

# TRACC

## Transport Accessibility at Regional/Local Scale and Patterns in Europe

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**Volume 3**

**TRACC Regional Case Study Book**

This report presents the final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

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The web site provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

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## Introduction

The ESPON project TRACC (**TR**ansport **ACC**essibility at regional/local scale and patterns in Europe) aimed at taking up and updating the results of previous studies on accessibility at the European scale, to extend the range of accessibility indicators by further indicators responding to new policy questions, to extend the spatial resolution of accessibility indicators and to explore the likely impacts of policies at the European and national scale to improve global, European and regional accessibility in the light of new challenges, such as globalisation, energy scarcity and climate change.

The Transnational Project Group (TPG) for the ESPON project TRACC consisted of the following seven Project Partners:

- Spiekermann & Wegener, Urban and Regional Research (S&W), Dortmund, Germany (Lead Partner)
- Charles University of Prague, Faculty of Science, Department of Social Geography and Regional Development (PrF UK), Prague, Czech Republic
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This report is part of the TRACC Final Report. The TRACC Final Report is composed of four volumes.

- Volume 1 contains the Executive Summary and a short version of the Final Report
- Volume 2 contains the TRACC Scientific Report, i.e. a comprehensive overview on state of the art, methodology and concept, and in particular results on the global, Europe-wide and regional accessibility analyses and subsequent conclusions of the TRACC project.
- Volume 3 contains the TRACC Regional Case Study Book. Here, each of the seven case studies conducted within the project is reported in full length.
- Volume 4 contains the TRACC Accessibility Indicator Factsheets, i.e. detailed descriptions of all accessibility indicators used in the project.

This Volume 3, the TRACC Regional Case Study Book, reports on the case study analysis done in TRACC. It starts with a short introduction to the case study regions. Then, for each case study, a separate report is presented. Each report gives the results for six different accessibility indicators. The indicators will be presented and discussed first for the whole case study region and then in more detail for selected subregions, so called zoom-in regions. This analysis of the current accessibility conditions for car travel and for public transport is followed by an analysis of how the planned trans-European transport networks would change the regional accessibility pattern.

The design of the case study analysis was made in a way that all seven case studies are highly comparable as the definition of the accessibility indicators and its implementation were handled in a rather strict way. Also, the way results are presented in maps, diagrams and more general in the case study reports is highly comparable. A comparable analysis across all case studies is provided in Volume 2, the TRACC Scientific Report.





## TRACC regional case studies

Global and European accessibility are important location factors for firms and working and leisure travel of people. However, for the daily life of citizens, regional/local accessibility to jobs, services and public facilities may be more important than global or European accessibility. One part of the TRACC project was therefore concerned with regional accessibility in a set of regional/local case studies in order to gain systematic knowledge on accessibility patterns in different types of regions throughout Europe.

One of the technical objectives for the regional case studies was to implement the methodologies as similar as possible in order to allow a comparison of the resulting accessibility patterns not disturbed by artefacts induced by methodological differences. In each case study, the set of regional accessibility indicators as defined in the TRACC set of accessibility indicators was implemented, calculated and analysed in a highly comparable way.

### **Accessibility indicators for case study analysis**

Table 1 presents this common set of six accessibility indicators for case study analysis. There are two sets of accessibility indicators for travel. The first set follows the traditional set of accessibility indicators calculated at the European level. All indicators are calculated for municipalities, i.e. at the LAU-2 level. However, in some case studies the calculation was done first for smaller raster cells and then also aggregated to LAU-2:

- *Access to regional centres.* How distant or how far away is the nearest regional centre? Proximity to an urban centre has often been used as proxy for accessibility to jobs and different services such as higher education, health care or commerce. The access to regional centre indicator is defined as minimum travel times by road and public transport to the nearest urban centre.
- *Daily accessibility of jobs.* How many jobs can be reached from the places of residence? This indicator approaches the opportunities of the regional labour market from the point of view of the population. The indicator is defined as the number of jobs reachable within a maximum commuting distance of 60 minutes by car and by public transport.
- *Regional potential accessibility.* What is the regional population potential of a municipality? Such a population potential is useful to evaluate the different locations within a region from the viewpoint of economic actors, e.g. firms assessing the regional labour market, or retail industries assessing the market area. As for the other spatial levels the population potential is defined as the sum of people in destination areas weighted by the travel times to go there. Modes considered are road and public transport.

The second set of indicators for the regional case studies considers destinations of specific relevance for daily life, namely services of general interest:

- *Access to health care facilities.* What is the travel time to go to the nearest hospital? Travel times for each municipality or raster cells by road and by public transport are able to show the spatial diversity in access to this important health care facility.
- *Availability of higher secondary schools.* Are higher secondary schools offering degrees to access a university available within reasonable travel time? Is there even a freedom of choice to select between different options? The indicator is defined as the number of higher secondary schools that can be reached within 30 minutes.
- *Potential accessibility to basic health care.* What is the locational quality with respect to basic health care? Using medical doctors as destination activity in a potential accessibility indicator allows to assess the relative distribution of health care provision of different areas within the case study region. The indicator is defined as sum of medical doctors located in the case study region weighted by travel times by road and public transport.

Table 1. TRACC set of accessibility indicators for case study analysis

<b>Basic characteristics</b>	<b>Generic type of accessibility indicator</b>		
	<b>Travel cost</b>	<b>Cumulated opportunities</b>	<b>Potential</b>
<b>Travel (traditional)</b>	<b>Access to regional centres</b> Travel time to nearest regional centre by road and public transport	<b>Daily accessibility of jobs</b> Jobs accessible within 60 minutes by road and public transport	<b>Regional potential accessibility</b> To population by road and public transport
<b>Travel (to services of general interest)</b>	<b>Access to health care facilities</b> Travel time to nearest hospital by road and public transport	<b>Availability of higher secondary schools</b> Number of higher secondary schools within 30 minutes travel time by road and public transport	<b>Potential accessibility to basic health care</b> Potential accessibility to medical doctors by road and public transport

### Impacts of TEN-T developments on accessibility patterns

The analysis of the current accessibility conditions for car travel and for public transport is followed by an analysis of how the planned trans-European transport networks would change the regional accessibility pattern. For each region, the recent proposals of the European Commission for a TEN-T core network are implemented in the regional network databases. The local and regional accessibility impacts of the TEN-T developments are demonstrated by using the accessibility to population indicator. The potential by car and by public transport are presented for the future situation, the changes compared to today are analysed in relative and absolute terms.

### Case study regions

The TRACC project aimed at an exploratory analysis of regional accessibility patterns across Europe. To do so, three considerations have guided the selection of the regional case studies.

- The case study areas for regional accessibility modelling in TRACC should cover a wide range of different types of regions in different parts of Europe. This asks either for a relative large number of case study regions or for relatively large case study areas that incorporate different types of regions.
- The comparison of regional/local accessibility patterns in different parts of Europe would be difficult if case study regions would be limited to one or very few NUTS-3 regions. These could be analysed in an isolated manner only without having information on regional accessibility in the surrounding regions. Therefore, case study areas should be larger in size.
- There are data constraints which are mainly related to network data. It is currently impossible to set up a harmonised network database for Europe, in particular for public transport, with the level of detail from which subsets could be extracted for regional case studies. Consequently, regional case studies have to be developed from existing regional network databases.

Based on these considerations the TRACC project has developed a specific concept for the case study regions. Each regional case study in TRACC consists of two integrated spatial levels, the total case study and a set of zoom-in areas.

- The regional case study area is usually defined at NUTS-0 or NUTS-1 level, i.e. contains a large number of NUTS-3 regions of different types.
- A number of zoom-in areas usually defined at NUTS-3 level should represent different types of regions within each case study region.

The regional accessibility models of the case studies were requested to be set up in a way that they are able to calculate the accessibility indicators at least for LAU-2 regions, if possible for smaller raster cells. This allows on the one hand to analyse accessibility pattern for the wider area of the macro region with different types of regions and on the other hand more in-depth analyses for specific types of regions by looking into the zoom-in areas.

In order to implement this spatial concept for the regional case studies, a pragmatic component had to be part of the case study selection process. Only those areas could be selected as case studies for which project partners had already a fairly good database for accessibility modelling. Figure 1 shows the seven TRACC case study regions selected: West Mediterranean in Spain and France, Northern Italy, Bavaria in Germany, the Czech Republic, Poland, the Baltic States and Finland. Together, they form an arc stretching from the Mediterranean Sea in south-western Europe up to the far north of the Nordic countries.



Figure 1. TRACC regional case studies

The case study regions selected forming almost a continuous arc across Europe offer the possibility of an additional contrast of results along neighbouring case study regions. Transitions from one case study region to the next are to be expected relatively smooth because of the role of common geographies and socio-cultural and historical linkages. Such cross-section of Europe will allow a continuous analysis from south to north:

- The West Mediterranean region and seaside Northern Italy are coastal corridor regions fringed by mountainous back areas in the Mediterranean framework.
- Northern Italy and Bavaria are densely populated regions located in flatlands topped by major mountain ranges, in this case the Alps.
- Bavaria, Czech Republic and Poland are part of the Central European plain, characterised by polycentric city structures.
- Czech Republic, Poland and the Baltic States, like many other new EU member states, have infrastructure deficits under way of amendment.
- Poland, the Baltic States and Finland form the south-eastern fringe of the Baltic Sea region.
- The Baltic States and Finland are peripheral regions with low density figures and conditioned by rigorous climates.

The case study regions cover a wide range of different types of regions in different parts of Europe. They cover both core and peripheral areas, inland, coastal and insular territories, urban and rural territories, densely populated and sparsely populated areas, flat and mountainous territories, territories located both in the old EU15 countries and in the new EU member states. Contrasting the case study regions with the nine standard ESPON territorial typologies, urban-rural, metropolitan regions, border regions, island regions, sparsely populated regions, outermost regions, mountainous regions, coastal regions, regions and regions in industrial transition, yields that the 275 NUTS-3 regions of the case study regions have almost for each regional typology the same share of regions of each type of region as the whole ESPON space (Table 16):

- In the case studies, there are slightly more rural regions and little less urban regions than in the ESPON average. Northern Italy and Poland are those case study regions with the highest share of urbanised regions; the Western Mediterranean, Northern Italy, Bavaria and Czechia have above-average shares of intermediate regions close to a city.
- The classification of the case study NUTS-3 regions in terms of metropolitanisation is very close to the overall ESPON average. Twelve percent of the NUTS-3 regions are small metropolitan, six percent are medium size metropolitan and 20 percent are big metropolitan regions.
- Also with respect to border regions, the case study regions with half of the regions classified as border regions closely follow the ESPON average.
- The share of island regions is slightly lower for the case studies than for the ESPON average. The EURAM and Finland case study have islands included.
- With the inclusion of Finland as case study, the share of sparsely populated regions of the case studies is almost two percent and such equals the ESPON space average.
- The share of mountainous regions is slightly lower for the case study regions than for the ESPON space. Northern Italy and Poland have the highest shares of regions falling in one of the mountainous categories.
- The share of coastal regions is slightly higher for the case study regions. Highest shares are in the Western Mediterranean region, the Baltic States and Finland, whereas Bavaria and Czechia do not have coastal regions at all.
- The share of regions in industrial transition is slightly higher for the case study regions than for the ESPON average.

Table 2. Case study regions and ESPON regional typologies

<b>ESPON Typology of region</b>	West Mediterranean	Northern Italy	Bavaria	Czechia	Poland	Baltic States	Finland	All case studies	ESPON Space
NUTS-3 regions (total number)	11*	46	96	14	66	22	20	<b>275</b>	<b>1351</b>
<b>Urban-rural regions (% of NUTS-3 regions)</b>									
1 Predominantly urban	18,2	23,9	9,4	14,3	24,2	13,6	5,0	<b>16,0</b>	<b>23,2</b>
21 Intermediate, close to a city	54,5	45,7	43,8	42,9	33,3	22,7	20,0	<b>38,5</b>	<b>36,7</b>
22 Intermediate, remote	9,1	4,3	0,0	0,0	0,0	4,5	10,0	<b>2,2</b>	<b>1,6</b>
31 Predominantly rural, close to a city	9,1	23,9	44,8	42,9	37,9	31,8	30,0	<b>36,0</b>	<b>26,1</b>
32 Predominantly rural, remote	9,1	2,2	2,1	0,0	4,5	27,3	35,0	<b>7,3</b>	<b>12,4</b>
<b>Metropolitan regions (% of NUTS-3 regions)</b>									
1 Small metropolitan	18,2	10,9	10,4	7,1	16,7	9,1	10,0	<b>12,0</b>	<b>12,4</b>
2 Medium size metropolitan	0,0	10,9	3,1	7,1	7,6	9,1	0,0	<b>5,8</b>	<b>7,6</b>
3 Big metropolitan	18,2	19,6	20,8	21,4	28,8	9,1	10,0	<b>20,7</b>	<b>17,4</b>
0 Not a metropolitan region	63,6	58,7	65,6	64,3	47,0	72,7	80,0	<b>61,5</b>	<b>62,6</b>
<b>Border regions (% of NUTS-3 regions)</b>									
1 In eligible border program	27,3	58,7	27,1	92,9	65,2	86,4	50,0	<b>51,3</b>	<b>42,7</b>
0 Not in eligible border program	72,7	41,3	72,9	7,1	34,8	13,6	50,0	<b>48,7</b>	<b>57,3</b>
<b>Island regions (% of NUTS-3 regions)</b>									
1 Major island < 50 000 inhabitants	0,0	0,0	0,0	0,0	0,0	0,0	5,0	<b>0,4</b>	<b>0,9</b>
2 Major island between 50 000 – 100 000	9,1	0,0	0,0	0,0	0,0	0,0	0,0	<b>0,4</b>	<b>0,4</b>
3 Major island between 100 000 – 250 000	9,1	0,0	0,0	0,0	0,0	0,0	0,0	<b>0,4</b>	<b>0,5</b>
4 Island with 250 000 – 1 mill inhabs	9,1	0,0	0,0	0,0	0,0	0,0	0,0	<b>0,4</b>	<b>1,2</b>
5 Island with >= 1 mill	0,0	0,0	0,0	0,0	0,0	0,0	0,0	<b>0,0</b>	<b>2,2</b>
0 Not an island region	72,7	100,0	100,0	100,0	100,0	100,0	95,0	<b>98,5</b>	<b>94,7</b>
<b>Sparsely populated regions (% of NUTS-3 regions)</b>									
1 Sparsely populated	0,0	0,0	0,0	0,0	0,0	0,0	25,0	<b>1,8</b>	<b>2,0</b>
0 Not sparsely populated	100,0	100,0	100,0	100,0	100,0	100,0	75,0	<b>98,2</b>	<b>98,0</b>
<b>Mountainous regions (% of NUTS-3 regions)</b>									
1 Predominantly mountainous, remote	0,0	6,5	2,1	0,0	0,0	0,0	0,0	<b>1,8</b>	<b>6,5</b>
2 Predom. mountainous under urban influence	9,1	23,9	9,4	21,4	4,5	0,0	0,0	<b>9,8</b>	<b>13,7</b>
3 Moderately mountainous, remote	27,3	0,0	0,0	0,0	1,5	0,0	0,0	<b>1,5</b>	<b>1,9</b>
4 Moderat. mountainous under urban influence	0,0	10,9	10,4	21,4	1,5	0,0	0,0	<b>6,9</b>	<b>8,6</b>
0 Areas not covered by classification	63,6	58,7	78,1	57,1	92,4	100,0	100,0	<b>80,0</b>	<b>69,3</b>
<b>Coastal regions (% of NUTS-3 regions)</b>									
1 Coastal with low share of coastal population	0,0	10,9	0,0	0,0	3,0	9,1	10,0	<b>4,0</b>	<b>4,2</b>
2 Coastal with medium share of coastal pop.	9,1	4,3	0,0	0,0	3,0	9,1	0,0	<b>2,5</b>	<b>4,2</b>
3 Coastal with high share of coastal population	36,4	4,3	0,0	0,0	3,0	4,5	25,0	<b>5,1</b>	<b>6,5</b>
4 Coastal with very high share of coastal pop.	45,5	13,0	0,0	0,0	3,0	18,2	20,0	<b>7,6</b>	<b>15,2</b>
0 Areas not covered by classification	9,1	67,4	100,0	100,0	87,9	59,1	45,0	<b>80,7</b>	<b>69,9</b>
<b>Regions in industrial transition (% of NUTS-3 regions)</b>									
1 With industrial branches losing importance	36,4	73,9	69,8	57,1	25,8	31,8	40,0	<b>52,7</b>	<b>47,0</b>
2 With industrial branches gaining importance	0,0	4,3	3,1	0,0	28,8	9,1	5,0	<b>9,8</b>	<b>3,7</b>
3 With internal industrial structural change	27,3	4,3	8,3	35,7	9,1	18,2	10,0	<b>10,9</b>	<b>12,1</b>
0 Area not covered by typology	36,4	17,4	18,8	7,1	36,4	40,9	45,0	<b>26,5</b>	<b>37,2</b>

\* Andorra not included in ESPON typologies

Within each case study region, between three and six zoom-in areas have been defined. The selection results in a good distribution of in total 30 zoom-in areas over different types of regions ensuring the in-depth study of different kinds of territorial typologies with different accessibility patterns associated.

### **Results of the case study analyses**

The results of the accessibility analysis for each case study region is presented firstly in a separate report. Each report gives the results for the six different accessibility indicators for case study analysis. The indicators are presented and discussed first for the whole case study region and then in more detail for the selected subregions, the so called zoom-in regions. This analysis of the current accessibility conditions for car travel and for public transport is followed by an analysis of how the planned trans-European transport networks would change the regional accessibility pattern.

The seven case study analyses are documented in the following seven Parts of Volume 3 of the TRACC Final Report:

- Part A: West Mediterranean case study
- Part B: Northern Italy case study
- Part C: Bavaria case study
- Part D: Czechia case study
- Part E: Poland case study
- Part F: Baltic States case study
- Part G: Finland case study

A comparative analysis across all case studies is provided in Volume 2, the TRACC Scientific Report. Chapter 9 provides an integrated summary on the findings of the seven case studies on current accessibility patterns with respect to the six indicators defined. Chapter 11.3 gives a comprehensive overview on accessibility impacts of the current plans for the trans-European transport infrastructure networks on the local/regional accessibility potential in the case study regions.



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