

D.T1.1.3 WORK PAPER

Identification and Learning from Key
Literature and Good Practices

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1. Introduction

The “Work Paper - Identification and Learning from Key Literature and Good Practices” provides an overview of key literature in the field of accessibility planning - especially in the context of rural passenger transport with a focus on intermodal integration in peri-urban hinterland regions to primary transport hubs. Besides the key literature, the paper compiles examples of good practices provided by the project partners about establishing and improving public transport connections in polycentric regions as well as the development of sufficient quality in public transport service.

Both, literature and good practices, summarise the current state of the art in the field of transport planning to connect poly-centric regions. Therefore, they lay the groundwork for instructional knowledge which enables the partner regions to elaborate and review their implementation plans and pilots. Therefore, the work paper investigates the topic by covering three subjects:

1. *Spatial planning - Definition of central places:* Following a hierarchical transport planning approach - from rural hinterland regions up to metropolitan areas - the classification and identification of central places is a main approach to categorise access points to utility services and primary transport nodes in a wider network of places, connections and infrastructure. Central places serve as main-hubs according to their role in such a system. With their facilities, services and infrastructure they play a crucial role in the supply of people within a given area. The identification of central places is, therefore, one of the first steps within a hierarchical transport planning approach.
2. *Improvements of accessibility and connections to higher transport infrastructure/networks:* With the knowledge of central places and - deduced from that concept - a categorisation of main-nodes and sub-nodes in the hinterland in a hierarchical network of public transport services, we are able to focus on the quality of connections and infrastructure between main-nodes, sub-nodes and the hinterland. This could be done via a two-step process: first by the identification of shortcomings, like missing links or a poor quality of services, and second by the recommendation of well-adapted measurements to establish new connections out of the hinterland to the identified sub-nodes as well as actions to improve the quality of services. Taking this two-step process into consideration, the subject of the improvement of accessibility and connections to higher transport infrastructure covers a range of literature and good practices that deal with the assessment and improvement of public transport services, especially in rural areas.
3. *Policy instruments/policy strategies to improve connectivity and accessibility:* The third dimension of accessibility planning relates to a certain political and organisational assertiveness of regional authorities. Such authorities, like the municipality or local government, are the political institutions in charge of the implementation of improved public transport services. A purposeful strategy contains the direction and aims of the development as well as the specification of measurements. Such a policy instrument guarantees the implementation of improved hinterland connections in the end. This part of the analysis covers, therefore, the issues around the policy instruments or policy strategies to improve connectivity and accessibility within a given region.

The compilation and analysis of the literature, as well as the identification of good practices, follows a multi-step approach. Literature has been analysed and results have been converted into a structure being able to provide a brief overview of key elements of the knowledge according to the chosen subjects. The same was done with the good practice examples.



2. Topic A: Spatial planning - Identifications and indicators of central places

In 1999 the European Commission published the “European Spatial Development Perspective (ESDP)” [1] which serves as the main policy framework towards a balanced and sustainable development of the territory of the European Union. One of the main aims of this major spatial development strategy lies in the development of a balanced and polycentric urban system and a new urban-rural relationship. This includes the strengthening of the partnership between urban and rural areas in order to create an advanced urban-rural relationship. This culminates in several policy options. Among them is the “Strengthening [of] secondary transport networks and their links with TENs, including the development of efficient regional public transport systems” (p.27). With regard to a polycentric urban system, the European Commission considers small and medium-sized towns with careful attention. That is because small and medium-sized towns and their inter-dependencies form important hubs and links, especially for rural regions (p. 24).

With this statement, which is no less than a general strategy for spatial development programs in all parts of the European Union, the European Commission acknowledges the importance and significance of small and medium-sized towns for their hinterlands. Spatial development programs in the member states of the European Union and their local planning authorities seek to strengthen small and medium-sized cities as key elements of the territorial integrity in a polycentric system, especially in declining rural areas.

A.1 European spatial planning

Despite the various spatial planning strategies or approaches of the EU member states, the implementation of the ESDP produces a concept of its own, which is referred to as the European spatial planning approach. The European spatial planning approach can only be understood by considering the perspective of governmentality [2]. From this perspective European spatial planning is defined as a strategic approach to coordinate the spatial impacts of policymaking horizontally across policy sectors, vertically between different levels of government and geographically across administrative boundaries [3]. Broadly spoken, frameworks and principles form policies with spatial impacts. Nevertheless, the power of the European spatial planning approach, which is relevant for the stakeholders within the SubNodes project, lies within the potential capability to link urban areas with their surrounding areas and promote and steer cooperation. The appropriate instruments are strategic spatial plans and frameworks at a regional or local level. Albrechts et al. (2003) highlight the potential power of strategic spatial plans and frameworks which they summarise in five dimensions of the European spatial planning:

- Plans have the capacity to frame concepts and images to mobilise and fix attention,
- they create policy discourses through which specific decisions and practices are focused,
- they have impacts on statutory tools and procedures,
- they create expert policy communities that carry new ideas from place to place and enrich local learning capacity, and
- they are able to shift governance cultures [4].



A.2 Small and medium-sized towns

In recent years there is a growing recognition of the importance of small and medium-sized towns among scientists and practitioners in the field of regional development. European spatial policies take account of the various initiatives – a position which has been underlined by the EU Ministers responsible for Spatial Development in 2011 in the Territorial Agenda 2020: “In rural areas small and medium-sized towns play a crucial role; therefore it is important to improve the accessibility of urban centres from related rural territories to ensure the necessary availability of job opportunities and services of general interest” [5]. The specific role of small towns consists of the provision of jobs and services for their hinterlands which are usually rural as well as their location within transport and city networks. In this context Maly [6] points out that the service function of small towns is affected, next to its own population size, by the position of the town towards the core city of a metropolitan region and especially by the transport infrastructure. In this sense, the existence of a transport system connecting to the core city can serve as a criterion to define small and medium-sized towns as *sub-nodes* in a wider local and regional network within the urban-rural continuum. Besides the provision of central services and facilities, small and medium-sized towns serve as hubs for their hinterland in terms of development and local stabilisation.

A.3 Centrality and definition of central places

Central places are usually defined as towns fulfilling central functions for the surrounding area. This idea has been developed as a concept to understand and plan some structures of spatial organisation. Spatial planning around central places intends to improve the spatial coordination in order to provide goods and services. The concept of central places has recently been enhanced and redefined by integrating a network theory. It is assumed that city networks are complementing local factors and support the specific rural hinterland in their development [7] – in which cities are understood as local networks as well as functionally specialised nodes in a wider non-hierarchical network [8].

As the definition of central places usually follows functional approaches, service provision and job density are centrality indicators. To figure out central places it is necessary to develop a hierarchical system of cities with a specific set of purposes, infrastructure and facilities. The catalogue of necessary facilities for the different types of central places varies widely from one approach to another [9]. Nevertheless, each approach contains a set composed of educational facilities, local amenities, health centres and public services. In Germany, for example, the regional planning authorities list at least 14 different kinds of services in their development plans [9].

Every central place serves as a regional node for a predefined catchment area. At this point, spatial planning overlaps with transport planning: The access to central places must be assured for the people living in a specific catchment area – transport is, therefore, a service of public interest.



Relevant literature and good practices:

Subject A.1: European spatial planning		
Title	key elements	year and source
<i>ESDP European Spatial Development Perspective: Towards Balanced and Sustainable Development of the Territory of the European Union</i>	<ul style="list-style-type: none"> × EU strategy: Achieving the Balanced and Sustainable Development of the Territory of the EU × The Contribution of the Spatial Development Policy × Policy Aims and Options for the Territory of the EU 	1999 [1]
<i>Polycentricity in European Spatial Planning: From an Analytical Tool to a Normative Agenda</i>	<ul style="list-style-type: none"> × European spatial planning framework × spatial policy discourses × concept of polycentricity 	2003 [10]
<i>Strategic Spatial Planning and Regional Governance in Europe</i>	<ul style="list-style-type: none"> × development of strategic spatial development frameworks for city regions in Europe × three examples: (a) Hanover city region, (b) the Spatial Structure Plan for Flanders, (c) the Northern Ireland Regional Development Strategy 	2003 [4]
<i>Planning in Europe for 'EU'rope: Spatial planning as a political technology of territory</i>	<ul style="list-style-type: none"> × space and spatiality as central constituents of the territory of the EU × capacity to fuse populations and geographical areas into manageable entities 	2015 [3]
<i>European spatial planning as governmentality: An inquiry into rationalities, techniques, and manifestations</i>	<ul style="list-style-type: none"> × perspective to explicate European spatial planning × European spatial planning through the lens of governmentality × planning practices in northern Finland 	2015 [2]
<i>From smart growth to European spatial planning: a new paradigm for EU cohesion policy post-2020</i>	<ul style="list-style-type: none"> × the implementation and main impacts of European Union cohesion policy × alternative strategic design based on a cohesive and sustainable development vision 	2017 [11]
<i>European spatial planning</i>	<ul style="list-style-type: none"> × spatial planning policies supported by the European Commission × roots in the planning systems and practices of a number of North-Western European countries, most notably France, Germany and the Netherlands 	2018 [in press] [12]

Subject A.2: small and medium-sized towns		
Title	key elements	year and source
<i>Framing urban habitats: The small and medium towns in the peripheries</i>	<ul style="list-style-type: none"> × integrative vision of the role of small and medium towns × the role of sustainable regions and the effects as well as the causalities of urbanisation within the changing dynamics of cities 	2015 [13]



<p><i>Small towns in the context of "borrowed size" and "agglomeration shadow" debate: The case of the South Moravian region (Czech Republic)</i></p>	<ul style="list-style-type: none"> × Small towns play a key role in providing services for its wider hinterland × revealing the extent to which the provision of services is determined by location of small towns within a regional urban system strongly affected by a metropolitan area × the importance of tourist and commercial attractiveness of particular places (towns) to final provision of services 	<p>2016 [6]</p>
<p><i>Between urban and rural: Sustainability of small towns in the Czech Republic</i></p>	<ul style="list-style-type: none"> × small towns are functionally important as rural centres × position of small towns in the Czech settlement system × the definition of small towns, their geographical positions, demographic characteristics and functions in the national settlement system × typology of small towns aimed at individual pillars of their sustainability 	<p>2016 [14]</p>
<p><i>Significance of small towns in the process of urbanisation of the Wielkopolska region (Poland)</i></p>	<ul style="list-style-type: none"> × significance of small towns in the process of urbanisation of Wielkopolska × there is not a crisis of small towns since they play an important role in the process of urbanisation of the region × appearance of new towns set up as a result of the restitution of municipal rights 	<p>2016 [15]</p>
<p><i>Policies for Small and Medium-Sized Towns: European, National and Local Approaches</i></p>	<ul style="list-style-type: none"> × consideration of approaches at European and national levels to small and medium-sized towns (SMSTs) × in recent years there has been limited recognition that SMSTs have a significant role to play in the European territory × The research shows that the category SMSTs contains a varied and often dissimilar group of towns in a wide variety of regional contexts × 'one-size fits all' approach should be avoided × Policy approaches should be developed within particular national and regional contexts supported by the European level. 	<p>2017 [16]</p>
<p><i>Small and Medium-Sized Towns in Europe: Conceptual, Methodological and Policy Issues</i></p>	<ul style="list-style-type: none"> × theoretical and methodological challenges when it came to identifying, studying and analysing small and medium-sized towns (SMSTs) and the theoretical framework developed to inform our understanding of SMSTs × three themes are discussed: (a) the ontological problem of defining a town, (b) interpretative approaches about the relationship between towns and their regional context. (c) the thematic and multi-scalar perspectives that can characterise the policy approach to towns 	<p>2017 [17]</p>



Subject A.3: Centrality and definition of central places		
Title	key elements	year and source
<i>Alternative Explanations of Hierarchical Differentiation in Urban Systems</i>	<ul style="list-style-type: none"> × accessibility constraint is viewed as the systemic ordering principle of the spatial structure of urban systems × Improvement in accessibility, directed towards more and more sophisticated activities, in order to reduce uncertainties of life 	2006 [18]
<i>Intensive urbanisation: Levels, networks and central places</i>	<ul style="list-style-type: none"> × sociotechnical systems and space syntax are brought together in order to propose an interpretation of the different spaces, scales and layers of urbanisation × model of urbanisation and central place formation that crosses scale differences 	2013 [19]
<i>The Regional Economy, Spatial Structure and Regional Urban Systems</i>	<ul style="list-style-type: none"> × approaching the concept of the regional urban system, attention is initially drawn to the better-known types of economic region × models from location theory, which provide important points of reference, and within the setting of the present-day city-region 	2014 [20]
<i>From places to flows? Planning for the new 'regional world' in Germany</i>	<ul style="list-style-type: none"> × the experience of Germany to consider the political struggle to overcome the contradictions, overlaps, and competing tendencies that result from new regional spaces appearing × how the Federal State is using the ambiguity of the regional concept to present territorial and relational approaches as complementary alternatives × the analysis of regions and regionalism 	2014 [21]
<i>The Regional Economy, Spatial Structure and Regional Urban Systems</i>	<ul style="list-style-type: none"> × concept of the regional urban system, attention is initially drawn to the better-known types of economic region × particular models from location theory, which provide important points of reference 	2014 [20]
<i>Polycentricity and the Multiplexity of Urban Networks</i>	<ul style="list-style-type: none"> × multiplexity of urban networks with regard to the relational complexity of urban regions × geographical scope and spatial structure of different functional networks 	2014 [22]
<i>The Delimitation of Urban Hinterlands Based on Transport Flows: A Case Study of Regional Capitals in The Czech Republic</i>	<ul style="list-style-type: none"> × Transport flows are a good indicator of complex spatial relations - Transport regions of the Czech regional capitals are defined × delimitation of the urban hinterlands of the most important settlement centres in the Czech Republic, based on transportation flows × The metropolitan regions defined by transport relations are compared with regions of the Czech Republic based on commuting flows. 	2014 [23]



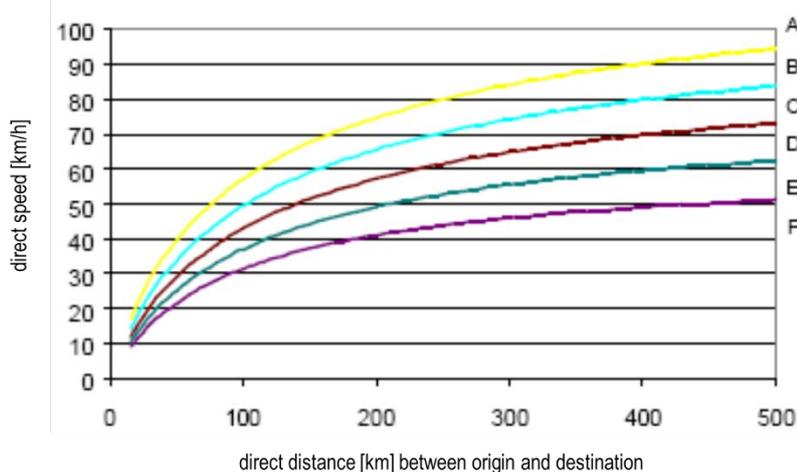
<p><i>Central places or networks? Paradigms, metaphors, and spatial configurations of innovation-related service use</i></p>	<ul style="list-style-type: none"> × empirical validity of this contention by analysing the geography of service use by innovators × local services diminish as one moves down the urban hierarchy, and services most strongly connected with innovation 	<p>2015 [8]</p>
<p><i>Borrowing size in networks of cities: City size, network connectivity and metropolitan functions in Europe</i></p>	<ul style="list-style-type: none"> × Network connectivity positively enhances the presence of metropolitan functions, but local size remains the most significant determinant for most types of functions. × The importance of size and network connectivity differs across metropolitan functions and across cities 	<p>2016 [7]</p>
<p><i>Classification of rural areas in Poland as an instrument of territorial policy</i></p>	<ul style="list-style-type: none"> × Typology of rural areas in Poland, the typology is based on three approaches (structural, locational and dynamic). × The individual types of rural areas can be assigned appropriate undertakings within the territorial policy. 	<p>2016 [24]</p>
<p><i>How much does urban location matter for growth?</i></p>	<ul style="list-style-type: none"> × the effect of location characteristics on urban growth × differences in accessibility to major urban centres and geographic isolation help explain differences in population growth rates across municipalities × urban population growth is related to the effect of distance to major centres and agglomeration 	<p>2017 [25]</p>
<p><i>Territorial Arrangements of Small and Medium-Sized Towns from a Functional-Spatial Perspective</i></p>	<ul style="list-style-type: none"> × functional-spatial perspective to the study of small and medium-sized towns × Types of urban centre according to positionality within territorial arrangement 	<p>2017 [26]</p>
<p><i>Central Place Theory: an Evaluation</i></p>	<ul style="list-style-type: none"> × a distinction is made between central places and specialized function centres, leading to the contention that in contemporary urban systems the central place structure represents one component of a more extensive urban system × central place theory is in need of elaboration and extension, but it continues to represent a valuable framework within location theory and urban and regional analysis 	<p>2017 [27]</p>

3. Topic B: Improvements of accessibility and connections to higher transport infrastructure

Considering the different challenges of the participating partner regions and the various approaches to improve accessibility or to maintain public transport services under challenging conditions, we suggest splitting the topic into five subjects. This includes approaches of improving the accessibility of transportation infrastructure itself, but also strategies to increase the attractiveness of public transport in rural areas in order to improve the access and the connections to central places and transportation hubs in the surrounding area. The approaches cover best practice guides from a more conceptual point of view as well as case studies and tangible concepts to tackle transportation problems in rural areas.

The implementation of measurements to improve the accessibility conditions within a region or to upgrade the system altogether can only be effective, if an analysis of the current situation reveals the main shortcomings. From the perspective of the passengers, the quality of transport connections depends on travel time, reliability, directness, safety, costs and comfort - those are therefore important criteria in order to evaluate the quality of service. The US Transportation Research Board published an extensive reference document that provides current research-based guidance on transit capacity and quality of service issues and the factors influencing both - the "Transit Capacity and Quality of Service Manual" [28]. The German Guideline for Integrated Network Planning RIN (Richtlinien für die integrierte Netzgestaltung) presents an approach to evaluate the service quality of entire journeys between an origin and a destination point including access and egress time. The evaluation scheme focuses on indicators that are suitable for quantifying the reliability - the time-dependent service quality [29]. This approach simplifies the evaluation and makes, therefore, the survey, calculation and rating easy to conduct. But by concentrating on time and speed as the only indicators, the evaluation disregard other factors such as cost or comfort. Even so, with its plain approach to qualify a level of service, we are able to recognize shortcomings and identify critical network elements. The Guideline for Integrated Network Planning suggests an evaluation function for the indicators trip time ratio, direct speed and detour factor [30]. Based on this relatively easy to collect data, the scheme recommend a classification based on six levels of service - from "A" very good to "F" insufficient. Figure 1 shows the function for direct speed: a service, for example, who achieves a direct speed between 50 and 55 km/h on a direct distance from the origin to destination of 100 km is regarded with levels of service "B".

Fig. 1: Function for evaluating direct speed (DS) according to the RIN 2008





B.1 Attracting new target groups

Public transport services in rural and remote areas in general concentrate on the provision or the maintenance of service for the general public. Within the planning process, financial and organisational aspects are the main issues. In countries where transport provision in rural areas more or less is public service, it is common that groups are targeted, which represent people with mobility disadvantages: usually elderly people or people with disabilities, children or poor people. This is the case in nearly all countries of the EU. Transport service in rural areas is more understood as a service of public interest and less as a competitor in a market together with private motorized transport. Thus, attracting new target groups in order to maintain the service is in part underdeveloped and measures to attract new target groups seldom present.

The exception are tourist regions or districts that aim at developing their tourist potential. There are quite a few efforts to attract tourists of all kinds for public transport not only to support the tourism sector in the region but also to use their potential as passengers to sustain or even improve the public transport services. Even in some other cases, traditional target groups of rural transport planning are addressed with much more innovative measures. An Italian project, for example, which has been implemented in the Po region along the cycle tourist path VENTO, aims at reactivating underused railway stations which should be transformed into “green mobility hubs” that serve the needs of cycle tourists by providing repair places and luggage storages as well as facilitating intermodal transport chains [31].

B.2: New services/Reactivation/Reorganisation of railway services in rural areas

After a decline of regional railway services and the closing down of underutilized lines in rural areas, the appreciation of public railway services and their share in the economic wealth gains more attention among authorities. A bunch of activities to improve the mobility conditions in rural areas, therefore, concentrates on the implementation of new services or even on the reactivation of tracks. In any case, this is accompanied by a reorganisation of public railway services. This has led to a number of studies to analyse the potential of railway reactivation in different regions which cumulate in advice on how to run appropriate railway services in a rural area [32].

B.3: Improving intermodality, interconnectivity and accessibility

High-speed connections among rail hubs are constantly upgraded, especially on TEN-T networks and along main intercity lines. The next step is the upgrade of rail and public transport as feeder lines for those main hubs. Intermodality, interconnectivity and accessibility are the key terms in most transport plans to achieve a sustainable public transportation system. The EU funded project “INTERCONNECT”, for example, has worked on different solutions to improve connections between long and short transport distances in order to improve the interconnection of European railway networks. The programme aimed at integrating networks and services as well as stimulating co-operation between authorities and providers to find appropriate solutions, e.g. for attractive interchange points, improved transport services or pricing and ticketing systems [33]. Park-and-ride facilities for public transportation provide numerous benefits to commuters and communities - new or expanded park-and-ride capacity has shown to increase ridership [34].

B.4: Digitalisation, Information and Communications Technologies

To enhance the quality and reliability of public transport by real-time tracking and digital passenger information, passenger information systems have been developed for rural areas. In the course of the growing market diffusion of smartphones, more and more applications provide users with real-time information about public transport, e.g. the location of vehicles or their delay in times of disruption. Such



applications usually link given information and add open data sets, so that passengers can get Real Time Passenger Information.

B.5: Flexible Transport Systems (FTS)/Demand Responsive Transport (DRT)

To provide transport services in rural areas, Flexible Transport Systems (FTS) or Demand Responsive Transport Systems (DRT) have been developed on a relatively high level. These systems are recognised more efficient than regular services in rural areas, because they use much smaller vehicles and provide a service only upon request. There is no lack of case studies and reviews of and surveys on existing Flexible Transport Systems or Demand Responsive Transport to find out which types of service exist and how they perform [35-37]. This more academic literature is supplemented with handbooks and guidelines about best practices concerning the implementation of such services [38,39]. A helpful approach to support communities is a paper by Mulley et al. [39] on how to overcome barriers to implementation of FTS.

Relatively new approaches are Volunteer-Based Paratransit or community transport. Those are services, in which volunteers are responsible for the organisation and implementation of the transport service in regions, where regular transport service is reduced to an absolute minimum or unavailable at all. On the one hand, community transport could be a possibility to maintain transport services, but on the other hand, authorities are able to delegate their responsibility to provide public service to volunteers with the argument that the service is still maintained and differs from the former concept only in the aspect of its organisation.



Relevant literature and good practices:

Subject B.1: Attracting new target groups		
Title	key elements	year and source
<i>Identifying target groups for environmentally sustainable transport: Assessment of different segmentation approaches</i>	<ul style="list-style-type: none"> × Use of attitude-based market segmentation has recently increased in the transport sector. × Different segmentation approaches are compared based on marketing criteria. × Approaches based on behavioural theories have advantages in predicting and changing car use. × The approach that should be chosen depends on the field of application. 	2013 [40]
<i>Drivers of customer satisfaction with public transport services</i>	<ul style="list-style-type: none"> × Attributes on-time performance, travel speed and service frequency are very important. × Characteristics urbanization, age and public transport mode-choice have a significant impact. × Gender, public transport trip frequency, trip motive and car availability are less influential. 	2015 [41]
<i>Selected Aspects of the Implementation of Active Marketing Campaign To Raise Awareness and Promote Public Transport Services in Rural Areas</i>	<ul style="list-style-type: none"> × selected aspects of the implementation of the EU's SmartMove project, which aims to promote feeder public transport systems in rural areas through the implementation of an active marketing campaign (AMC) × characteristics of one of the implementation areas of the project are presented, namely, the Liszki district near Cracow × selected results are presented from a survey that was conducted among residents of the area from the point of view of the implementation of the AMC 	2016 [42]
<i>Regenerating small and medium-sized stations in Italian inland areas by the opportunity of the cycle tourism, as territorial infrastructure</i>	<ul style="list-style-type: none"> × how cycle tourism could activate a regeneration of small and medium-sized stations in inland areas, able to involve also territorial and urban areas hosting these stations × Starting point is the issue of the small and medium-sized Italian stations, mostly unused even if there still is an operating rail service × "green mobility hubs", where shifting from train to bicycle and vice versa is possible 	2017 [31]



Subject B.2: New services/Reactivation/Reorganisation of railway services in rural areas		
Title	key elements	year and source
<i>Regional Rail - a Case Study in Rejuvenation?</i>	<ul style="list-style-type: none"> × Study on neglected regional railways in rural areas and their transportation potential × regional rail, a low cost, low maintenance, fit for purpose concept applied to a low volume railway 	2010 [32]
<i>Rethinking the death of the railway in the Portuguese countryside</i>	<ul style="list-style-type: none"> × availability of rail services and public transport access to stations, considering separate types of destinations, trip frequencies and departure times for different population segments × effects of providing extra rail connections and bus feeder routes are estimated, identifying the parts of the country and railway network with the highest potential improvements × despite low levels of demand in absolute terms, rail services still had the potential for serving a significant part of the population in the areas around some of the lines closed 	2013 [43]
<i>Reviewing Efficiency and Effectiveness of Interurban Public Transport Services: A Practical Experience</i>	<ul style="list-style-type: none"> × methodology and analysis tool developed for a study aimed at the reorganisation of the interurban public transport services of the Piedmont region of Italy. 	2014 [44]
<i>A network approach to rural and exurban public transport</i>	<ul style="list-style-type: none"> × Examines the rural network approach (in contrast to demand-responsive transport approaches) by using findings of a case study on integrated timed-transfer in a rural and remote region of Switzerland × Characteristics of pulse timetable networks and the wider rural network approach are considered, drawing broad lessons for their potential application elsewhere 	2016 [45]
<i>The relationship between public transport and the progressive development of rural areas</i>	<ul style="list-style-type: none"> × Do integrated systems of public transport contribute to the Czech rural development? × Research consists of analysing the countryside accessibility & depopulation trends. × Frequency of connections is one of main reasons for locals to stay in the countryside. × integrated system contributes positively to rural development and rural tourism. 	2017 [46]



Subject B.3: Improving intermodality, interconnectivity and accessibility		
Title	key elements	year and source
<i>Transport poverty meets the digital divide: accessibility and connectivity in rural communities</i>	<ul style="list-style-type: none"> × Rural communities face a range of challenges associated with accessibility and connectivity which apply in both the physical and virtual sphere × examine the context for accessibility and connectivity in rural communities highlighting key transport and technology challenges × explores barriers and opportunities to bring together transport and technology solutions to enhance rural accessibility and connectivity 	2012 [47]
<i>Types of solutions improving passenger transport interconnectivity</i>	<ul style="list-style-type: none"> × Presents solutions to improve interconnectivity between long and short transport distance transports in Europe with regard to TEN and to the EU funded INTERCONNECT program × European transport networks' role as integrated international networks is compromised by poor interconnectivity and because the next generation of European transport policies will have to be sensitive to the differences between short, medium and long-term transport markets and the market advantages of each transport mode 	2012 [33]
<i>Intermodal Passengers Terminals: Design standards for better level of service</i>	<ul style="list-style-type: none"> × investigates how the provided level of service of passenger Intermodal facilities affects the commuters' behaviour regarding the modal choice × a categorization of the various terminals is attempted, considering their specific characteristics in terms of the means that they serve as well as the commuters that use them, in order to establish general design rules for each category 	2012 [48]
<i>Railway Hub Cities and TEN-T network (RAILHUC Project) - How to improve connectivity around several Central European railway hub cities?</i>	<ul style="list-style-type: none"> × Central Europe cities are the "first/last legs" of transnational transport chains × On the one hand, high speed connections among rail hubs in Central Europe are being upgraded, especially on TEN-T networks and along the main intercity lines. On the other hand, nevertheless rail bound and in general public transport bound feeder lines to need to be upgraded, strengthened and better organized × This project aims at improving Central Europe's interconnectivity by an intermodal integration of rail hubs at three different levels: into the TEN-T system, into regional and local transport rail and non-rail systems 	2014 [49]



<p><i>Strategic Station Access Planning for Commuter Rail Balancing Park-and-Ride with Other Modes</i></p>	<ul style="list-style-type: none"> × a process to identify multimodal access priorities at high- capacity transit stations, and to weigh the benefits and trade-offs × how this station access planning process could be adapted and applied to a commuter rail network × the paper recommends policy scenario analysis as a consultative and analytical approach to prepare a system wide station access policy × the paper also presents a decision- making framework to assess parking needs at the individual station level 	<p>2014 [34]</p>
<p><i>Integrated Transport System of the South-Moravian Region and its impact on rural development</i></p>	<ul style="list-style-type: none"> × analysis of the frequency, travel time and fare of public transport system and its comparison with demographic development in rural areas, especially in the peripheral ones × results are discussed in view of the system of central places in the region and present urbanization processes like suburbanization, counterurbanization and reurbanization 	<p>2015 [50]</p>
<p><i>Transport infrastructure and territorial cohesion in rural metro-adjacent regions: A multimodal accessibility approach. The case of Castilla-La Mancha in the context of Madrid (Spain)</i></p>	<ul style="list-style-type: none"> × propose a multimodal and diachronic transport network accessibility approach with a focus on rural regions influenced by metropolitan areas and state restructuring × The Spanish Castilla-La Mancha region is used as a case study × Results demonstrate the usefulness of accessibility for assessing regional interconnection, interaction and competition 	<p>2016 [51]</p>
<p><i>Łódź accessibility by public transport</i></p>	<ul style="list-style-type: none"> × Examines how accessible the city of Lodz is from the perspective of the surrounded rural towns × Results of research devoted to differentiation of spatial accessibility of Łódź with the assumption that travellers from the Łódź province relocate using public transport. 	<p>2016 [52]</p>
<p><i>Evaluation of Park and Ride Facilities at Communication Corridors in a middle-sized City</i></p>	<ul style="list-style-type: none"> × Multiple criteria decision-making methodology for selecting beneficial sites of P&R lots and for outlining desirable directions of development of the city of Vilnius with incorporated P&R facilities × a set of descriptive criteria for planning the P&R scheme; expert evaluation was used for estimation of weights of significance of the chosen criteria 	<p>2017 [53]</p>
<p><i>Decision-Making Toolbox to Plan and Manage Park-and-Ride Facilities for Public Transportation</i></p>	<ul style="list-style-type: none"> × a guidebook to better plan and manage park- and-ride facilities for public transportation × the document summarizes the technical research and presents the in-depth park-and-ride case studies 	<p>2017 [54]</p>



Subject B.4: Digitalisation, Information and Communications Technologies		
Title	key elements	year and source
<i>Variation in bus transit service: understanding the impacts of various improvement strategies on transit service reliability</i>	<ul style="list-style-type: none"> × examines the impact of different strategies to improve the transit service reliability × automatic vehicle location (AVL) and automatic passenger count (APC) systems at the bus route segment level of analysis × a smart card fare collection system increased bus running time and service variation 	2013 [55]
<i>Designing a Passenger-Centric Information Eco-System for Integrated and Flexible Transport Systems in Rural Areas</i>	<ul style="list-style-type: none"> × describes a real-time passenger information system that integrates heterogeneous transport information: (a) to understand the various operational and technology-related deployment issues with FTS in rural areas; (b) to describe the development of a passenger-centric information system; and (c) to establish the anticipated usefulness of the developed information eco-system for various FTS services 	2014 [56]
<i>Applicability of ICT solutions in passenger transport - case studies from different European backgrounds.</i>	<ul style="list-style-type: none"> × present the applicability of ICT solutions in passenger transport from the perspective of transport users taking into consideration real case studies from a different European background × User acceptance is a combination of many subfactors of which most important are: D2D travel time, D2D travel costs, comfort and convenience, safety and security. × Five European settings are selected for in-depth research. Each case represents different geographic, social and economic area, which forms a good European sample across differentiated setups. 	
<i>Using Internet technologies in rural communities to access services: The views of older people and service providers</i>	<ul style="list-style-type: none"> × Older participants demonstrated a considerable interest in learning how to use the Internet for accessing particular services, with social support networks and third-party facilitators being crucial enablers × importance of balancing the views of older people and service providers in the design of online engagement strategies 	2016 [57]
<i>Exploring the rural passenger experience, information needs and decision making during public transport disruption</i>	<ul style="list-style-type: none"> × illustration and categorisation of travel disruptions × Requirements for real-time passenger information – particularly for rural public transport users – are identified for each type and stage of disruption through interviews and focus groups with rural passengers × necessary advances in digital technologies for real-time passenger information systems required to support public transport users during disruptions 	2016 [58]



Subject B.5: Flexible Transport Systems (FTS)/Demand Responsive Transport (DRT)		
Title	key elements	year and source
<i>Key lessons learned from recent experience with Flexible Transport Services</i>	<ul style="list-style-type: none"> × provide guidelines for the implementation or development of flexible services identifying key issues that need to be considered at a policy level × provide accessible and user-friendly guidelines for the implementation or development of flexible services identifying key issues that need to be considered at a policy level 	2007 [37]
<i>Guidebook for Rural Demand-Response Transportation: Measuring, Assessing, and Improving Performance</i>	<ul style="list-style-type: none"> × The Guidebook is a resource to assist DRT systems to measure, assess, and improve their performance, focusing on DRT 	2009 [59]
<i>Barriers to implementing flexible transport services: An international comparison of the experiences in Australia, Europe and USA</i>	<ul style="list-style-type: none"> × makes recommendations to enable and encourage greater use of flexible transport services by transport service planners and providers through the sharing of best practice and information on overcoming barriers to implementation 	2012 [38]
<i>The Potential Role of Flexible Transport Services in Enhancing Rural Public Transport Provision</i>	<ul style="list-style-type: none"> × explores the existing context of public transport provision in rural and remote areas illustrated with experience from Scotland. × A critical review of existing Flexible Transport Services (FTS) in rural areas is provided and illustrated with selected case studies, with the objective of identifying the extent to which FTS can enhance the public transport offer. × Findings confirm that FTS offers considerable potential to contribute to and support the public transport system in rural areas. 	2012 [36]
<i>A Survey of Demand Responsive Transport in Great Britain</i>	<ul style="list-style-type: none"> × examines the design, performance, rationale and likely futures of DRT schemes by surveying DRT providers 	2014 [35]
<i>Investigating the contribution of Demand Responsive Transport to a sustainable local public transport system</i>	<ul style="list-style-type: none"> × six potential DRT market niches were identified, including those which offer potential commercial opportunities (e.g. airport surface access) and those that meet social needs (e.g. non-emergency hospital trips) × it is particularly difficult to make DRT services financially viable × Of the DRT services investigated, those targeting airline or train passengers offer potential × Some of the DRT schemes explored meet social needs, such as to access shopping facilities or hospitals, but they face cost challenges 	2014 [60]



<p><i>Exploring the propensity to travel by demand responsive transport in the rural area of Lincolnshire in England</i></p>	<ul style="list-style-type: none"> × the paper shows how individual level factors influence the use of rural DRT systems. × Applies ordered logit model to a survey of DRT users in Lincolnshire, UK. × DRT used most to travel for work, by disabled and more rural residents. × Emerging market potential for DRT from the retired male market segment. 	<p>2015 [34]</p>
<p><i>From the Concept of Flexible Mobility Services to the 'Shared Mobility Services Agency'</i></p>	<ul style="list-style-type: none"> × the concept of the Shared Mobility Services Agency for the planning and managing of collective transport services at an urban and regional level × shared mobility services Agency offers a co-ordinated solution to planning and managing collective transport services, including New Mobility Services which are not yet integrated with traditional transport services × the fundamental role of the Public Transport Authority (local or regional) to enable the implementation of the Services Agency 	<p>2016 [61]</p>
<p><i>German Experiences with Volunteer-Based Paratransit and Public Transport</i></p>	<ul style="list-style-type: none"> × experiences of volunteers to organise and operate public transport services in Germany × Service planning is done in partnership with local authorities and transport providers and benefits from the volunteers' local knowledge × The services use small vehicles and have a complementary function in the transport system × They primarily cater to local shopping and leisure journeys and, although available to the general public, are predominantly used by pensioners. 	<p>2016 [62]</p>
<p><i>The social and economic benefits of community transport in Scotland</i></p>	<ul style="list-style-type: none"> × Investigation of the social and economic benefits of Community Transport in Scotland. × Presentation of five case studies. × Calculation of savings for Social Services and Health Services. × Consideration of policy implications. 	<p>2017 [63]</p>



4. Topic C: Implementation - Policy instruments and policy strategies to improve connectivity or accessibility

Measurements to a better-integrated public transport system in rural areas concentrate widely at technical and organisational aspects, as easily apparent from the examples shown in Topic C. Aspects concerning political or governmental issues are often disregarded or ignored. Considerations about the political implication and requirements as well as about stakeholder concerns and funding opportunities seldom exceed the regional level - they are stuck with local problems. In consequence, compared with the literature about the various technical and organisational aspects about public transport and accessibility planning - often described in great detail -, the literature on policy instruments and policy strategies to improve connectivity is by far less common - even then, it covers the topic usually at a more abstract and conceptual level.

Given that public transport in rural and deprived areas is recognised as public service, local policies, as well as activities developed and implemented, managed and organised by local authorities, are crucial factors to guarantee the success of measurements or even simple solutions to improve connectivity or accessibility. Relatively well regarded are strengths and weaknesses of accessibility instruments in planning practice - but again, in the accessibility literature planning practice is overstated whereas political issues are underrepresented [64]. Relatively new are lines of thoughts considering the opportunities of smart government enabled by the rapid progress of the information technology. The key literature around that subject highlights the importance of digital data for smart transport policy and government service [65]. Altogether, we identified four subjects within the transport policy literature:

- transfer of responsibilities,
- stakeholder engagement,
- financial support and funding opportunities and
- social media for government service.



Relevant literature and good practices:

Topic C: Policy instruments and policy strategies to improve connectivity or accessibility		
Title	key elements	year and source
<i>Towards the preservation of a regional railway in a peripheral area - the decision making process in the case of the Neustrelitz - Mirow railway service, Germany</i>	<ul style="list-style-type: none"> × an description of the transfer of responsibility from the state to the district is organised and in which further stakeholders are involved × At the start of the process, its participants agreed upon the definition of the future service, their specific responsibilities regarding the support of the railway service and those criteria, which eventually will be used to evaluate the process and decide on its continuations. 	2013 [66]
<i>The Impact of Social Media Usage on Transport Policy: Issues, Challenges and Recommendations</i>	<ul style="list-style-type: none"> × Transport stakeholders are increasingly recognizing the value of social media in connecting with their customers in many forms. × the potential uses of social media by transport service suppliers and the potential value to policy development of shared transport related information by the public × transport policy-relevant information can be harvested from online social media sources 	2014 [67]
<i>The interaction of spatial planning and transport policy: A regional perspective on sprawl</i>	<ul style="list-style-type: none"> × combined regional analysis of spatial planning instruments and transport policy, with a special emphasis on urban-rural diversities × results suggest that transport policy is obviously effective in addressing transport externalities, while it would have to be set at a politically infeasible stringency to have an effect on residential patterns 	2014 [68]
<i>Transport Policy: Social Media and User-Generated Content in a Changing Information Paradigm</i>	<ul style="list-style-type: none"> × The ways in which social media data can be used alongside or potentially instead of current transport data sources, × Whether there are wider institutional barriers in harnessing the potential of social media data for the transport sector 	2015 [69]
<i>Assessing the impact of different policy decisions on the resource requirements of a Demand Responsive Transport system for persons with disabilities</i>	<ul style="list-style-type: none"> × Different policy scenarios were applied to assess the impact of these requirements. × The applied methodology and results for a case study on Flanders are presented. × Modal split, accessible public transport and user flexibility are key elements. × Insights for governments on assessing the financial sustainability of a DRT system. 	2015 [70]
<i>Efficiency and effectiveness in the urban public transport sector: A critical review with directions for future research</i>	<ul style="list-style-type: none"> × Self-contained reference for policymakers and scholars in local public transport. × Framing economic efficiency into a transport planning perspective. × Includes Operations Research studies on scheduling and tactical design in local public transport. 	2016 [71]



<p><i>Transport policy and governance in turbulent times: Evidence from Ireland</i></p>	<ul style="list-style-type: none"> × An analysis of transport policy in Ireland before, after & during the Celtic Tiger. × How governance systems respond to rapid economic, political, and social changes. × Lessons relevant to sustainable transport policy efforts internationally. × Identification of opportunities for, and barriers to, more sustainable transport. 	<p>2016 [72]</p>
<p><i>Marginal cost-pricing in the Swedish transport sector</i></p>	<ul style="list-style-type: none"> × This paper investigates actual external marginal costs of transport in Sweden for all modes of passenger transport in urban and rural areas and compares it to the level of positive system- and scale effects in local and regional public transport. × It is highlighted that taxes and fees in level with marginal costs can cover the existing financial deficit for public transport and an optimal subsidy in both the urban county and the rural county. 	<p>2016 [73]</p>
<p><i>Sustainable funding sources and related cost-benefit measurements</i></p>	<ul style="list-style-type: none"> × It elaborated a wide range of benefits from public transport services, to both users and non-users. In regard to non-users, there was a particular focus on the role of public transport in promoting positive external benefits, such as agglomeration economies, and reducing the negative external costs of car use. × Value capture was seen as a vital funding opportunity, both for supporting operating funding and capital funding requirements. × Funding circumstances that were seen as more properly a governmental responsibility were identified. 	<p>2016 [74]</p>
<p><i>Reducing dependency on special transport services through public transport</i></p>	<ul style="list-style-type: none"> × public sector in Sweden is required by law to provide special transport services (STS) for those who are unable to use public transport or private car × a study of the effects of public transport system design on the demand for STS permits and usage 	<p>2017 [75]</p>
<p><i>Mobility innovations for sustainability and cohesion of rural areas: A transport model and public investment analysis for Valdeorras (Galicia, Spain)</i></p>	<ul style="list-style-type: none"> × A case study to compare alternatives of sustainable mobility in rural areas. × A transport model is developed to obtain commuting-to-work patterns, means and routes. × Environmental costs and integration indicators are obtained in two future scenarios. × An Analytic Hierarchy Process analysis identifies higher benefits-to-cost of an existing railroad facility. 	<p>2017 [in press] [76]</p>
<p><i>Dealing with the Complexity of Stakeholder Interaction in Participatory Transport Planning</i></p>	<ul style="list-style-type: none"> × Including an active participation of citizens and stakeholders from the beginning of transport decision-making processes is widely recognized as a precondition to avoiding the failure of policies/plans as a consequence of a lack of consensus. × Appropriate methods and tools are needed to support participation processes towards well-thought and shared solutions. 	<p>2018 [in press] [77]</p>

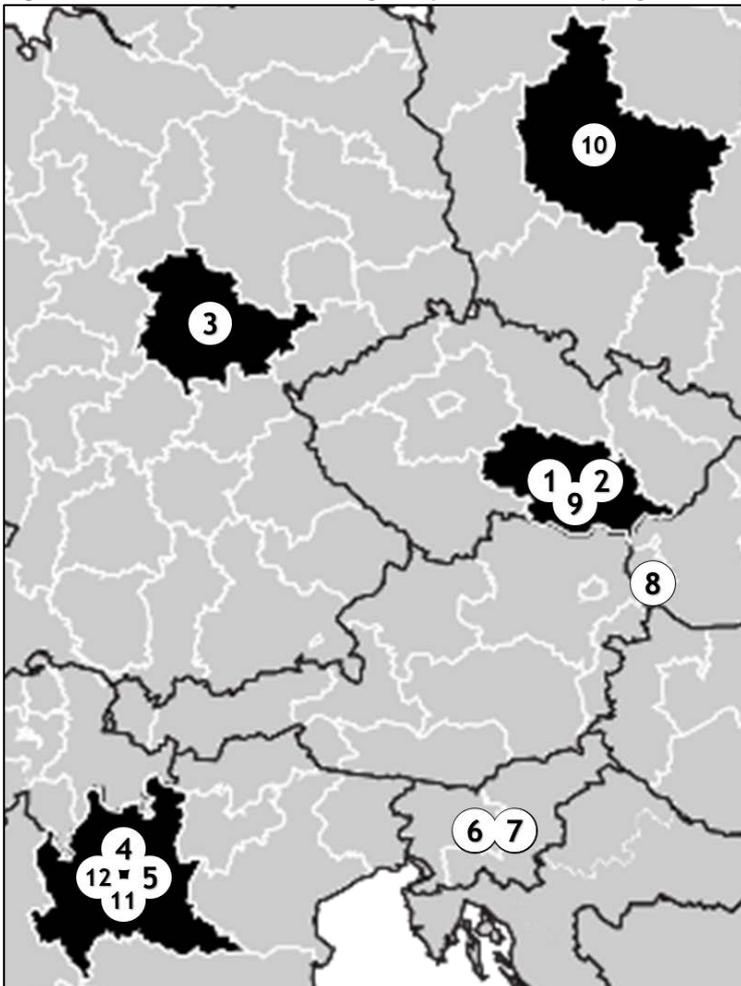


5. Good Practices - built on the experience of the project partners

The SubNodes partners have experience on past and ongoing projects within the fields of public transport and spatial planning, tariff and ticketing, IT-tools and digitalisation. Those experiences are invaluable for the SubNodes project, the progress and the learning from each other in terms of developing own projects or pilot actions in the field of public transport planning.

The following compilation of good practices from the partners shall serve as a starting point to offer insight into possible solutions. Altogether, there are twelve good practices and project examples from within all of the SubNodes project regions (see Fig. 2). Although nearly all of the included good practices and project examples are related to more than one of the various topics within the SubNodes project, we arranged them in three thematic groups according to the composition of the key literature review: A - Transfer of responsibilities and stakeholder engagements, B - Intermodality and interconnectivity and C - Digitalisation, Information and Communications Technologies.

Fig. 2: Location of the twelve good practices and project examples





A - Transfer of responsibilities / stakeholder engagements

1. Establishing of the Integrated Public Transport System in the South Moravian Region (IDS JMK)
2. Central dispatching (IDS JMK)
3. Intermunicipal transportation association of the Central Thuringia (Verkehrsverbund Mittelthüringen)

B - Intermodality and interconnectivity

4. New cross-border railway line Arcisate-Stabio between Arcisate (IT) and Stabio (CH) (Lombardy Region)
5. Bergamo Tramway Network (Lombardy Region)
6. Integration of public passenger transport in Slovenia
7. Implementation of Park and Ride (P+R) Network in Ljubljana Urban Region
8. Integrated transport system in the Bratislava region

C - Digitalisation, Information and Communications Technologies

9. EOC - Electronic ticketing and TCC - Traffic clearing centre (IDS JMK)
10. CHAMPIONS - „Improvement of CE regions' accessibility through air transport interconnectivity“ - Electronic Ticketing (Wielkopolskie)
11. E015 digital ecosystem - a digital open space for cooperation, to develop integrated software applications (Lombardy Region)
12. moving in Lombardy - online travel planner for all modes of transport (Lombardy Region)



A - Transfer of responsibilities / stakeholder engagements

Project Title	Establishing of the Integrated Public Transport System in the South Moravian Region	
Specific objective / aim	<ul style="list-style-type: none"> • Common timetable, network, tariff, information and marketing system in the area of Brno and all the South Moravian Region • 1,2 mil. residents, 728 municipalities, 100 ths. students • Standards of public transport: 6 connections at working days, 3 at weekends for every municipality. • Quality standards. Interval timetable. • Tendering of all regional bus lines. • Economic optimization. <p>Central Control Centre:</p> <ul style="list-style-type: none"> • real time positions of regional buses + city public transport + trains • direct manages more then 800 regional buses • ensures 34 thousands connections between lines every day • answers the passenger queries 	
Main institutions involved	KORDIS JMK, a.s.	
Timescale (start / end date)	2010 ongoing	
Location	Country	Česká Republika
	NUTS 1	CZ0
	NUTS 2	CZ06 Jihovýchod
	NUTS 3	CZ064 Jihomoravský kraj
content and relevance for the SubNodes project	<ul style="list-style-type: none"> • transport association • integrated public transport 	
reference / link, if available	-	
Contact details for further information		
Name	Vojtěch Elstner	
Organisation	KORDIS JMK, a.s.	
Email	velstner@kordis-jmk.cz	



Project Title	Central dispatching of the IDS JMK	
Specific objective / aim	<ul style="list-style-type: none"> • CED is a source of information for electronic information panels and for mobile applications. • More than 170 panels are currently in operation in the region, about 100 are KORDIS assets, 50 are owned by DPMB and others are owned by municipalities and other entities. • Panels contain not only on-line information, but also the possibility of audio and graphic reporting. • the region is well covered in several places. In the case of smaller stops, we prefer to use mobile phones as a source of information about departures. • In the future, the main emphasis will be put on mobile apps that allow passengers to find departures anywhere. <p>Display data about exclusions and emergencies:</p> <ul style="list-style-type: none"> • In cooperation with DPMB, at the beginning of 2017, KORDIS was first able to run the system to entering and displaying up-to-date and forthcoming exclusions and emergencies in traffic. • This information is also available to all partners involved, and it is possible that in a few months the exclusions will be displayed not only on iRIS, but also on Mapy.cz. • It is anticipated that DPMB will join this model of central database in the near future <p>Cooperation with the components of the integrated rescue system:</p> <ul style="list-style-type: none"> • Agreement with the Fire Rescue Service. In the case of emergencies, KORDIS will provide the FRS with buses controlled by it and send the necessary information to all involved information systems and applications. • On the contrary, FRS informs the CED about the operation of its vehicles. • CED is also used by the Police of the Czech Republic, especially for searching for missing persons. 	
Main institutions involved	KORDIS JMK, a.s.	
Timescale (start / end date)	2005 ongoing	
Location	Country	Česká Republika
	NUTS 1	CZ0
	NUTS 2	CZ06 Jihovýchod
	NUTS 3	CZ064 Jihomoravský kraj
content and relevance for the SubNodes project	<ul style="list-style-type: none"> • transport association • Information service • Direct managing of the transport system 	
reference / link, if available	-	
Contact details for further information		
Name	Vojtěch Elstner	
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Project Title	Intermunicipal transportation association of the Central Thuringia (Verkehrsverbund Mittelthüringen) (VMT)	
Specific objective / aim	<p>Non-integrated public transport systems tend to neglect the needs of customers, which ultimately results in a decrease of ridership. Public transport integration is of a great benefit for customers as well as operators, authorities and the general public.</p> <p>Verkehrsverbund Mittelthüringen (VMT) is an association of 13 transport companies from the region of Central Thuringia. The main aim of its establishment was to change the existing regional system of transportation into a simple, environmentally friendly and inexpensive mobility solution. The territory of the VMT covers the cities of Erfurt, Weimar, Jena and Gera as well as the counties Gotha, Weimarer Land and the Saale-Holzland-district.</p> <p>The core element of the VMT concept is a uniform tariff system, which allows the passenger to use city and regional buses, trams and trains throughout the whole VMT area with only one ticket. The basis is the 113 tariff zones, divided into city or region zones. All transport companies involved in the network sell and accept this common tariff.</p> <p>The main task of the VMT and its affiliates is to create attractive offers and easy-to-understand passenger information. This includes, in addition to the uniform transparent tariff, coordinated timetables, common transport conditions and a comprehensive information system. Via the route planner on the VMT homepage one can quickly and easily check the information about the connections for the entire journey. Many extra features, e.g. a map-based tool indicating the way to and from the stop, make navigation easier.</p> <p>The main stakeholders of this concept are the participating cities, counties and districts as well as their transport authorities, participating public transport companies, operators and services providers. Beneficiaries are the inhabitants because they get an integrated, well planned public transportation network</p> <p>The main objective of the project is increasing the quality of the regional transportation system thanks to:</p> <ul style="list-style-type: none"> • a uniform pricing system, the so-called tariff, • a standardized assortment of tickets, which is accepted by all transportation companies • coordinated timetables, • uniform timetable information • harmonised timetables and connections between larger geographical areas 	
Main institutions involved	13 public transport companies from the Central Thuringia	
Timescale (start / end date)	2006 ongoing	
Location	Country	Germany
	NUTS 1	Thuringia
	NUTS 2	Thuringia
	NUTS 3	Central Thuringia (planning region of Thuringia)



content and relevance for the SubNodes project	<ul style="list-style-type: none"> • transport association • integrated public transport • stakeholder involvement
reference / link, if available	-
Contact details for further information	
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C - Intermodality, interconnectivity

Project Title	New cross-border railway line Arcisate-Stabio	
Specific objective / aim	<p>Realisation of a new railway line between Arcisate (IT) and Stabio (CH). The new railway line is for passengers. The rail speed allowed is 100 km/h, and the line is 8,4 km long, double track. The total cost is 261 mln€, financed by Italian Ministry of Infrastructures.</p> <p>This new line will allow the connection between the Italian railway line Varese-Porto Ceresio and the Swiss railway line Stabio-Mendrisio.</p> <p>This new rail line allow the completion of a new cross-border "suburban service", connecting Varese, Como, Bellinzona, Lugano and Malpensa.</p>	
Main institutions involved	<p>Lombardy Region RFI (Italian rail infrastructure manager) Municipalities (Induno Olona, Arcisate, Cantello) Consortium of mountain municipalities of Piambello Province of Varese</p>	
Timescale (start / end date)	2008 - end of 2017	
Location	Country	IT - Italy
	NUTS 1	ITC - Nord-Ovest
	NUTS 2	ITC4 - Lombardia
	NUTS 3	ITC41 - Varese
content and relevance for the SubNodes project	<p>The realization of this new connection improve sustainable connections between cross-border sub-nodes, allowing :</p> <ul style="list-style-type: none"> • The realization of a new "cross-border suburban railway system" between Lombardy - Italy and Canton Ticino - Switzerland, with the activation of new rail services (e.g. Como - Chiasso - Varese - Lugano, Varese - Como - Bellinzona via Mendrisio, Como/Ticino-Varese-Malpensa); • The reduction of greenhouse gas emissions; • The improvement of local economy; <p>The realization of this project was facilitated by various stakeholders thanks to the creation of a specific negotiating table, in which was possible to monitor the timing of the realization and to discuss and solve main problems, for example problems for polluted ground, problems for people living near the construction sites, etc.</p> <p>To mitigate the annoyance due to the construction sites, Lombardy Region subscribed a deal with other stakeholders to realise other projects in cities involved (e.g. local roads, cycle lanes, etc.).</p>	
reference / link, if available	-	
Contact details for further information		
Name	Emira Lanari	
Organisation	Lombardy Region	
Email	emira_lanari@regione.lombardia.it	



Project Title	New cross-border railway line Arcisate-Stabio	
Specific objective / aim	<p>Realisation of a new railway line between Arcisate (IT) and Stabio (CH). The new railway line is for passengers. The rail speed allowed is 100 km/h, and the line is 8,4 km long, double track. The total cost is 261 mln€, financed by Italian Ministry of Infrastructures.</p> <p>This new line will allow the connection between the Italian railway line Varese-Porto Ceresio and the Swiss railway line Stabio-Mendrisio.</p> <p>This new rail line allow the completion of a new cross-border "suburban service", connecting Varese, Como, Bellinzona, Lugano and Malpensa.</p>	
Main institutions involved	<p>Lombardy Region RFI (Italian rail infrastructure manager) Municipalities (Induno Olona, Arcisate, Cantello) Consortium of mountain municipalities of Piambello Province of Varese</p>	
Timescale (start / end date)	2008 - end of 2017	
Location	Country	IT - Italy
	NUTS 1	ITC - Nord-Ovest
	NUTS 2	ITC4 - Lombardia
	NUTS 3	ITC41 - Varese
content and relevance for the SubNodes project	<p>The realization of this new connection improve sustainable connections between cross-border sub-nodes, allowing :</p> <ul style="list-style-type: none"> • The realization of a new "cross-border suburban railway system" between Lombardy - Italy and Canton Ticino - Switzerland, with the activation of new rail services (e.g. Como - Chiasso - Varese - Lugano, Varese - Como - Bellinzona via Mendrisio, Como/Ticino-Varese-Malpensa); • The reduction of greenhouse gas emissions; • The improvement of local economy; <p>The realization of this project was facilitated by various stakeholders thanks to the creation of a specific negotiating table, in which was possible to monitor the timing of the realization and to discuss and solve main problems, for example problems for polluted ground, problems for people living near the construction sites, etc.</p> <p>To mitigate the annoyance due to the construction sites, Lombardy Region subscribed a deal with other stakeholders to realise other projects in cities involved (e.g. local roads, cycle lanes, etc.).</p>	
reference / link, if available	-	
Contact details for further information		
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Project Title	Integration of public passenger transport in Slovenia
Specific objective / aim	<p> Since September 2016 an integrated public passenger transport (IPPT) has been put in operation in Slovenia, encompassing complete national and inter-urban transport as well as urban transport of Ljubljana, Maribor and Murska Sobota. IPPT is regulated, controlled and co-funded by the IPPT Authority, provisionally organised at the Ministry of Infrastructure. Currently only students can benefit from integration but it will be further extended to other passenger categories. Integration of the public passenger transport didn't bring a change to the financing model but to the fare revenue sharing (including need for a sale commission). As integrated ticket fare sharing raises income risk for the operators IPPT Authority has adopted solution of the transitional period where total fare revenue has been secured on the proportion of ticket sales in the selected base year (in the past). Fare revenue sharing model is still under development and testing. Integrated tariffs paid by the customer are the same whoever sold the ticket and with whichever transport operator has been used. Tariff integration in Slovenia is based on the same ticket price for the passenger and different total ticket price per operator (a temporary solution). At inception the integrated ticketing in Slovenia has only rolled out periodic travel passes. Single tickets will come up later, after the consolidation of fare revenue clearing. The fact that tickets at the railways are still validated by the conductor makes a big issue to catch all integrated ticket users in time for a check-in control which is needed for ticket income sharing based on the ticket use. IPPT Authority has made available ticket sale application, validation devices to be fixed on the buses and handheld validation devices for ticket sale/validation and control on the railways (control - also on the busses) to all transport operators giving transport (or sale) services in the integrated public passenger transport. The operators that joining the integrated ticketing system can opt between hiring the devices from IPPT Authority (upon availability) or to employ their own devices after passing certification procedure in compliance with IPPTA standard. IPPT Authority is using the existing operators' sale network points in Slovenia by providing its own ticket sale application at the counters and ATC-s selling the integrated tickets. The IPPT Authority sale application is exchanging sale data with the transaction server at IPPT Authority's in real-time. All tickets need to be purchased prior to boarding the vehicle. </p> <div data-bbox="603 1749 997 1995" data-label="Image"> </div> <p> Integrated multimodal ticket in Slovenia, based on a smart card </p>



Main institutions involved	<ul style="list-style-type: none"> - Ministry of Infrastructure - Slovenian Railways - Ljubljana City bus operator (LPP) - Maribor City bus operator (Marprom) - Institute of Traffic and Transport Ljubljana - Inter-urban bus operators 	
Timescale (start / end date)	2013-2017	
Location	Country	<i>Slovenia - project on national level</i>
	NUTS 1	
	NUTS 2	
	NUTS 3	
content and relevance for the SubNodes project	<p>The integration of public passenger transport represents a case of a successful cooperation between stakeholders resulting on improvement of public passenger transport on national level.</p> <p>Integration of public passenger transport improved intermodality, made public transport easier and more attractive and enhanced the connectivity between different modes of public passenger transport.</p>	
reference / link, if available	<p>http://www.jpp.si/en-us/ (route planner and integrated timetable)</p> <p>https://www.prnewswire.com/news-releases/slovenia-is-introducing-a-multilateral-passenger-transport-ticket-by-which-public-transport-will-become-more-accessible-friendly-and-attractive-591263201.html</p>	
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Project Title	Implementation of Park and Ride (P+R) Network in Ljubljana Urban Region
Specific objective / aim	<p>The delayed renovation of railway transport network and constant increase in road transport demands the construction of new infrastructure. The public passenger transport network in Slovenia is poorly interconnected and underdeveloped, mainly with regard to intermodality. Public passenger transport in the joint transport system has a small share and does not enable fast, comfortable and price-efficient mobility at the regional level.</p> <p>Every day there are more than 100.000 commuters (employees and students) entering the Ljubljana. More than 90 % daily commuters use personal vehicles. The idea with P+R scheme was to collect these commuter on one point and from where they use public transport to the city centre.</p> <p>The P+R scheme (park and ride) is a combination of private and collective transport enabling the user to drive to key locations on the fringes of the city in their own car or in some other vehicle, leave the car at the P+R car park, and head towards the inner region on high-quality public transport. The scheme has some variants: the 'park and bike' scheme found at certain locations involves parking a private car and renting a bicycle to continue the trip. And there is a 'park and pool' scheme involving car-pooling i.e. one or more drivers arrive in their own cars and continue the travel sharing one of their cars. All of these forms are complementary and inter-connected, and therefore they need long-term planning and direction.</p> <p>As public transport (PT) and private cars are complementary, P+R systems need additional long-term land use and transport planning, process of P+R development began in the year 2007. In this year central Slovenia statistical region of 26 municipalities set out a significant outline of its development vision in 'The Regional Development Programme'. It was a fundamental programmatic document at the regional level of the Ljubljana Urban Region which was adopted by the Council of the Ljubljana Urban Region - i.e. by the mayors of the municipalities in Ljubljana Urban region (LUR). Besides other goals and measures also initial ideas for P+R development in Ljubljana urban region were outlined. Through the involvement of key stakeholders at national level Regional Development Agency of Ljubljana Urban Region (RDA LUR) managed to bring the project in the national strategies (OP) to provide EU funding.</p> <p>The whole system of P+R sites in the region act as intermodal interchange points situated in local centres and on the fringes of Ljubljana.</p> <p>Thus the function of the intermodal interchange point is two-fold: to enable passengers fast and safe transits between forms of transport, and to attract passengers to public forms of transport, thereby making them competitive.</p> <p>In Ljubljana Urban region there are currently 10 P+R parking facilities. The Park and Ride schemes provide efficient combination of private and collective public transport in metropolitan regions.</p> <p>At Ljubljana's P+R facilities, you can leave your vehicle and transfer to a city bus for a journey to the city centre. With the purchase of a parking ticket you get two bus tickets valid for the day of the parking ticket purchase.</p> <p>The Park and Ride schemes provide efficient combination of private</p>



	<p>and collective public transport in metropolitan regions. Local communities and the Ljubljana urban region included a broad participatory planning process in the preparation of P+R study. This study identified the need for the construction of P+R collection points in the region which will enable development of public transport and reduce the number of cars.</p>	
Main institutions involved	<ul style="list-style-type: none"> - Municipalities in Ljubljana Urban Region (15), - Regional Development Agency of Ljubljana Urban Region, - Ministry of Infrastructure, Republic of Slovenia. 	
Timescale (start / end date)	2007 -	
Location	Country	Slovenia
	NUTS 1	
	NUTS 2	West Slovenia
	NUTS 3	Central Slovenia
content and relevance for the SubNodes project	<p>The Park and Ride schemes provide efficient combination of private and collective public transport (mainly buses) in Ljubljana Urban Region.</p> <p>The main objective of SubNodes is to improve the public transport system in the hinterland of TEN-T nodes by better connecting them to the national and European transport networks through enhanced and coordinated planning. Ultimate goal is to change mobility patterns by efficient, coordinated services linking all public transport systems.</p>	
reference / link, if available	<p>http://www.rralur.si/en</p> <p>http://www.lpp.si/en/informations-passengers/p-r</p>	
Contact details for further information		
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Project Title	Integrated transport system in the Bratislava	
Specific objective / aim	The Integrated transport system in the Bratislava region mainly involves a unified fare system, thanks to which it is possible to use all types of public transport in the region with only one ticket. It involves the regional trains (Slovak state train operator ZSSK), regional buses (buses financed by the Bratislava region by the company Slovak Lines) and Bratislava city public transport (city public transport operator DPB financed by the city of Bratislava). The main objective is to make it easy and comfortable to use public transport in the Bratislava region even if the commuter uses more than one transport mode. The fare system works in the whole region since November 2015.	
Main institutions involved	Bratislavská integrovaná doprava, a.s.	
Timescale (start / end date)	November 2015 ongoing	
Location	Country	Slovakia
	NUTS 1	-
	NUTS 2	SK01 Bratislava Region
	NUTS 3	SK011 Bratislavský kraj
content and relevance for the SubNodes project	integrated ticketing	
reference / link, if available	https://www.idsbk.sk/en/	
Contact details for further information		
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C - Digitalisation, Information and Communications Technologies

Project Title	Electronic ticketing (EOC) / Traffic clearing centre (TCC)	
Specific objective / aim	<ul style="list-style-type: none"> In the Integrated Public Transport System the vast majority of users use prepaid seasonal tickets (80% in Brno, 60% in the region). Therefore it was very important to find a comfortable electronic ticketing solution for these passengers. In January 2017 the new seasonal ticketing system has been introduced in Brno and it is expected in the next 2 years to be expanded to all the system. Now it has >50000 users. In this system bank card is used as an identifier of the user and all information of the ticket is saved in the central database - Traffic Clearing Centre (TCC)- which provides the data to inspecting machines. For the inspection it is only simple bank card reader and a mobile app needed. Users can buy the ticket on-line in the e-shop, and they simply on-line save all necessary personnel information incl. the ID picture. Eshop - is responsible for communication with passengers, sale of seasonal tickets, payment channels for the seasonal tickets, displaying of history of travel and payments KORDIS as the transport organiser is operating the Traffic Clearing Centre - registration of users and sold tickets, distribution of this information to the control facilities of DPMB, KORDIS, Czech Railways and bus carriers, in the next stages will ensure the sale of one-off tickets and their processing. 	
Main institutions involved	KORDIS JMK, a.s.	
Timescale (start / end date)	2017 ongoing	
Location	Country	Česká Republika
	NUTS 1	CZ0
	NUTS 2	CZ06 Jihovýchod
	NUTS 3	CZ064 Jihomoravský kraj
content and relevance for the SubNodes project	<ul style="list-style-type: none"> integrated ticketing digital solutions for integrated ticketing 	
reference / link, if available	-	
Contact details for further information		
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Project Title	"Muoversi in lombardia" (" <i>moving in Lombardy</i> ")	
Specific objective / aim	Travel planner of public local transport in Lombardy. This planner, accessible via website, allow passengers to plan their travel using all public transport modes in Lombardy, with respective scheduled time	
Main institutions involved	Lombardy Region public transport operators in Lombardy	
Timescale (start / end date)	Since 2013	
Location	Country	IT - Italy
	NUTS 1	ITC - Nord-Ovest
	NUTS 2	ITC4 - Lombardia
	NUTS 3	-
content and relevance for the SubNodes project	This system allow passengers, in the whole region: <ul style="list-style-type: none"> • To make available all scheduled timing; • To know the transport supply. 	
reference / link, if available	http://www.muoversi.regione.lombardia.it/planner/	
Contact details for further information		
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Project Title	“E015 digital ecosystem”	
Specific objective / aim	<p>E015 digital ecosystem is a digital open space for cooperation, to develop integrated software applications.</p> <p>Every „participant” (company, authority, association) can:</p> <ul style="list-style-type: none"> • Make available an own informational contents, that can be used in specific application developed by other participants; • Use informational contents, shared by other participants, to be utilised in own digital applications. <p>In „infomobilità” („info-mobility”) section are make available contents regarding scheduled timing of transports, traffic, driveability, info-mobility, real time.</p>	
Main institutions involved	<p>Lombardy Region Companies Authorities Associations</p>	
Timescale (start / end date)	Since 2015	
Location	Country	IT - Italy
	NUTS 1	ITC - Nord-Ovest
	NUTS 2	ITC4 - Lombardia
	NUTS 3	
content and relevance for the SubNodes project	<p>This system allow passengers, companies, authorities, entities in general:</p> <ul style="list-style-type: none"> • To share and exchange services and contents for digital info-mobility applications created by transport authorities and transport operators • To create a digital open space with common technological standards, well-defined and certified 	
reference / link, if available	http://www.e015.regione.lombardia.it/PE015/	
Contact details for further information		
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Project Title	CHAMPIONS - „Improvement of CE regions’ accessibility through air transport interconnectivity” (CEP)	
Specific objective / aim	<p>Poznan Airport decided to look at Passenger Information System in a modern and innovative perspective and, as a pilot investment in the CEP project CHAMPIONS, introduced mobile application on smart phones available for free on airport website. The application is called Poznań Airport Guide and provides the passengers of Poznan Airport with such services as:</p> <ul style="list-style-type: none"> • public transport ticket purchase • payment of parking fees in parking zones • access to Poznan Airport flight timetables • access to train and public transport timetables • purchase of train tickets • online check-in • excessive luggage fees • hotel room booking • ordering a taxi • renting a car • payment of airport parking fees 	
Main institutions involved	<i>Poznań Airport, Marshal’s Office of the Wielkopolska Region (LP)</i>	
Timescale (start / end date)	March 2010-February 2013	
Location	Country	<i>Poland</i>
	NUTS 1	<i>PL 4</i>
	NUTS 2	<i>PL41 Wielkopolska</i>
	NUTS 3	<i>PL418 Poznań</i>
content and relevance for the SubNodes project	<ul style="list-style-type: none"> • preparing of the IT-application which shall deliver bus timetables on- line as one of the PP5 pilot action goals, 	
reference / link, if available	https://www.airport-poznan.com.pl	
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