Picture: Janez Nared

SMART-MR project and partners' responses to the COVID-19 pandemic

In spring 2020, the Interreg Europe project Sustainable Measures for Achieving Resilient Transportation in Metropolitan Regions (SMART-MR) completed its planned work. Since the beginning of the project in 2016, the project partners have been actively sharing experiences between partner regions and trying to use the lessons learned to improve their own mobility policies. Despite the project's successes in implementing the developed action plans, mobility in all partner regions was tested by the new COVID-19 pandemic that has profoundly affected the way we work, travel, and live. The word "resilient," which is part of the project title, once again became central to the thinking among mobility experts as well as in the broader context. The radical nature of the pandemic has led the Interreg Europe programme to de-

cide to further support project partnerships in finding solutions to the challenges associated with COVID-19. Therefore, we proposed a new set of activities, including seven e-work-shops and one physical workshop, to support the regional adaptations of the mobility actions in the partners' regions. After being successful in the 5th call of the Interreg Europe programme, the activities started in October 2021.

Janez Nared

SMART-MR
Interreg Europe

European Union
European Regional
Development Fund

SMART-MR: Sustainable measures for achieving resilient transportation in metropolitan regions

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Table 1: Project structure.

Activities at the transnational level	
e-workshops	e-WS1: Enabling e-participation e-WS2: Adapting the logistics to the new behaviour pattern - home delivery services e-WS3: Densification and mobility changes due to COVID-19 in station areas – processes e-WS4: Station Area Concept – reactions/responses e-WS5: Managing transportation – processes e-WS6: New and traditional mobility solutions in a post-COVID-19 world e-WS7: Integrating COVID-19 experiences into (regional) mobility plans
physical workshop	WS in Barcelona: COVID-19-related processes and responses in metropolitan regions

Activities at the regional level	
Ljubljana Urban Region	PP01 and PP02 will observe mobility measures within the Sustainable Urban Mobility Plan of the Ljubljana Urban Region and upgrade it by suggesting COVID-19-related modifications.
Gothenburg Region	PP05 will support the Strategic policy document and budget for 2023–26 by suggesting COVID-19-related modifications.
Helsinki Region	PP06 will produce new regional information to support the definition of regional development priorities and contribute to improving the policy document through new innovative actions and sharing experiences and good practices.
Budapest	PP07 will collect the partners' experience and knowledge on COVID-19-related objectives and measures, which will be the basis for the review of Volume I (Objectives and measures) of the Budapest Mobility Plan, planned for 2022.
Metropolitan City of Capital Rome	PP08 will reconsider the strategies included in the document for the development and implementation of the metropolitan SUMP on the basis of the changed COVID-19 situation.
Porto Metropolitan Area	PP09 will analyse the experiences in the partnership cities related with the situation of the new and traditional mobility solutions in a post-COVID-19 world and will improve the regional SUMP along with the instrument that will finance it.
Barcelona Metropolitan Area	PP10 will share and collect the partners' experiences and knowledge on mobility strategies after the COVID-19 crisis to improve the Agreement for a new metropolitan mobility in Barcelona, already adopted.

We have organized four e-workshops to date. Their results are presented in this Newsletter.

e-WORKSHOP 1:
Enabling e-participation in mobility planning

1.1 Introduction
The Enabling e-Participation in Mobility Planning workshop was the first response to the challenges posed by the COVID-19 pandemic. In particular, the lockdown and limited number of meetings have slowed down participatory processes and thus taken away the citizens' ability to participate extensively in mobility planning. In addition, the pandemic and related protective measures have profoundly affected mobility by:

- Restricting access to public transportation, as it occasionally did not work or operated only a limited number of vehicles with reduced seat availability;
- Encouraging remote work that has reduced the need for mobility;
- Individuals' reluctance to use public transportation to avoid the risk of contagion, which led to both an increased use of

their own cars as well as active forms of mobility, such as walking and biking;
- Reduced availability of sharing mobility options (e.g., car sharing) because the potential providers worked from home or felt unsafe and therefore preferred to travel alone.

The sharp changes in the conditions driving the supply of public transportation and changing user perceptions required an immediate response—both at the policy and operational levels—while user experiences were difficult to obtain because there were very few gatherings. At the same time, the operational level/transport providers have been forced to adapt to the rapidly changing situation and the lack of experience with the pandemic.

To help SMART-MR partners better engage stakeholders in the mobility planning process, the first e-workshop was organized on 17 December 2021. Ms. Maja Drobne

gave the keynote speech on e-participation, which was followed by an overview of e-participation in the partners' regions by collecting partners' responses to the inventory, presentation of pre-recorded good practices, and the results of the sessions that addressed the issues raised by individual partners.

1.2 E-participation in partners' regions: the inventory results

1.2.1 Experiences with e-participation in mobility planning
Partner experience shows that the pandemic has accelerated the use of online meetings, workshops, and other types of online communication. E-participation has become an important tool to support everyday work and enable telework, and a variety of different tools have been developed to support e-participation. Despite the hesitation at the beginning

of the pandemic, e-meetings have proven to be very productive, and the stakeholder meetings have also essentially achieved the goals that the partners were aiming for.

E-participation has had a positive impact on the partners' close interactions with politicians and citizens at the regional level and decision-making has become more digitised and efficient with the advent of e-government and e-decision-making. Transportation costs have been reduced and the number of participants in regional online webinars has increased compared to on-site seminars. There is no need to reserve travel time and e-participation is more flexible since the webinar is often recorded for later use. A broader audience tends to be reached, especially young people, and the information available seems more complete and comprehensive. There is also much more audience focus on the issues being discussed.

Of course, e-participation also has some drawbacks. There is some concern about the limited interaction and possible exclusion of people who do not have access to digital forums, which hinders the participation of some vulnerable groups of citizens, such as the elderly. It works well for sharing information, but has limited success when it comes to networking and co-creating benefits/outcomes. It is much more impersonal, there are far fewer opportunities for informal contact, and technically it is sometimes much more difficult. The quality of the discussions and relevant input received from the public or stakeholders in an

e-form is much lower than in the regular form of communication. This hinders side conversations that often enliven the discussion. It is also challenging to organise enough online meetings to allow for quality interaction with citizens. Some stakeholders face technical difficulties in participating (weak internet connectivity, organisational-level security systems), there is a risk of cyber threats), and there may also be legal constraints, such as in policy-making processes where physical participation is sometimes required.

1.2.2 Broader impacts of the COVID-19 pandemic on participatory democracy

Of course, the pandemic has also had implications beyond participatory mobility planning. On the positive side, ICT-based tools have been expanded and the quality of the corresponding ICT tools for e-participation has increased and is better adapted to the specific needs of users. It has promoted the digitization of many processes and improved the use of ICT in public administration. E-tools have enabled the crowd-sourcing of ideas and consensus building, bridged the gap between decision-makers and citizens, and reached a larger number of people. The use of digital tools is easier and widespread and has led to a greater number of participants in democratic processes. It allows for greater flexibility and it is easier to reach younger generations in particular. The pandemic has increased the electronic and digital "maturity"

of communities and the increased number of discussions has given more people the opportunity to participate in e-meetings and contribute on an equal footing. Governments and organisations have been motivated to organise large-scale surveys and other methods of gathering opinions, which has made planning processes more transparent.

On the negative side, communication and participation were limited (only or mostly) to online channels, some social groups were unable to voice their opinions due to limited access to ICT tools, and it was difficult to organise adequate digital meetings aimed at citizen dialogue, consultations, etc. Therefore, participation was less representative of the public reality and diversity, as some social groups are not used to e-platforms. The online participatory events focused on sharing information rather than creating discussions and dialogues. E-participation may be more attractive to those who prefer to provide comments in writing rather than orally, though it may have limited one's creativity depending on the method used. Despite the larger number of participants, the diversity of stakeholders involved has not necessarily increased. Decision-making took more time because the interventions via online resources took longer. An important drawback was also the lack of major events, such as car-free days during European Mobility Week, site visits and field meetings, demonstrations, etc.

Table 1.1: Selected tools to support e-participation.

	Name of the platform	Features/functionalities	Link
Online meetings/ Webinars	MS Teams	meetings	https://www.microsoft.com
	Zoom	meetings, webinars	https://zoom.us/
	Jitsi	meetings	https://meet.jit.si/
	Webex	meetings	https://www.webex.com/
	Bluejeans	meetings	https://www.bluejeans.com/
	Skype for Businesses	meetings	https://www.skype.com/en/business/
	Google Meet	meetings	https://meet.google.com/
	Google Hangouts	calls and messaging	https://hangouts.google.com/
	GoToMeeting	meetings	https://www.goto.com/meeting
	Avaya Spaces	meetings	https://www.avaya.com/en/products/ucaas/spaces/
Questionnaire	1-ka	survey	https://www.1ka.si/d/en
	SurveyMonkey	survey	https://www.surveymonkey.com
	Typeform	survey	https://www.typeform.com/
	Webropol	survey	https://webropol.com/
	Google Forms	survey	https://www.google.com/
Online interaction	Sli.do	online interaction	https://www.sli.do/
	Menti.com	online interaction	https://www.mentimeter.com/
Online GIS	Maptionnaire	web-GIS	https://maptionnaire.com/
	Survey123 (ESRI)	web-GIS	https://survey123.arcgis.com/
Mobile apps	Opinio	app for mobile surveys	https://www.objectplanet.com/opinio/
Whiteboard tools	Flinga	whiteboard, wall	https://flinga.fi
	Miro	whiteboard	https://miro.com/
	Mural	whiteboard	https://www.mural.co/
Sharing tools	Dropbox	sharing	https://www.dropbox.com/
	Google Doc	sharing	https://www.google.com/docs/about/
Participation platforms	Consul	online engagement	https://consulproject.org/en/
	Your priorities	online engagement	https://www.yrpri.org/domain/3
	Opin.me - Platform for youth eParticipation in Europe	online engagement	https://opin.me/en/
Interactive quizzes	Kahoot	learning platform	https://kahoot.com/
	Socrative	learning platform	https://www.socrative.com/
Mingling tools	Wonder	networking exhibitions workshops social events	https://www.wonder.me/
Other (national) tools	Kerro kantasi	online engagement	https://kerrokantasi.hel.fi
	Harava	web-GIS	https://www.sitowise.com/fi/digitaaliset-palvelut/tuote-ratkaisut/karttakysely-harava
	Budapest dialog	questionnaires, results and commenting	https://www.kozossegitervezes.hu/
	Közösségi költségvetés	public budgeting	https://otlet.budapest.hu/
	Budapesti polgári kezdeményezés	online petitions	https://peticio.budapest.hu/
	Szervezetek	group work/interest groups	https://civil.budapest.hu/szervezetek/

1.3 Workshop results

1.3.1 Overview of the workshop

The workshop addressed six questions prioritised by the partner regions. The discussion took place in two rounds; in each round, the participants chose one of three groups to address one question at a time. This allowed each participant to participate in the discussion on two questions.

1.3.2 Platforms and tools to support e-participation and capacity building

Many platforms and tools have been developed over the past two years (see Table 1). They allow meetings and webinars, surveys, calls and messaging, whiteboards, online GIS, questionnaires, etc. to support e-participation. Some of them are very efficient and user-friendly and allow a quick analysis of the results, while others require more effort to analyse the results, especially when there is a large number of responses.

1.3.3 Encouraging, motivating, and informing citizens to participate

Encouraging and motivating citizens to participate is a very important step in the planning process. Information about the planning process must be provided in a timely and comprehensive manner, the materials must be engaging, and everyone should receive and understand them. The process must be well designed and interesting to keep the participants' interest. A variety of methods can be used, but there should be a balance between e-methods and physical methods to achieve the intended results. A good communication plan should be created to facilitate the process.

1.3.4 How to ensure all social groups are represented and the results are valid?

To ensure a high quality of the planning and achieved results, all social groups must be represented in the participation process, especially the weak ones. This can be achieved through highly skilled facilitation experts who are able to adapt activities and forms of participation to specific social groups (e.g., specific phone hours for the elderly, open e-platform, e-maps). In addition, adequate information is crucial for the involvement of social groups as well as for a sufficient quorum that would make the results valid.

1.3.5 How can the role of e-participation be strengthened (e.g., from e-participation to e-decision-making)?

The culture of participation should be strengthened by means of educational activities, greater transparency, and access to information and data. The process should be led by professional facilitators who can use high-quality e-tools, gadgets, and methods. Because using digital tools is easier than using traditional techniques, the number of participants in democratic processes is potentially higher, which can help governments and organizations organize large-scale polls and other methods to gather opinions.

1.3.6 Analysis in the case of numerous responses, Big Data, social media, etc.

New forms of data collection, such as mobile phone data, Big Data collected in a variety of ways, Citizen Science, and the use of artificial intelligence offer a wealth of opportunities for better decision-making. At the same time, the privacy of the individual must be fully respected and the analysis must be carried out by experts.

1.3.7 Monitoring and evaluating the implementation

It is important that the participation process is conducted in such a way that all participants have their say and that it is not the loudest who get their way. It is important to prevent unproductive rumours and avoid distractions, possibly through targeted communication and a clear focus on the goals of the participation process. In tracking the process, constant feedback should be enabled and e-tools are particularly well suited because they provide track record.

1.4 Good practices

Ljubljana Urban Region
Gothenburg Region
Helsinki Region
Budapest
Metropolitan City of Capital Rome
Porto Metropolitan Area
Barcelona Metropolitan Area

1.5 Policy recommendations

Take participation and e-participation seriously

Make participation count. Consider when participation is needed (not all processes require participation), clearly define the steps of the process and the goals, carefully define stakeholders from different sectors, social groups, etc., and hire a well-trained facilitator to lead the process.

Explore and use e-participation tools

New e-tools offer a variety of opportunities for public participation. Familiarise yourself with them, test them, and select them based on the type of stakeholders you want to engage. Young people can help older people when using e-tools. Carefully analyse the potential sources of information and the results obtained during the participation process.

Inform, invite, encourage, educate, involve

Once you have established the participation process, develop a communication strategy and ensure that citizens and stakeholders are fully informed (e.g., by posting QR codes at bus stops to reach more people, through local media, direct contact, etc.) and that they feel welcome and needed. You can offer them giveaways and encourage them to use various e-tools or voice their opinions publicly. Make sure they are well informed, raise their awareness through various campaigns, provide capacity building and proper training. Strive to involve them fully in the participation process.

Make the results count and be visible

Include the results in the respective plan and make the results of the participation process known. Build and evaluate participants' trust; after all, feedback is critical to fostering collaboration in the future. Learn from the results and improve the process for future opportunities/needs.

Janez Nared

E-participation practices in SUMP LUR

Klemen Gostič, Katja Butina, RDA LUR
15th December 2021

Picture: Alen Kahvedžić, Pošta Slovenije

Pošta Slovenije

Last mile solutions, models, vehicles and tools in urban delivery

e-WORKSHOP 2:
Adapting the logistics to the new behaviour pattern – home delivery services

2.1 Introduction

Due to the COVID-19 pandemic, logistics services were directly affected as the pandemic changed the flow of goods. After the initial hiccups in the logistics chain, logistics was shown as a valuable ally that was integrated across international borders while also helping businesses to get their products to the customer as people were asked to stay at home. To overcome the loss of income, logistics service providers had to learn resilience to confront uncertainties and risks being triggered by adverse health events, increases of home delivery, in-store pickup services, and increased demand for faster delivery options.

The e-workshop "Adapting the logistic to the new behaviour pattern – home delivery services" presented the main environmental aspects of logistics and innovative measures for improving logistics given the pandemic that has been going on for the past two years. The project partners were able to observe many good practices while also sharing their experiences on how logistics adapted to the new behaviour pattern in each partner's region.

The second SMART-MR e-workshop was organized on 21 January 2022. Mr. Alen Kahvedžić gave the keynote speech on adapting the logistics to the new behaviour pattern, especially regarding home delivery services. Moreover, two good practices were presented and a moderated discussion was held on selected logistics topics and on urban logistics and the environmental aspects of logistics.

2.2 Inventory results

Observations from the partners' regions were focused on several topics in home delivery services that had emerged in the last two years. An overall inventory analysis focused on the main positive and negative experiences on logistics services in COVID-19 times, good examples, and expected future challenges in the logistics sector. Inventory reports from partner regions emphasised that freight transport has indeed increased significantly during the pandemic, with the greatest rise occurring in home deliveries. New delivery services had emerged in urban areas in recent years and have been boosted by increased e-commerce as a result of pandemic mitigation measures.

The partners reported that a significant change has been observed in consumer habits as a result of ever faster increases of digital retailers. The segment had already been showing growth in 2019 and early 2020, but it has vastly expanded with the introduction of new channels of communication, the lockdown of retails shops, and increase of home delivery or in-store pickup services. The partners report an increase of demand for faster delivery options and the emergence of more local, yet smaller warehousing and logistics hubs located nearer to the source of consumption in the region. While inventory reports that 25% of all deliveries of goods in urban areas and 50% of all deliveries of light goods could be made on bicycles and cargo tricycles, the partner regions expressed a need to continue moving towards more sustainable mobility in urban freight distribution.

2.3 Workshop results

The results from the workshop were conducted on the metroretro platform (www.metroretro.io) so that they were visible to all the project partners. Everyone was assigned a link to

access the platform and was able to present their views on the four addressed questions and present policy recommendations. The workshop addressed the following:

– General barriers and motivators in the field of green logistics.
– The main changes of green logistics in the COVID-19 situation.
– Activities of governments to promote green logistics.
– Small but effective and innovate measures in the field of green logistics.
– Policy recommendations.

The discussion took place in two groups. While the first group discussed the environmental aspects of urban mobility, the second group proposed the main innovative measures for improving logistics in light of the COVID-19 pandemic situation. The discussions regarding the addressed questions and policy recommendations of both groups revealed that, based on governmental implications and incentives, logistics companies are able and willing to modify their logistics activities and include the environmental impact in their strategic and operational plans. The groups also raised awareness about the environmental aspect of logistics as the rising and changing structure of the urban logistics sector in the past years and the environmental aspect of logistics have become one of the most important issues to tackle.

At the end of the discussion, policy recommendations were made and divided into logistics, environmental, and innovative aspects. Considering the environmental aspects of logistics, the main discussions were focused on proposing the inclusion of the main stakeholders, policy actors, retailers, and logistic companies in the initial stages of innovative and environmentally sound logistics measures in order to create a bottom-up approach and active discussion among the private and public sector. Another set of results focused on the need to standardize logistics procedures and improve the processes of digitalization related to safety and privacy. The discussions were based on the innovative aspects of urban logistics-proposed governance to design and think even more on devising Sustainable Urban Logistics Plans (SULP) and starting to plan more centralized micro-consolidation hubs rather than regular warehouses in the vicinities of urban areas. The final synthesis of the workshops was focused on the need for local and regional governances to measure and evaluate logistics operation in their influence areas.

2.4 Good practices

The partner regions presented their good practices in the field of urban logistics dealing with the emerging COVID-19 pandemic.

The selected good practices were presented to the interested public at an online event and its replication potentials were discussed. The good practices that were presented are listed below.

2.4.1 Good practice from the Gothenburg Region, Sweden

Besides the good practices of current parcel practices presented by Pošta Slovenije, the leading parcel company in Slovenia, a good practice was also presented from the Gothenburg Region, which presented the innovative elements of logistics. In addition to the practices in Gothenburg, many Swedish municipalities are already developing local concepts for the coordinated distribution of goods. The purpose is to increase efficiency in logistics chains for goods delivered to public institutions (schools, retirement homes, etc). These concepts may reduce transport at a local or potentially regional level.

2.4.2 Good practice from Gothenburg, Sweden

Another good practice was shown from Sweden, which has developed the concept of Railport Scandinavia, a highly efficient railway network connecting inland terminals throughout Sweden and Norway with the Port. The rail shuttles are a sustainable, cost efficient, long-term solution ensuring that large volumes of freight can reach end customers rapidly and efficiently. Currently, 60% of containers passing through the Port are transported by rail.

2.4.3 Good practices from Budapest, Hungary, and Ljubljana, Slovenia

Another good example was presented from Budapest: the freight traffic regulation system applied in Budapest takes into account the particularities of the capital (residential areas, road network conditions, industrial and logistics areas of the city) and also deals with environmental aspects in the form of payments of entrance fees for restricted zones (fee categories according to the EURO category of vehicle engine). Similar good examples were presented in the case of the Ljubljana pedestrian area, where electronics permits are available for entering the Ljubljana pedestrian area in an assigned timeslot from 6 to 10 am. There has also been an expansion of local companies delivering parcels on e-bikes that

Picture: Alen Kahvedžić, Pošta Slovenije

have derived from the urge for green fleets delivery needs.

2.4.4 Good practice from the Barcelona Metropolitan Area, Spain

The Barcelona Metropolitan Area and the Municipality of Barcelona have exercised their respective powers to improve urban freight distribution and facilitate the management of parking in regulated freight parking areas through the creation of Barcelona's urban freight distribution platform (SPRO), which allows users to park in urban freight parking areas through a mobile app.

SPRO is a free app for freight professionals launched on 29 June 2020. The idea is to improve urban freight parking management in the entire Barcelona Metropolitan Area by expanding all its services from the 1.6 million people living in Barcelona municipalities to the 3.2 million people who live in the 36 municipalities integrated in the Barcelona Metropolitan Area. SPRO users can easily register within the app and once registered, they can:

1. Find the nearest freight parking areas.
2. Check the free space availability prediction.
3. Activate the parking ticket and get a notification before it expires.
4. Manage operations and vehicle data.

All these actions are aimed at establishing an intelligent system that reverts to a more efficient management of mobility from a multi-sector perspective. And finally, a metropolitan platform for the management of the information of the app's use allows mobility to be monitored with high precision. This information system will optimize public policies. The Barcelona Metropolitan Area has a line of grants for fleet change dedicated for carriers with low income. The development of urban pilots encourages the consolidation of the deliveries and promotes the last mile distribution by bicycle.

2.5 Policy recommendations

The activities in the workshop were divided into two groups, one discussing the environmental aspects of urban mobility and the other proposing the main innovative measures for improving logistics in light of the COVID-19 pandemic situation. The discussions and policy recommendations of both groups revealed that, based on governmental implications and incentives, logistics companies are able and willing to modify their logistics activities and include the environmental impact in their strategic and operational plans. The real challenge is to find models that let us balance different issues: the reduction of costs, the improvement of service levels, the definition of an adequate inventory level, and the decrease of the carbon footprint of logistics operations. With the rise and changing structure of the urban logistics sector in the past years, the environmental aspect of logistics is one of the most important issues to tackle and is an important issue not only for companies, but for local and regional governments as well.

Environmental aspects of logistics

In light of the environmental aspects of logistics, the main policy recommendations proposed to include the main stakeholders, policy actors, retailers, and logistics companies already in the initial stages of innovative and environmentally sound logistics measures. The workshop participants expressed a positive attitude about the Living Lab participation process, which supports a bottom-up approach and active discussion among the private and public sector addressing challenges related to environmental topics in urban logistics. Another policy recommendation was to address and raise awareness on logistics among local and regional governances. Only skilled local and regional personnel can address the topics of urban logistics in a concise and effective manner. Another set of policy recommendations within the environmental aspects of logistics was the need to standardize logistics procedures and improve digitalization processes related to safety and privacy. Governance should not only think on the greening of logistics fleets, but should also pivot around green warehousing, land-use planning related to logistics, and sustainable packaging.

Innovative aspects of logistics

Policy recommendations based on the innovative aspects of urban logistics prompted governmental bodies to design and think even more on devising Sustainable Urban Logistics Plans (SULP) and start to plan centralized micro-consolidation hubs rather than regular warehouses in the vicinities of urban areas. When planning and regulating the logistics sector, regional governances should understand and regulate logistics at the metropolitan level and not base it on different local laws and measures. The final policy recommendation was focused on the need for local and regional governances on beginning to measure and evaluate logistics operation in their influence areas. Only then can the real measures and effects take place.

Špela Praznik,
Katja Butina,
Klemen Gostič

Picture: Alen Kahvedžić, Pošta Slovenije

e-WORKSHOP 3:
Densification and mobility changes due to COVID-19 in station areas – processes

3.1 Introduction

Urbanisation is a fundamental presumption for urban development regionally and globally. Planning and development for buildings, infrastructure, and investments in physical or administrative systems are typically dimensioned for urban growth. Further, *density* is considered to benefit sustainability in various ways, such as land use and transport efficiency, proximity and accessibility to services. As a result, *densification* is a well-established planning strategy in European metropolitan regions. Densification is also a recurring topic in SMART-MR, not least stressed by the Gothenburg Region in our project contributions focusing on sustainable densification in station communities.

The COVID-19 pandemic has had a great impact on society in terms of work, transport, shopping, culture, and, obviously, everyday life itself. Even though countries faced different challenges and took different strategic paths when dealing with the pandemic, the immediate societal impact has been clear. Consequently, there have also been thorough effects on cities and regions where transport, commerce, and urban life changed radically and rapidly.

However, we know little about the pandemic's implications on spatial structures in a wider perspective. How will they affect urbanisation and density? And more importantly, what does this mean for the transformation towards smart mobility and better liveability?

For the Gothenburg Region, these questions have been of certain interest in this prolongation of SMART-MR. The opportunity for an European outlook on the pandemic effects, as well as learning from our project partners, is highly valuable for spatial planning in our region. So, as we slowly move away from the state of pandemic and further into a new future (a "new normal"?), what will be the long-term spatial impact on our metropolitan regions? And, in turn, how should spatial planners and governments deal with the effects?

3.2 Inventory results

The topics on urbanisation and density were approached by asking partners to describe their pandemic experiences from the perspectives of *housing, land use*, and *mobility*.

Land use: Swift changes and thriving local economies

The partner experiences indicate that land use and functional mix changed rapidly in many cities during the initial phase of COVID-19. Parking spaces turned into terraces and outdoor seating, "covid-bike lanes" were introduced, and even some "superblocks" emerged as a result of traffic reductions. Public spaces have benefitted from these changes in several locations, which has corresponded with an increased demand for such spaces. Not surprisingly, the usage of green spaces has increased significantly during COVID-19.

Furthermore, partner experiences show that pandemic effects sometimes promoted local consumption, both in peripheral and central locations, sometimes even in residential areas. In other words, consumption during COVID-19 became more "proximity-based", resulting in growing local economies as well as low transport demand. Hence, several partners raised questions about how to deal with potential new centralities in places that may not be pointed out in regional mobility plans, etc. In summary, land use and functional mix changed swiftly, but primarily within existing physical structures. There have, thus far, been no clear signs of more structural spatial impacts, such as permanent land use changes, or the emergence of new centralities that will persist over time.

Housing: Need for space – and multilocation

In Sweden, as well as in many other countries, the pandemic's (negative) impact on the housing market was surprisingly low. In contrast to the expected price drop due to the outbreak of COVID-19, prices generally increased significantly. This is the case for both apartments and single houses in central locations and suburban areas. The demand for additional space seems to be a common denominator for relocation patterns during COVID-19. People who live in one-room apartments desire two rooms, people with four rooms want five rooms, and so on.

Moreover, the demand for more space has partly resulted in relocations to second homes. During the pandemic, some people stayed in both their primary homes and their second homes, which was facilitated by flexible work conditions, and resulted in a growing multilocation. Assuming that multilocality remains high, there will probably be challenges in providing public services in locations where the density of people and activity are unpredictable. This may be a long-term issue for spatial planners and governments.

Overall, the pandemic has underlined inequalities in the housing market, when it comes to various groups' opportunities to act on the pandemic's social impact. It became clear that socioeconomic factors very much determined who can procure that additional space (or relocate to the cottage) and who cannot. In addition, remote work advantage is critical for relocation. That, in turn, indicates that far from everyone had, or will have in the long-term, the capability to respond to the pandemic effects on their living conditions and everyday life.

Mobility: Public transport decline – and more flexibility

COVID-19 restrictions hit various countries in various ways. One major immediate issue was about flattening the demand curve for public transport. In many countries, lockdowns and other hardline actions made public transport operations more or less impossible and in turn, pushed demand to a minimum. In Gothenburg, the public transport company chose a different path, maximizing the number of departures in order to avoid crowding.

In any case, the effects on public transport have been obvious with very significant drops in passengers. Partner experiences indicate a shift in modal split from public transport to individual modes of transport. For shorter distances, walking and bicycling have increased, including various kinds of micromobility. For longer distances, car traffic has increased in many regions. Generally, several partners highlight that COVID-19 has reduced the total transport volume, but the share of individual motorized work trips increased. From an urban development perspective, these shifts mean both opportunities and challenges.

Along with an "individualisation" of travel patterns, the pandemic also seemed to induce *flexibility* as a key factor within mobility. Remote work reduced not only transportation per se, but also the need for traditional office hours. This resulted in a larger spread

in travel behaviour and a demand for more flexible mobility services. One key mobility issue post-COVID-19 is whether public transport will find its way back to previous levels or not. Partners have raised questions about the future of peak hours and whether they will be as defining for mobility planning as they have been historically. If individuality and flexibility remain key mobility factors post-COVID-19, they will probably challenge traditional models for planning mobility in metropolitan regions.

3.3 Study: Post-pandemic changes in locations preferences

As a part of the SMART-MR prolonged project, the Gothenburg Region performed a study to explore how increased remote work may affect relocation patterns. The prevailing doctrine among planners has been that urbanisation and density is positive for sustainability. Will the pandemic change this and, if so, should planners change focus? Or will society simply return to normal? The study was done by Per Kristersson, Gothenburg Region, with support from Alexander Hellervik at Chalmers University of Technology. Per Kristersson presented the results in a keynote as a part of GR's workshop on 24 February.

The study's hypothesis is that the working situation during the pandemic has called for an increased demand for more space in the living situation. This factor could result in changes in urbanisation, urban sprawl, and increased segregation due to socioeconomic factors.

Not everyone can work remotely. According to a Swedish survey, only 10 per cent of people working in hotels and restaurants and 15 per cent working in health care have this opportunity, while working remotely is possible for 80 per cent in the information sector. But if you can work remotely, what are the consequences for the choice of location? Many discovered that their apartment or house is too small and that relocation may be the obvious solution. However, not everyone can relocate because of social or economic limitations or simply due to working condi-
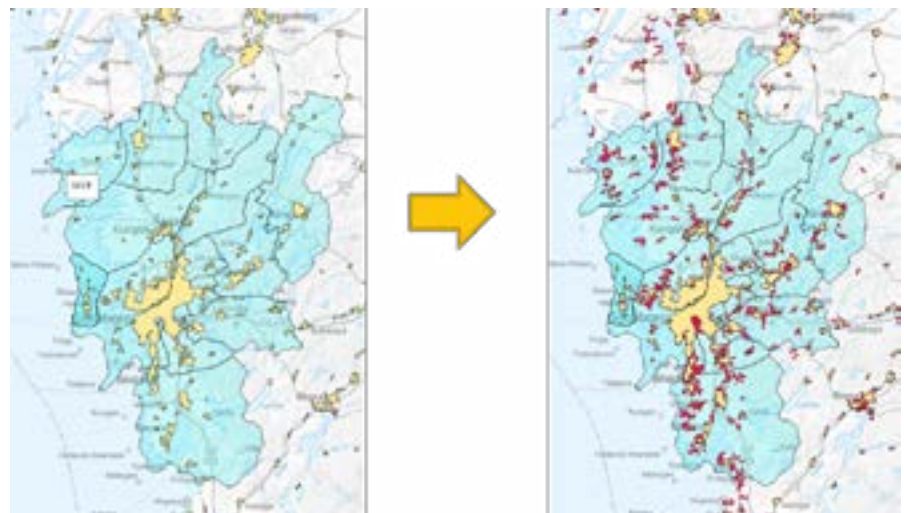

Figure 3.2: De-urbanization and urban sprawl in the Gothenburg Region between 1990–2018. Map data: Gothenburg Region.
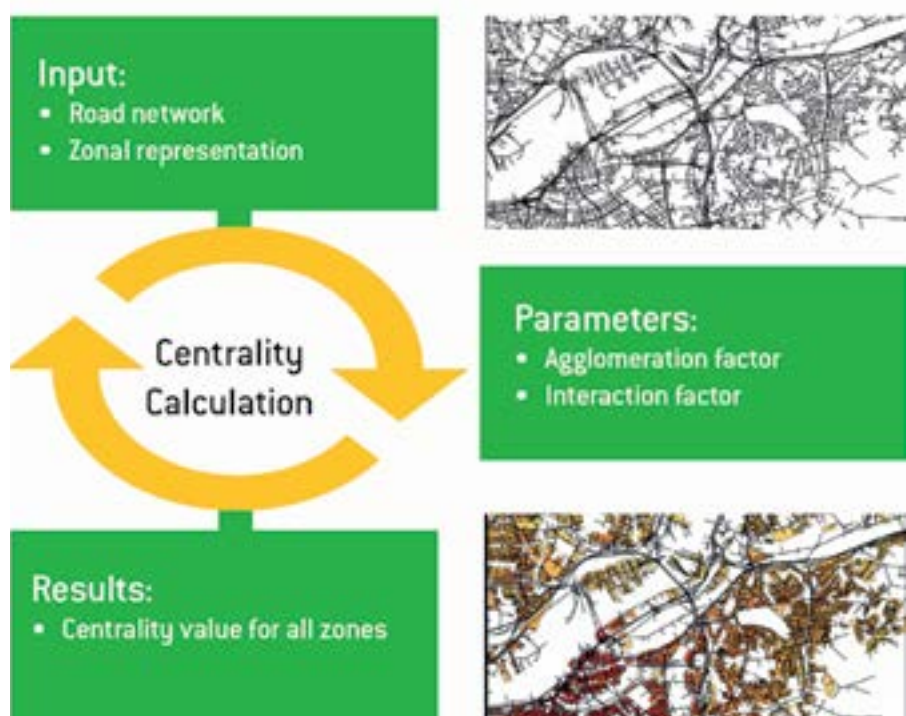

Figure 3.3: Comparing the multi-regional preferential centrality model (left) with empirical land taxation data (right). Values (model and empirical) are aggregated to larger administrative tax assessment areas. The shown values are relative to the area.
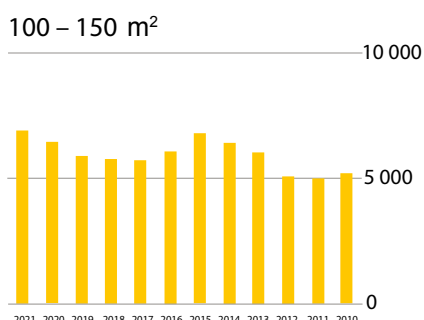
100 – 150 m²

Figure 3.1: House sales over time for single family houses 100–150 m² (Source: www.booli.se)

tions. Also, according to Swedish real estate statistics, prices on single-family houses did increase during the pandemic, but the number of sales did not increase significantly.

Based on those insights, one may argue that a "mass relocation" from urban areas is not very likely over time. Yet, from a planning perspective, there are reasons to assess various spatial scenarios based on the pandemic experiences.

The investment cost is a key deciding factor when it comes to finding a large apartment or a single-family house. In the Gothenburg Region, less expensive housing can be found outside the Gothenburg agglomeration or in the regional hinterland. If relocation to peripheral areas becomes a significant pandemic

effect, it raises new questions for spatial planners. What happens if relocation causes an increase in urban sprawl?

The study explores the concept of *centrality* as a method for assessing the potential spatial consequences of relocation. Centrality is, in short, a measure of potential interaction and activity. By using a mathematical model[1], a relative centrality index for an area is given, depending on the input scenario. A low cen-

1 Alexander Hellervik, PhD at Chalmers University of Technology, constructed the mathematical model that was used in the study. ("Networks of urban interaction – Growth and centrality in the complex geography of urban activity" is Alexander Hellervik's doctoral thesis.)
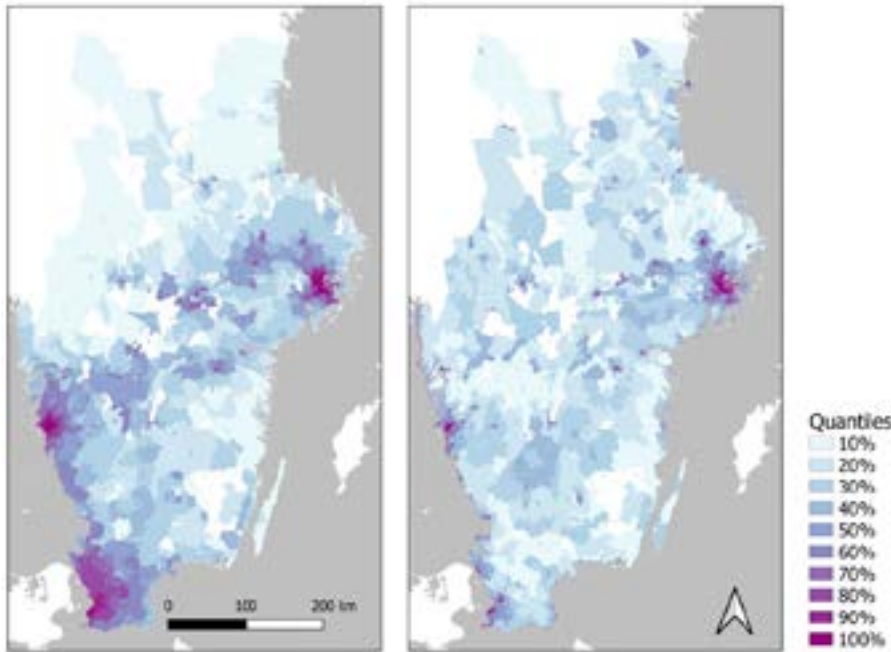
Figure 3.4: Implementation structure for the preferential centrality model.

Figure 3.7: COVID-19 has contributed to desirable changes towards a sustainable spatial development.

trality value indicates a low grade of exchange between people, as well as low regional "efficiency", for example in public transportation systems.

How strategic planners shall address the new situation and at the same time limit urban sprawl, de-urbanisation and segregation, is a challenge, but a flexible work situation will be a part of a new planning strategy. Centrality and urbanisation may be useful for describing spatial outcomes, such as the consequences from increased relocation to peripheral areas.

3.4 Workshop results

Based on the study and the inventory, the webinar participants were asked to indicate whether they agree or disagree with four presented statements. These were intended to stimulate discussions by "forcing" participants to assume a position on the complex issues. The statements focused on what pandemic experiences may mean for spatial planning. According to the answers, there seemed to be a consensus that planning practice *should* adapt to demands for more space and flexibility. But also that in the long run, COVID-19 will probably *not change density* as a presumption for spatial development. Other statements were not as widely agreed upon. See the results below.
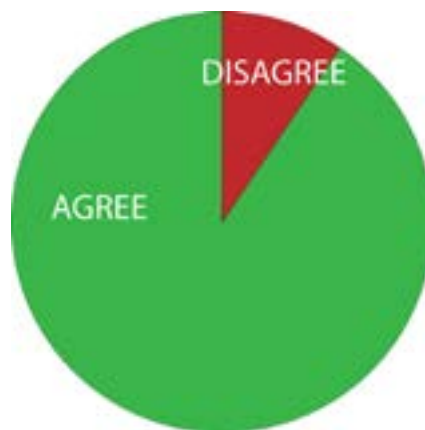

Figure 3.5: The spatial planning practice should adapt to the demand for more space and flexibility.
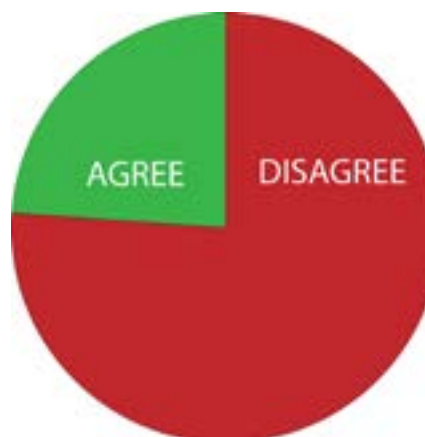

Figure 3.8: Remote working will support the development of areas that are not addressed in existing spatial plans.

Figure 3.6: COVID-19 will have a long-term and structural impact on density as a presumption for spatial development.

During group work, participants discussed two main topics and were asked to present policy recommendations for each topic.

Adapting planning practice post-COVID-19
- How can and should we adapt our planning practices to the experiences from the pandemic?
- How can we meet the demand for more space/flexibility and still ensure sustainable land use?
- What are the arguments for density in a post-pandemic planning practice?

New trends post-pandemic
- How do we make use of the pandemic's positive trends for a more balanced long-term territorial development?
- How do we encourage smart mobility and better liveability in dense areas due to, or because of, the pandemic experiences?
- What are the prospects for urban densification considering the experiences from the pandemic?

Group work conclusions
- Individuals and organisations have an increased need for flexibility, which has consequences for planning at a local and regional level.
- Sooner or later, things will turn back to 'so-called' normal with a few exceptions, such as city logistics, commuting in some areas, business meetings, etc.
- Policies restricting the incorporation of new areas into land use and especially suburbia are already in place in most cities.
- COVID-19 does not have a tremendous impact on city-scale planning. Firstly, because it is market driven. Secondly, because processes have been going on for quite a long time and the time scale of urban development is larger than the time of pandemic situations.
- Cities should not be organised around mobility, but around people.
- We need to increase flexibility in mobility when preparing for the next COVID situation. However, the danger of flexibility is that there is less incentive to provide proper public transportation, when we are not designing solutions for the 'permissible load' of public transportation.

- Actively planning and "reinventing" local centres.
- Use provisional measures implemented during COVID-19 (terraces, bike lanes, public spaces) to make them permanent.
- Promoting mixed use will support sustainable land use and a flexible travel demand.
- Planning for density has not changed that much in the post-pandemic situation. Governments should calculate and include all the aspects of external and spatial costs when opting for spatial planning decisions.

3.6 Concluding remarks
The Gothenburg Region's part of the SMART-MR prolonging has focused on COVID-19's impact on urbanisation, density, and densification from the perspective of post-pandemic spatial planning. Drawing conclusions from the recent past is difficult, not to mention the complexity in predicting the future. Time will tell what the long-term consequences for spatial planning will look like. Anyway, our project activities can contribute some reflections for future planning practice.

Firstly, the pandemic has had a major impact on land use, housing, and mobility in metropolitan regions. Many consequences were immediate and swiftly transformed urban life in cities. Some changes have actually been desired for a long time and COVID-19 accelerated them, for example traffic reductions and the expansion of public spaces. Secondly, the pandemic increased the demand for more space and for individual and flexible behaviours. If these demands are here to stay, they will probably affect spatial planning significantly. Thirdly, according to our discussions, planners do not think that density will be less relevant in post-pandemic spatial planning. There are still arguments for density when it comes to spatial organisation, for several reasons related to sustainability and resilience. So finally, as planners, we should keep observing the development of a post-pandemic world, without abandoning established planning practices.

GR Team (Sebastian Andersson, Anna Gustafsson, Per Kristersson, and Maria Ljung)

3.5 Policy recommendations

Housing
- Identify tools to reach an equilibrium in the housing market and "options for choice" for various groups in society.
- Buildings should be designed for multi-functional usage in order to make them more flexible. This could be done either by allowing to change the functionality (e.g., from apartment to office) or by providing more flexibility in terms of size and units.

Mobility
- Improve regulations on shared and smart mobility (e.g., by financing IT platforms).
- Provide on-demand public transportation.
- Improve infrastructure for micro-mobility and restrict the use of cars to create a supportive environment for local businesses.
- Remote work should be measured permanently in order to gather data on travel patterns.
- Remote work should be promoted and extended wherever possible.

Land use/spatial structures
- In order to promote a better densification, we need to plan more green areas and walking spaces; we need to have everything we need within a 15-minute walk.

Campanhã Station Intermodal Terminal in Porto, Portucal (in construction) will also include extensive green areas. Picture: Janez Nared

Picture: Vanessa Riki

e-WORKSHOP 4:
Station Area Concept – reactions and responses

4.1 Introduction

Following experiences gained with the SMART-MR project the Station Area Concept (SAC) suggests that by linking city growth to existing public transport corridors and developing a polycentric metropolitan structure with rail as the backbone, would decrease the need for private cars. These measures will support the goal of achieving sustainable development on regional level. By acknowledging the importance of integrated planning, the concept suggests developing station areas as multi-functional urban nodes, starting points, and pilot platforms for low-carbon area development. What is needed are the steps and understanding for the functioning and best practices locally at the metropolitan, city, and station area level.

The COVID-19 pandemic – and that might be a first one that has taught us a lot – has challenged the organization of transport. We have seen rapid changes in mobility patterns and modal split, and the need for the last mile logistics has increased. Decreased

mobility during the pandemic restrictions and increased teleworking have transformed people's perception of mixed use of spaces. Station areas as urban nodes for working, living, and services vary from urban to rural areas in the functional metropolitan area. There are large differences among station areas on how the COVID-19 pandemic has impacted the station environments depending on the functional mix, density level, mixture of housing, and quality of the urban space near the stations.

During the COVID-19 pandemic, increased remote working has reduced the need for long distance and motorized mobility. Individuals' willingness to use public transportation has decreased to avoid the risk of contagion. This is reflected in reduced numbers of rail transport users and further has led to an increased use of cars—for those having one, many do not own a car in urban centres throughout Europe—and to increased active mobility, meaning walking and cycling. Visitor numbers in station areas have

dropped, although less drastically in those station areas where commercial services attract visitors. The demand for local services and green areas has grown. For the first time ever, education has been partly transferred to distance learning or online formats for weeks and months. As peak hours are influenced by school beginning hours and those of higher education facilities, one could also observe a real break in peak hour loads of public transport. It has been noticed that the behaviour during longer periods of the pandemic has not been a changed behaviour by own will and optimisation of individuals but that the described effects have largely been by governmental and in some cases company enforcement. All observations therefore have to be judged with caution.

Home, workplace, education, shopping and leisure are the crucial points of 'everyday life' that define people's mobility behaviour. If these change, as happened during the COVID-19 pandemic, it impacts mobility behaviour and spatial distribution of activities. To

support knowledge sharing among European metropolitan regions regarding the COVID-19 pandemic experiences in mobility and their possible implication on station area development, the SMART-MR project organized the workshop 'Station Area Concept – reactions and responses', held on 17 March 2022.

The workshop started with a keynote speech by Professor Gunnar Heipp. *He focused* on urban rail nodes and station area development looking back at the history and today of urban development and rail nodes. Professor *Heipp suggested recommendations such as* more intensive mixed use and densification and in much larger areas as most cities provide today. However, it is not enough to make a city a rail based one by this only, but cities must focus more on walkability. The goal should be improving the urban public spaces on a city-wide level, as the use of public transport by broad groups of society always heavily depends on walking to and from stops and stations. Professor *Heipp also addressed the importance of* leadership in urban and transportation planning, land (ownership) policies, management of parties involved, added value management by cities and integrated approach to public space management.

The workshop also included an overview of the inventory questions collected from partner regions beforehand and a presentation on the preliminary analyses of mobility behaviour changes in station areas during the COVID-19 pandemic in the Helsinki metropolitan area. The workshop continued with group discussions. Main goal was to understand possible behavioural changes, and their eventual translation into spatial and mobility planning for a future non-crisis context.

4.2 Regional study

The analyses of mobility behaviour changes in station areas during the COVID-19 pandemic in the Helsinki metropolitan area included using aggregated and irreversibly anonymized Telia Crowd Insight mobile phone data, which is based on tracking phone locations in the mobile network provided by mobile operator Telia and scaled to represent the whole population. 14 station areas were analysed with monthly and hourly data on dwellers in the station areas and trips to and from the station area in the years 2019, 2020, and 2021.

On weekday mornings, the numbers of people arriving to the stations dropped for 35% to even almost 90% in 2020 compared to 2019 levels. Based on preliminary analyses, it appears that the recovery of visitor numbers in 2021 has been faster in station areas with more commercial services, however, there are large differences between station areas and more detailed analyses are needed.

4.3 Inventory results

4.3.1 Impacts of increased teleworking on CO$_2$ emissions in transport

In 2020, reductions in greenhouse gas emissions in the transport sector were reported due to reduced mobility during COVID-19, which was related to mobility restrictions and increased teleworking. Increased teleworking has the potential also post-crisis to reduce work trips, contributing to greenhouse gas emission reductions. However, only a few regions out of the seven European project metropolitan regions identified studies that evaluate the impacts of teleworking on CO$_2$ emissions in transport, and some studies focused mainly on air quality. The current identified national-level studies estimated that the COVID-19 impact on CO$_2$ emissions in the transport sector would remain low in the long-term. Further, considering the impacts of teleworking on CO$_2$ emissions, the partners' regions addressed the importance of also considering other aspects of changes. Changes were recognized in travel modes, in energy usage (at home and office locations), consumption behavior, at the impact of possible relocation habits, and possible increase in other trips than work trips to get a more comprehensive view. To that respect, especially the move from international tourism to national and regional tourism and leisure activities has been observed throughout Europe, but no correlated data with work trips and behavior has been collected systematically so far.

There are several factors limiting teleworking now and, in the future, such as the structure of jobs since only a limited number of people can work remotely; working con-
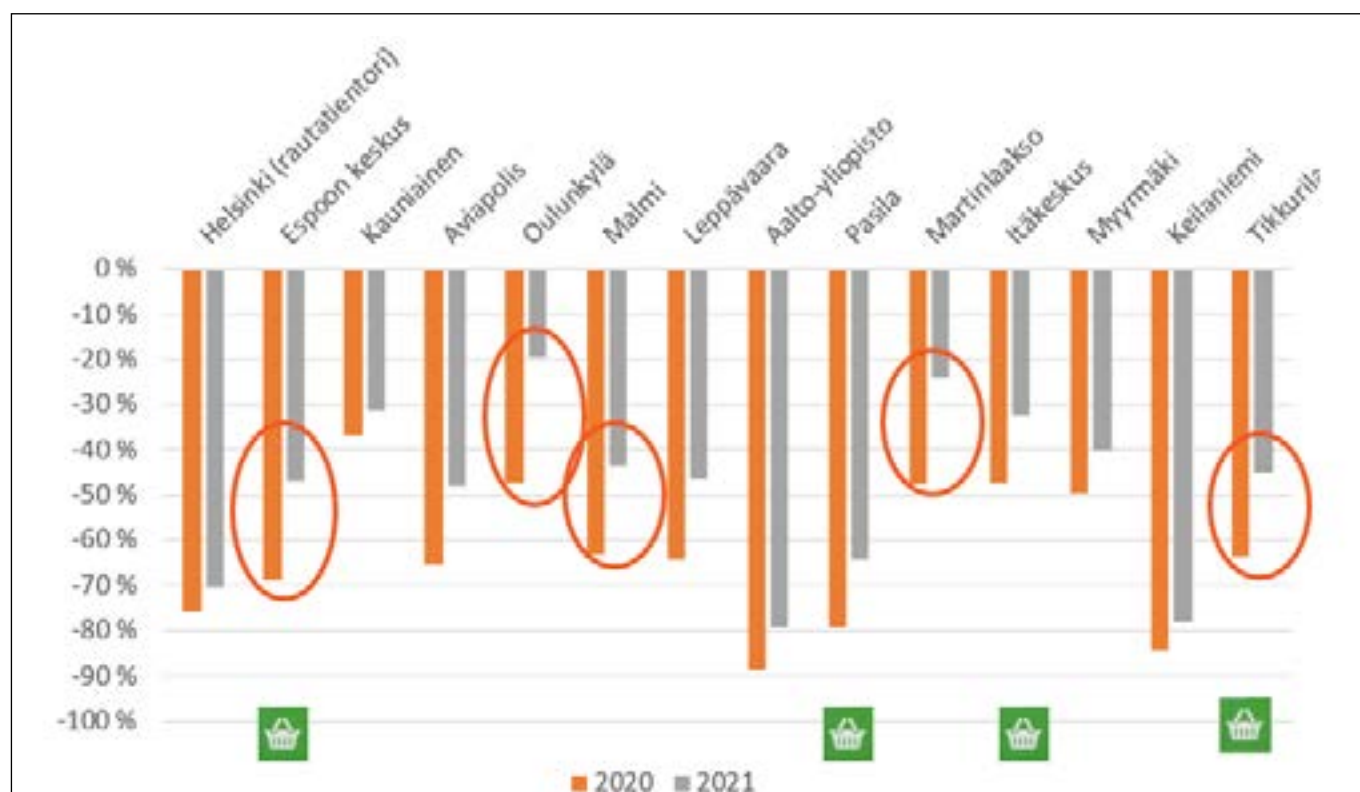

Figure 4.1 The number of people arriving to stations decreased in Helsinki metropolitan area compared to year 2019.

ditions at home; flexibility of work practices; social and cultural aspects; insufficient infrastructure and ICT; taxation practices; lack of regulation; and cyber security practices. A complete study of which proportion of the population—depending on the workplace, social/family and housing situation—can and is willing to do this, seems not yet to exist. But it is evident for transport predictions, transport modelling, as well as concrete projects what types of patterns can be realistically awaited in the future.

4.3.2 Low-carbon initiatives during COVID-19

Many local low-carbon area development initiatives have been implemented during the COVID-19 pandemic in the partner regions, such as improved cycling infrastructure, pedestrian streets, and new or improved bus service and bus lanes. Traffic has been calmed in a few neighbourhoods; low-carbon logistics practices have been piloted. New forms of flexible usage of space have emerged in the form of service terraces, flexible usage of parking spaces, and local meeting areas. Communication campaigns have supported cycling and the use of public transport. It seems the COVID-19 pandemic times have sped up the implementation of low-carbon mobility initiatives, especially concerning walking and cycling. However, many of the pilots were only temporary and these immediate reactions and low-carbon initiatives during COVID-19 have mostly not been located in station areas.

4.3.3 Local development in station areas

Some sectors, like gastronomy, hotels, retail generally experienced huge challenges due to COVID-19 restrictions. Subsidies to companies in these sectors were provided, reducing the negative impact to employed persons and shareholders of this type of businesses. Many businesses developed their services into new forms, such as home delivery and e-commerce. Some of them also managed to reach out to new consumer groups. Those that could not adapt, had close. As a result, there was no strong immediate economic fall, but merely a slight transformation of existing businesses models. Station areas were identified to benefit from teleworking, for example as attractive places for new office construction with good public transport accessibility.

Food and convenience: Online stores selling food experienced a significant boost in 2020. New grocery service business models and actors basing their business models solely on e-commerce have emerged. Lunch restaurants have faced severe difficulties and developed new business models, such as lunch bags or piloted circulating food trucks. Food delivery companies have grown significantly, and restaurants have developed their own delivery options. Some restaurants and coffee shops that could not perform home deliveries and did not have enough capital were forced to close. In some areas, cafés and restaurants have been booming.

Teleworking spaces: New spaces for teleworking have emerged, but this development had already been identified before the pandemic. There has been discussion about the potential for co-working spaces in more peripheral areas, possibly in station areas, but also in more rural places. The user base of the facilities is expanding more and more from the creative industries and start-ups to large companies and representatives of traditional industries and public organizations. A few examples of developing co-working concepts in public sector have been identified.

Circular and sharing economy: The use of micromobility has increased, and some new mobility points, such as bike and car sharing, have been planned in central and stations areas. Some sharing economy businesses have faced difficulties with the loss of customers, such as Airbnb, but new business models have developed as well.

4.3.4 Data used for analysing mobility behaviour changes

New forms of data collection offer the potential for better decision making through the collection of behavioural data, such as Mobile Phone Data. The use of Mobile Phone Data was new to most of the partner regions, some aiming to pilot the use. Mobile Phone Data had been used in the Helsinki, Barcelona and Rome regions to estimate mobility behaviour changes during COVID-19.

4.4 Workshop results

4.4.1. Recovery of public transport and the role of station areas at the metropolitan level

Public transport has faced a shock during the COVID-19 pandemic, which has had implications on station area development as transport hubs. Increased teleworking, partly also rising unemployment possibly, during the COVID-19 pandemic has decreased the number of people commuting, especially long distances. Regional and local public transport usage has seen a slow recovery. Developing transport nodes requires awareness regarding how people will continue to telework and commute in the future: if, for example, the willingness to spend time commuting decreases, what does this mean for the development of public transport services? Cycling has increased, and travelling by private car has been preferred as the safer option during the pandemic, and these trends impact how public transport and station areas are to be developed.

According to experiences from partner regions it seems that travelling at peak hours has reduced during the pandemic and it was highlighted that it should be better considered how flattening peak hours impacts the management of public services; for example, it should be acknowledged in transport route planning. Looking only at peak hours does not serve as a good base for planning and developing lively and multi-functional station areas either, and therefore strengthening mixed-usage and the variety of roles station areas have as urban nodes supports resilient development. Changes in the use of space and in people flow is occurring in other locations as well, which might impact station area development.

The role of station areas as urban nodes for local services has been strengthened, as the need for travelling to the city centre appears to have reduced and the need for local services has increased during the pandemic. Station areas should be developed as urban nodes for services as well, not only as transport hubs, but well-connected to the surrounding urban structure. Attractive spaces are needed for businesses, and it is important to increase the attractiveness of spaces that attract people to stay rather than only fluent to transit. There is also the potential to develop station areas as teleworking places.

The time scale in urban planning and the processes of how it can be developed need to be considered. Cities should continue to define what "station areas" and "urban nodes" are in terms of urban form and in terms of size and management. One key problem in managing "station areas" is the divided responsibility between (mostly) municipalities and

railway station operators, not to mention the hundreds of stakeholders acting inside those extremely complex parts of urban structures. The conception and development of planning and decision-making structures for co-development should be a priority. The Station Area Concept (SAC) and the Low Carbon District concept created in an earlier phase of the SMART-MR project for station areas provide a tool for setting shared goals for station area development and support the definition of actor roles as developers of the area.

It will be increasingly more important to develop station areas as part of urban centres that can have a permanent role in people's daily life independently of the use of railways. An example would be more educational facilities nearby or in the station itself as a variation from pure shopping and (fast) food for a more diverse structure of usage and better public spaces, which also contributes to its attractiveness, becoming part of the iconic part of cities, the "places to be". The pure transit and quick shopping functions have been proven to be a risk, as they can be easily replaced.

The pricing of public land and parking should be considered more in station area development so that, for example, the mismanagement of parking places can be avoided. The price of public space should be highlighted much more and foresee the changes in space usage. For example, if there are fewer commuters and less need for parking spaces, a more flexible approach to space usage is required.

4.4.2. Local development in station areas

Actions to improve walking and cycling facilities in station areas were identified as a development priority. It was recognized that COVID-19 has sped up low-carbon pilots, especially related to walking and cycling, but many of the low-carbon measures implemented during COVID-19 were not located in station areas. Further, many of the pilots were temporary and not permanent solutions. Other challenges were identified as well, especially based on the temporary nature of the pilots, such as using car lanes for cycling during reduced car traffic in COVID-19 times, creating safety issues when car traffic increases or during maintenance. Support services for improving cycling friendliness in stations has also been identified as important.

New cycling lanes might have been developed by taking space away from other sustainable transport modes, which does not support sustainability goals in the larger context, and therefore it is essential to consider the space allocations.

The work ahead will involve safeguarding those positive initiatives, flexibility, and fast action. These actions did not unfold as part of the need for climate protection, but because quick solutions were necessary for local mobility alongside public transport. This could also indicate that the "branding" of measures needs to be overhauled to generally make changes in modal shift happen.

Political support is needed for a successful implementation of new low carbon pilots, and the actions need to be included as part of regional development policies and funding possibilities so that instead of temporary pilots, the very urgently needed leap into large scale implementation becomes a reality.

Successful station area developments and implementations have focused on strengthening the overall and comprehensive approach to station area development and gaining political support. Bringing actors to the same table and better management of public and private spaces is the way forward. There is more potential to involve citizens and other stakeholders more actively in the development. Examples of successful community rail projects were identified from outside the partner regions, such as in the UK. Boosting community development can contribute to increasing attractiveness, place making, but also the safety of station areas; it does have to be recognized, however, that those examples are mostly from rural or smaller cities and cannot be easily transposed to larger cities.

It has been recognized that parking spaces take a lot of space, depending on the location, the required area size, as well as who benefits from the space usage. The challenge has been identified to be how Park&Ride can better support those arriving from a distance and not the people coming by car from a short distance where the use of walking and cycling would better serve sustainability targets. At the same time, Park&Ride must not erode the fragile regional bus networks if they are to have a future. Saying this, it is evident that the pricing of Park&Ride should also be on the table as well as parking fee levels in cities in general. The present pricing schemes in most European cities still favour car ownership and car ridership in terms of pricing or parking versus public transport.

4.4.3 Data provision opportunities and challenges for station area development

The potential of artificial intelligence and Mobile Phone Data has been recognized by partner regions in order to improve data provision to support planning and decision making. However, insufficient experience of the data, the prices of data services are high, privacy policies are still developing, and only insuffi-

cient risk analyses of digital systems exist to estimate the full value of these new data collection and analyses methods. Mobile Phone Data services have not yet developed to identify travel modes.

Station operators—as do train operators—should offer alternative types of data collection, such as locally collected data through detection at stores, entrances, parking spots, escalators, or publicity boards. This can deepen the knowledge and reduce the dependency on expensive data by mobile phone operators and their consulting and reduce the risks related to sharing people's location data.

4.4.4 Teleworking: opportunities and challenges for station area development

The opportunities and challenges of teleworking depend on the perspective. From an individual point of view, it offers many benefits, such as improved flexibility or possibility to relocate more freely. However, from a societal perspective, the impacts of teleworking are much harder to estimate. Reduced commuting flattens traffic peaks or their distribution might change, which would have implications on the arrangement of public transport. Increased teleworking might result in urban sprawl; however, it was also recognized that rising energy prices and increasing distances might mitigate any possible urban sprawl. The benefits of teleworking would not be dispersed equally because the benefit of improved flexibility would concern only the limited group of people who are able to work remotely.

The positive impacts could include strengthening the role of smaller centres, such as in surrounding municipalities and could support the improvement of public transport to those areas with better regional accessibility between the regional centre and surrounding centres. However, reduced commuting could result in deeper challenges for the arrangement of public transport. Estimating the CO_2 emission reduction potential is vital, but it is not the only approach; other emissions and impact on air quality also need to be considered, and therefore, a holistic approach should be developed and applied to estimate the impacts of teleworking.

It is also pertinent to think about the possibility of combining "passive effects" (what people like to do and will do if allowed) and "proactive strategies" (what regional and local authorities will implement in order to achieve overall societal goals). One example are systems of road pricing or mobility pricing (including public transport), which aims to break expensive to offer services during peak hours

and which be widely accepted when teleworking remains a normal part of people's lives for a few days a week.

4.5 Policy recommendations
Based on the presentations, inventory results, and discussions, the following policy recommendations have been prepared:

- *Apply a holistic approach to estimate the benefits and impacts of teleworking on the use of public transport as well as on the other transport modes in urban nodes in the future.*
- *Improve the walking and cycling environment around stations (utilising lessons-learned from COVID-19 time pilots) to support liveability in station areas and support fluent sustainable travel chains.*
- *Develop more public open spaces and pop-up spaces around the stations to support the liveability and attractiveness of the area.*
- *Apply and further develop 15-minute city concepts (accessibility by walking or cycling) and make station areas the hub of them. Develop railway stations around more than just trains departing and arriving.*

It has been recognized that the COVID-19 period has not significantly sped up station area development, which is important, because the biggest gap is the slow implementation of development targets towards a low-carbon and polycentric urban structure in metropolitan regions. Therefore, referring to the earlier SMART-MR Low Carbon District and Station Area District concepts, the project makes following recommendations:

- *Define the appropriate size for station area development projects, aiming at co-developing a high-quality part of the city including usages and public spaces amongst stakeholders. Be sure to plan an operations and maintenance phase to secure quality.*
- *Support processes that bring different actors involved in the station area development to the same table to discuss, develop, and make informal and formal decisions: create a permanent governance model for each of the station areas with the stakeholders.*
- *Consider the price of public space carefully when developing station areas. Take action in land use and land ownership as the municipal planning authority in the earliest stage possible to secure the possibility of acting.*
- *Political decisions are needed to make the station environment and land attractive by defining various land use zones supporting the defined goals (such as mixed use).*
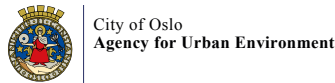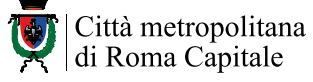- *Political decisions on a strategic approach need to be defined for station area development goals (developed as a transport hub, a station community, or something in between).*
- *Support community development at station areas and promote the involvement of citizens to create an attractive and safe space in station areas.*
- *Develop station areas as integrated mobility hubs supporting sustainable travel chains with bikes, buses, carsharing, taxis, shared bikes, and shared cars; do not forget to consider city logistics. Develop and enable a flexible use of car parking spaces as to enable a different use later.*
- *Find regulations or pricing models that stimulate car parking in station areas targeted to users coming from greater distances.*

Helsinki Team: Irma Karjalainen, Roosa Halonen, Aino Hatakka

Picture: Helsinki Region Environmental Services HSY / Jenni-Justiina Niemi

17

Metropolitan region	Partner	
Ljubljana	Research Centre of the Slovenian Academy of Sciences and Arts	ZRC SAZU
	Regional Development Agency of Ljubljana Urban Region	RRA LUR regional development agency of ljubljana urban region
Oslo/Viken	City of Oslo, The Agency of Urban Environment - observer	City of Oslo Agency for Urban Environment
	Viken County Council - observer	VIKEN COUNTY COUNCIL
Gothenburg	Göteborg Region Association of Local Authorities	GÖTEBORGS REGIONEN
Helsinki	Helsinki Region Environmental Services Authority	HSY
Budapest	BKK Centre for Budapest Transport	BKK BUDAPESTI KÖZLEKEDÉSI KÖZPONT
Rome	Metropolitan City of Capital Rome	Città metropolitana di Roma Capitale
Porto	Porto Metropolitan Area	amporto
Barcelona	Barcelona Metropolitan Area	AMB Àrea Metropolitana de Barcelona

Interreg Europe project SMART-MR (Sustainable measures for achieving resilient transportation in metropolitan regions) supports local and regional authorities in eight European metropolitan regions to improve mobility policies. It also aims to provide sustainable measures for achieving resilient low-carbon transportation and mobility in metropolitan regions of Barcelona, Budapest, Göteborg, Helsinki, Ljubljana, Oslo/Viken, Porto and Rome. Project will be running from April 2016 until March 2023 and coordinated by Anton Melik Geographical Institute of the Research Centre of the Slovenian Academy of Sciences and Arts and funded by European Regional Development Fund.