ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

REPORT //

Updating and Integrating PROFECY Dataset and Maps

ESPON 2020 data and maps updates II

Final Report // April 2022

This report is conducted within the framework of the ESPON 2020 Cooperation Programme, partly financed by the European Regional Development Fund.

The ESPON EGTC is the Single Beneficiary of the ESPON 2020 Cooperation Programme. The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.

This delivery does not necessarily reflect the opinions of members of the ESPON 2020 Monitoring Committee.

Coordination:
University of Valencia

Authors
Mar Ortega-Reig, Mayca de Castro and Adrián Ferrandis, Institute for Local Development, University of Valencia (Spain)

Carsten Schürmann, TCP International (Germany)

Advisory group
ESPON EGTC: Marjan van Herwijnen (Project expert) and Caroline Clause (Financial Expert)

Acknowledgements
Geoinnova

Information on ESPON and its projects can be found at www.espon.eu.
The website provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

Published in March 2022

Graphic design by BGRAPHIC, Denmark

Contact: info@espon.eu

ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

REPORT //

Updating and Integrating PROFECY Dataset and Maps

ESPON 2020 data and maps updates II

Final Report // April 2022

Disclaimer

This document is a final report.

The information contained herein is subject to change and does not commit the ESPON EGTC and the countries participating in the ESPON 2020 Cooperation Programme.

The final version of the report will be published as soon as approved.

Table of contents

List of figures and tables

List of figures

List of tables

Abbreviations

D1	Delineation 1. Higher car travel time to regional centres
D2	Delineation 2. Economic potential interstitial areas
D3	Delineation 3. Areas of poor access to SGIs
D4	Delineation 4. Depleting areas
EC	European Commission
EGD	European Green Deal
EGDIP	European Green Deal Investment Plan
ERDF	European Regional Development Fund
ESF+	European Social Fund+
EU	European Union
GDP	Gross Domestic Product
IP	Inner Periphery, inner Peripheries
JTM	Just Transition Mechanism
km	Kilometre(s)
LAU	Local administrative units
Min	Minute(s)
NUTS	Nomenclature des Unités Territoriales Statistiques
SGI	Service(s)-of-general-interest
UMZ	Urban morphological zone(s)

1 Introduction

1.1 Project context

The aim of this project is to update ESPON PROFECY database and maps and adapt the results of the project ESPON PROFECY "Processes, Features and Cycles of Inner Peripheries in Europe" (Noguera et al. 2017a) to the latest developments regarding inner peripherality processes and drivers.

1.2 Conceptual framework from ESPON PROFECY project

Inner peripherality is a multidimensional phenomenon which compounds the effects of various socio-economic processes that cause disconnection from external territories and networks. The notion of Inner Peripheries (IPs) comes from the more conventional concept of 'peripherality', which focuses just on the geographic position of a region in relation to all centres of economic activity in Europe. Much more complex, talking about IP includes a wider sense of 'disconnection' in relation to the core areas. Their general performance, levels of developments, access to services, or the quality of life, are relatively worse when compared with their neighbouring territories.

The ESPON PROFECY project (Noguera et al., 2017a) identified three theoretical concepts which described *primary processes* or conditions of inner peripherality:

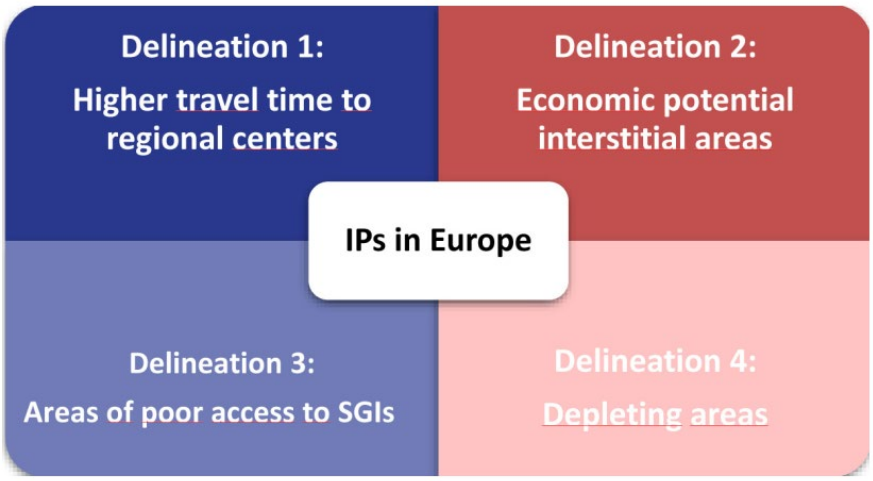
1. ***Enclaves of low economic potential,*** described by the distance from centres of economic activity. These are localities which have relatively high levels of 'conventional' peripherality (low accessibility to centres of economic activity), but which are not 'on the edge' of Europe.
2. ***Poor access to Service(s)-of-General-Interest (SGIs) poor connectedness***. IP processes driven by having poor access to SGIs, because of spatial distance, changing service delivery technologies, austerity, or other changes in provision such as privatization. It has a direct impact upon the human and social capital cycle, and thence an indirect (secondary) effect upon the productivity of economic activity, which feeds back into regional tax-raising capacity.
3. ***Aspatial peripheralization processes, as lack socio-political interaction.*** This driver is based on the disconnection from the centres of political power, which produces a lack of connectedness of stakeholders, exclusion from 'the mainstream' of economic activity and lack of influence in terms of governance due to social and institutional characteristics, of individual, groups, firms, or organizations, rather than geographic features.

As for the methodology, PROFECY translated the three theoretical concepts of the conceptual framework into four operational delineations:

- **Delineation 1 (D1)** identifies IPs based on **higher car travel time to regional centres**, which are considered the most important centres for SGI provision and for all social and economic activities. D1 interprets IPs through the calculation of car travel times higher than in other neighbouring NUTS3 (Nomenclature des Unités Territoriales Statistiques) regions.
- **Delineation 2 (D2)** defines areas which are not on the physical edge of Europe, but being surrounded by areas of greater centrality and have **low economic potentials** (expressed in potential accessibility).
- **Delineation 3 (D3)** identifies those areas with **poor car accessibility to public and private service** in comparison to surrounding areas and/or the region. A better connectedness to SGI contributes to reducing population loss, since it ensures higher quality of life.
- **Delineation 4 (D4)** identifies IPs on the basis of **negative development processes.** These are areas that have entered into a negative downward spiral due to increased unemployment, population loss and negative GDP (Gross Domestic Product) development.

Inner Peripheries appear often in two or more delineations, since the drivers are all interconnected and overlap. For instance, an area with low economic potential (D2) is probably suffering from a negative downward spiral (D4). Also, there are areas that, although not being identified as IPs (due to poor access to five or more SGI) (D3), are considered to be areas-of-risk. Delineation 3 was used to identify areas-of-risk of becoming Inner Peripheries in the near future, because of poor accessibility to three or four SGIs.

Figure 1-1. Delineations of Inner Peripheries



Source: Noguera et al. 2017b

1.3 Interest and overview of the report

The purpose of this project is to update the Delineation 3 database ensuring comparability with 2016 data. Delineation 3 is composed of delineations for the following ten SGIs: Banks, cinemas, health care (doctors, hospitals and pharmacies), schools (primary schools and secondary schools), retail (supermarkets and convenient stores), urban morphological zones (proxy for jobs) and train stations (all passenger train stations).

There are several reasons why D3 is meaningful. As said, it helps to identify areas at risk of becoming IPs. Also, the ESPON PROFECY project showed that 45% of peripheralization processes were driven by poor access to SGIs. Furthermore, D3 can expose geographical overlaps between different drivers of IPs and other regional typologies. Concretely, the results showed that poor SGIs access overlaps 45,2% with rural regions and 53,8% with mountain regions. These outcomes are relevant to define intervention logics for strategies and policies. Finally, the grid approach of D3 facilitates the identification of IPs, since IPs are poorly captured by the available NUTS3 data. The updated delineation will provide a clearer picture for policy strategies, since IPs can be better identified with data at levels below NUTS3. Only delineations 1 and 3 are based on a grid approach, being D1 (based on higher car travel time to regional centres) a general approach to the issue and D3 a more detailed calculation of the access to specific services.

The PROFECY Data and Maps Update project provides the following information related to Services of General Interest across Europe:

- **Distance matrices for NUTS0 to NUTS3** (from centroid to centroid) for the NUTS versions 2016 and 2021 have been calculated.
- Data regarding the **location of SGIs**: Updated data for banks, health care (doctors and pharmacies), Schools (primary schools and secondary schools), retail (supermarkets and convenient stores) (Annex 1). As it was not expected to find major changes since 2016, the location of cinemas, hospitals, urban morphological zones (proxy for jobs) and train stations was not updated.
- The **indicator and maps of density of SGIs by NUTS3 region** (for banks, primary and secondary schools, shops, pharmacies and doctors) and **maps regarding availability of SGIs within a defined travel time** at grid level (Annex 1).
- Identification of **enclaves with poor access to the different SGIs** at grid level. This grid results are then overlaid with LAU (Local Administrative Units) units, and NUTS3 regions, allowing the identification of inner peripheries at different spatial scales. (Annex 1).
- Updated delineation 3, based in the **identification of areas experiencing poor access to SGIs:** areas having poor access to five or more services (whatever the type of service) upon the condition that they suffer from poor access to hospitals (health care), poor access to primary schools (education) or poor access to train stations (provision of public transport).
- However, poor access to services has been identified in PROFECY only as one important driver for inner peripherality. Other drivers are poor economic potentials and poor socio-economic and demographic

situations. Therefore, a combination of updated delineation 3 with Delineation 1, Delineation 2, and Delineation 4, provides an overview of the **main drivers of inner peripherality.**
- Identification of **areas of risk to become IP in future**: areas with poor access to three or four SGIs.
- The **development paths of inner peripheries regarding unemployment rates (15+) for the 2009-2019 period** (Annex 1).
- Identification of **impacts of border closures due to the health crises in the provision of SGIs** (banks and shops).

1.4 Challenges for Inner Peripheries

ESPON PROFECY has shown that there are several **challenges** that recognize the logic of various interacting processes in IPs, including several areas of development and wellbeing such as infrastructures, human and social capital, territorial growth or economic potential. The multifaceted nature of IPs calls for a holistic and cross-sectoral analysis, since there is no guaranteed single indicator for Inner Peripheries.

However, despite the uniqueness of driving factors in each IP, there are features which seem common to investigated cases. These common features include generally a fragile local economy sometimes based on traditional activities, a weakness of local and regional institutions, outmigration of the youth and difficulties to attract external workforce, and a feeling of abandonment perceived by local communities or 'being forgotten' in the political attention from higher-policy levels. Common IP challenges can be classified in four groups:

- Providing good **access and connectivity to general services as part of a development plan.** Access to SGIs has an influence in the development potential and also in processes of out-migration and low rates of productivity. In turn, population loss impacts demographic ageing and reduces income for the area, which produces a negative downward spiral resulting in less SGIs provision. There is also a challenge in combining quality services with good infrastructure to ensure accessibility.
- Ensuring **green development in enclaves of low economic potential**. Poor access to centres of economic activity results in higher transportation, production and distribution costs in IP areas, producing lower competitiveness. Low levels of economic activity have secondary effects related to fiscality, human and social capital and, again, infrastructure.
- **Improving social capital and local capabilities** to unleash their development potentials. As previous experience in a range of European policies shows (mostly the ones addressing the needs of rural areas), the measures are frequently territorially-blind, due to inattention to territorial gaps and lack of collaboration between sectoral administrations. IPs are affected by these problems that need to be targeted by a multi-level governance approach.
- **Strengthen social capital and promote cooperation** between territories. Facing peripheralization caused by aspatial processes such as deficit of political and administrative power due to poor connectedness is challenging. The challenge lays on the strategy design to improve the capacity for interaction, across a variety of actors, from individual entrepreneurs to established business, institutions and local governance. Moreover, depleted areas are often less dynamic in terms of social and political cooperation with surrounding areas.

2 Methodology

Delineating inner peripheries in Europe

In order to ensure comparability of the updated results with the results of the PROFECY project, exactly the same definitions, parameters, thresholds and procedures for the delineation of inner peripheries were applied as in PROFECY. A modification of the approach would risk that results were no longer comparable.

According to PROFECY, the procedure to delineate inner peripheries and identify areas-of-risk to become IPs in future involves the following steps:

1. Updating the **road network** for 2021 (based on OpenStreetMap road network data).
2. Calculating **distance matrices** (car travel time matrices) for NUTS-0 to NUTS-3 levels (from centroid to centroid) for NUTS versions 2016 and 2021.
3. Updating **service locations** for 2021 for the following six service types: banks, primary schools, secondary schools, shops, pharmacies, and doctors (general practitioners). Facilities for the other four service types (cinemas, jobs/UMZ, hospitals, and stations) have not been updated, but the previous PROFECY data have been used.
4. Calculating indicators on **density of services** per NUTS-3 region (for the six updated service types), for both NUTS versions 2016 and 2021.
5. Calculating **car travel times** from each raster cell to the nearest SGI facility for all ten service types.
6. **Standardization** of car travel times at the average of the neighbouring NUTS-3 regions.
7. Delineation **of inner peripheries at grid level**, individually for all ten service types.
8. Elimination of sliver polygons and **merging of IP areas** with a smoothing of boundaries at grid level.
9. Overlay of grid IP areas with **LAU units** and **NUTS-3 regions**, respectively. Regarding NUTS3, both 2016 and 2021 NUTS versions were applied[1]. Regarding LAU units, the same layer as in PROFECY was used.
10. **Identification of IPs at LAU and NUTS-3 and levels**. LAU units were identified as IPs if their territory was overlapped 50 % or more by grid IP areas; similarly, NUTS3 units were identified as IPs if their areas was overlapped 30 % or more by grid IP areas.
11. Calculate the **availability of facilities** within certain car travel times for nine out of ten service types[2].
12. Identification of **areas-of-risk** (at grid level) to become IPs in future.
13. Combination of the new results for Delineation 3 with results of Delineation 1, 2, and 4 of PROFECY to identify **drivers for inner peripherality**.

Many of these steps were implemented by using the Python scripts developed in PROFECY to allow for efficient, accurate and fast processing.

Figure 2-1 illustrates the above process, exemplified at the banks. All the steps within the grey box will be repeated several times, i.e. once for each service type. The colours indicate whether scripts (red boxes) or standard ArcGIS commands (orange boxes) were applied, and highlight the final results (green boxes).

Table 2-1 indicates the data sources used for updating the input data.

[1] In contrast to PROFECY, where NUTS 2013 classification was used.
[2] This indicator was not calculated for jobs/UMZ for conceptual reasons.

Figure 2-1. Process of updating IP delineations and calculating indicators.

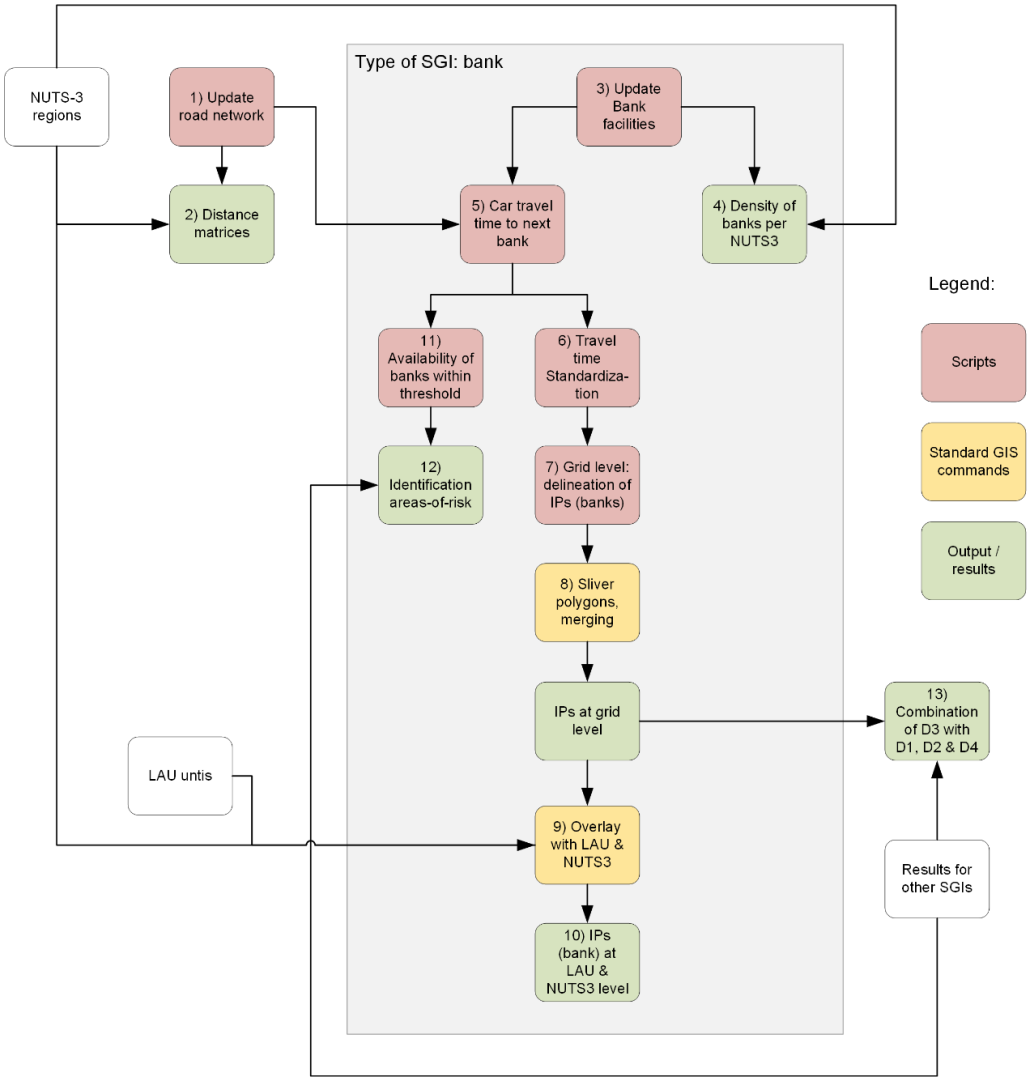


Table 2-1. Data sources for updating input data.

#	Input dataset	Data source
1	Road network for 2020	OpenStreetMap
2	Location of banks, primary schools, second-ary schools, shops, pharmacies, doctors	OpenStreetMap, plus as far as necessary addi-tional datasets as mentioned in Annex 2 of ESPON PROFECY Final Report
3	LAU boundaries	Not updated
4	NUTS system for 2016 and 2021	Eurostat
5	Centroids for NUTS system for 2016 and 2021	Project team (will be generated from the polygons provided by Eurostat)
6	Unemployment rate (15+) 2009-2019 at NUTS-3 level	Eurostat

Once the delineation process finished, maps were created in the standard map format by applying the ES-PON EU-wide Map Kit, visualising input data, interim calculation results as well as final results along the delineation process.

For each service type, the following twelve maps were produced:

- Availability of facilities within the given car travel time threshold (grid level)
- Density of facilities by NUTS3 region (for both 2016 and 2021 NUTS versions)
- Travel time to nearest facility by car (in minutes, grid level)
- Standardized travel times (grid level)
- Delineation of inner peripheries at grid level
- Overlay of LAU units with IP areas at grid level
- Identification of LAU units as inner peripheries
- Overlay of NUTS3 regions with IP area at grid level (for both 2016 and 2021 NUTS versions)
- Identification of NUTS-3 regions as inner peripheries (for both 2016 and 2021 NUTS versions)

Altogether, this results in 120 maps. In addition, across services, the following maps were updated:

- Inner peripheries in Europe (grid level)
- Inner peripheries in Europe (LAU level).
- Inner peripheries in Europe (NUTS-3 level)
- Areas of risk to become IP in future
- Combining the four delineations: main drivers of inner peripherality

Impact of health crises

To contain the Corona pandemic, many countries in Europe closed their borders with neighbouring countries in 2020. Different provisions were applied. Sometimes borders could not be crossed at all, tourists were no longer allowed to cross or only those from certain countries, or only cross-border workers with proof of health certificates were allowed to cross.

To model the impacts of such border closures on the provision and accessibility of SGIs in border regions, the following additional analyses were conducted for banks and shops as examples:

The indicator ‘number of facilities within a certain car travel time’ was calculated two times for banks and shops. In a first run, the model is allowed to reach facilities beyond the border, and in a second run the model is forbidden to reach these facilities, representing a situation with closed borders. The difference in the number of facilities to reach can be considered as the impact of a border closure on the provision of services-of-general-interest. This analysis is performed at grid level. For shops, a 15-minute and for banks a 30-minute travel time threshold was applied (the same thresholds as in the original calculations). Results of this modelling were illustrated in the following maps for both banks and shops:

- Number of facilities that can no longer be reached
- Percentage of facilities that can no longer be reached

3 Update of SGI data, indicators, and maps

3.1 Location of SGIs in Europe

The location of banks[3], primary schools, secondary schools, shops, pharmacies, and doctors have been updated based on actual OpenStreetMap data. Facilities for the other four service types (cinemas, jobs/UMZ, hospitals, and stations) have not been updated; instead, the previous PROFECY data have been used. As a result, for the latter one changes in travel times then solely reflect improvements in the road network; for the former ones, however, changes to the travel times reflect changes in the number and location of the facilities itself and improvements in the road network. Table 3-1 gives an overview about the number of facilities by service type. Location maps for each service similar to Figure 3-1 have been produced and provided in Annex 1.

Table 3-1. Number of facilities by service type 2021.

Type of service	Number of facilities in ESPON space 2021
Banks	116,251
Cinemas	8,385
Health care: Doctors (general practitioners)	68,959
Health care: Hospitals	11,691
Health care: Pharmacies	125,796
Education: primary schools	169,672
Education: secondary schools	50,033
Train stations: all passenger stations	35,225
Retail sector: Supermarkets and convenient stores	92,853
Jobs (places of work / urban morphological zones)	5,078

The spatial coverage of the facilities is generally considered to be very good across all services; however, for the doctors (general practitioners), there are reasonable doubts for a number of countries whether OSM has really coded all facilities in its database. For train stations, Cyprus, Iceland and Malta do not have railway systems, so indicators on 'access to train stations' cannot be calculated for these countries. Andorra and Liechtenstein, however, who also do not have any national railway systems, were not excluded, since land access to stations in neighbouring France and Spain is possible in case of Andorra, and Austrian and Swiss train services service Liechtenstein as well.

3.2 Density of SGIs by NUTS3 region

The density of banks, primary schools, secondary schools, shops, pharmacies, and doctors at NUTS3 level has been updated based on actual OpenStreetMap data. Services usually characterised by proximity between the service provider and the user, such as primary schools, pharmacies, retailing and banks, show a higher density of facilities as compared to doctors, hospitals, stations, and secondary schools. Figure 3-2 shows the density of doctors across Europe, similar maps have been produced for the remaining services (Annex 1).

[3] Only bank *offices* were considered in the analyses, while locations of cash machines were excluded.

When looking at geographical variation it can be observed that the density of services varies between countries differently. For instance, the density of doctors and retailing is markedly larger in Central and Western Europe, the Benelux countries, and England as compared to the remaining areas. By contrast, there is less heterogeneity in the density of pharmacies, primary and secondary schools, and banks, with the exception of Nordic and Baltic countries.

Figure 3-1. Location of banks in Europe.

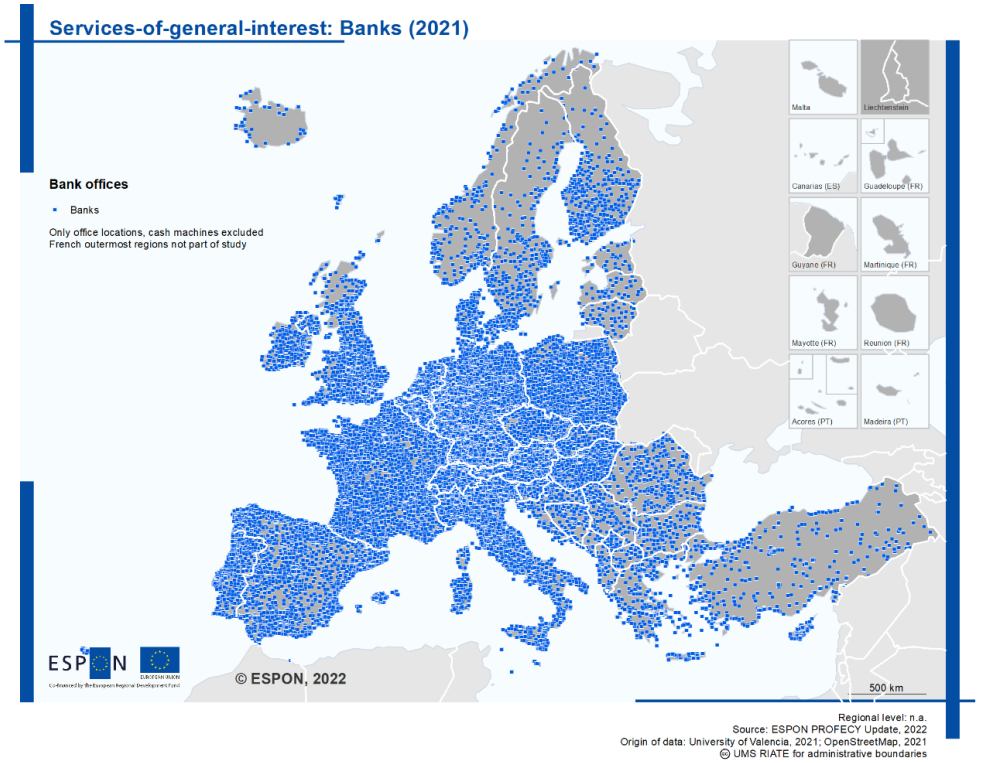
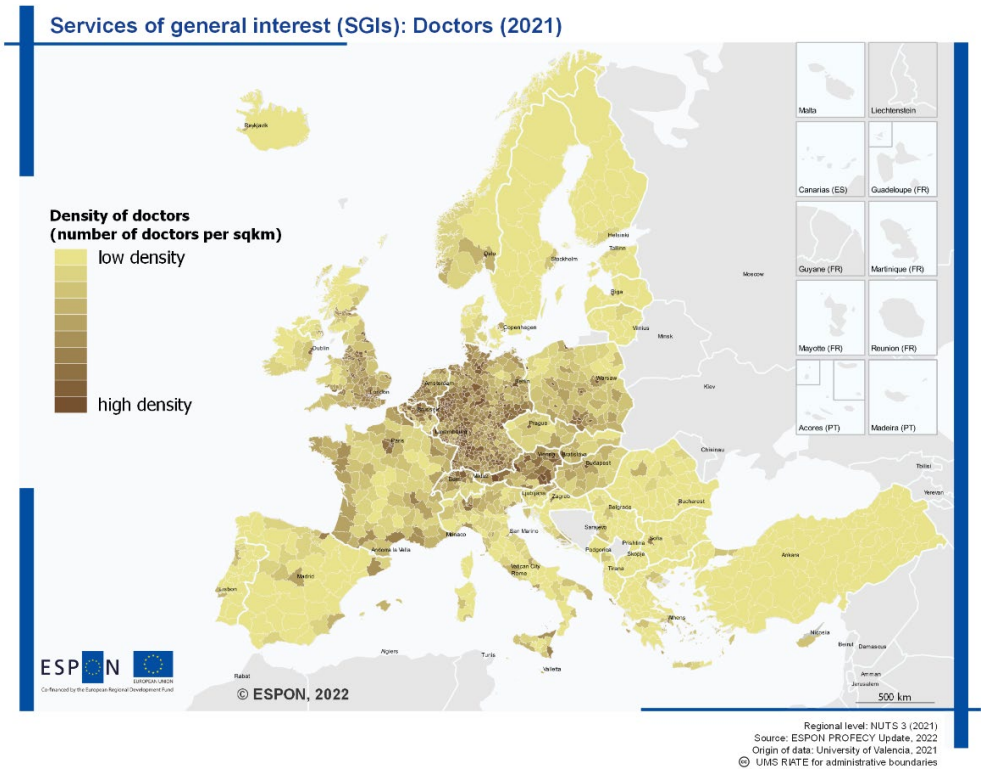


Figure 3-2. Density of Doctors in Europe (2021)



3.3 Access to SGIs

The accessibility of the facilities by car is - across all services - very heterogeneous (Figure 3-3, example: doctors). There are large-scale but also small-scale differences. From a European perspective, there are two basic blocks: Areas with long travel times, i.e. poor accessibility, contrast with those with short and very short travel times. The former includes large areas of the Nordic countries, many areas in Eastern Europe, much of the mountainous regions, many islands, and rural areas in southern and southwestern Europe and the Baltic States. The latter include large areas of Central and Western Europe, the Benelux countries, England and Northern Italy. This basic finding applies to all types of services.

However, these large-scale differences should not distract attention from the small-scale ones, which also exist. For example, in rural areas of central France or eastern Germany, areas with long travel times exist in close proximity to those with shorter travel times - the latter are located closer to highways and freeways. Areas with good and poor accessibility thus alternate within very small areas. Thus, the accessibility of the neighbouring village to secondary school or to the next hospital, for instance, can be significantly worse than in the village before. On the other hand, there are also easily accessible areas in Scandinavia or Eastern Europe near centres and along arterial roads that have significantly shorter travel times than the rest of the region. Overall, however, the sequence of highly and poorly accessible areas in these countries is not as small-scale as in Western and Central Europe.

This extreme fragmentation of space - especially in Western and Central Europe - becomes even more apparent when looking at standardized travel times (see Figure 3-4 as an example). Here, the small-scale alternation between regions with above-average (i.e. <100) and those with below-average (> 100) accessibility is clearly evident, leading to very high disparities in accessibility. In Eastern and South-eastern Europe and in the Nordic countries as well as in mountainous areas, this fragmentation also exists in principle, but since the areas with below-average accessibility are larger on average, the degree of fragmentation is lower. This is due to the village's lower density of facilities and less developed road networks.

Fragmentation of space is generally greater for service types with many locations (e.g., banks, pharmacies, primary schools, shops), compared to services with fewer ones (e.g., cinemas, hospitals, secondary schools, train stations) - the latter tend to have larger areas of poor accessibility and thus less fragmentation[4].

The large-scale European dichotomy is also reflected in the number of facilities that can be reached within a certain time span (Figure 3-5). While in the Nordic countries, in East and Southeast Europe, in the mountains and on islands usually only one or two, sometimes up to five facilities are within reach[5], in Western and Central Europe one can reach easily more than 10, 25 or even more than 50 facilities in the same time span. Although all areas from which at least one facility can be reached in the specified time period can as of today undoubtedly be considered as served in terms of spatial planning, the quality of the service provision is much greater for those areas from which more than five facilities of one service type can be reached. Customers then have a choice between several facilities, i.e. they can choose where to go by utilizing their personal preferences.

Basically, the available number of facilities relates to population density (i.e. to demand for services), with areas of low density corresponding to areas with a lower number of reachable facilities, and vice versa. This makes those areas vulnerable for future downward spirals: because of poor access to services, these areas become less attractive for residents and people may decide to move out or not decide to move in. If population decreases, demand decreases, and more facilities tend to close, thereby making these areas prone to become an inner periphery.

[4] Please refer to Annex 1 Report for a complete map series for all service types, where spatial patterns can be observed.
[5] It is worth mentioning that from many of these areas no facility at all can be reached in the specified time span, as the travel time to the nearest facility is longer than the selected threshold.

Figure 3-3. Car travel time to next doctor.

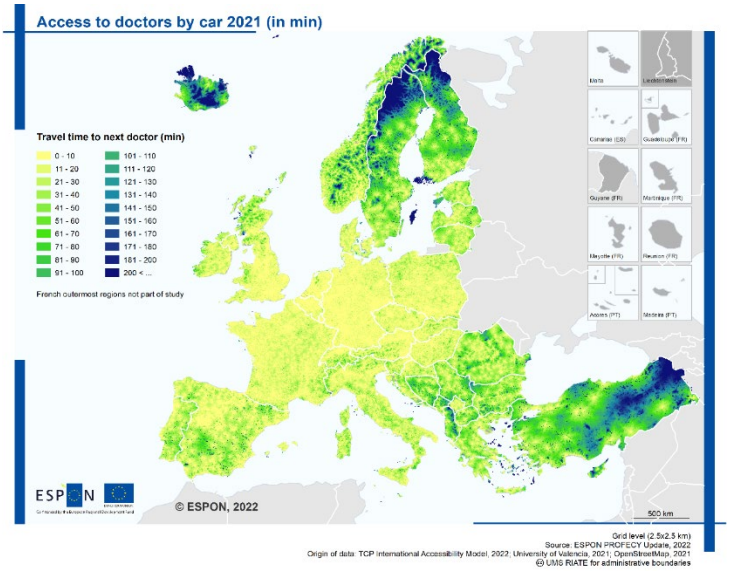


Figure 3-4. Standardized car travel time to next doctor.

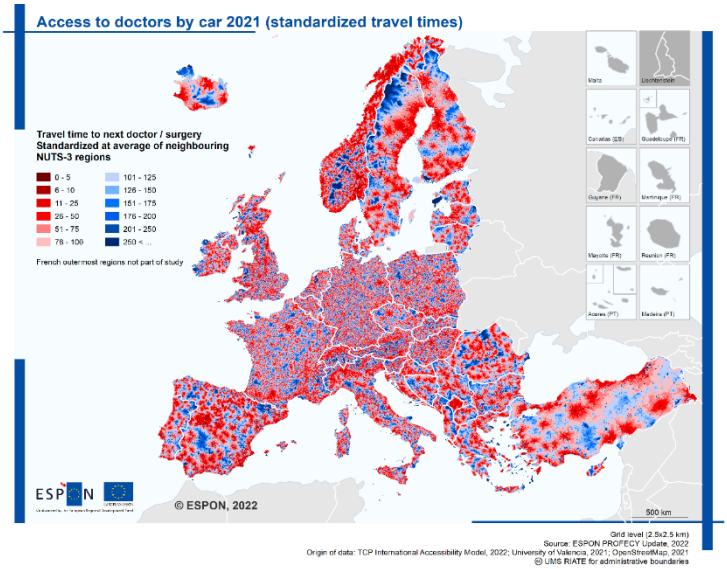
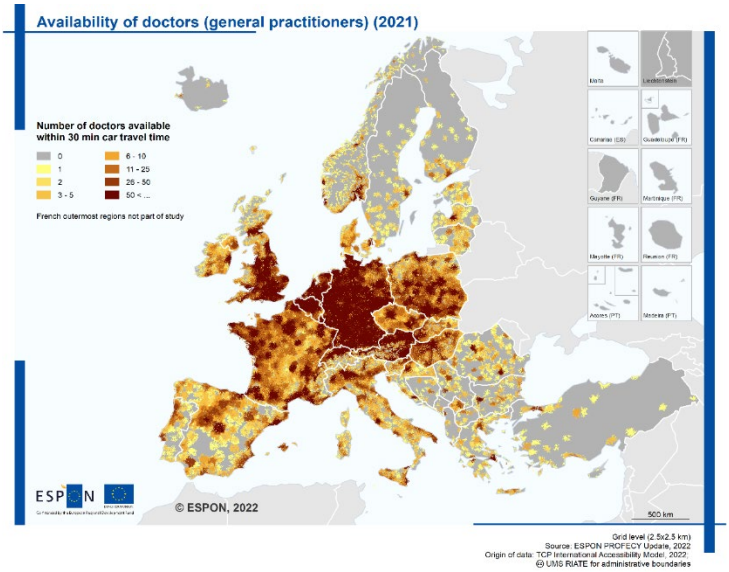


Figure 3-5. Number of doctors available within 30 minutes car travel time.



4 Results and analysis

The provision of services-of-general-interest is a highly dynamic sector. New facilities are opened, existing ones merged or closed, or services provided at a certain facility are amended in scope or nature every day somewhere in Europe. Changes to the facilities have many reasons, reflecting the expansion of settlement areas, demographic developments (i.e. changing demands as a result of growing or shrinking population), technical progress (replacement of offices by digital services), operational and commercial decisions of private and political decisions of public service providers (such as merging schools).

At the same time, governments and public authorities are constantly working to improve and expand road networks to enable shorter travel times and thus to guarantee better accessibility to services and facilities.

However, there is also a causal relationship between these two developments. Better accessibility to city centres may encourage service providers to close facilities on the outskirts or in the rural hinterland (due to increased competition from facilities in the centres which usually can benefit from higher economies-of-scale). The closure of a facility may then be compensated in whole or in part by shorter travel times to same facilities in the cities. In addition, road construction also triggers relocation decisions of private households, which in turn have effects on the demand for services and thus to the spatial allocation of service facilities. A merging or closure of facilities due to improved accessibility may be a rational business decision of a service provider, as costs are saved[6]. Which of these effects predominate in individual cases cannot be said in general terms, but depends on the actual conditions in the regions?

What is certain, however, is that because of these processes, the boundaries of the inner peripheries are just as constantly in flux. Sometimes the very decision to close or open one specific facility has a major impact on the delineation of the inner peripheries. This is shown by the new calculations presented below. However, they also show, in comparison with PROFECY, that basic patterns of IP are remarkably constant despite the diverse developments outlined.

4.1 Enclaves of poor access to different services

Reflecting the results of the travel time calculations, inner peripheries are found in all European countries for all services (Figure 4-1)[7]. Areas identified as inner peripheries can, across all service types, generally be characterized as:

- Mountain areas (examples: parts of the Alps, Pyrenees, Apennines, mountains in southern Norway, and the Carpathian mountains),
- rural areas off the main roads in all countries,
- interstitial areas between agglomerations in all countries, and
- areas along national borders (examples: Portuguese-Spanish border, Bulgarian-Rumanian border, Norwegian-Swedish border).

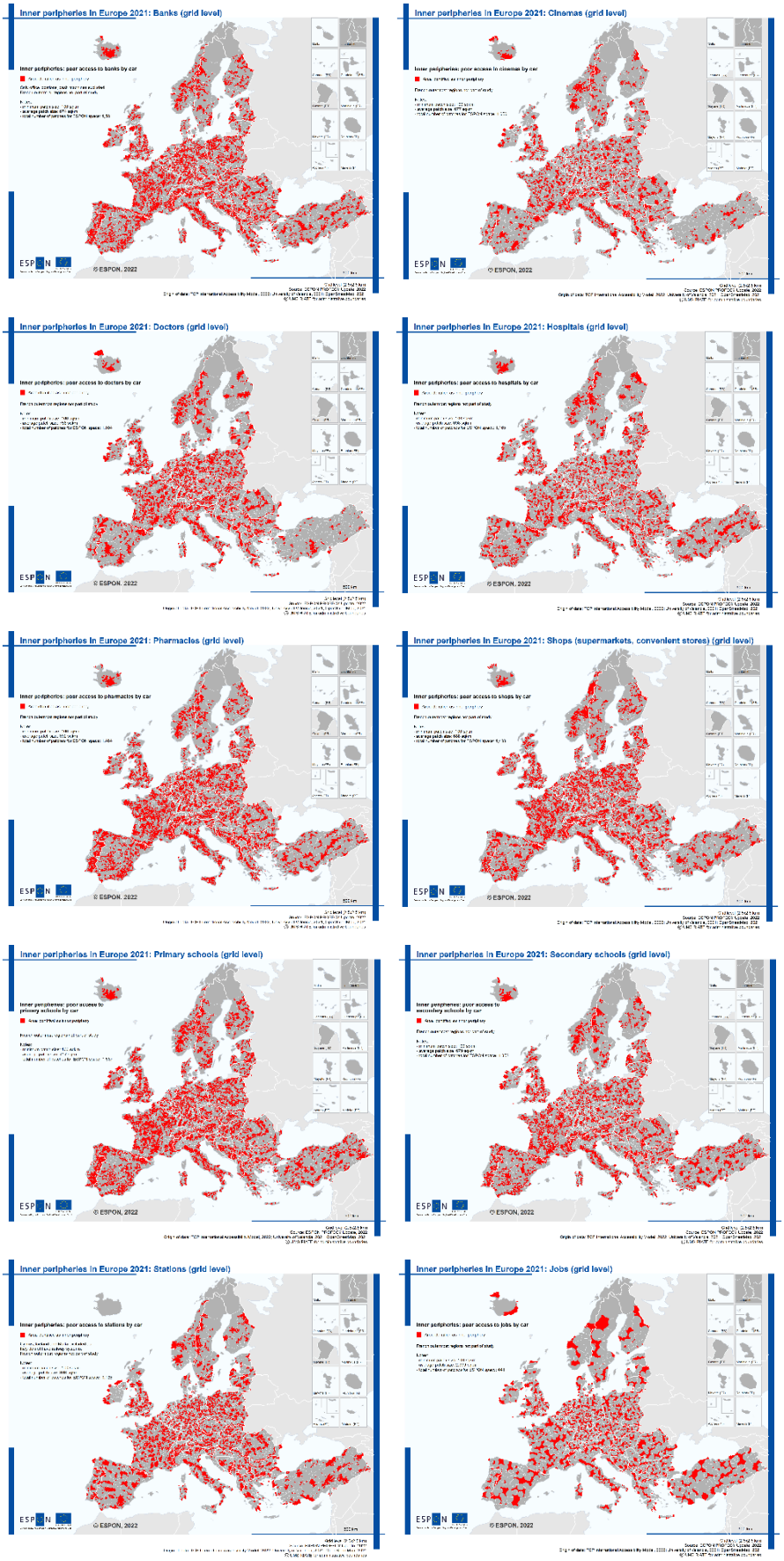
Still, patterns of inner peripheries differ in terms of number, size, fragmentation, and shape in different parts of Europe:

- In the Nordic countries (Iceland, Finland, Norway, Sweden) and in Turkey there are only few but large IP areas. This is because there are a generally lower levels of accessibility, and these levels are more evenly distributed. In other words: there are only few distinct areas of high accessibility, but a rather widespread territory of low accessibilities, so that inner peripheries only partially emerge.

[6] In macro-economic terms, however, the costs are shifted to the customers, who either have to accept longer travel times / distances, receive lower service quality, or who have to invest in their own digital infrastructures (hardware), for example, in order to be able to use the alternative digital services offered. In addition, those impacts are not homogenous but impact differently to populations groups (i.e. elderly, youth, vulnerable, disabled, etc.).

[7] This figure presents the ten maps in stamp size for the grid level. Large-format representations of the maps in their original size can be found in Annex Report 1. Similar maps are provided in Annex Report 1 for LAU and NUTS3 levels.

Figure 4-1. Inner peripheralities (grid level) for ten different service types.



- The existing IPs in the Nordic countries and Turkey are then comparably large areas, compared to those of other countries.
- IP areas in Spain and in East European countries are usually larger compared to IPs in Austria, Germany, and Benelux countries. In other words, the latter countries have a much higher small-scale fragmentation between IP and non-IP areas (or between areas with relative high and low accessibilities in the regional context), indicating large differences in access to services at a very small regional scale.
- New transport infrastructures tend to increase this fragmentation. In this case, the average patch size of IPs may become smaller, however, the number of IP patches may increase (virtually the same effect as habitat fragmentation in environmental sciences caused by new transport infrastructures)

A statistical comparison of the results for 2017 and 2021 reveals that (see Table 5-1, Table 5-2, and Table 5-3 in Annex 1)[8]:

- For all services except jobs, the total IP area significantly increased in 2021; for doctors, the total area even almost doubled; for jobs, the IP area stabilized.
- The number of IP patches increased (exception: retail, jobs), for some slightly (hospitals, stations), for others significantly (cinemas, doctors, secondary schools), but their average sizes only increased marginally (hospitals, secondary schools, stations) or even decreased (cinemas).
- Thus, towards 2021 a larger number of IP patches with stable average size led to an increased spatial fragmentation of IP patterns[9].
- The higher fragmentation reflects nicely the effects of the expansion of road infrastructures in combination with a closure of facilities: on the one hand, the accessibility of centres and facilities along new and upgraded roads increased, on the other hand, the areas that are not directly connected to the upgraded roads remain further behind (in relative terms).
- Analytically, a higher fragmentation of IP patches is a priori neither good nor bad. For small IPs, there is hope that they will lose their IP status in the future should their accessibility continue to improve. From a political point of view, however, focus is mainly given to large IP areas, which usually have to cope with further disadvantages, while smaller IPs areas are rarely on the political agenda.

The larger fragmentation at grid level also led to increased numbers of LAU and NUTS3 units identified as inner peripheries in Europe, as statistics in Appendix A1 show.

4.2 Identification of areas with poor access to SGIs

The enclaves identified up to this point can already be considered as inner peripheries in relation to the service concerned. However, the service quality in a region is not measured exclusively by one service, but by the sum of all services. If, from any location, the accessibility of one service is poor, that's certainly not nice, but if the accessibility for nine other services is very good from the same location, this counterweights the one bad service. Also, the importance of a particular service for households and families very much depends on their position in the life cycle. Families with kids are usually more concerned about access to kindergartens, schools, and doctors, compared to elderly people, who probably are more attracted by cinemas, theatres and retirement homes.

Inner Peripheries are therefore areas which have poor access to a majority of services, i.e. to five or more[10]. Figure 4-2 illustrates the results. Inner peripheries can be found in all European countries except for Cyprus

[8] For services, whose facilities were not updated (i.e. cinemas, hospitals, stations, and jobs), IP changes reflect the impacts of new or upgraded road infrastructures.

[9] It is worth mentioning that a minimum size of 100 km^2 was applied for an area to become an inner periphery. Smaller IP patches have been removed as artefacts. Despite this minimum size, the degree of fragmentation has increased. The construction and expansion of roads thus increased small-scale differences between areas with good and those with - relatively speaking - lower accessibility. This restructured the spatial continuum, especially in a regional context. What was a uniformly structured area before the upgraded road infrastructures (with equally good/bad accessibility), has become a sequence of good and poorly accessible areas afterwards.

[10] PROFECY added the following conditions to this: Provided, that among these five there is poor access to primary schools, hospitals or train stations.

and Malta. For their spatial characteristics, the previously said applies: Inner Peripheries are found in mountain areas, rural areas off the main roads, in interstitial areas between agglomerations, and along national borders. However, the number and overall size of these areas per country differs significantly.

A comparison with the 2017 results (Figure 4-3) shows:

- **Core areas of inner peripheries** in all European countries who remained disadvantaged in terms of poor access to services.
- Large areas who **lost their IP status** from 2017 to 2021 through improved accessibility. These areas are often adjacent to the core IP areas. These areas can mostly be found in Spain and Poland, but also in Germany and France, to a lesser degree in Italy, Bulgaria, Greece or in the UK.
- **New IP areas** emerged either through closure of facilities or to worsened relative accessibility (if road infrastructures in the neighbouring regions were improved). Such areas are mostly found in southern Portugal, western and northern France, Germany, Poland and in the Nordic countries. Usually, these new IP areas are smaller in size compared to the core IP areas.
- **Opposing developments**: Countries such as Poland, Germany or France are thus experiencing opposing developments in different parts of their territory: Areas where inner peripheries have receded contrast with others where new IPs have emerged. In other countries (Croatia, Greece, Finland, Ireland, Belgium, or Bulgaria), however, hardly any changes are visible with respect to the IPs.
- The **net result** is that there are countries such as Spain, the Netherlands, Austria, Slovakia or the Czech Republic where the share of IP areas on the national territory has decreased significantly; in contrast, it has increased in other countries (Portugal, Lithuania, Denmark, Estonia).

Figure 4-4 and Appendix A2 illustrate these shares by country. For 2021, shares range from 11.3 % for Finland up to 57% for Andorra (Figure 4-4). Although this is quite a large range, the range has significantly decreased from 2017 where Andorra faced 94.3 % of its territory as IP[11]. For the majority of countries, the share lies between 20 and 40 %. Nordic countries have even lower shares (Finland: 11.3, Norway: 12.8, Sweden: 15.3), small countries have larger shares (Slovakia: 41.5, Makedonia: 45.1, Albania: 45.6, Switzerland: 46, Slovenia: 49,6, Andorra: 57.1). As described above, the 2017-2021 development in the countries was very different. In four countries, the overall share of IPs did not change (Belgium, Bulgaria, Croatia and Greece). For seven countries, the IP territory enlarged slightly (Finland, Slovenia), medium (Bosnia-Herzegovina, Estonia and Denmark) or significantly (Lithuania with 8.2 and Portugal with even 12.2 percentage points). For the remaining countries, the share decreased more or less strongly.

Although the analysis of the individual services in Chapter 4.1 and Appendix A1 suggests a clear deterioration, this observation cannot be confirmed for the combined indicator (of overall access to SGIs). For the majority of European countries, the share of inner peripheries on their total area is decreasing or remains constant; only for a few is it increasing. It follows that the development of the different services is very different affecting different parts of the territory. For example, if an area becomes an inner periphery in terms of bank accessibility due to the closure of a bank office, this cannot simply be transferred to the other nine services, nor does it mean that the affected area as a whole is classified as IP across all ten services. The overall indicator of 'IP to all ten services' thus relativises the developments in the individual services; on the contrary, across all ten services, the positive effects of the expansion of road infrastructures seem to compensate for the negative effects from the closures of individual branches at the overall state level.

[11] Small countries like Andorra or Luxembourg are very sensitive towards changes of SGI provision and/or infrastructure improvements. Changes in one service may expose a large part of their territories to become/not to become IP. Also, changes to the service provision or infrastructure development in neighbouring countries will immediately impact their territories. Although the latter applies in principle to all border areas, Andorra and Luxembourg are particularly affected. The shares for these two countries therefore only reflect the developments within these countries to a limited extent, but are strongly influenced by the developments in their neighbouring countries.

Figure 4-2. Inner peripheries with overall poor access to services.

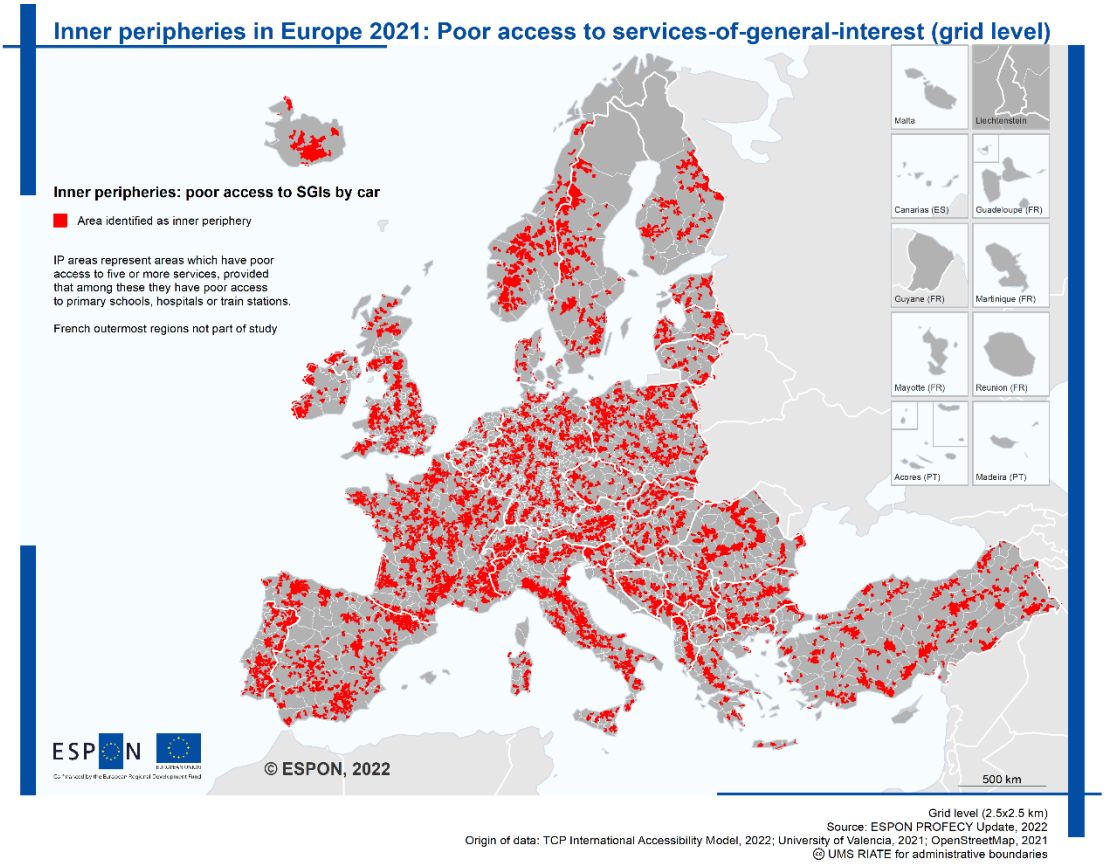


Figure 4-3. Comparison of IP patterns 2017 and 2021.

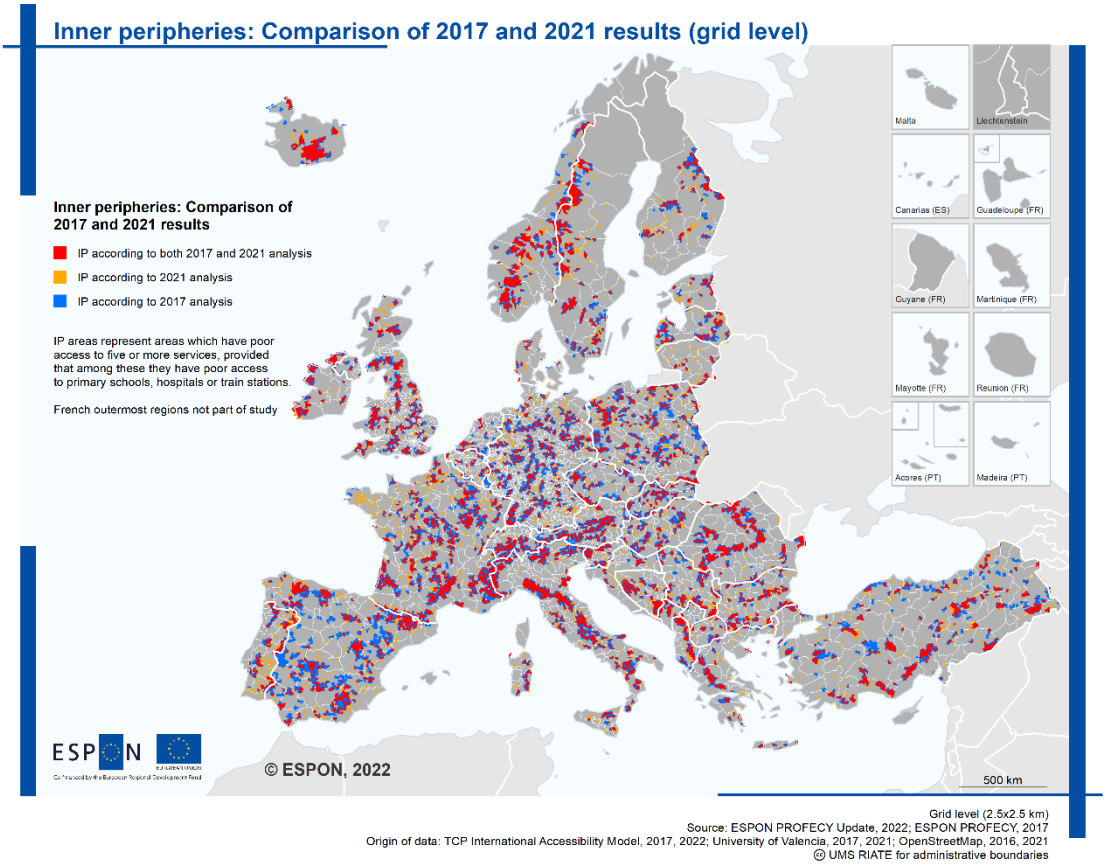
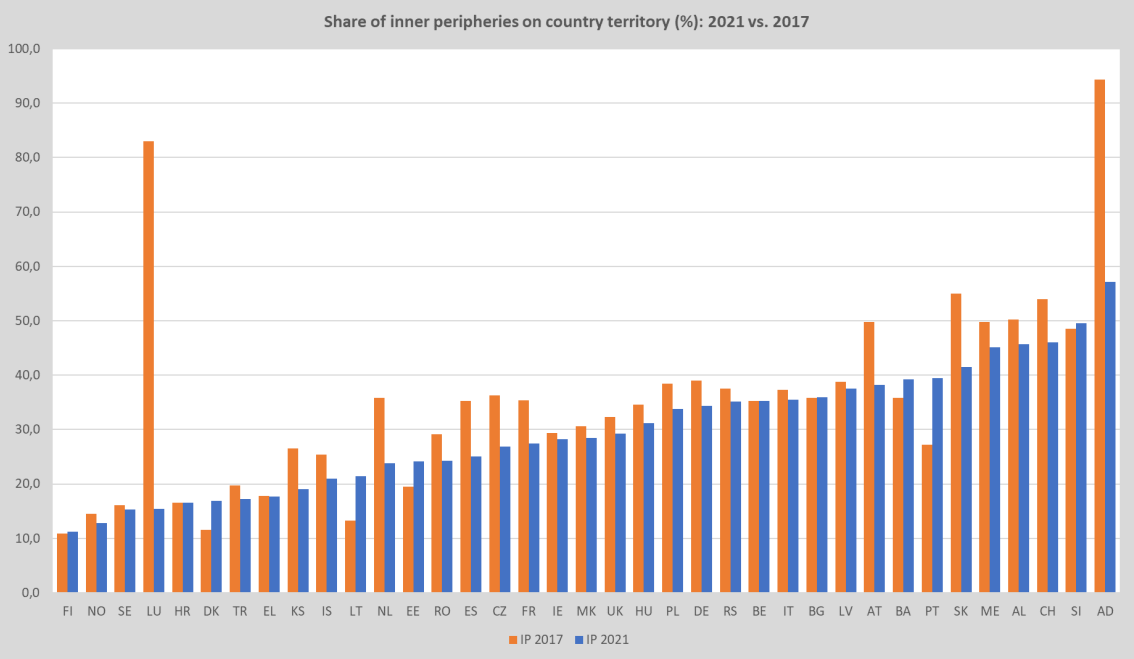


Figure 4-4. Share of inner peripheralities on country territory.



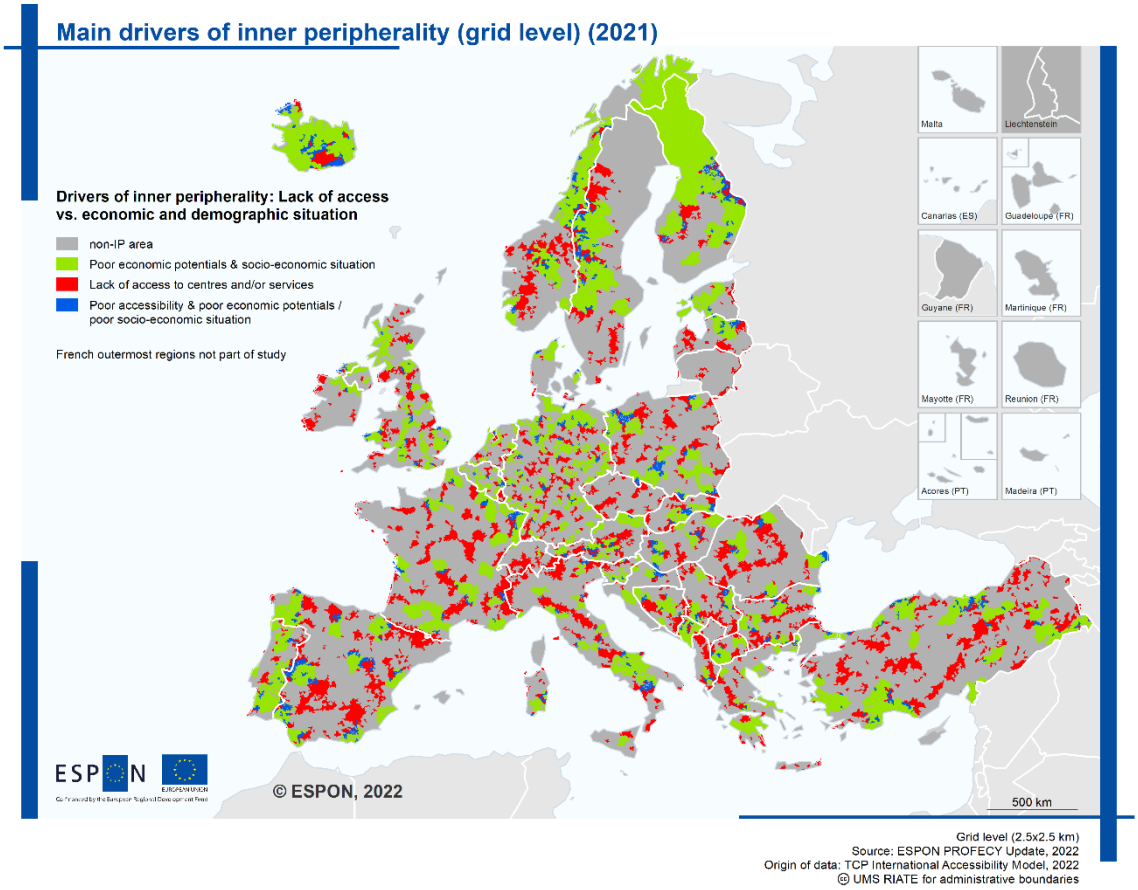
4.3 Main drivers of inner peripherality

Poor access to services of general interest is only one important driver for areas to become an inner periphery. ESPON PROFECY developed four different delineation approaches, of which (poor) access to services was only one (Noguera et al. 2017a). Altogether, as mentioned in chapter 1 the following drivers of inner peripherality were identified:

- Poor access to regional centres (delineation 1)
- Poor economic potentials (delineation 2)
- Poor access to services of general interest (delineation 3)
- Poor socio-economic and demographic situation (delineation 4)

These drivers manifest in Europe's regions rarely on their own but most likely in different combinations, or, one driver may be the most decisive one compared to the others. Figure 4-5 illustrates the drivers. The result is a kind of patchwork in Europe. Just by numbers, most inner peripheries are caused by poor accessibility to centres and services. However, the areas are smaller than such inner peripheries, which are caused by low economic potentials and a problematic socio-demographic situation. Here, not only in Northern Europe, larger contiguous areas result. A few inner peripheries are also caused by a combination of poor accessibility, negative economic potential, and problematic demographics. All these drivers are visible everywhere in Europe.

Figure 4-5. Main drivers of inner peripherality.



4.4 Areas of risk to become IP in the future

As indicated, inner peripheries are in a constant state of flux. Their boundaries are therefore not fixed but fluctuate depending on various developments. Inner peripheries can expand, and new IP areas can emerge when, for example, service facilities close. Conversely, the update and expansion of road networks and the opening of new facilities can also lead to a reduction in IP areas.

Areas that are not considered IP today may become IP tomorrow. Areas most at risk are those from which today only one facility per service type is within reasonable driving time (e.g., one secondary school is accessible within 60 min car travel time, or just one store within 15 minutes or one bank within 30 minutes). If this one accessible facility were to close, then the service quality for the affected regions would be severely compromised. If such closures happen for only one service type, it may not yet have a severe impact on daily life, but if several facilities for several service types are closed, regions quickly become completely disconnected from further development.

The number of accessible facilities within a reasonable travel time is therefore a good indicator and basis to perform such a risk assessment (Figure 4-7 provides a map series for all ten service types). Contrasting areas from which only one facility is reachable with the present IP areas reveals areas of risk to become IP in the future (Figure 4-8).

A comparison with the PROFECY results for 2017 shows that for most services, there has been little change for the most affected countries (Table 4-1). Across all services, the Nordic countries and Eastern Europe (including Turkey) are the ones with the most at-risk areas. In addition, for many services, Spain and Portugal, Scotland, parts of the Baltic States, and north-eastern Poland, as well as the core areas of the Alps, also have many risk areas. The remaining countries have small-scale risk areas, but these are only visible when the map is greatly enlarged (zoom-in).

Table 4-1. Countries with main areas-of-risk 2017 vs. 2021.

	Bank		Cin-ema		Doctor		Hospi-tal		Phar-macy		Retail		Primary School		Sec. School		Station	
	17	21	17	21	17	21	17	21	17	21	17	21	17	21	17	21	17	21
AD																		
AL																		
AT																		
BA																		
BG																		
CH																		
CZ																		
DE																		
DK																		
EE																		
EL																		
ES																		
FI																		
FR																		
HR																		
HU																		
IE																		
IS																		
IT																		
KS																		
IT																		
LT																		
LU																		
LV																		
ME																		
MK																		
NL																		
NO																		
PL																		
PT																		
RO																		
RS																		
SE																		
SI																		
SK																		
TR																		
UK																		

Legend:
Grey cells = small proportion of areas-of-risk on country territory,
orange cells = areas-of-risk in certain parts of the country,
blue cells = large amount and extent of areas-of-risk on country territory;
white cells = not applicable
17 = year 2017
21 = year 2021

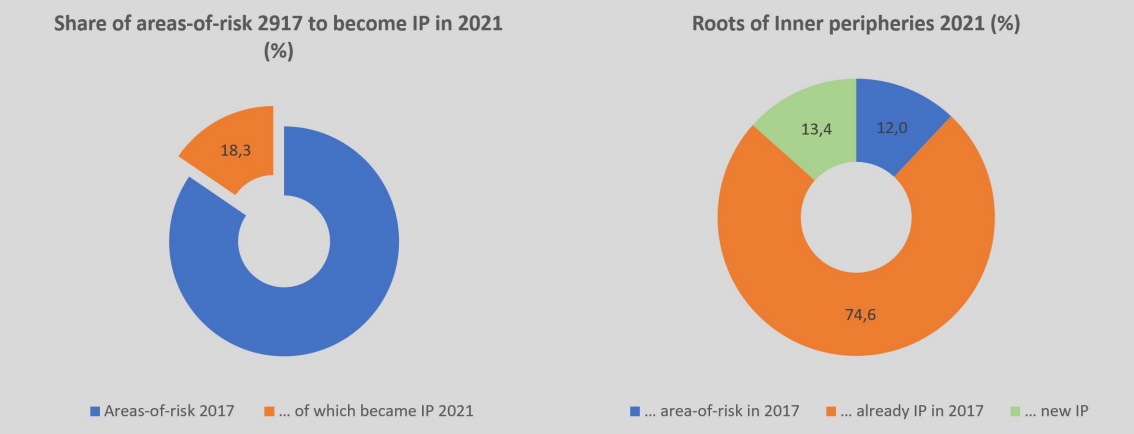
An interesting observation is that for public services (schools, hospitals), the risk areas turn out to be smaller and ultimately the number of countries affected is also smaller, whereas the risk areas for privately operated services (e.g. stores, banks, cinemas) are larger and affect more countries. This shows that state planning, especially for schools and hospitals, tends to create more homogeneous conditions within the states.

However, risk areas must be assessed differently. While in the affected areas in the Nordic countries, in Scotland, the Alps and partly also in Spain, a lack of demand and thus a low density of facilities must be assumed (many uninhabited areas), the problem in the affected areas in Eastern Europe is in fact rather a lack of accessibility because of low density and low-quality road networks.

Finally, areas under severe pressure to become inner peripheries in the future are those areas that have poor access to four or more services. In other words, from these areas no or only one facility can be reached in reasonable time for four or more services (Figure 4-9). Against the background of the previous analyses, these areas are, unsurprisingly, found in the Nordic countries, in Eastern Europe including Greece and Turkey, in the Baltic States as well as on the Iberian Peninsula, in Italy (Sicily, Sardinia), in the Alpine region, Scotland as well as in north-eastern Poland and in Ireland.

Approximately 18% of the areas-of-risk in 2017 have further 'downgraded' as they became inner periphery in 2021 (Figure 4-6 for summary statistics, Figure 4-10 for a map). In other words, almost one fifth of the at-risk areas became inner peripheries in this relatively short period of time. Conversely, 12% of inner peripheries in 2021 were areas-of-risk in 2017, almost 75% of the 2021 IPs were already inner peripheries in 2017 (Figure 4-6), while only 13.4% of the 2021 IPs were neither areas-of-risk nor IPs before. Geographically, 2017 areas-of-risk that became inner peripheries in 2021 are found all over Europe (Figure 4-10), with higher concentrations in France, Poland, Sweden, and Germany. In contrast, almost no such cases are found in Austria, the Netherlands and Switzerland. These findings illustrate the risk for a downward spiral once an area carries the status of a 'risk area' and emphasises that measures to stabilise the situation are already advisable in the areas-of-risk.

Figure 4-6. Development of areas-of-risk and inner peripheries 2017-2021.



Note: The proportions of 18.3% and 12% in the two figures are not identical because the respective parent populations are different (parent population on the left: total area-of-risk 2017; on the right: inner peripheries 2021).

Figure 4-7. Availability of facilities (grid level) for individual services.

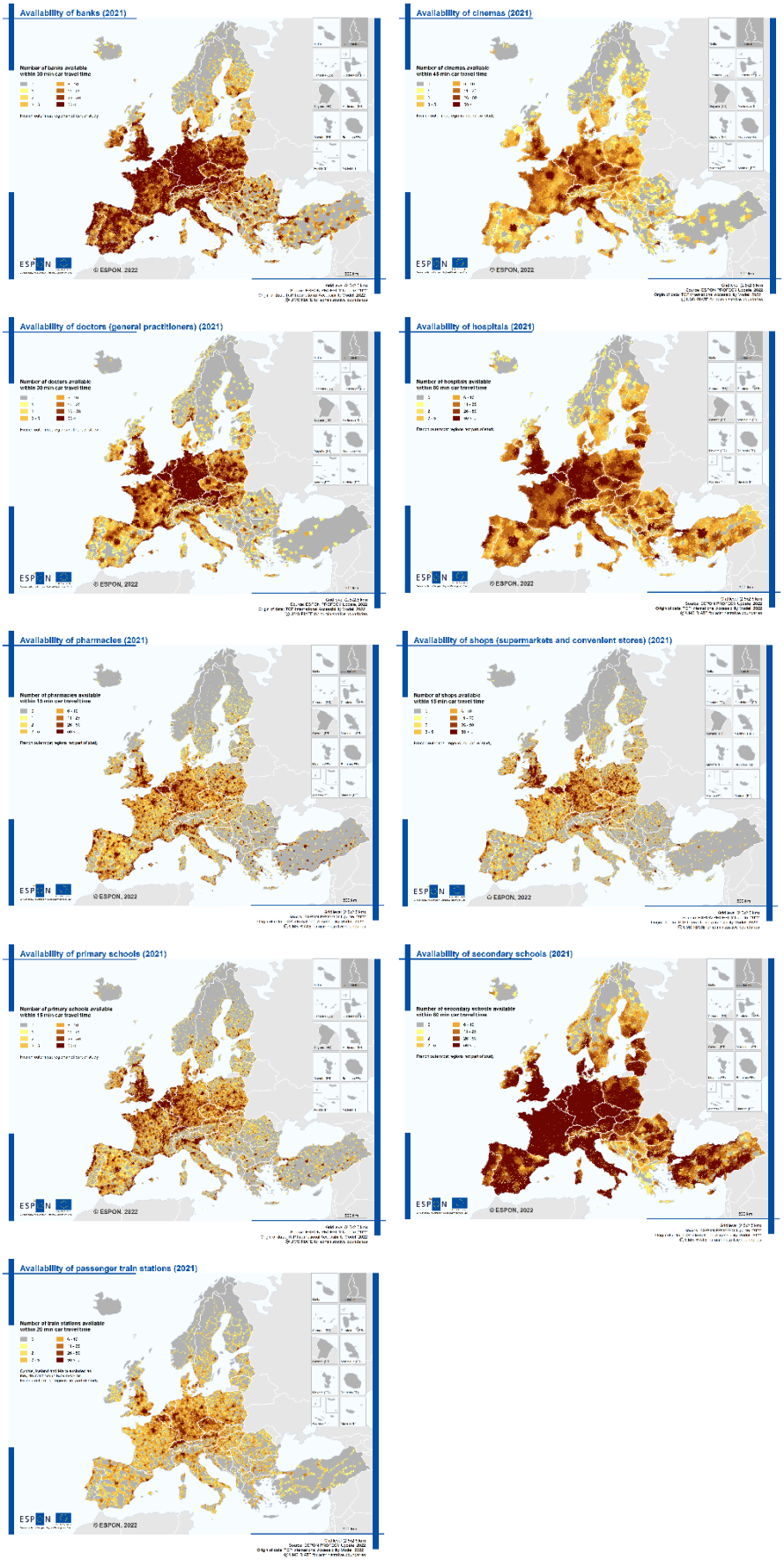
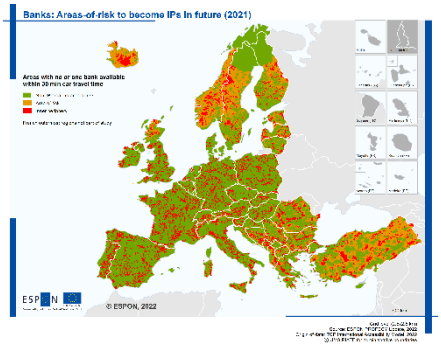
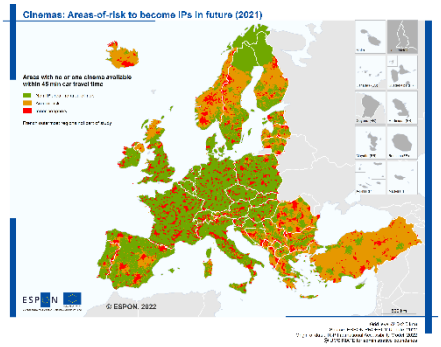
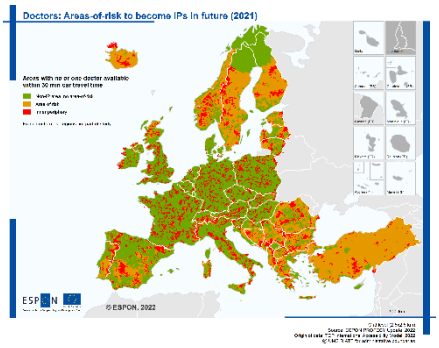
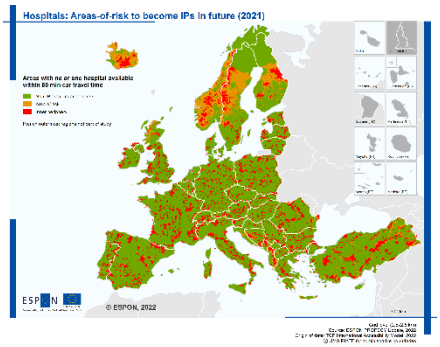


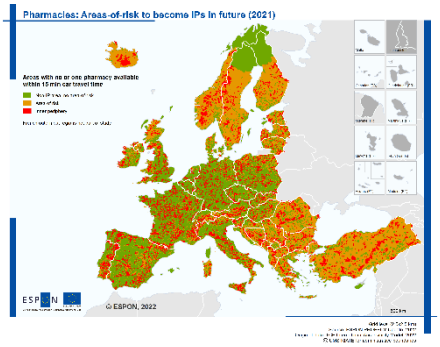
Figure 4-8. Areas of risk to become IP in future for individual services.

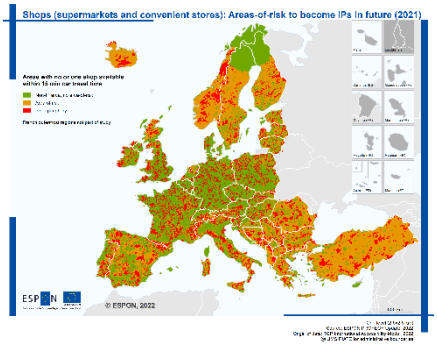


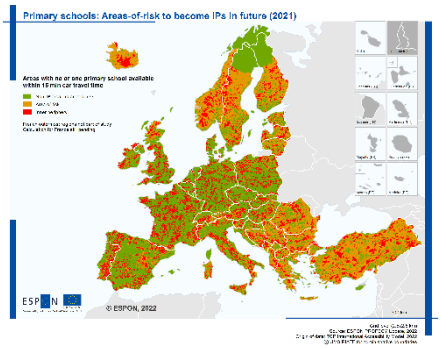


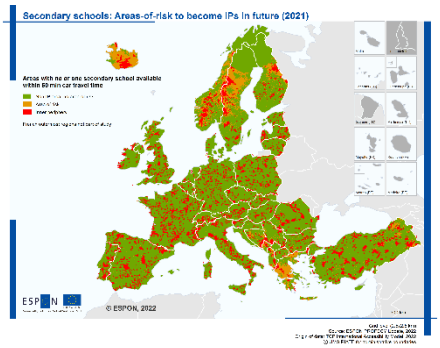












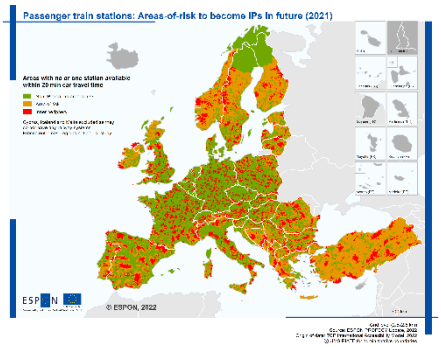


Figure 4-9. Areas under severe pressure to become IP in future.

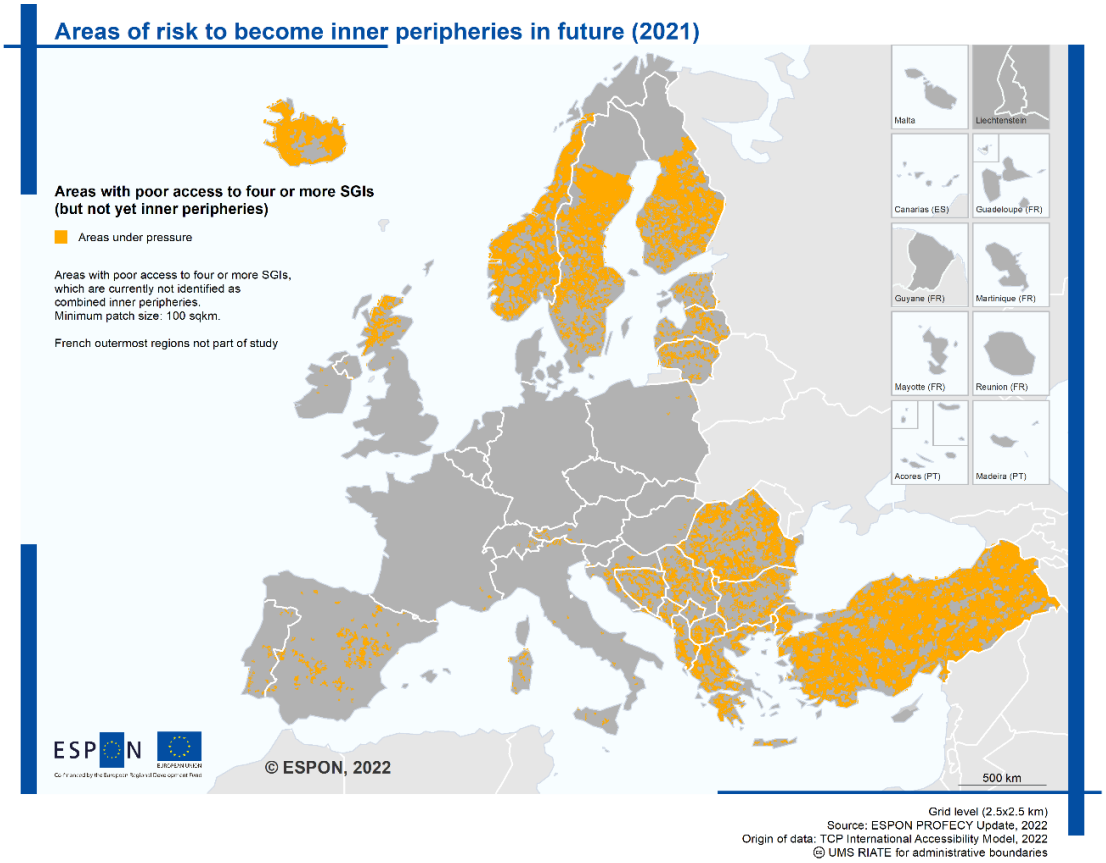
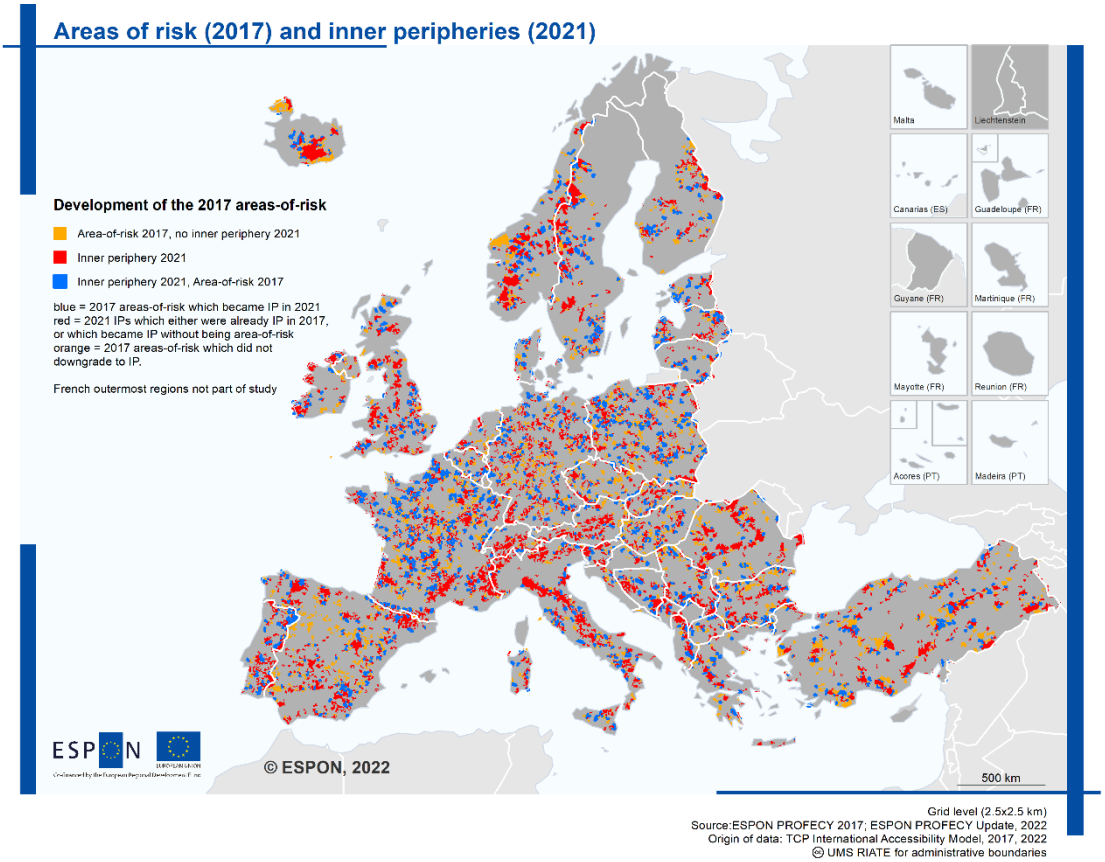


Figure 4-10. From areas-of-risk to inner peripheries.



4.5 Impacts of the health crisis on the accessibility of SGIs

Model results show that the impacts of border closures in border areas are very uneven across Europe. The magnitude of these effects depends on several factors:

- **Availability and density of border crossings**: Border areas with no or only few border crossings are likely to be less affected because people already phase difficulties in crossing borders even in situation where all borders are opened. So, these areas do not suffer from additional burdens, compared to their daily life.
- **Quality of the road networks**: In border areas with high quality arterial roads (motorways, express-ways), the impacts of border crossings are likely to cover a wider territory compared to border areas where border crossings are only provided through secondary or tertiary roads.
- **Spatial distribution of facilities in the border area**: Service facilities need to be in place close to the national borders; in absence of facilities, border closures would not have any negative effects. In absence of facilities only on one side of the border, the impact of the border closures would be one-sided, affecting only that side of the border without services.

Model results, expressed as (1) the number and (2) percentage of facilities that no longer can be reached after closing the borders, reflect these factors. However, as these factors are very unevenly distributed along Europe´s borders, the impacts are also very different.

Generally, for shops a corridor up to 20 km from the border crossings is affected (Figure 4-12), while for banks corridors up to 50 km suffer from border closures (Figure 4-11). Areas beyond these corridors are not affected from border closures[12]. Impacts are largest along borders of the Benelux countries, along German borders, along Eastern borders of Austria as well as along the Portuguese-Spanish border. In Eastern Europe and between the Baltic States, strong and less strong effects occur sporadically along the borders. Almost no impacts can be seen between the Nordic countries, and along borders in the Alpine space (France-Italy, Italy-Switzerland, Austria-Italy).

Even if a significant number of facilities (more than 10, 25 or 50) can no longer be reached, this does not immediately mean major losses in service quality or accessibility. Only when these figures reach a high percentage (Figure 4-12), the supply situation deteriorates significantly. In case of retail, for example, percentages drops of accessible facilities of more than 75% or 90% can be observed along the Dutch-German, Belgian-Dutch and partially along the Portuguese-Spanish borders. Also, some small border sections in Eastern Europe reach such high percentages. In these cases, the affected border corridors will severely suffer from border closures. Along other borders such as the Upper Rhine Area between France and Germany and Germany and Switzerland, or Austrian borders, the percentages are less than 50% or less than 25% resulting in less severe impacts. Areas with a decline in accessible facilities of more than 90% or 95% face a complete decline in service provision, as (almost) no facilities are accessible within the specified travel time (15 or 30 minutes, respectively). People from these areas then would have to travel extremely long distances into the hinterland to reach the next shop or bank.

[12] At least in terms of accessibility of services. Other negative effects, e.g. on the freedom of movement of cross-border commuters, have not been examined here.

Figure 4-11. Number of banks not reachable after border closures.

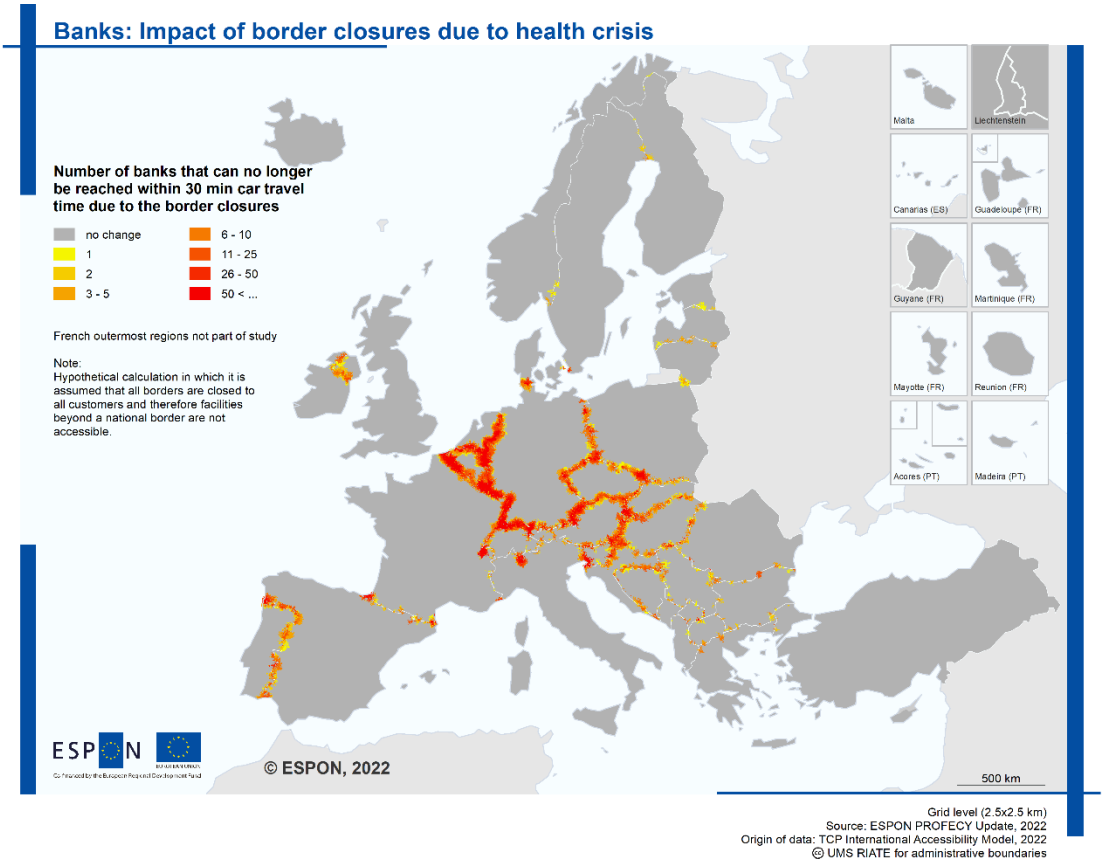
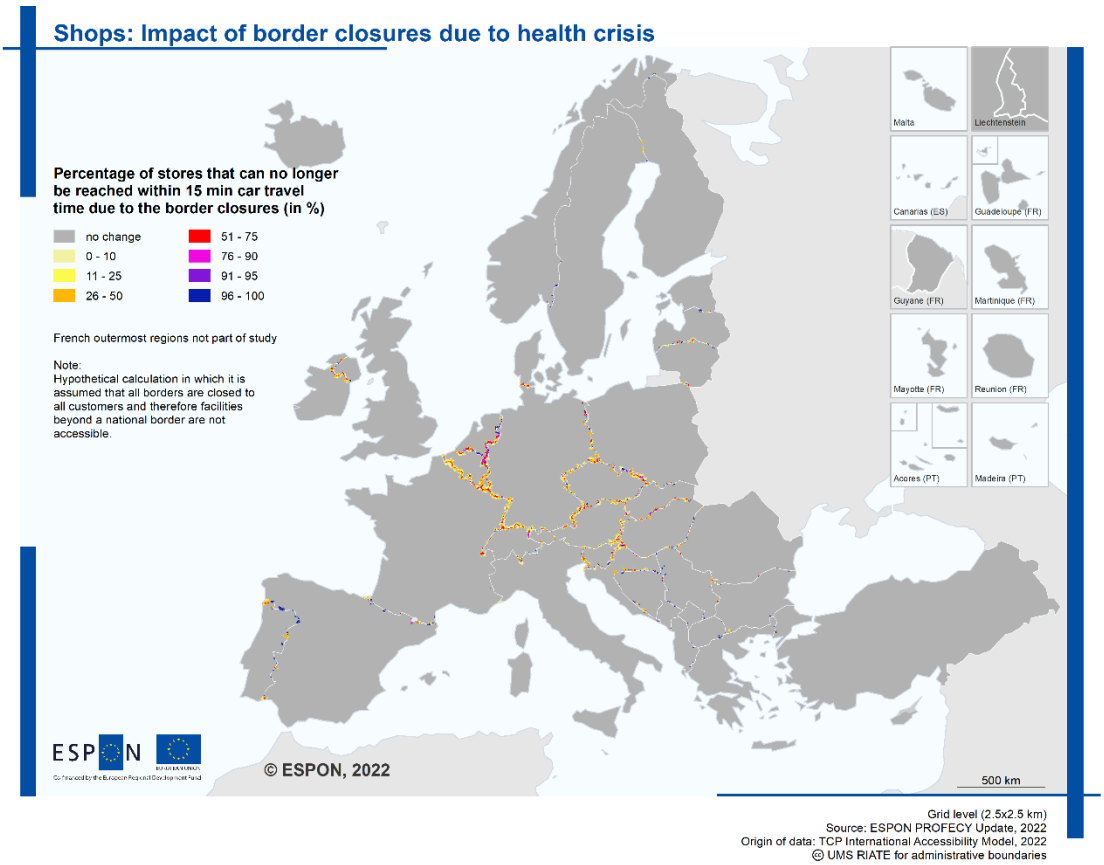


Figure 4-12. Percentage of stores not reachable after border closures.



5 Dealing with the challenges

5.1 Understanding inner peripherality

Inner peripheries have in common the fact that their general performance, levels of developments, access to services, or the quality of life, are relatively worse when compared with their neighbouring territories. In those areas 'peripherality' may be the result of processes linked to its spatial location: (i) enclaves of low economic potential or (ii) poor access to services, but also due to aspatial processes, such as (iii) the lack of relational proximity**. Its core characteristic is poor connectivity (spatial, aspatial and often a mixture of both) generally resulting in those areas lagging in socio-economic development.** Therefore, development potential of those areas is limited because of a multiple combination of processes that affect how the area is 'connected' with its environment. Thus, this is determined not only by 'geography' but also by relational connectedness. Relational connectedness is closely related to institutional capacity to interact, multi-level governance, insertion in networks, synergies between different actors and between contiguous territories, and any other types of links that enlarge the capacity to interact and influence at higher policy decision-making levels.

Whatever the combination of causal processes and factors, inner peripherality is usually associated with 'vicious cycles' where the relative disadvantages (i.e.in levels of economic activity, poor access to services or less connectivity) further impact economic performance, tax revenues, and out-migration. Those processes may, in the long-term, exacerbate accessibility problems, worsen the provision of services, and make the area become less attractive for residents and newcomers, eroding human and social capital. These intertwined feedback loops explain the difficulty of reversing the trend once the cycle is triggered.

By contrast, even geographically remote regions which provide good accessibility to services of general interest may offer better development possibilities and future perspective compared to geographically central regions with poor access to SGIs.

Inner peripherality is not a new phenomenon. Yet, despite the efforts to define it and map it, it has not been very visible in the policy arena until now. Although the term appears in the Territorial Agenda 2030, its defining features are not explicitly mentioned in other policy strategies at EU level. Surely EU policy has responded to problems of those areas to a greater or lesser extent. But even though the efforts, since 2017 until now there has not been a growing social awareness and the problem remains to some extent invisible. In this sense, the fact that inner peripheral areas experience a feeling of 'being abandoned' (Noguera et. al. 2017a) probably continues to be true. So, the question remains: how to use inner peripherality for prosperity?

5.2 The geography of inner peripheries and areas of risk

The update of ESPON PROFECY project has devoted most efforts to assess changes in accessibility to SGIs**. Shifts in accessibility appear both from changes in service provision and in transport infrastructure**. Regarding the provision of individual services, changes reflect how the territorial organization evolves at a detailed level. However, the effect of the improvement of services in some areas is not directly and straightforwardly translated into improved accessibility to SGIs, and vice-versa. Time-accessibility to services varies to a large-extent within a NUTS3 region and even within a LAU area. Similarly, improvements in roads and transport networks affect different areas in a heterogenous way.

In 2021, inner peripheries continue to be present in almost all European countries. Yet**, the variation of time-accessibility to services (in relative terms) shows a wide territorial differentiation and different services affect different parts of the territory.** Due to functional organisation of service provision, in many cases inner peripheries appear around administrative NUTS 3 boundaries (Figure 4-1). In this sense, indicators such as the density of services at NUTS3 level may have a limited explanatory power to deal with inner peripherality. **Nonetheless, areas with a low density of population are more vulnerable to this inner peripherality.** Similar to shrinking areas, population decrease (due to natural decrease or outmigration) leads to problems in maintaining service provision, and transport infrastructure, which further encourages the outflow of population. In addition to low population density, results show that in Eastern Europe low-quality transport networks also exacerbate the problem.

A comparison of 2021 inner peripheries with 2017 results shows **inner peripheries have fluid boundaries that respond to aggregated changes in service provision.** Although the statistical analysis of the individual services suggests a clear deterioration (Annex A1), when those changes are aggregated to identify areas

with poor access to SGIs the total area of inner peripheries is rather constant. This may be explained by changes in services affecting differently the territory[13] and by public services being provided more homogenously and responding more slowly to shifts in demand than private service provision. **Even though borders are fluid, some core areas remain: 75% of the 2021 IPs were already inner peripheries in 2017** (Figure 4-3). **Improving the number of facilities available in core areas will then be an effective way of addressing inner peripherality**. Furthermore, measures in core areas could also have beneficial spread effects to their surroundings.

It is generally accepted that road infrastructure improves territorial cohesion benefiting peripheral regions. However, the comparison of 2021 and 2017 shows that **inner peripheral areas behave in a complex way, as the improvements in road infrastructure are not simply translated in total reduced IP areas but on a higher fragmentation**. In IP areas where services are closed, the expansion of transport infrastructure may reduce commuting time and compensate, in the short-term, the negative effects for residents. However, when IPs appear because of infrastructural improvements in neighbouring areas, it is worth noting that the opening of a new road affects only a small strip of the territory and nearest municipalities, thus increasing small-scale differences between areas. In this sense, neighbouring areas that are not directly connected to the upgraded roads become smaller but remain further behind (in relative terms). In the long-term, new transport infrastructure has also an impact on population distribution, access to jobs and business activities. Although better access to centres of economic activity is a key factor to sustain population there are also some backwash effects in the areas bypassed by road improvement. In inner peripheral areas resulting from cumulative factors such as low population density and weak economic activity, people may choose to move to better-connected areas.

Regarding areas of risk of becoming an inner periphery, approximately 18% of the areas identified in 2017 have further 'downgraded' and became an inner periphery in 2021. (Figure 4-10). Therefore**, the identification of areas of risk to become IP in future as areas of poor access to three or four SGIs**[14] has **proved to be a useful indicator**. In those areas, the further closure of facilities can lead to areas becoming less attractive.

5.3 EU Policy Overview

This section provides an overview of how current policies address the challenges of IPs (chapter 1.4). Due to the multi-faceted nature of IPs, a variety of EU policies can be useful to deal with IP singularities. The following section provides a general assessment of how the EU policy context may contribute to develop the potentialities of IPs and address the drivers behind IP problems (or if, on the contrary, there is a risk to contribute to strengthen them). The main focus of this EU policy overview has been on European development plans envisioned through the European Green Deal, with its Sustainable Europe Investment Plan and the Just Transition Mechanism, the Territorial Agenda 2030, and Cohesion Policy. These policies are briefly described below, followed by some recommendations based on an 'IP perspective'.

5.3.1 European Green Deal: pricing roads and access to SGIs

The European Green Deal (EGD) (European Commission, 2020a) is the growth strategy to transform the EU into a resource-efficient and competitive economy meanwhile fighting climate change. The measures will ensure a climate-neutral, green, and inclusive growth. The plan, complemented with other initiatives, is based on three dimensions: financing climate action to foster clean energy; enabling sustainable investment, and providing practical support in designing and executing sustainable projects.

As part of the Commission's climate ambition, the revision of the Energy Taxation Directive will achieve effective road pricing in the EU in order to reduce CO_2 impact. Decarbonising measures, especially taxing fossil-fuels and road pricing, will affect Inner Peripheries in the short to medium term. Measures to reduce the use of fossil fuels and pricing roads could have a direct impact on IPs, since those areas are generally characterised by dependence on private transport due to the existing limitations of collective transport options in many of these areas. The increase of the cost of private transport (even enhanced by the recent Russian invasion of Ukraine) could worsen access to SGIs, especially affecting the most vulnerable groups.

[13] An IP area has poor access to five or more services including poor access to primary schools, hospitals, or railway stations.
[14] **B**ased in the availability of only one facility per service type within a reasonable driving time (e.g., one secondary school is accessible within 60 min car travel time, or just one store within 15 minutes or one bank within 30 minutes).

Furthermore, it is to be expected that not only car traffic will become more expensive, but also other products and services (e.g. heating costs, costs for schools, health, etc.). Since IPs are not among the economically strongest regions, their inhabitants are disproportionately affected by general price increases.

On the other hand, the improvement of public transport and recharging infrastructure for low-emission vehicles in less densely populated areas could also contribute to closing the existent gaps with neighbouring areas in the mid-long term, when properly planned. However, the plan to ramp-up the deployment of sustainable alternative transport remains general and does not significantly address IPs' challenge about providing a good access to SGIs. The past has shown that innovations first roll out in big cities and agglomeration areas, and less in rural and lagging areas. It therefore remains to be seen when the new technologies will also be found in the IPs on a widespread basis.

5.3.2 European Green Deal Investment Plan (EGDIP)

As part of the Green Deal, the Commission has put in place the European Green Deal Investment Plan (EGDIP), the investment pillar of the EGD that will mobilise significant investments over the period 2021-2027 to support citizens of the regions most impacted by the transition (European Commission, 2020b).

EGDIP's strategy is aiming to create an enabling framework for both private investors and the public sector. It plans to mobilise at least EUR 1 trillion of private and public sustainable investments. The EGDIP is aware these investment flows would need to be sustained over time, and consistency in development plans will also benefit IPs. Moreover, one of the focus areas of the EGDIP is the renovation of buildings. The measure could have positive effects for IPs, especially on those areas with impaired housing whose renovation could also contribute to clean economic developments, strengthening the locally based craftsmen, and to attract population. Precisely for this reason, it is important that this type of investments also address the particularities of housing problems in IPs and rural areas.

Tackling the sustainable opportunities that could reach private investment is therefore essential for IPs, as EGDIP is putting sustainable financing at the heart of the financial system. In that sense, it is a positive aspect for IPs that the Investment Plan provides tailored support to public administrations and project promoters in identifying, structuring and executing sustainable projects. Regarding IPs, the challenge consists in matching the support with the existence of a local skilled force, often limited in small and rural areas, and ensure neo-endogenous approaches to reach local-based potential for these sustainable opportunities.

EGD has started to set-up InvestEU, an open platform bringing together all the stakeholders (buildings and construction sector, architects and engineers and local authorities) to address the barriers to renovation, as a way to mobilise industry in the new clean circular economy. In this sense, the platform InvestEU could be an opportunity to tackle IPs' sustainable and rural proofing while reaching local and rural promoters and ensuring visibility and networking opportunities for them. However, an 'IP perspective' and rural proofing is needed to ensure that innovative financing schemes under InvestEU also target IP challenges. Similarly, the policy mix of regulations and incentives to implement the 'polluter pays' principle through investment decisions, must also consider 'rural proofing'. Furthermore, if the impact on IP areas is not carefully assessed there is a risk of the combination of 'sustainability proofing' and 'polluter pays' principles to become counterproductive to IPs' development, fostering shrinking and putting barriers to economic growth (in those areas with already low economic dynamism), with the side-effect of contributing to vicious circles.

5.3.3 Just Transition Mechanism (JTM)

The Just Transition Mechanism (JTM) is included in the EGDIP and focuses on ensuring a fair and just transition to a green economy for every European region. It provides targeted support to generate the necessary investments in these territories, based on three pillars: the Just Transition Fund, the dedicated just transition scheme under InvestEU, and a new public sector loan facility for additional investments to be leveraged by the European Investment Bank (European Union, 2020). The planned investment will provide solutions for public transport and energy poverty, as well as promoting the transition providing access to re-skilling programmes, jobs in new economic sectors, or energy-efficient housing. These investments are targeted to sectors which offer possibilities to develop the potential of Inner Peripheries and to foster their economic dynamism.

JTM brings clear opportunities for a green transition for IPs development. However, in order to translate those opportunities into effective changes, it would be necessary that the Guidelines for environmental protection and energy that Member States have to follow also include a 'rural proofing' perspective to trigger sustainable options on IPs and rural areas. Furthermore, there is a need to implement mechanisms that

allow small municipalities benefiting from the expected guidance, training activities and the dissemination of good practises for life-cycle-costing methodologies and green purchase, as well as bureaucratic simplifications.

In addition, there is also a risk that the focus on environmental and agri-environmental measures excludes territorial measures that counteract depopulation and poor access to SGIs. For instance, ensuring the supply of critical raw materials, might be a double challenge for IPs. Since a primary peripheralization process caused by the exclusion from agglomerative advantages is low competitiveness due to higher transport costs for non-local raw materials. The access to resources is a strategic security question for Europe's ambition to deliver the Green Deal.

Ideally, Member States should be aware about IPs so they can identify them as eligible territories in their Plans. The support from the JTM Fund will be very beneficial and relevant for those areas whose employment is dependent on coal, lignite, oil shale and peat production. Just Transition Plans will set out ways to best address social, economic and environmental challenges of those areas. Therefore, an endogenous perspective to adapt policies to the peculiarities of each region is relevant for ensuring social welfare linked to access to services.

5.3.4 Territorial Agenda 2030

The Territorial Agenda 2030 provides an action-oriented framework to promote territorial cohesion in Europe. It means promoting balanced and harmonious territorial development between and within countries, regions, cities and municipalities. This is the only policy that explicitly mentions IPs and discusses their different development potential and challenges. This policy framework emphasises IPs' challenges (as discussed in this report: quality of life, SGIs' access, demographic and societal imbalances, employment and economic development, among others) and brings them to the attention of policy makers.

It encourages Member States to adopt a place-based approach to policy making and consider the multi-level governance approach to ensure cooperation and coordination with all actors involved (citizens, business, research institutions, etc.). Therefore, it addresses the development of place-based territorial capital, which is essential for an integrative growth of these areas.

5.3.5 Cohesion Policy

Cohesion Policy is delivered under three general programmes: Interreg, technical assistance and Investment for Jobs and Growth (IJG). However, the geographical distribution of funding allocation within the European Regional Development Fund (ERDF) and the Cohesion Fund uses as criterion GDP per capita at NUTS 2 level (article 108(2) of Regulation (EU) 2021/1060). This geographical level poses serious problems to address the needs of IP areas, and especially if IPs are embedded in prosperous region, as they may remain invisible to policy. Notwithstanding that, there is some scope for change. As stated in the Regulation 2021/1058 (24 June 2021) on the ERDF and on the Cohesion Fund, "the ERDF should pay particular attention to the specific difficulties of areas at NUTS level 3 and local administrative unit level (...), namely those that have a population density of less than 12,5 inhabitants per square kilometre, or areas that have suffered from an average annual population decrease of at least 1 % of inhabitants over the 2007-2017 period." Similarly, NUTS-3 level does not reflect well the territorial phenomena of inner peripherality. As stated in the former PROFECY report (Noguera et al., 2017a), "in the future, increasing grid resolution, lowering the level of standardisation with neighbouring areas and using lower units of aggregation (including sub-urban districts) could be especially useful". This recommendation is still valid in the light of updated results.

Furthermore, setting eligible regions at NUTS2 also brings conceptual barriers to deal with IPs needs. Since 1988, the main criteria for geographical targeting have been based on GDP per capita lower than 75% of the EU average at NUTS2 level. This NUTS 2 regional classification is related to a deep-rooted assumption that links agglomeration, innovation, and growth, and hence uses an urban-based approach. City-region approaches have a poor record of delivering benefits outside immediate commuting hinterlands. As mentioned by Copus and Dax (2020), in some parts of Scotland these approaches have mutated into a form of exogenously-funded place-based development strategy. Urban-based policies and exogenous strategies based on economic factors are limited to foster the development of IPs. As encompassed in this and other ESPON reports (Noguera et al., 2017a; Copus and Dax, 2020), it is essential for IPs to conceive place-based approaches as the main conceptual basis for developing territorial policies according to a holistic perspective of growth.

5.4 Concluding remarks

The previous policy overview shows that some of the existing challenges are addressed by current policies in a transversal or indirect manner. However, the notion of IPs is not usually adopted in policy discourses neither the complexity of their challenges and vicious circles.

For instance, transport and infrastructure development policies do rarely address the relation with subsequent changes in the provision of SGIs which is a crucial aspect for the future development of those areas. It is naïve to assume that an expansion of transportation infrastructures would automatically lead to a decrease in the number and area of inner peripheries. Although, as a first step, new and better roads lead to shorter travel times to the centres (and subsequently to accessibility to services in the centres), one should also consider the negative consequential effects: due to the better accessibility and the resulting greater competition for rural service providers, many service providers decide to abandon these locations (the shift to online services also reinforcing this trend). Furthermore, the expansion of transport infrastructures also often influences the location decisions of households (which are demanders for services), and often leads to out-migration from rural regions, reducing service provision in the long-term because of falling demand and the described vicious circles of inner peripheries. Furthermore, many road projects plan to improve travel time between agglomerations, however they do not usually improve accessibility in rural regions.

Similar to how new roads fragment habitats, they also tend to increase fragmentation of inner peripheries. As a result, the number of IP areas increases, but not their average size. The analysis of the results reflects these considerations: the number of IP areas has increased for all services, as has the total area of inner peripheries. This PROFECY update provides detailed results for individual services which can be used to identify target areas and initiate measures to improve the service quality. This also applies in particular to the areas of risk.

However, in IPs in addition to poor access to SGIs, limited economic potential and socio-economic situation overlap with aspatial peripherality leading to weak social outcomes: poor access to education and opportunities, poor quality of infrastructure and public services, lack of community participation and networks, vulnerability to economic and health crisis. Although some policy tools (such as the investEU) address aspatial challenges of IPs (social capital, business networks, global-local linkages, institutional networks, multi-level governance, etc.), there is a need to implement them with an 'IP perspective' so to translate them into effective changes. Similarly, policies such as the Territorial Agenda are sensitive to IPs challenges and vulnerabilities, promoting place-based approaches to foster neo-endogenous development and territorialisation, but their recommendations need to be implemented in practice.

Infrastructural improvements, together with growth-oriented economic development policies, have usually an urban-centred perspective that have a 'shadowing effect' on inner peripheries. This may result in negative impacts for IPs as the intensive attraction of urban areas or more developed neighbouring areas (through rural-urban outflows and counter-urbanisation processes) has its counter-effect in IPs. Although important efforts have been made in the past decades to increase social cohesion in Europe, the mapping of inner peripheries reflects that many areas in middle income and less developed regions continue to fall behind, also referred to as a 'geography of discontent'. The gap seems to be larger in Southern and Southwestern Europe, as well as in Nordic countries but the phenomenon exists across all European countries (although processes may be markedly different and need to be assessed in a more detailed manner).

Implementing instruments that enhance 'connectedness' such as access to knowledge circuits, entrepreneurship and innovation networks, local collaboration (associations of municipalities to develop strategic plans or improving service provision), or support from regional agencies or platforms, contributes to long-term development. At the same time, information and communication technologies offer more and better possibilities for development, and new opportunities which are gradually changing our world and the interactions between individuals, business, and institutions. The COVID-19 crisis has accelerated those changes and stimulated further debate about the importance of the provision of services of general interest.

The unprecedented funds being released for a transition to green and digital economies offer promising opportunities to develop the potential of IPs and closing the territorial gaps. Generating opportunities for areas outside the direct influence of large cities is important for future growth. However, there is a general missing aspect in the reviewed policies, and it is the link of poor access to services, poor economic potential and dynamism with demographic change (ageing and out-migration), which tend in turn to weaken social capital. Even if these policies consider the needs of IPs in a very targeted way, local authorities often face implementation problems - if only due to a lack of competences and staff (this applies to the public sector in particular, where there is often a lack of staff to implement such programmes).

5.5 Key recommendations

1. **Prioritising access to services-of-general-interest for people living in IPs, and promoting collaborative and innovative solutions**. SGIs are essential for the daily life of citizens and companies, and they play a major role in ensuring territorial cohesion. Although their organisation varies significantly across Europe, access to high-quality services can be enhanced throughout different combinations of public-private-social actor's collaboration, (i.e. in the Region of Valencia, in Spain, regional government has reach an economic agreement with banks to guarantee basic banking services in rural areas). Furthermore, agreements between partners or obligations on service providers to a defined territorial coverage (and at an affordable price) can be levers of change. Based on the foregoing, it is vital to prioritise accessibility to SGIs for peripheral areas of low economic potential, disconnected and/or depleted. Despite that the Territorial Agenda 2030 specifically refers to access to SGIs and encourages local-based approaches, concrete policies such as European Green Deal or Just Transition Mechanism do not explicitly mention the peculiarities of IPs neither the importance to ensure access to services in their key actions. Use of new technologies has proved useful during the COVID-19 pandemic and can play a key role to overcome geographical distance.

2. Embrace a more integrated approach and the multi-faceted nature of IPs. A full range of assets play a role in local and regional development (infrastructure, financing, natural resources, human resources, social capital, cultural perceptions, institutional capacity, etc.). Therefore, systemic approaches recognising the importance of 'softer' capital and the involvement of a wide variety of actors can foster 'virtuous cycles' and be helpful to deal with complex marginalisation. There is a need to move towards a focus on development understood as improvement in quality of life and not in the sense of quantitative growth. Better ways to measure the phenomenon and success (complementing conventional economic measurements) would be helpful to address inner peripherality. Even though EU policies have evolved to embrace neo-endogenous and bottom-up approaches, policy goals rarely address one of the key aspects of inner peripherality: 'relational connectedness'.

3. Increasing the visibility of IPs in the policy arena: including an 'IP perspective' or 'rural proofing' in policies dealing with a transition to green economy and decarbonisation to unleash associated opportunities for IPs and rural areas. Rural proofing is a political mechanism created by the European Network on Rural Development to ensure all relevant policies are aligned with rural needs and realities. Some IPs overlap and share needs of rural regions in terms of access to SGIs and protecting social well-being. Most important, rural proofing is a useful concept along with sustainability proofing, since some of the policies having an urban-centred perspective could be counter-productive for IPs. For instance, the plan to ramp-up the deployment of sustainable alternative transport remains general and does not significantly address IPs' challenge about providing a good access to SGIs while transitioning to a green circular economy.

4. Ensuring the existence of a local skilled force to manage European Development Plans. Several policies, such as the European Green Deal Investment Plan or the Just Transition Mechanism, are focusing on providing investment that could be very beneficial to face IPs challenges. However, at a local level the implementation of these plans needs to be complemented to ensure management of these resources and also enhance administrative capacities in those small and disadvantaged areas.

5. Targeting core areas of IPs and areas-of-risk. Addressing different forms of 'connectedness' and access to SGIs in core areas of inner peripheries will be an effective way of addressing inner peripherality, having also beneficial effects in its surroundings. Similarly, preventive measures are already advisable in the areas-of-risk to stabilise the situation and limiting down-ward spirals in an early step. Due to its evolving nature, there is still a need of strengthening the ties between evidence and policy to find successful ways of dealing with IP processes as there is no one-size fits all solution. Tools allowing for comparable research of inner peripheralization could contribute a better understanding of the process of small-scale differentiation between regions.

6. Dealing with the phenomenon at an appropriate scale. Resources from the ERDF and European Social Fund+ (ESF+) (i.e. for the Investment for jobs and growth goals) are allocated through a classification at NUTS 2 level. However, NUTS 2 is not best suited to tackle IPs. Even more, NUTS 3 level is still limited for understanding territorial phenomena such inner peripherality due to regional fragmentation and a lack of availability of adequate and harmonised statistical information. As stated in the former PROFECY report (Noguera et al., 2017a), "in the future, increasing grid resolution, lowering the level of standardisation with neighbouring areas and using lower units of aggregation (including sub-urban districts) could be especially useful". This recommendation is still valid in the light of updated results.

5.6 Methodological remarks

Regarding the methodology for delineating inner peripheries and areas of risk, the following remarks can be made:

- **Closures of facilities**: If many facilities of the same service type were to close in a seamless territory, this may not be properly reflected in the delineation of IPs, since the moving averages will go down for the entire territory and no part of this territory is disadvantages over its neighbours. Although travel times increased and the number of facilities within reach diminishes, effects on the delineation of inner peripheries may be marginal. Therefore, the indicators travel time, number of facilities and the delineated IP areas must always be analysed in combination to capture all the impacts on regional development.
- **Mapping travel times**: The standard ESPON European-wide maps are dominated by the dichotomy between wide areas of the Nordic countries with extremely long travel times, and the rest of Europe with shorter travel times. However, the analysis results include a much greater variety, even in Central European countries. In fact, this is not properly reflected in European maps, as mountain regions, northernmost and island regions visually appear as the most disadvantaged ones. If similar maps for individual countries would be produced with class breaks adapted to the respective national context, these maps would show much more details which are somehow hidden in a European-wide map. As of now, the same class breaks are used for all SGI types to allow for comparisons among them; optionally, different class breaks could be used for different SGIs, reflecting their different service purposes.
- **Overall IP indicator**: Chapter 4.1 showed an increase in the number and total area of inner peripheries at the level of individual services due to increased fragmentation caused by the interplay of closures of facilities on the one hand and the expansion of transport infrastructures on the other. These individual developments are 'dampened' at the level of the overall indicator (Chapter 4.2), who indeed suggests a decrease in IP area at the level of the total states. From the perspective of comprehensive spatial planning approaches, the overall indicator is preferable over the individual results. Nevertheless, it would be appropriate to learn more about the interplay of the developments of individual service sectors vis-à-vis the overall development of all sectors through case studies at the level of individual countries or regions. The current approach assumes that there is a point where the overall situation of a region changes in such a way that one can speak of an inner periphery. This point is reached with poor accessibility towards five services. In reality, however, the development usually proceeds gradually from being a 'normal' region to become an areas-of-risk to finally reach the IP status.
- **Aggregated results at LAU and NUTS3 levels**: The aggregation of grid results to LAU and NUTS3 levels are biased by the LAU and NUTS classifications itself. When overlaying grid results with these administrative / statistical entities, the calculation of the overlaid territories is affected heavily by changes to the LAU and NUTS systems. As LAU and NUTS entities may have been merged, split, or their boundaries otherwise changed, this will have large impacts on the percentages. This also makes it difficult[15] to statistically compare analysis results for different years. For this reason, grid results should be understood as the most relevant results [16].
- **Further services and tailored analysis for demographic groups**: The ten service types analysed already cover a wide spectrum of interests and applications. However, many other public and private services such as kindergartens, theatres, gas stations, universities, public administrations, police, retirement homes, public swimming pools, libraries, shopping malls, and others were not considered. It is known from empirical social research that families and households are interested in very different services depending on their stage of life. Therefore, combined studies from the perspective of different social groups could be interesting. Families with small children are probably mainly interested in good accessibility to kindergartens, schools and pediatricians. It would therefore be interesting to determine inner peripheries for these three services and then compare the results with the distribution of young families in Europe. Conversely, retirees are probably more interested in the accessibility of nursing and retirement homes, primary care physicians, and emergency medical services as well as in cultural and socialisation services (i.e. theatres, senior citizens day centres). Although accessibility to cinemas was analysed, inner peripheries for these additional services could be delineated and contrasted with the distribution of the elderly population.

[15] If not to say impossible.
[16] Provided that the grid system has not been changed.

References

Copus, Andrew; Dax, Thomas (2020). ESCAPE. European Shrinking Rural Areas: Challenges, Actions and Perspectives for Territorial Governance. Final Report – Annex 1, Policy Background. ESPON

European Commission (2020a). The European Green Deal. 11 December, Brussels, COM(2019)640

European Commission (2020b). Sustainable Europe Investment Plan. European Green Deal Investment Plan. 14 January, Brussels, COM(2020)21

European Union (2020). The Just Transition Mechanism: Making Sure No One Is Left Behind. January, doi:10.2775/19010

Noguera, J.; Ortega-Reig, M.V.; del Alcázar, H.; Copus, C.; Berlina, A.; Moodie, J.; Mantino, F.; Forcina, B. Weck, S.; Beißwenger, S.; Hans, N.; Tagai, G.; Koós, B.; Kóvacs, K.; Uzzoli, A.; Dax, T.; Manchold, I.; Schürmann, C.; Tobiasz-Lis, P.; Dmochowska-Dudek, K.; and Wójcik, M. (2017a). PROFECY–Processes, Features and Cycles of Inner Peripheries in Europe. Final Report. ESPON.

Noguera, J.; Ortega-Reig, M.V.; del Alcázar, H.; Copus, C.; Berlina, A.; Moodie, J.; Mantino, F.; Forcina, B. Weck, S.; Beißwenger, S.; Hans, N.; Tagai, G.; Koós, B.; Kóvacs, K.; Uzzoli, A.; Dax, T.; Manchold, I.; Schürmann, C.; Tobiasz-Lis, P.; Dmochowska-Dudek, K.; and Wójcik, M. (2017b). Handbook. PROFECY–Processes, Features and Cycles of Inner Peripheries in Europe. Handbook. ESPON.

Territorial Agenda 2030. A future for all places. Informal meeting of Ministers responsible for spacial planning, territorial development and/ or territorial cohesion. 1 December, Germany. https://territorialagenda.eu/wp-content/uploads/TA2030_jun2021_en.pdf

Appendix

A1. Statistics on inner peripheries by type of service

Statistics at grid level are the most precise ones. Due to the aggregation method towards LAU and NUTS-3 levels (i.e. the thresholds applied), the area covered as IP for LAU and NUTS3 levels tend to be smaller than for the grid level. A LAU unit is only considered IP, if its territory is covered by grid IP area of 50% or more; similarly, a NUTS-3 region is only considered as IP if its territory is covered by grid IP area at least of 30%.

Table 5-1. Statistics on inner peripheries at grid level.

Type of service	PROFECY 2017			PROFECY Update 2021			Change 2017 to 2021 (%)		
	Number of IP patches	Total area (km^2)	Average patch size (km^2)	Number of IP patches	Total area (km^2)	Average patch size (km^2)	Numbers	Total area (km^2)	Average size
Banks	1,231	714,488	580	1,501	970,522	647	21.9	35.8	11.6
Cinemas	810	593,228	730	1,050	710,703	677	29.6	19.8	-7.3
Doctors	774	434,169	600	1,104	837,094	758	42.6	92.8	26.3
Hospitals	1,102	635,559	695	1,165	813,109	698	5.7	27.9	0.4
Pharmacies	1,069	641,566	600	1,484	1,027,100	692	38.8	60.1	15.3
Retailing	1,423	786,291	550	1,433	985,863	688	0.7	25.4	25.1
Primary schools	1,309	784,578	600	1,537	1,102,472	717	17.4	40.6	19.5
Secondary schools	1,046	680,009	650	1,352	918,484	679	29.3	35.1	4.5
Stations	974	741,613	760	1,135	917,459	808	16.5	23.7	6.3
Jobs / UMZ	465	969,403	2,085	441	1,031,316	2,339	-5.2	6.4	12.2

Table 5-2. Statistics on inner peripheries at LAU level.

Type of service	PROFECY 2017		PROFECY Update 2021		Change 2017 to 2021 (%)	
	Number of LAU units as IP *	Total area (km²)	Number of LAU units as IP *	Total area (km²)	Numbers	Area
Banks	9,852	487,084	15,028	673,470	52.5	38.3
Cinemas	9,106	437,295	11,526	514,294	26.6	17.6
Doctors	9,700	346,675	14,285	613,026	47.3	76.8
Hospitals	9,360	516,599	11,577	581,485	23.7	12.6
Pharmacies	9,428	453,382	16,502	707,009	75.0	55.9
Retailing	10,034	495,747	15,338	716,832	52.9	44.6
Primary schools	11,458	539,994	17,568	756,130	53.3	40.0
Secondary schools	9,790	509,516	13,542	664,587	38.3	30.4
Stations	12,723	605,857	15,785	732,210	24.1	20.9
Jobs / UMZ	17,055	906,449	18,565	965,625	8.9	6.5

* *before merging neighbouring LAU units*

Table 5-3. Statistics on inner peripheries at NUTS3 level.

Type of service	PROFECY 2017		PROFECY Update 2021		Change 2017 to 2021 (%)	
	Number of NUTS3 units as IP *	Total area (km²)	Number of NUTS3 units as IP *	Total area (km²)	Numbers	Area
Banks	132	362,928	247	768,157	87.1	111.7
Cinemas	121	421,439	134	419,042	10.7	-0.6
Doctors	256	319,330	217	742,426	-15.2	132.5
Hospitals	97	322,901	117	491,509	20.6	52.2

Pharmacies	434	464,354	277	933,534	-36.2	101.0
Retailing	165	407,329	251	920,346	52.1	125.9
Primary schools	192	531,895	315	1,095,843	64.1	106.0
Secondary schools	156	449,910	192	702,988	23.1	56.3
Stations	358	486,404	237	817,898	-33.8	68.2
Jobs / UMZ	654	1,106,033	265	1,108,855	-59.5	0.3

* *before merging neighbouring NUTS3 units*

A2. Statistics on inner peripheries across services

Although the statistical analysis of the individual services suggests a clear deterioration (Annex A1), this observation cannot be confirmed for the combined indicator. For the majority of European countries, the share of inner peripheries on their total area is decreasing or remains constant; only for a few is it increasing.

It follows that the development of the different services is very different affecting different parts of the territory. For example, if an area becomes an inner periphery in terms of bank accessibility due to the closure of a bank office, this cannot simply be transferred to the other nine services, nor does it mean that the affected area as a whole is classified as IP across all ten services. The overall indicator of 'IP to all ten services' thus consolidates and relativises the developments in the individual services; on the contrary, across all ten services, the positive effects of the expansion of road infrastructures seem to compensate for the negative effects from the closures of individual branches at the overall state level.

In fact, to be declared an inner periphery overall, an area must have poor accessibility to five or more services, including poor access to primary schools, hospitals, or railway stations. If an area has only poor access to four, it is no overall inner periphery. Conversely, if an area was declared an overall IP in 2017 because it had poor access to just five services, and in the new calculation it only had poor access to four services (i.e. service provision for one service improved), it is no longer considered an overall IP.

Table 5-4. Share of inner peripheries on total country area (grid level).

Country	Share of inner peripheries on total territory (%)			Country	Share of inner peripheries on total territory (%)		
	2017	2021	Development		2017	2021	Development
Andorra	94,3	57,1	-37,1	Kosovo	26,6	19,0	-7,5
Albania	50,2	45,6	-4,6	Lithuania	13,2	21,4	8,2
Austria	49,8	38,3	-11,5	Luxembourg	83,0	15,4	-67,6
Bosnia-Herzegovina	35,8	39,2	3,4	Latvia	38,8	37,5	-1,2
Belgium	35,3	35,2	0,0	Montenegro	49,8	45,1	-4,7
Bulgaria	35,8	36,0	0,2	Makedonia	30,6	28,5	-2,1
Croatia	16,6	16,6	0,0	Netherlands	35,9	23,9	-12,0
Czech Republic	36,2	26,9	-9,4	Norway	14,5	12,8	-1,7
Denmark	11,6	16,9	5,3	Poland	38,4	33,8	-4,6
Estonia	19,5	24,1	4,6	Portugal	27,2	39,4	12,2
Germany	39,0	34,3	-4,6	Romania	29,1	24,2	-4,9
Greece	17,8	17,7	-0,1	Serbia	37,6	35,2	-2,4
Finland	10,9	11,3	0,4	Slovakia	55,0	41,5	-13,5
France	35,4	27,5	-7,9	Slovenia	48,5	49,6	1,1
Hungary	34,6	31,2	-3,4	Spain	35,2	25,1	-10,1
Ireland	29,3	28,2	-1,1	Sweden	16,1	15,3	-0,7
Island	25,4	21,0	-4,4	Switzerland	54,0	46,0	-8,0
Italy	37,3	35,5	-1,8	Turkey	19,8	17,2	-2,6

grey = stable IP area at national level; green = decrease of IP areas at national level; red = increase of IP areas at national level

List of Annex Reports

Annex 1 Report: Map series

Annex 2 Report: Map descriptions

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

ESPON 2020

ESPON EGTC
4 rue Erasme, L-1468 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

The Single Operation within the programme is implemented by the ESPON EGTC and co-financed by the European Regional Development Fund, the EU Member States, the United Kingdom and the Partner States, Iceland, Liechtenstein, Norway and Switzerland.