented in separate Regional Action Plan documents.

### 4.1. Population Mobility Monitor for Estonia and Germany

**Estonia.** For every unique user one home and one work location is defined per month. Everyday mobility is described as movement between home and work. Current dataset does not allow to construct real routes of movements and trips (FIG. 1). Therefore the results are calculated as OD-matrix between neighborhoods. Coordinates in OD-matrix are the centroids of the neighborhoods most populated administrative unit. Estonian official coordinate system has been used L-EST97 epsg:3301.

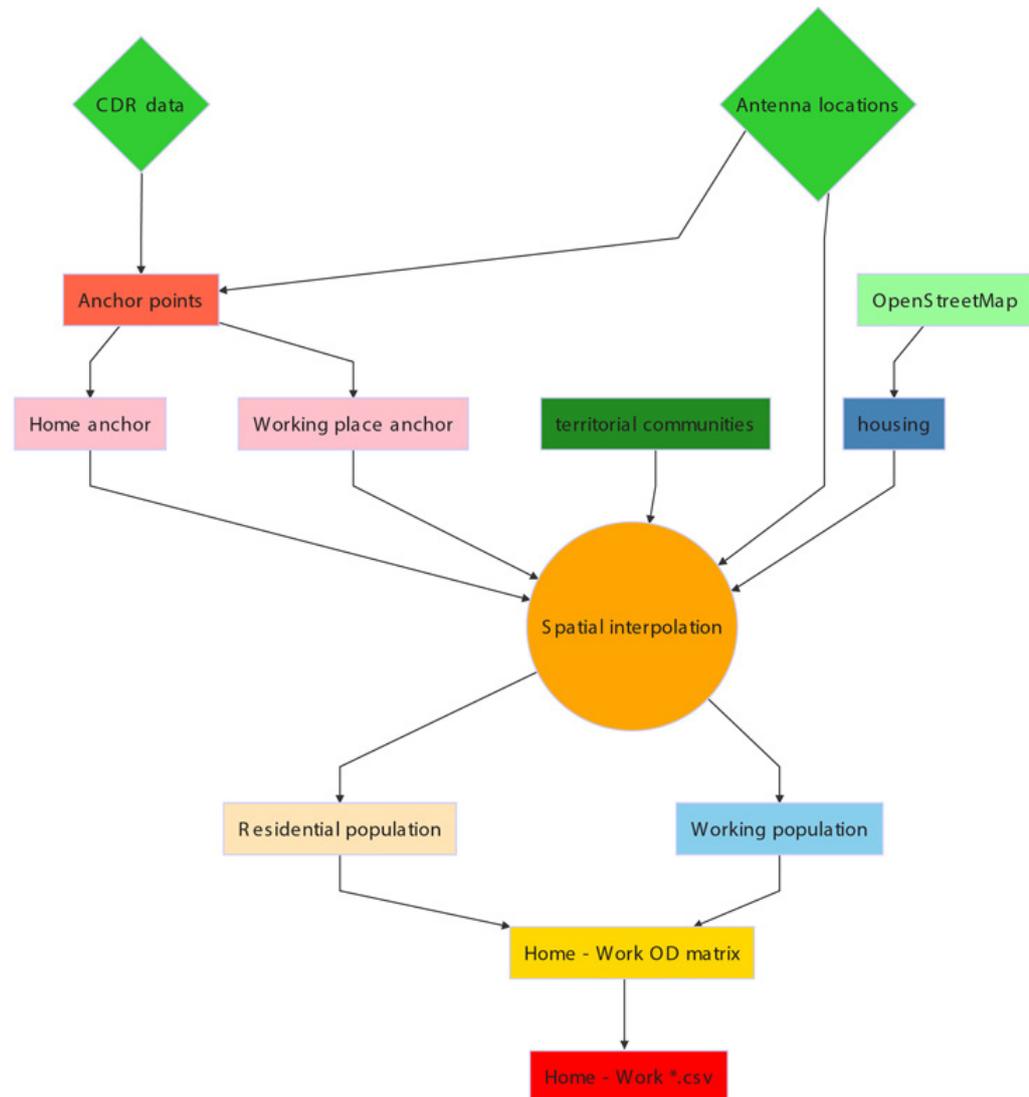
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<sup>1</sup> <https://mara.ut.ee/>

The developed methodology and database is innovative in several aspects. The life's pace has remarkably accelerated over the years and the 11-year periodicity of censuses is not enough to give a complete picture of the mobility of people as the start and the end of some phenomena (economic crisis, urban sprawl etc) might lay between two censuses. It means that the understanding of those processes stays in a very general level. Furthermore, the other official data sources may also give an insufficient or incorrect data about the mobility. For example, up to ¼ of home addresses registered in population registry do not correspond to the reality; traffic surveys have poor spatial coverage and do not usually give any information about the origin and destination of people.

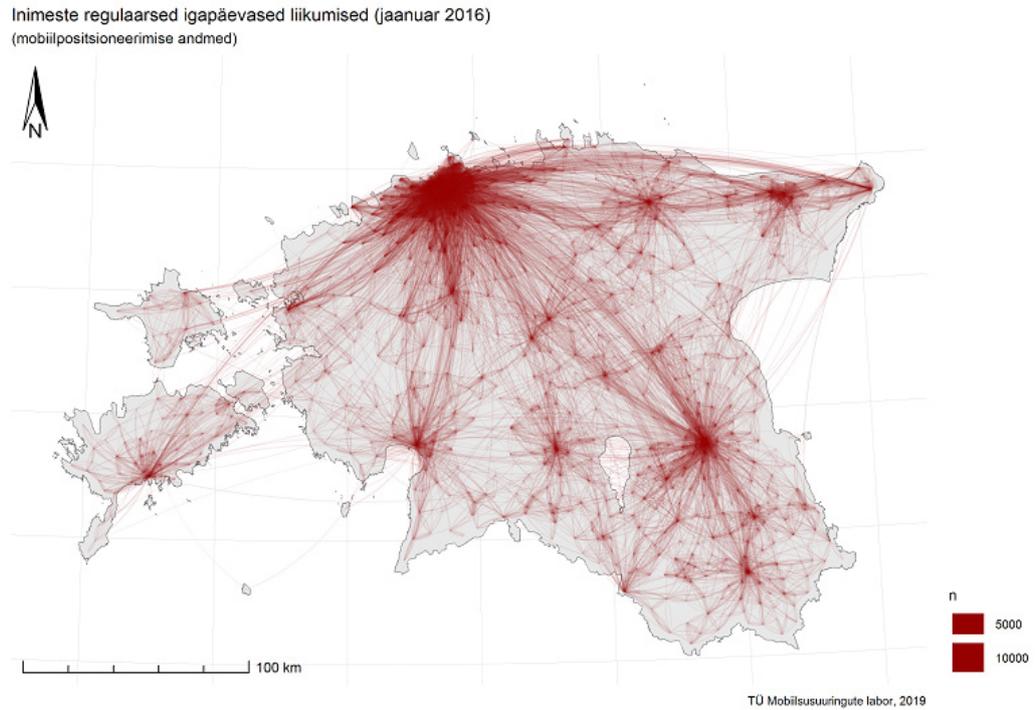
As the result of current work package are the monthly data files (csv) of origin-destination (OD) matrices (FIG. 2)

**FIGURE 1.** Data processing workflow. Source: OD-matrices of regular movements in Estonia. ([https://mobilitylab.ut.ee/OD/#data\\_\\_methods](https://mobilitylab.ut.ee/OD/#data__methods))



**FIGURE 2.** Example of mapped regular movements (home – work). Source: [https://mobilitylab.ut.ee/OD/#data\\_\\_methods](https://mobilitylab.ut.ee/OD/#data__methods)

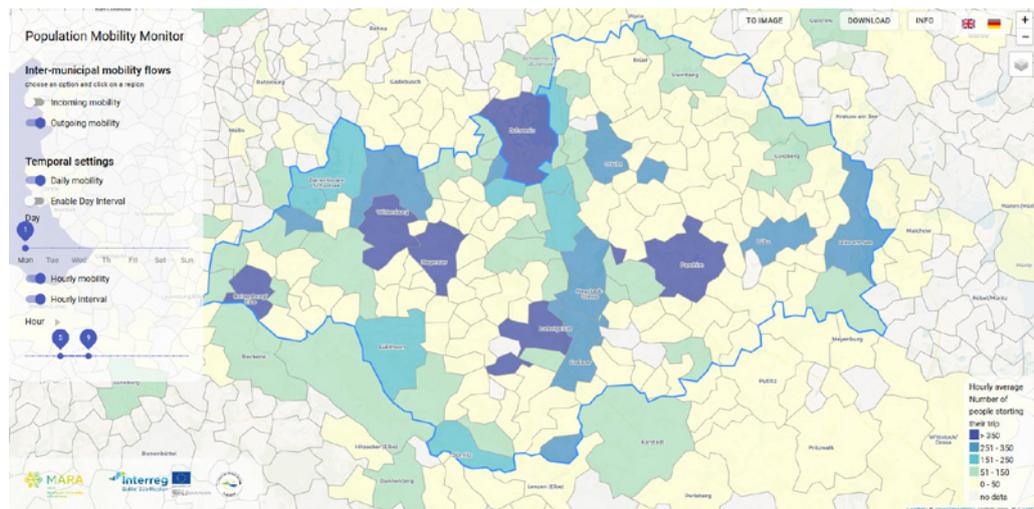
Example of mapped regular movements (home – work):



**Germany.** According to PMM results the municipalities of the district of LUP are divided into categories (according to number of people starting their trip) 5 – see **FIG. 3** and distinguished from each other by colour. Obviously, more people start their trips from the cities).

**FIGURE 3.** Outgoing mobility per municipality on a Monday morning, 5 am – 9 am

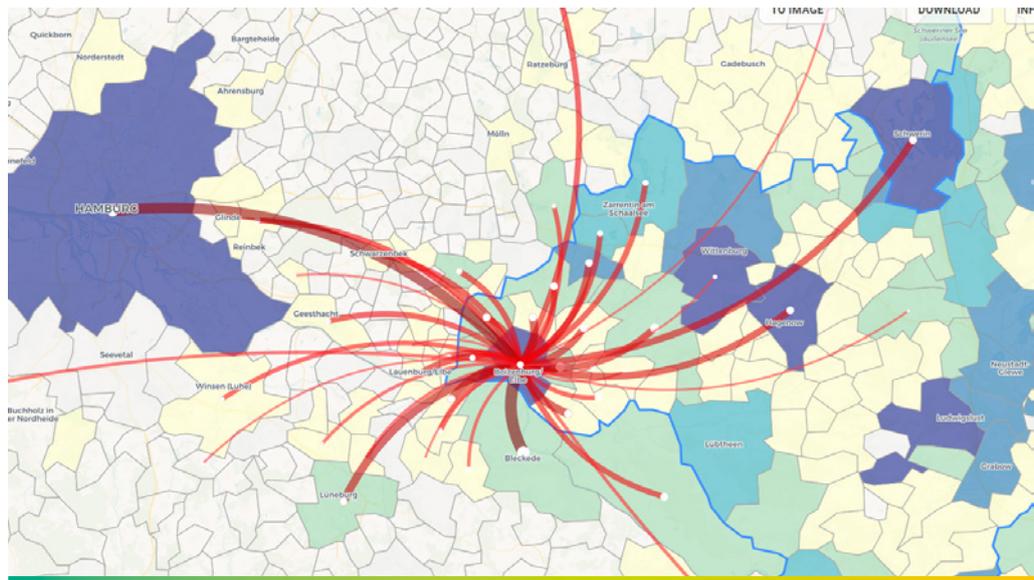
Source: Population Mobility Monitor of the MARA project (<https://pmm.ut.ee/>)



The next image (FIG. 4) gives an example of the visualisation of the mobility streams from one given municipality (here Boizenburg in the far west of LUP). The thickness of the bar illustrates that most people are going on a Monday morning (probably for work) to Hamburg, Lüneburg and Bleckede. Hence they are leaving the district and even the federal state. This is an important information for the transport planners as it illustrates the need to cooperate with public transport companies from neighbouring districts / federal states.

**FIGURE 4.** Outgoing mobility streams of one specific municipality (here Boizenburg) on a Monday morning, 5am–9am

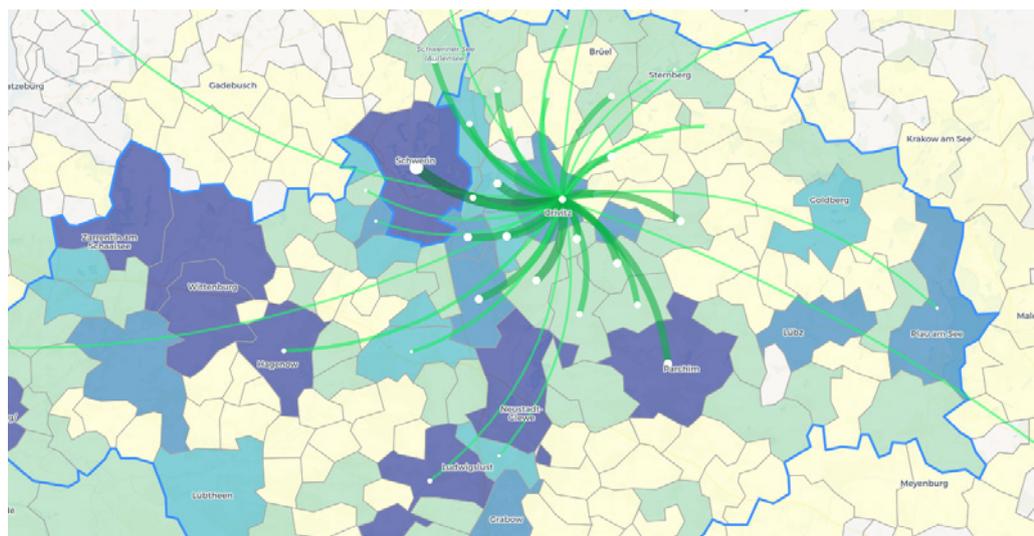
Source: Population Mobility Monitor of the MARA project (<https://pmm.ut.ee/>)



An example for incoming mobility streams is shown on FIGURE 5:

**FIGURE 5.** Incoming mobility streams of one specific municipality (here Crivitz) on a Monday morning, 5am–9am

Source: Population Mobility Monitor of the MARA project (<https://pmm.ut.ee/>)



In this case most people going to Crivitz on a Monday morning come from neighbouring cities / settlements.

This analysis can be repeated using different parameters. The mobility stream can be analysed according to:

- Incoming / outgoing mobility;
- Over 100 Municipalities in LUP;
- Mobility within the district and to neighbouring destinations (one – either origin or destination must be located within the district of LUP);
- Specific daily mobility (Monday vs. Sunday) / daily intervals (e.g. Weekdays vs. Weekends);
- Hourly mobility / hourly intervals.

Some of the results of the work with the PMM have helped to elaborate the following overview of challenges. The systematic application of the PPM for assessing and modifying the timetable of the buses is subject of the case study that is completed only in autumn 2021.

## 4.2. Mobility needs of tourists in each region

Below the short presentation of results concerning mobility needs of tourists in each studied region was listed. The detailed descriptions for each participant are present in separate Regional Action Plan documents

**Region Mecklenburg-Vorpommern based on case study of Ludwigslust – Parchim district (Germany):** Mobility needs of different age groups of inhabitant in Ludwigslust-Parchim region are focused mainly on typical tourist activities, and are varied according to timing and range of mobility. The detailed description is present in table 3.

**TABLE 3.** Mobility needs of tourists in Ludwigslust – Parchim district

USER GROUP	RELEVANCE FOR NON-CAR TRANSPORT	SPECIFIC MOBILITY NEEDS
Tourists	Very relevant as tourism has been identified as key economic sector	Travelling to the accommodation
		Visiting touristic sites
		Shopping (mostly grocery)
		Recreational visits (restaurants, concerts, swimming etc.)
		Recreational activities (walking, cycling, boating, canoeing etc.)
Seasonal dwellers	Less relevant as seasonal dwellers come with their car	Travelling to weekend-house
		Shopping (mostly grocery)
		Recreational visits (restaurants, concerts, swimming etc.)
		Recreational activities (walking, cycling, boating, canoeing etc.)

### Hajnówka Region (Poland):

- improvement of technical condition of roads;
- improving travel safety;
- reducing the cost of bus tickets and train ticket;
- increasing the frequency of buses and trains;
- improving the technical condition of bus stops buses railway stations and rolling stock;
- increasing the number of bus stops railway stations, bicycle paths, parking spaces for bicycles and parking spaces for cars;
- increasing the availability of information about bus communication;
- improving bus punctuality;
- introducing facilities for the disabled in buses and in trains.

### Setesdal Regional Council (intermunicipal public body consisting of the four municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):

- renovation of the roads network, including to aim for «yellow parting strip to Hovden» and renovation of county roads network;
- increasing the number of kilometres of walk and cycle paths;
- improved public transport facilities, including more departures and reduced fares.

### Vidzeme Planning Region (Latvia):

- need of safe infrastructure;
- satisfactory level of service (comfort, security, availability, convenient to use etc.)
- need for more cycling roads;
- a few bicycle parking lots provided near public buildings, trade, service, and tourism facilities;
- need of vehicle-sharing systems outside the capital.
- Republic of Karelia, Zaonezhye area (Russian Federation):
- there are no alternative transport and excursion routes to the water transport to Kizhi island and Kizhi skerries;
- tourism infrastructure along the route R-17 Medvezh'egorsk – Velikaya Guba is not developed.

### Birštonas municipality and Druskininka municipality (Lithuania):

- need for scooter-sharing system;
- need for bike-sharing system;
- need for car-sharing system.

### Kymenlaakso Region (Finland):

- trains, local buses and taxi services have been used to some extent;
- rental car services and city bikes have been almost unused by respondents.
- ridesharing, electric cars to be borrowed and a "bus one demand" services, defined as follows as well as new modes of transport service that combines the features of a taxi and a bus should be developed on the region.

### Sälén/Trysil and the Åre areas (Sweden):

- need for better accessibility to public transport.

Considering the above-mentioned problems allowed to distinguish a few typical issues related to tourists mobility needs in the analyzed areas:

- improvement of technical condition of roads and technical transport infrastructure: *Hajnówka Region, Setesdal Regional Council, Vidzeme Planning Region;*
- improvement of level of transportation service (comfort, safety, security, availability, convenient to use etc.): *Ludwigslust – Parchim district, Hajnówka Region, Vidzeme Planning Region, Setesdal Regional Council; Sälen/Trysil and the Åre areas.*
- increasing the number of kilometres of walk and cycle paths: *Setesdal Regional Council;*
- need of vehicle-sharing systems outside the capital: *Vidzeme Planning Region; Birštonas municipality and Druskininka municipality; Kymenlaakso Region.*

### 4.3. Mobility needs of inhabitants in each region

Below the short presentation of results concerning mobility needs of inhabitants in each studied region was listed. The detailed descriptions for each participant are present in separate Regional Action Plan documents.

**Ludwigslust – Parchim district (Germany):** Mobility needs of different age groups of inhabitant in Ludwigslust-Parchim region are focused mainly on routine daily activities, and are varied according to timing and range of mobility. The detailed description is present in table 4.

**TABLE 3.** Mobility needs of tourists in Ludwigslust – Parchim district

USER GROUP	RELEVANCE FOR NON-CAR TRANSPORT	SPECIFIC MOBILITY NEEDS
Elderly people	Growing, the number of people aged 65 or older will further increase	Shopping (mostly grocery)
		Medical Services (incl. specialists)
		Official visits to authorities / lawyers / tax advisors etc.)
		Recreational visits (restaurants, concerts, swimming etc.)
Youth	Very relevant as no driving license, stable population development (<20 y.o.)	Attending school
		Attending extracurricular activities (sports, music, private tutoring etc.)
		Meeting friends
		Recreational visits (restaurants, concerts, swimming etc.)
Families	Relevant (Commuting, single car only, low income / no car) (20–45 y.o.)	Driving to work (incl. commuting to Hamburg etc.)
		Transport services for small children (daycare, primary school etc.)
		Shopping (grocery and clothes)
		Medical Services (primary health care for children and adults)
		Recreational visits (restaurants, concerts, swimming etc.)

USER GROUP	RELEVANCE FOR NON-CAR TRANSPORT	SPECIFIC MOBILITY NEEDS
Singles / Couples without children	Less relevant and decreasing demographic trend (20–45 y.o.)	<ul style="list-style-type: none"> <li>Driving to work (incl. commuting to Hamburg etc.)</li> <li>Shopping (grocery, clothes and furnishings)</li> <li>Medical Services (primary health care)</li> <li>Meeting friends</li> <li>Recreational visits (restaurants, concerts, swimming etc.)</li> </ul>

#### Hajnówka Region (Poland):

- improvement of technical condition of roads;
- improving travel safety;
- reducing the cost of bus tickets and train ticket;
- increasing the frequency of buses and trains;
- improving the technical condition of bus stops, buses, railway stations and rolling stock;
- increasing the number of bus stops, railway stations, bicycle paths, parking spaces for bicycles and parking spaces for cars;
- increasing the availability of information about bus communication;
- improving bus punctuality;
- introducing facilities for the disabled in buses and in trains.

#### Setesdal Regional Council (intermunicipal public body consisting of the four municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):

- need for renovation of local roads;
- need for E1-bike system;
- need for system for "bus on demand";
- need for app with compatible system for carpooling;
- potential need for self-driving (autonomic) busses and/or cars.

#### Vidzeme Planning Region (Latvia):

- need of safe infrastructure;
  - satisfactory level of service (comfort, security, availability, convenient to use etc.);
  - need for more cycling roads;
  - a few bicycle parking lots provided near public buildings, trade, service, and tourism facilities;
  - need of vehicle-sharing systems outside the capital.
- Zaonezhye area (Russian Federation):
- regular communication with Kizhi and Bolshoy Klimenetsky islands (Sennaya Guba village);
  - lower cost of transport services by water during navigation;
- Birštonas municipality and Druskininka municipality (Lithuania):
- need for scooter-sharing system;
  - need for bike-sharing system;
  - need for car-sharing system.

### Kymenlaakso Region (Finland):

- there is a need to combine public transport, social and healthcare transport and school transport supported by municipality or state;
  - the first and second grade education has centralized a lot, causing a great need for school transport;
  - the rent-bike stations are located in the urban areas and therefore serve only part of the region. In the remote area cycling is not an option.
- Sälen/Trysil and the Åre areas (Sweden):
- need for better accessibility to public transport.

Considering the above-mentioned problems allowed to distinguish a few typical issues related to inhabitants mobility needs in the analyzed areas:

- improvement of technical condition of roads and transportation technical infrastructure: *Hajnówka Region; Setesdal Regional Council; Vidzeme Planning Region;*
- improvement a level of transportation services (comfort, security, availability – especially from the perspective of older people and people with disabilities, ticket price, convenient to use, flexibility, etc.): *Ludwigslust-Parchim Region, Hajnówka Region, Vidzeme Planning Region; Zaonezhye area; Kymenlaakso Region; Sälen/Trysil and the Åre areas.*
- implementation of e-bikes/e-cars or bus-on-demands systems with dedicated apps: *Setesdal Regional Council, Vidzeme Planning Region Birštonas municipality and Druskininka municipality; Kymenlaakso Region*
- development of bike paths and bike parkings: *Hajnówka Region; Vidzeme Planning Region.*

## 5. Summarizing

Below the short analysis focused on showing the gap between mobility needs and the current state of mobility solutions was listed. The detailed descriptions for each participant are present in separate Regional Action Plan documents.

**Region Mecklenburg-Vorpommern, Ludwigslust – Parchim district (Germany):** According to three types of analytical tools (Accessibility portal, Population Mobility Monitor and Expert interviews) the several gaps between mobility needs and current solutions were stated:

#### *Accessibility portal*

- The access to local railway stations is suboptimal in regions that are far away from the railway network
- Mobility needs with a predominantly local dimension (schooling, shopping) are suboptimal in the East and Southeast of the district
- The three natural sites in LUP are poorly connected to the supra-regional railway network

#### *Population Mobility Monitor*

- Incoming and outgoing mobility streams of communities located at the border of the district of LUP show the high relevance of destinations located in neighbouring districts / federal states that is not reflected in transport offers

### Expert interviews

- The design of the public bus transport is supply-driven, information on real mobility streams is scarce
- Innovative models like the call-a-bus system are not well known by inhabitants and even less by tourists
- The integration of transport modes is incomplete.
- Public financing is not supporting sufficiently innovative mobility models (e.g. community bus/transport service, driver qualification of volunteers or those with side jobs)

**Hajnówka Region (Poland):** The differences related to the existing mobility provision are focused on issues indicated below:

- Poor communication with public transport of the Białowieża Forest Region with other Polish regions, which ultimately poses difficulties in social communication and on the other hand it weakens the region's economy, because it makes planning a vacation more difficult and discourages tourists from using the region.
- Poor communication between the public transport of the Białowieża Forest Region and the capitals of the neighboring counties: lack of extensive bus offer for connections between Hajnówka (22,000 residents) and Siemiatycze (14,000 inhabitants) and Bielsk Podlaski (26,000). This makes it difficult to interact with these cities, which are local growth centres.
- Insufficient offer of public transport in the county – e.g. in terms of bus networks inside the county, there are large disproportions regarding the frequency of buses running on particular routes. There are places where public transport does not reach on weekends (or on non-school days) or at all. This contributes to the social exclusion of the inhabitants of these villages, who do not have private cars. This is the most significant shortage of public road transport in the region.
- Despite of the developed network of cycling routes, the district has an insufficient offer of alternative transport: e.g. bike rental at the level of the local government tourist offer (e-bikes, stationary city bikes) and private business.
- Lack of integration with transport systems linked to the incompatibility of transport carriers; the same situation also applies to rail and bus transport offers.
- Insufficient offer of transport connections with work places, which enables transport to tourist attractions, this in a negative way affects the economic condition of the region.

**Setesdal Regional Council (municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):** The differences related to the existing mobility provision are focused on five elements:

- Renovation of the roads network, including to aim for «yellow parting strip to Hovden» and renovation of county roads network.
- Improved public transport facilities, including more departures and reduced fares.
- Increasing the number of kilometres of walk and cycle paths.
- Solutions that address demographic changes (ageing population).
- Solutions that reduce carbon gas emissions.

**Vidzeme Region (Latvia):** In Vidzeme region, there is a certain part of population that use public transport (PT) services regularly, and also, there are groups of population whose mobility needs cannot be met by conventional PT.

- In suburban and rural areas, which tend to be less populated, investments are required in smart, user-friendly transport services which better suit travelers' needs.

New car-sharing and bike-sharing concepts, and e-bike services are examples of transport modes that could replace or complement the poor bus service.

- The use of e-bikes essentially requires the same infrastructure as a conventional bicycle – cycling lanes, parking lots or sheds and information signs. Unfortunately, in many places in Vidzeme, the cycling infrastructure is relatively poorly developed, which is one of the main factors hindering the use of bicycles.
- Wrong approach was made at the beginning of the development of cycling infrastructure in urban areas – bicycle lanes were combined with pedestrian paths, thus increasing accident risk.
- Poor development of pedestrian and cycling infrastructure outside the built-up areas deters from using bicycle for everyday needs. Also, towns where cycling is more developed are not interconnected, for example, Līgatne – Ieriķi, Priekuli – Cēsis.
- As the average speed of an e-bike is higher than that of a conventional bike, a flat, wide enough cycling road, separated from pedestrian and car traffic, is much more appropriate for safe travelling conditions. This applies not only to cities, but also to rural areas, where high road traffic and the lack of cycling lanes pose significant safety risks to cyclists and thus discourage people from using bicycles.
- The availability of bicycle parking lots and sheds is also important, where users can leave e-bikes safely for a longer period of time, protecting them from theft and precipitation (rain, snow). It is especially important to create such bicycle sheds at public transport nodes (railway stations, bus stations) and thus promote the use of e-bicycles as a part of multi-modal trip. Bicycle storage facilities are also necessary at public, sports, cultural and commercial sites.
- An accurate and easy-to-understand information system (including road signs) is helpful for any user of cycling infrastructure, but it is especially important for tourists who travel in unfamiliar environments and face differences in traffic organization, culture and language. It is important for e-bike users to plan the trip in advance: to calculate the expected length of the trip according to the capacity of the battery and to locate the charging points. Road signs to tourist attractions and service places are useful to stay on the right track and safely reach the destination.

**Republic of Karelia, Zaonezhye area (Russian Federation):** The majority of respondents spoke of problems affecting the accessibility and mobility of the area:

- The first group includes problems related to travelling to Zaonezhye (poor road quality, lack of petrol stations, tire repair stations, insufficient number of information signs along the way).
- The second group of problems is related to roadside services for tourists (the need for free equipped parking areas, campsites, toilets, shops and cafes along the road, availability of waste disposal services).
- Local residents draw attention to the importance of resuming social flights from Petrozavodsk by water transport, solving the problems of electricity outages, low availability of medical and social services.

**Birštonas municipality and Druskininka municipality (Lithuania):** Mismatches of mobility demand & transport service supply in Druskininkai and Birštonas resort towns:

- Insufficient connectivity by public transport with the international airports of Vilnius and Kaunas.
- Absence of sufficient connection by public transport with Poland and Belarus.
- Lacking municipality attempts to implement the connection with Poland and Belarus by river transport (links by river Nemunas in Belarus & Augustowo channels in Poland).
- Lack of well-developed integration of bicycle transport with public transport.
- The dominance of private car fleet in the modal split.
- Insufficient use of electric vehicles (e-cars).

- Insufficient quantity of charging stations for electric vehicles.
  - The mobility needs of disabled people and the special needs of the elderly are not fully met.
  - The absence of a car-sharing system within the town itself.
  - Absence of car-sharing intercity system, especially it is no steady connection with Vilnius and Kaunas city.
  - Lacking the attractive and operating car parking system (P & R).
  - The traffic of rented e-scooters is not safe when the path is common with pedestrians' paths.
  - Insufficiently developed network of bicycle paths.
- Key findings of actions to improve the mobility system in the areas:
- The perceptible enhancement of public transport service inside the regions area.
  - Ensuring sustainable integration of non-motorized transport with town public transport.
  - Continual implementation of the Intellectual Transport Systems (ITS) – digitalization of both towns transport service.
  - Enhancement of using electric vehicles: development of charging station (tax-free).
  - Investigation of the possibility to use "bus by demand" for meeting the needs of elderly and disabled people.
  - Examine the potentials of the implementation of the car-sharing system.

**Kymenlaakso Region (Finland):** confrontation/overlay of the research steps regarding the mobility offers and mobility needs (overlay PMM results <-> current public transportation lines and stops | RESULT: gaps in offer / identify redundant lines and stops); integrate mapping of facilities with current mobility offers (lines&stops) | RESULT: gaps in offers – identify new possible lines and stops

#### **Sälen/Trysil and the Åre areas (Sweden):**

- The overall mobility GAP in the whole area is 35,9 percentages, i.e. the coverage of bus stops to the hotels are 64,1 %. Of the 128 target features 82 are having access to public transport within 300 m of distance.
- Within 500 m of distance 81,3 percentages of hotels are covered by public transport.
- From the perspective of 700 m. distance there is a holiday home area not covered by public transport. This in turn points to an obvious GAP in the accessibility to this area with a public transport mobility options.

## **6. Innovative mobility solutions – case studies**

Below the short presentation of innovations and innovative solutions and/or other solutions concerning mobility needs of inhabitants and tourists in each studied region was listed. The detailed descriptions for each participant are present in separate Regional Action Plan documents.

**Ludwigslust – Parchim district (Germany):** Based on the obtained research results the three main perspectives of innovations were stated:

1. Cooperation & Integration:
  - Better integration of local transport means: Integration of network, timetables & timetable information, ticketing;

- Cooperation and integration with transport operators from neighbouring districts / federal states needs to be established / improved: Integration of network, timetables, ticketing.
- 2. Digitalization & Internet Applications:
  - Tools for digitally cross checking the supply with the real transport demand are needed;
  - Efficient communication & awareness raising campaigns (incl. social media) are needed;
  - State-wide uniform information along the entire journey including sales, booking and paying of mobility services of all types.
- 3. New Transport Means & Operators:
  - Alternative, quicker feeding services are needed (incl. private and civil society initiatives);
  - Coordinated transfer offers from the tourism sector & sharing concepts (cars & bikes).
- 4. Other:
  - The districts need to have an own budget line dedicated to innovative mobility models.

**Hajnówka Region (Poland):** Mobile app for bike travelling in Białowieża Forest Region. The graphical concept of the app should be prepared in the form of a region map with a marked network of routes. The advantage of cycling routes in the Białowieża Forest region is their compatibility – the routes connect. They connect the seats of municipalities, lead to the most important tourist attractions, as well as to places that are not reached by other means of transport. The application should contain information about the route, its length, coordinates of bicycle stops. Furthermore – it should be compatible with GPS navigation, which will allow you to connect routes freely. In addition, in order to congruence the application with other means of transport (the principle of parity, departure from thinking about routes only as a form of recreation), the application should contain data coordinates of buses and trains stops available on a given bicycle path along with information about the timetable, routes served and contact to the carrier.

The implementation of a mobile application can be treated as an introduction to the design of further solutions to improve mobility model. The application will undoubtedly contribute to the increase in the popularity of the bicycle as a means of transport, which will affect the image of the region as an environmentally friendly place and leveling of communication white spots. In turn, the compatibility of the route network with other forms of transport – will give the routes the status of an alternative means of communication. The application is also an easy tool to update data, which is important from the point of view of information access. This app might encourage tourists to use the bicycle as a means of transport, and the demand for bicycle services may contribute to the development of cycling tourism. It can be a stage to expand this mobility model in the future, designed using the causative capabilities of municipalities and private business (in the form of city bikes, electric bikes). It is also an excellent tool for the development and implementation of a tourism management system in the Białowieża Forest region.

**Setesdal Regional Council (intermunicipal public body consisting of the four municipalities of Bykle, Valle, Bygland, and Evje and Hornnes, Norway):** Based on the obtained research results a few innovative solutions for improving inhabitants and tourists mobility activities are postulated:

- *System for "Bus on Request":* The system is based on a digital booking technology where the user can book transport from home within a time frame, and be

transported to a preferred destination within a certain geographic area or to a public transport hub.

- *E-bike System:* The longterm goal is to create a system providing access to e-bikes in all the villages in the five municipalities, and that it forms a continuous network of e-bikes throughout all of Setesdal and also up to Åseral. The long established Cycle Route 3 will make up a starting point for this system.
- *Carpooling system:* A system of the kind is based on digital solutions in which travellers are connected via their departure and destination points. The advantages with such solutions are that only one passenger in the car is avoided, it becomes easier for those without a car to move about, and one will most likely get more options in departure times. By having more people using the same car, carbon emissions are reduced too, and it will reduce wear and tear on the roads network. For many people, the social aspect will be a boon too. Also, it would benefit passengers and driver economically compared to traveling on their own. An Autonomous Vehicles Communication System should, with assistance from sensors, in-built computers and network-based navigation tools and connection, be able to drive and navigate along the roads network without human intervention. Despite of above mentioned self-driving vehicles still are in a premature phase, it remains a mode of transport that is interesting for the districts, and for Setesdal and Åseral.

**Vidzeme Planning Region:** E-bike sharing/rental system for tourism in Vidzeme: As the everyday users and tourists are different target audiences, requirements for the technical parameters of e-bikes, usage and complementary services differ as well. A self-service sharing scheme, possibly together with the mobile application is more suitable for everyday users, while in the tourism segment it is better to set up full-service rental points, where qualified staff can provide customers with detailed information on e-bike use and suggest the most interesting routes and attractions.

**Republic of Karelia, Zaonezhye area (Russian Federation):** several innovative initiatives are being considered, aimed mainly at improving the tourist infrastructure:

- *Construction of Medvezh'egorsk – Tolvuya – Velikaya Guba road:* in accordance with the contract between the Karelian Road Administration and PSK Stroitel, construction of the 31.3 km Velikaya Guba – Oyatevshchina road is due to be completed by 30 June 2023;
- *Pier with associated infrastructure in Kondopoga:* OOO Karelia Tour Tourist Company is building a pier with associated infrastructure in Kondopoga. The plans for 2020–2021 are to buy 5 passenger ships with 45 seats and to open regular voyages from Kondopoga to Kizhi island during the navigation period;
- *Ferry connections:* Kizhi Museum-Reserve is exploring the prospects of organising a ferry from Oyatevshchina village to Kizhi Island;
- *Construction of port open for foreign-flagged vessels:* By Order of the Government of the Russian Federation No. 734-r of May 5, 2012 the port of Petrozavodsk is included in the list of ports open for foreign-flagged vessels;
- *Lake Onega open for vessels from other countries:* Lake Onega is included in the list of inland waterways of the Russian Federation where vessels flying the flags of foreign countries are allowed to navigate;
- The local population is actively involved in the development of services in passenger and freight transport, excursion services and hospitality;
- *Development of visit centre at Oyatevshchina and a small multifunctional tourist complex:* The Kizhi Museum plans to create a visit centre at Oyatevshchina and a small multifunctional tourist complex (see the sketch) outside of it. Car drivers wishing to visit the island will be able to leave their cars there, have lunch and, if they wish, spend the night. It will have a capacity for up to 120 guests and will include parking areas, a café, facilities and an area for camping.

**Birštonas municipality and Druskininka municipality (Lithuania):** An innovative initiative of autonomous vehicle:

- *System of automated vehicle (AV):* automated vehicles may appear and service will change from conventional car sharing to the bus by demand. A detailed review of AV technology is presented in the study of Skrickij et al. (2020). Automated driving is a kind of technology that can change the whole paradigm of transportation (ERTRAC 2019). However, an implementation of this technology is a complicated task and few issues and problems need to be discussed.

Technological solutions for increasing the automated driving reliability, as well as a decrease in the cost of the sensing and processing system, are necessary. The certification procedure is also a complicated task because artificial intelligence (AI) technology will affect the functional safety of the vehicle. The algorithms for neural networks cannot be described as an equation as they function as a black box. Another aspect is that the EU is a follower in the field of AI and takes the risk of losing its dominant positions in the sector of road transport if industrial companies fail to compete on the global stage.

**Kymenlaakso Region (Finland):** The development of public transport services in the Kymenlaakso area was clearly felt to be important or very important (63%). Only 5% of the respondents felt that development was not at all important or not very important. The survey also surveyed respondents' views on possible new modes of transport services that could be developed in the area. The most interesting new modes were ridesharing, electric cars to be borrowed and a "call a bus" services, defined as follows: New mode of transport service that combines the features of a taxi and a bus. The charterer defines the pick-up location and destination, and the trip is linked to other rides in the same direction.

The aim of survey also was to map the mobility behavior of summer visitors in the Kymenlaakso region and the destinations they visited regularly or infrequently and what kind of mode of transportation they used to these destinations. The survey contained several items to locate regarding a person's basic needs or recreation (e.g. shopping, visits to cultural and natural sites).

**Sälen/Trysil and the Åre areas (Sweden):** Public participation GIS (PPGIS), is used to generate spatially explicit place-based information that can inform land-use planning and management alternatives (See for example Brown, 2017 or Kahila-Tani et al., 2016 for further reading). Historically, PPGIS comes to the GIS community from the planning profession and has the main aim of including input from different groups in society that would otherwise be excluded in decision making (e.g. Craig et al., 2002). As part of the testing phase of the MARA project, with the aim of improving the early stage planning, a PPGIS study was carried out as part of paper and pen survey. PPGIS mapping tasks was included as part of the survey described previously in this report.

The questions included multiple choices where respondents could answer with the attributes as of below.

- Why do you think these places need improvement?
- What kind of development do you think is required?

The mapping question was the one intended to be of most value for transport planning in early stages. In this draw question, respondents had the opportunity to mark places in need of improvement and suggest the type of improvement to be made.

## Conclusions

Based on the results obtained, it can be concluded that the Baltic Sea region, seen from the perspective of stakeholders from different countries and related remote areas, can be characterized on the basis of a number of common elements.

A common feature of each of the analyzed regions is the growing problem of aging societies and the increasing degree of their disability. At the same time, aging and declining communities require a specific approach to the mobility issue related to their daily functioning. The aforementioned decline in the size of the communities makes maintaining constant and frequent connections economically unprofitable. The research results indicate that the development of bus-on-demand connections seems to be significant. It is also postulated to implement e-bikes and / or e-cars and carpooling systems along with the necessary virtual and real technical and IT infrastructure ensuring the possibility of booking, paying for and renting a vehicle. These systems will balance and adjust the supply of transport services to the existing, diversified demand. The disadvantage of the proposed solutions may be the digital exclusion of older people, which from the perspective of, for example, the Hajnówka Region, may constitute a significant barrier to the implementation of such systems. Another problem may be the creation and implementation of integrated payment systems (as it was mentioned in the case study of Ludwigslust-Parchim Region), in which, by making a one-off payment, the consumer may purchase a transport service consisting of several elements provided by various entities (e.g. bus-train-bike or other combination of vehicles).

Residents also pay attention to the need to improve road and technical infrastructure for local transport services especially from the perspective of safety of services and their personal comfort and safety. In addition, insufficient availability of bicycle paths and bicycle parkings is also a frequent problem of analysed regions from the perspective of the inhabitants.

Tourists in analysed regions improvement of technical condition of roads and technical transport infrastructure:he p indicated similar mobility needs. The problems connected with improvement of technical condition of roads and technical transport infrastructure, quality and safety of transportation services were also highlighted in research results. Similarly to inhabitants, tourist also underline the need for bike paths and bike parking places with related infrastructure. The higher number of accessible car parkings is also requested.

