

A Methodological Update Proposal for Measuring the Degree of Periphery from Essential Services in the Classification of Inner Areas in Italy

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Abstract

In February 2022, the Interministerial Committee for Economic Planning and Sustainable Development announced the update of the Italian Inner Areas map. In this update, the analysis tools were revised, returning more precise results, but both indicators and methodology did not change. This paper intends to present part of the key points of ongoing research that analyses the current methods and criteria for classifying Inner Areas. To develop a homogeneous territorial mapping tool, better suited to the purposes of territorial cohesion, the objective of the research is to define a new method of classification. The actual definition of Inner Areas corresponds with the "fragile territories" where the overall condition of difficulty is one of Italy's greatest criticalities. However, it would be a mistake to consider them as "weak". The current classification distorts the reading of the territory simplifying social, economic, and environmental reading. Furthermore, it ignores essential services embedded in fundamental contexts. The main strategy proposes a new perspective no longer based on dependence on urban poles but on the distribution of resources. This article demonstrates the possibility of an update of the techniques for measuring accessibility to essential services by comparing the results of the current classification with the updated method, based on temporal isochrones, which considers the actual distribution of the population and of individual essential services.

Keywords: essential services; analysis tools; fragile territories; isochrones

Citation

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Propuesta de actualización metodológica para la medición del grado de periferia desde los servicios esenciales en la clasificación de las Áreas Internas en Italia

Resumen

En febrero de 2022, el Comité Interministerial de Planificación Económica y Desarrollo Sostenible anunció la actualización del mapa de Áreas Interiores de Italia. En esta actualización, se revisaron las herramientas de análisis, con lo que se obtuvieron resultados más precisos, pero tanto los indicadores como la metodología no cambiaron. Este documento pretende presentar una parte fundamental de una investigación en curso que analiza los métodos y criterios actuales de clasificación de las Áreas Interiores. Con el fin de desarrollar una herramienta cartográfica territorial homogénea y mejor adaptada a las finalidades de la cohesión territorial, el objetivo de la investigación es definir un nuevo método de clasificación. La definición actual de Áreas Interiores se corresponde con la de "territorios frágiles" en los que el estado general de dificultad es una de las mayores criticidades de Italia. Sin embargo, sería un error considerarlas "débiles". La clasificación actual distorsiona el territorio simplificando la lectura social, económica y medioambiental. Además, ignora servicios esenciales integrados en contextos fundamentales. La principal estrategia que se propone es una nueva perspectiva que ya no se base en la dependencia de los polos urbanos, sino en la distribución de los recursos dentro de los territorios. Este artículo demuestra la posibilidad de una actualización de las técnicas de medición de la accesibilidad a los servicios esenciales comparando los resultados de la clasificación actual con el método actualizado, basado en isócronas temporales, que tiene en cuenta la distribución real de la población y los servicios esenciales individuales.

Palabras clave: servicios esenciales; herramientas de análisis; territorios frágiles; isócronas

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1. Introduction ¹

1.1 *Updating the tools for territorial cohesion in Italy*

During the Pandemic in Italy, there was insistent talk about small villages, considered “safe” and healthy places, but at the same time still characterised by uneven development and depressing in demographic and socio-economic dynamics. The small villages are in fact located in those territories that have been classified as “Inner Areas” for years.

The following article constitutes part of an ongoing research aimed at the reviewing and updating the Inner Areas classification method used to date for the development of the territorial cohesion policies in Italy. Specifically, this article highlights some weakness of the current classification (NUVAP, 2020) in capturing the difficulty of the population in accessing basic services through a comparison with a proposed methodological update and measurement techniques. A thorough revision of the methodology and tools of the current classification will lead to a more accurate representation of the conditions of the territories falling within the Inner Areas. Through this update, territorial cohesion policies could benefit from the support of a comprehensive tool capable of capturing the effects of ongoing strategies (at every level). Therefore, the aim of the research is to offer an operational support to rebalancing policies through a potential instrument guiding territorial planning.

1.2 *An alternative to the city in the post-Covid era? The rediscovery of small villages and Inner Area*

The dramatic global health emergency that we have experienced in recent years during the Covid-19 Pandemic should have made us understand that we cannot continue to think of “always remaining healthy in a sick world”, quoting the words of Pope Francis during the *Extraordinary Universal Prayer for the End of the Pandemic* in St. Peter's Square in Rome on, 27 March 2020. A “sick” world whose diseases are un-sustainable development, individualism, social exclusion, uncontrolled and senseless exploitation of natural resources, lack of respect for the planet we live on, endless hatred between peoples and wars. Over the last few decades, since the mid-1950s, pursuing the myth of infinite development, we have allowed entire communities to concentrate in urban areas with permanently high, if not critical, population densities (UN, 2022), or to consume immense territories around those same cities by the settlement phenomenon (Fabbri, 1983) that, as early as the 1960s, was called “urban sprawl” and later identified such as “suburbanisation”². But we have also allowed entire territories to be abandoned³, causing the disappearance of those activities linked to the “care” of the land and all those centuries-old traditions and economic activities - and their consequent “fragilization” - with a concomitant increase in exposure to natural hazards. Two opposed but intricately connected dynamics that are producing increasingly serious effects on the climate and on the planet's capacity to defend itself.

Moreover, the Pandemic has allowed us to experience the contradictions of large cities, more or less extensive urbanised areas where people have become habituated to living in contexts that have often sacrificed the comfort and quality of public space, housing and workplaces to speculative interests, and where mobility is frequently a critical issue.

At the same time, the Pandemic allowed us to suddenly rediscover the minor villages, cornerstones of the “Inner Areas”, finally considered as “safe” and “people-friendly” places. Since March 2020, “archistars” and prominent experts have spoken in their favour, and many people have decided to

¹ This article collects and develops the previous work presented at the 14th International Conference “Virtual City and Territory” held in Bogota and Cartagena (Colombia) from 26 to 30 September 2022.

² According to the United Nations, in 2015, from 33% of the world's population lives in low-density areas, “urban clusters”.

³ Such as, for example, those territories that in Italy have been called “Aree Interne” (Inner Areas) or in Spain “España Vacía” or in France the “Diagonale du vide” (Empty Diagonal).

spend more time there, taking advantage of the ever more widespread remote working and learning. But to truly rediscover small villages, it is necessary to (re)activate the whole of the territories in which they are located, via coherent and effective policies and strategies. These must aim at relaunching local economies and traditional activities, in a modern key, through the recovery of the territory's "values" (Sau, 2018).

Among other topics, this is precisely what the PNRR National Recovery and Resilience Plan⁴ is focusing on. The Plan is divided into six missions (digitalisation, innovation, competitiveness, culture, and tourism; green revolution and ecological transition; infrastructures for sustainable mobility; education and research; inclusion and cohesion and health), which will be accompanied by four structural reforms: public administration, justice, simplification of legislation, and promotion of competition.

The focus on the issue of territorial rebalance and the revitalisation of the heritage constituted by small villages, those small and very small municipalities that constitute 70% of the total but inhabited by a population equal to 21% of the national total⁵, is central in the PNRR.

However, in order to assist the reconstruction of that economic layout, essential for the reactivation of fragile territories, it is necessary to start from a profound revision of the strategies activated on Inner Areas, starting with the classification mechanisms. Only in this way, small villages and Inner Areas can become a potential engine for demographic and socio-economic revitalisation and at the same time an enormous opportunity to change many of the stereotypes of the globalised society in which we live.

2. The National Strategy for Inner Areas

2.1 *The status of Inner Areas*

The definition of Inner Areas identifies a substantial part of the Italian territory as: "*areas significantly distant from the centres providing essential services (education, health, and mobility), rich in important environmental and cultural resources; about a quarter of the Italian population lives here, in a portion of territory that exceeds 60% of the total and is organised in over 4'000 municipalities*" (Barca et al., 2014).

The overall fragile condition (physical, demographic, socio-economic, environmental) in which these areas persist is one of the most criticism of the Italian peninsula. Poor accessibility to essential services is the main characteristic of Inner Areas, but the solution to this problem is far from effective. Hospitals outside the large urban areas have been reduced in number over the years, as they are financially "not convenient"; the distribution of schools, in the Inner Areas, has progressively suffered from the demographic decline and the decreasing presence of students, losing the possibility of spreading the culture of "territorial awareness"; infrastructural networks favour connections between large cities, reducing the effectiveness and efficiency of minor and transversal connections (Amato & Ravagnan, 2020; Ravagnan et al., 2021); finally, access to Internet and IT technologies represents a heavy gap in the inland territories, denouncing a noticeable backwardness.

Physical and technological distance from basic services is not the only critical factor. Within the Inner Areas, we find indeed a substantial part of "fragile" territory, threatened by natural and human-caused hazards, on which the effects of climate change weigh heavily, with unsustainable social costs.

⁴ The PNRR, presented by the Italian government in 2021 with funds from the Next Generation EU programme for the revival of the European Union's economies engulfed by the pandemic crisis, can count on resources amounting to 248 billion euros: 191,5 billion from the NGEU, 30,6 billion from the Complementary Plan prepared by the Draghi government and 26 billion already allocated for specific works.

⁵ Measures for small villages and territories are included in Missions 1 (Digitalization, Innovation, Competitiveness, Culture and Tourism), 2 (Green Revolution and Ecological Transition), 5 (Inclusion and Cohesion) and 6 (Health).

2.2 Society, economy, environment

The effects and, at the same time, the causes of the conditions of inland territories are mainly recognisable in the demographic dynamics of depopulation (Castronovo, 2021). From 1951⁶ to 2019, the population in the Pole areas increased by +30,6% while in the Belt areas it increased by +48,9%. In the Peripheral and Ultraperipheral areas, which mostly overlap with the fragile territories, there are population losses of -17,7% and -26,4% respectively. Analysing a more proximate period, from 2002 to 2024, the percentage change in the population of the Pole, Inter-municipal Pole and Belt areas saw an increase of +5,4% (with the Belt areas leading the balance with an increase of +8,5%) while the Inner Areas as a whole lost -2,1% of their population (among which the Ultra-peripheral areas weigh in with a reduction of -10,8%)⁷. The impossibility of an easy life perspective increases the exodus of families and amplifies its effects by altering the territorial balance and pulverising the boundary between urban and rural (Cattivelli, 2021).

From a social point of view, depopulation produces other negative effects. In 2024, the population over 65 years old stands at 25,2% in all Inner Areas, so the lack of a narrative of the territory precludes new generations from inheriting its values. The social issue also has repercussions on the economic field, linked to the poor diversification of work, producing a gap of approximately 5'500.00€/year in *per capita* income between those living in Poles and Inter-municipal Poles (22'308,84€/year) and those living in Peripheral and Ultra-peripheral areas (16'864,55€/year)⁸.

The morphological complexity of this territory, exposed to tectonic, hydrographic, and volcanic events, yields a varied set of natural landscapes to be preserved. The protection and prevention of natural hazards are extremely complex matters and in Italy, regarding policies and management strategies, still in an embryonic stage (Cerasoli et al., 2019; Pica et al., 2018). According to ISPRA⁹, over 7 million people living in vulnerable areas and 18,4% of the national territory is seriously threatened by erosion, landslides, and floods¹⁰. Excessive soil consumption and unauthorised building, the abandonment of agriculture and traditional and sustainable practices (e.g. agricultural terracing) and the use of intensive monocultures, in addition to other practices of unconscious (but in the worst cases conscious) exploitation of the soil, are some of the main causes of this disaster.

2.3 The National Strategy for Inner Areas

The National Strategy for Inner Areas (SNAI) was first promoted in 2013 by the Agency for Territorial Cohesion¹¹ and the former Minister for Territorial Cohesion, Fabrizio Barca, with the aim of revitalizing the Italian fragile territories. SNAI aims to reverse or mitigate the processes of marginalization and depopulation in these areas through two lines of action. The first reflects a top-down approach with the direct involvement of state bodies responsible for ensuring access to essential services. The second seeks to stimulate the latent potential of these territories through a bottom-up approach, supported by European Structural Funds and the involvement of public and private actors.

⁶ 1st national population census in Italy after the end of the Second World War and the birth of the Republic.

⁷ Retrieved from Openpolis processing based on Istat data. <https://www.openpolis.it/le-aree-interne-tra-spopolamento-e-carezza-di-servizi>.

⁸ Data released by the Ministry of Economy and Finance on 23 April 2024 on 2023 IRPEF declarations (2022 income). https://www1.finanze.gov.it/finanze/analisi_stat/public/index.php?COMUNE&opendata.

⁹ Institute for Environmental Protection and Research. Italian public research body, supervised by the Ministry of the Environment and Energy Security.

¹⁰ Data released by ISPRA in 2021 edition of the report on report on hydrogeological instability in Italy: hazard and risk indicators. https://www.isprambiente.gov.it/files2022/pubblicazioni/rapporti/rapporto_italia_ifinale_web.pdf

¹¹ The Agency for Territorial Cohesion (ACT) was a public agency directly supervised by the Presidency of the Council of Ministers, established in 2013 through the splitting of responsibilities from the Department for Economic Development and Cohesion. On December 1, 2023, it was definitively suspended, and its functions were transferred to the Department for Cohesion Policies and the South.

At the base of the strategy lies the classification of Inner Areas, simply based on the distance between each Municipality and the primary service provider is calculated exclusively on the average value of actual road travel times during weekday peak hours (pre-Covid19). This classification defines which municipal territories require priority intervention. In February 2022, the Interministerial Committee for Economic Planning and Sustainable Development (CIPESS¹²) published through NUVAP¹³ an update of the Inner Areas Map (2020), integrating the classification developed in 2014. In this update, the analysis tools were revised, returning more precise results, but without changing the indicators and methodology (Figure 1). The classification distinguishes Italian Municipalities into six types:

- Pole
- Inter-municipal Pole
- Belt
- Intermediate inner area
- Peripheral inner area
- Ultra-peripheral inner area.

Pole and Inter-municipal Pole are defined as those Municipalities capable of simultaneously offering these primary services to the people:

- Hospital with at least level “1” Emergency and Acceptance Department (DEA I)¹⁴.
- At least one high school and a technical/professional institute.
- A railway station of at least Silver level¹⁵.

Instead, all the other municipalities compose the vast Inner Areas territory. The methodology applied for the classification envisages two consequential phases:

- the identification of the Poles and Inter-municipal Poles.
- the development of the matrix of distances from each Municipality to its nearest Pole.

Taking the centroid of each Municipality as a reference, the average distances were then ranked in ascending order and threshold values were identified, corresponding to the median, the third quartile and the 95th percentile. The update of the Inner Areas 2020 map slightly changed these values compared to 2014, yielding the following ranges:

- up to a maximum of 27,7 minutes travel time to reach the nearest Pole for the Belt band.
- from over 27,7 and up to 40,9 minutes for the Intermediate belt.
- over 40,9 and up to 66,9 minutes for the Peripheral belt.

¹² Interministerial Committee for Economic Planning and Sustainable Development (CIPESS), formerly known as the Interministerial Committee for Economic Planning (CIPE) until December 31, 2020. Is a governmental body chaired by the Prime Minister and is permanently composed of the Minister of Economy and Finance, who serves as Vice President, and the Ministers for Foreign Affairs, Economic Development, Agricultural, Food and Forestry Policies, Infrastructure and Sustainable Mobility, Labor and Social Policies, and Ecological Transition.

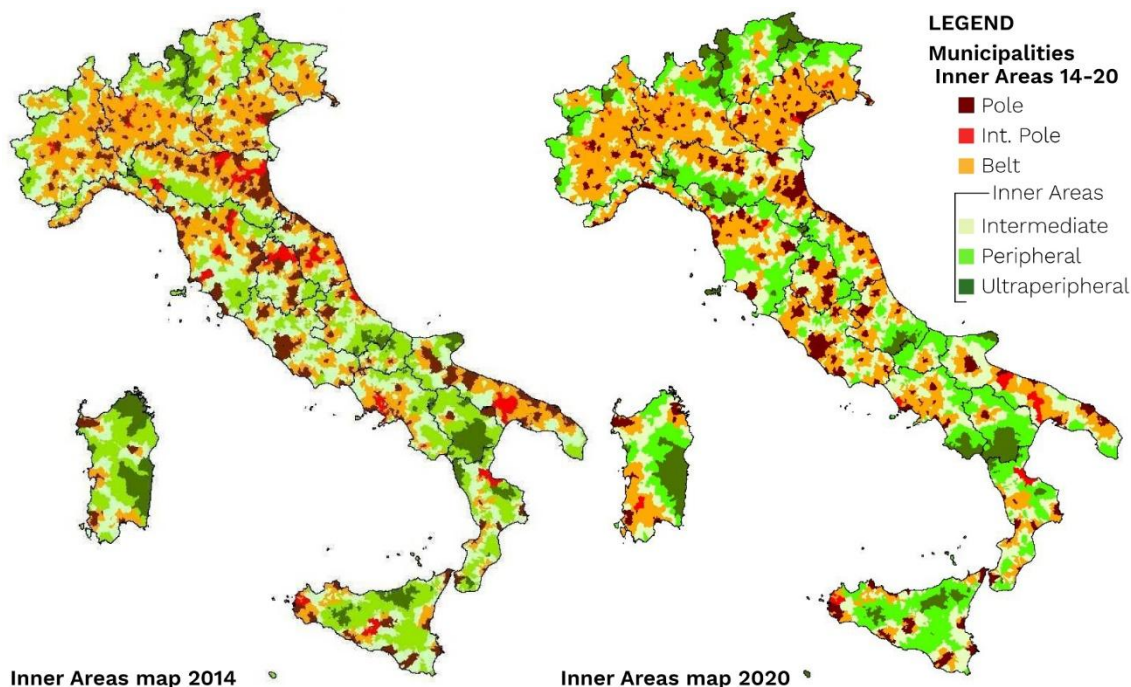
¹³ The Evaluation and Analysis Unit for Programming (NUVAP) worked at the Department for Cohesion Policies and the South until 2023, then renamed Unit for Cohesion Policies (NUPC).

¹⁴ In Italy, the Departments of Emergency Acceptance are divided into two levels of complexity, DEA II (hub) and DEA I (spoke). In the DEA (both Level I and Level II), the basic operational units of first aid and anaesthesia and resuscitation, with intensive care beds, must be present. In addition to these, there are specific structures for more complex disciplines, which differentiate the two levels together with the potential catchment area (DEA II 600'000 to 1'200'000 inhabitants, DEA I 150'000 to 300'000 inhabitants).

¹⁵ Rete Ferroviaria Italiana (RFI) classifies stations according to 4 levels: 1) Platinum Stations - the most important stations, which allow the movement of over 6'000 passengers per day and yield greater revenue both in terms of tariffs and in terms of the traders who conduct their activity within the station, 2) Gold Stations - These stations serve large urban centres and have an elevated level of traffic, while presenting not extremely high commercial potential, 3) Silver Stations - Medium-sized stations, often connecting to metropolitan or regional services, and 4) Bronze Stations - Small stations, with a small number of passengers served daily.

- over 66,9 minutes for the Ultra-peripheral belt.

Figure 1. Comparison between 2014 and 2020 Inner Areas map



Source: 2020 update of the map of Inner Areas, NUVAP technical note 2022.

Once the mapping phase was over, the Inner Areas Technical Committee issued guidelines for the selection, by the Regions, of territory in which launch pilot projects. During this phase, the Regions presented a much more detailed study of the components of the Inner Areas status for the proposed territory, which ranges from demographic aspects to those of agricultural production, from the industrial sector to that of tourism. In the period 2014-2020 was identified 72 Area Strategies which resulted in the same number of Framework Programme Agreements (APQ). With the updating of the strategy in 2020, 56 new areas were included in the procedure for a total amount of 1'904 Municipality and 4,57 million of inhabitants.

The final acceptance of the Framework Programme Agreements allows associated municipality to access the financial endowment of about 1'142 million Euros, collected in total by the SNAI from 2014 to 2020. This found are provided by two different category of lenders and assigned to two distinct levels of actions.

- Adaptation and improvement of essential services, funded by Italian national resources, the so-called "preconditions for development".
- Local development projects, mainly financed by European Structural and Investment Funds (ESIF).

The first set of actions aims to improve accessibility to basic services identified as Healthcare, Education, and Mobility, through strengthening both physical and digital infrastructures. In addition to adapting the existing service network, the Strategy proposes a rethink of service provision to meet the needs of communities in Inner Areas. This includes: telemedicine assistance, establishment of mobile healthcare services, and home care from a healthcare perspective; upgrade equipment and bring schools closer to local communities for education; rehabilitation of secondary routes and implementation of on-demand public transport.

For the second level of actions, due to the specific characteristics of each territory, the Strategy envisages that local development projects should be place-based. In this regard, the proposal is to

focus on the actual potential of the territory to trigger processes of sustainable reactivation with visible and measurable results in the medium term.

There are five points on which projects should be based:

- Protection of the territory and local communities.
- Enhancement of natural resources.
- Agri-food systems and local development.
- Energy saving and local renewable energy chains.
- Know-how and artisanry.

However, the most obvious limitation of this approach, is that it reduces Regions, the subject to which the Constitution entrusts the matter of Territorial Government, to a mere supporting role in the choices taken at the Central State level, primarily the distribution of funding.

2.4 Weaknesses of the SNAI classification

The complexity of fragile territories is based on a series of interconnected factors ranging from the social to the economic, from the geomorphologic to the environmental. Specifically, the depopulation of small historical villages and the consequent migration to the large cities, the *per capita* income gap (between the outermost areas and the poles), and the dramatic conditions of abandonment of the natural heritage, should all be involved in the restitution of a classification that aims to photograph the degree of need.

Moreover, these dynamics transcend narrow administrative boundaries, extending over a different territorial geography composed of peculiar socio-economic relations and environmental conditions. The SNAI, however, classifies Inner Areas only according to their distance from the service delivery centres, simplifying the perception of the actual critical issues but also of the resources. Regarding this method of measurement, the main criticisms concern three aspects: the selection of services for Health and Mobility, the method of measurement by centroids and the identification of the threshold value above which a municipality is identified as an Inner Area.

With respect to the selection of services for healthcare, the current classification only considers hospital facilities with level I Emergency Department, Urgency and Reception (DEA). However, the Decree of the Minister of Health of 2 April 2015 n. 70, concerning the definition of hospital care standards, identifies four distinct types of facilities designed to respond to urgent care needs:

- Level II DEA hospital (regional or macro-area centres of excellence known as hubs).
- Level I DEA hospital (peripheral centres of excellence known as spokes).
- Hospital with an emergency department.
- Hospital in a particularly disadvantaged area¹⁶.

The first three structures¹⁷ represent an important territorial outpost that can ensure accessibility to healthcare services in emergency cases. By not including hospitals with emergency departments among healthcare services, crucial facilities for territories, especially in rural contexts, are ignored. Furthermore, this lack is reflected in the classification of municipalities. Taking the example of the municipality of Bracciano (RM), north of Rome, that it is classified as a peripheral area (over 40,9 and up to 66,9 minutes from a Pole) despite offering simultaneously:

- an hospital with an emergency department.

¹⁶ More than 90 minutes away from the hub or spoke centers of reference or 60 minutes away from emergency departments.

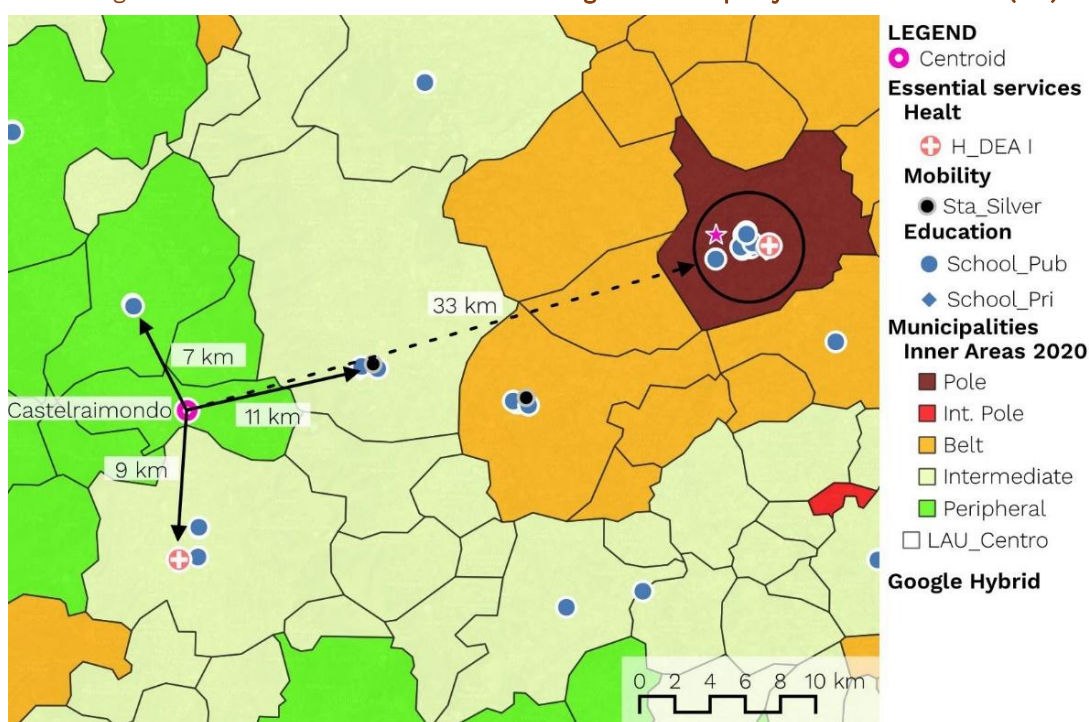
¹⁷ Excluding hospital in particularly disadvantaged areas, whose activation is often challenging due to economic and administrative issues.

- three different secondary schools.
- a Silver level railway station.

Also, for Mobility services, SNAI excludes Bronze-level stations and all those affiliated with concession lines (not directly managed by RFI and therefore not classified). This undervalues the strategic importance of a station (and thus a railway line) not for directly offering inter-regional service but in proposing as an access point to a broader network of mass public transportation. This limitation is further exacerbated by measuring travel time to a Pole exclusively by car.

The method of measurement based on centroids is an oversimplification that does not allow the actual distribution of services and population to be considered. Indeed, by measuring travel times exclusively from the centroids of Poles, services - of the same level - that may be closer are excluded (Figure 2).

Figure 2. Distribution of services surrounding the municipality of Castelraimondo (MC)



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

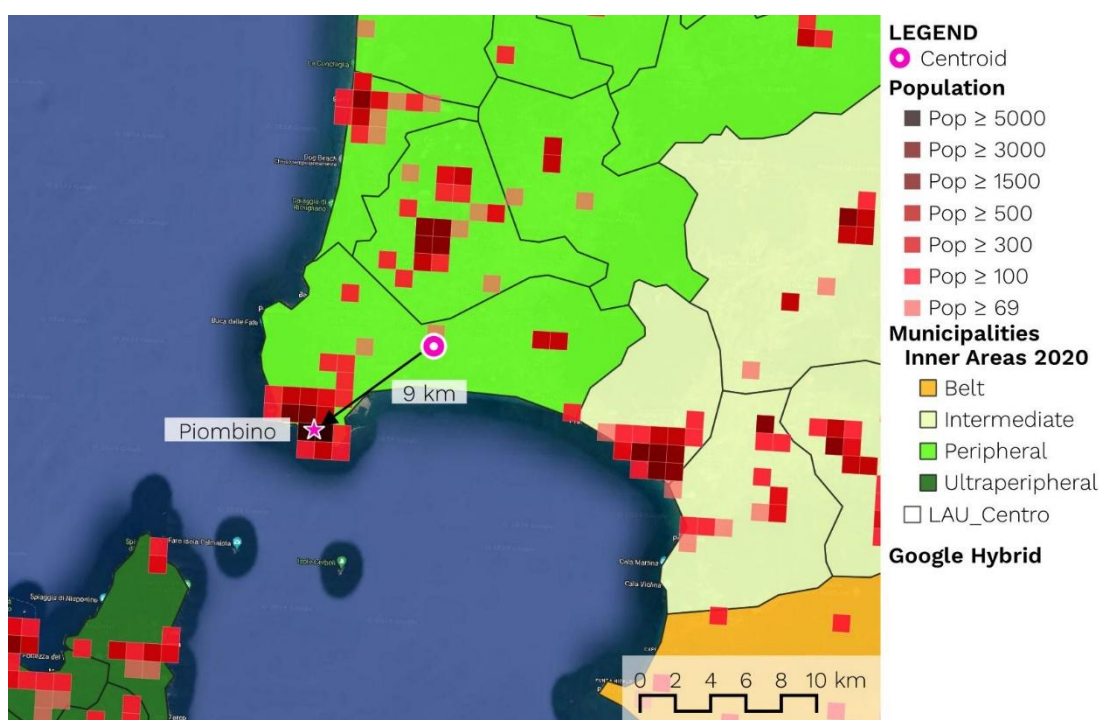
This is a significant aspect from the perspective of territorial rebalancing. Considering the sharing of territorial services among different municipalities means moving away from the concept of dependence on a single urban centre (Cattivelli et al., 2019). If supported by strategic territorial planning, this change in perspective can have the dual effect of alleviating the burden on major urban centres and only developing infrastructure in areas where necessary, thus optimizing investments and operating costs.

Moreover, not always the most populated core (Figure 3) or the distribution of services (Figure 4) corresponds to the centroid of the municipality. Moreover, in large municipal areas, services can be located far apart (Figure 5), making the use of a centroid ineffective.

Finally, the threshold value could be revised. The current classification sets the accessibility threshold at 27,7 minutes, beyond which the territories of Inner Areas are identified. This value is not related to territorial accessibility criteria but emerges from a statistical division of distance measurements between municipalities and Poles using the quartile method.

The first threshold (27,7 minutes) corresponds to the median value, the second (40,9 minutes) to the third quartile, and the last (66,9 minutes) to the 95th percentile. The lack of a reference parameter directly connected to service accessibility reinforces the inefficacy of the classification in showcasing this aspect. From a healthcare perspective, the Essential Levels of Assistance (LEA)¹⁸, established by the Ministry of Health, introduced the D09Z Alarm-Target Interval indicator for emergency vehicles in 2008. The indicator defines an acceptable threshold for the arrival of an emergency vehicle as 18 minutes from the receipt of the call (with a minimal acceptable deviation between 18 and 21 minutes). Practically, this value does not measure the distance from an emergency healthcare facility but rather the response capability of an emergency vehicle equipped with instruments and expertise capable of ensuring the Basic Life Support procedure with the addition of defibrillation (BLS-D)¹⁹. However, considering the possibility that this service cannot be guaranteed, then proximity to an emergency facility becomes a determining factor.

Figure 3. Distribution of population in the municipality of Piombino (LI) in relation to the centroid



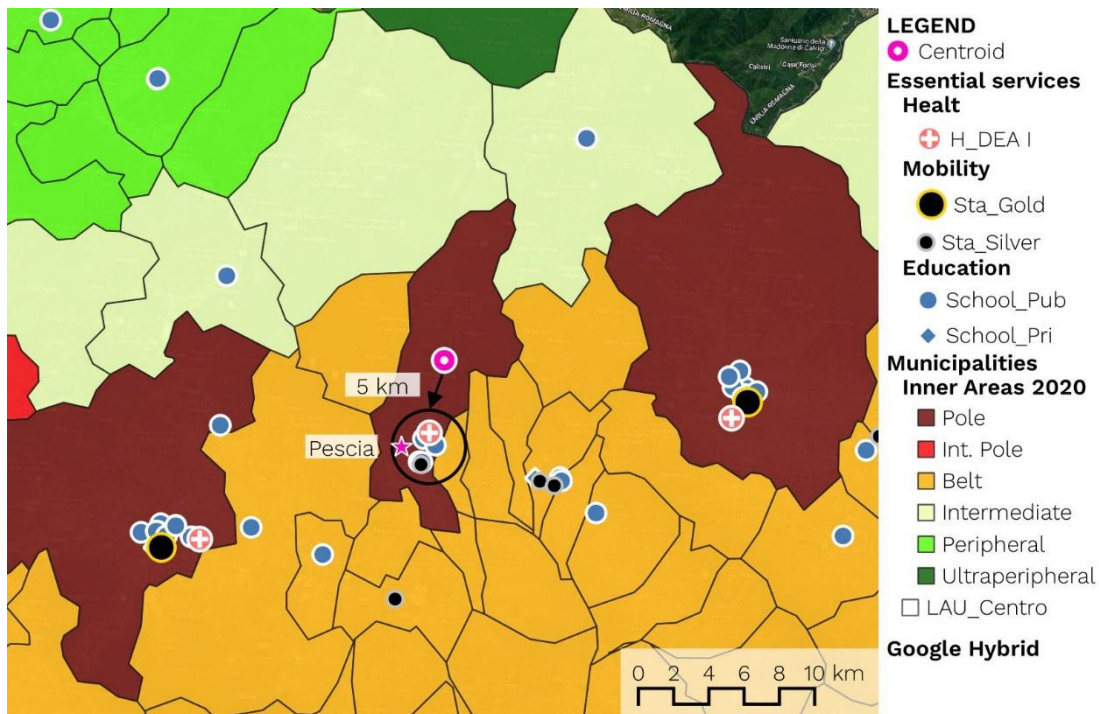
Source: Own elaboration on data from ISTAT, GEOSTAT.

In conclusion, the current accessibility trend in the urban sphere is based on the rediscovery of the *15-minute city* by Carlos Moreno (Allam et al., 2023) based on the possibility of access, by walking, cycling or public transport, to all necessary local services within 15 minutes. By transferring these considerations to the extra-urban sphere and projecting them onto services on a territorial scale, the paradigm of the *20-minute territory* could guarantee contexts that are increasingly independent of large urban areas. Improving the infrastructural offer and (physical and digital) accessibility in fragile territories to reduce times to a maximum of 20 minutes would collaborate in territorial rebalancing, in order to reduce migratory trends and promote a sustainable alternative to life in big cities.

¹⁸ The LEA indicators define the minimum services and performances that the National Health Service (SSN) is required to provide to all citizens. These parameters are compared with the data available in the New Health Information System (NSIS) within the framework of the New Guarantee System (NSG) to assess the capability of healthcare facilities to meet these needs.

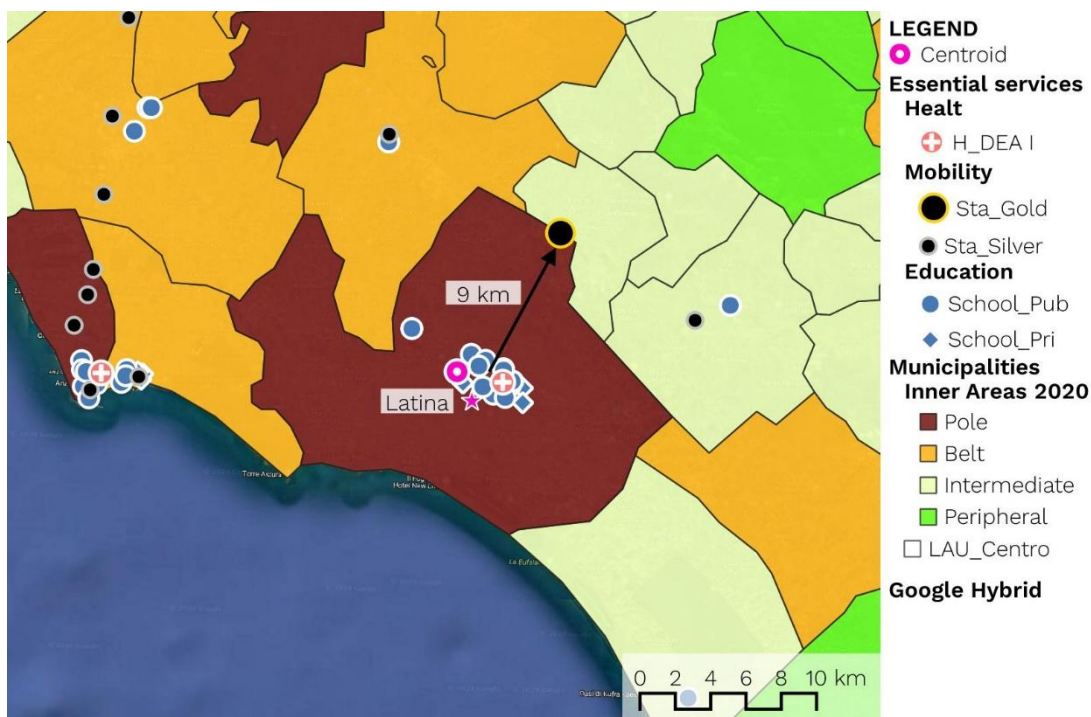
¹⁹ In Italy, the vehicles assigned to intervene within the Emergency Medical Service are divided into: Basic Life Support vehicles (BLS), Intermediate Life Support vehicles (ILS), Advanced Life Support vehicles (ALS) including Mobile Intensive Care Units (MICUs) and helicopter emergency medical services.

Figure 4. Distribution of essential services in the municipality of Pescia (PT) in relation to the centroid



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

Figure 5. Distribution of essential services in the municipality of Latina (LT)



Source: Own elaboration on data from MS, MIUR, RFI.

3. European Union research on access to essential services in Inner Areas territory

3.1 *A policies brief*

With the Lisbon Treaty of 2008, a third dimension of cohesion policies was introduced as a fundamental aspect for the European Union, alongside the economic and social dimensions: territorial cohesion. This political concept is based on the central idea of equity among territories at a certain level, fostering solidarity between institutional entities and the integrated implementation of various equalization mechanisms, with which each specific level is endowed.

To support these objectives, the European Union has introduced structural funds such as the European Regional Development Fund (ERDF) and the European Social Fund (ESF) within various cohesion policy cycles. These funds have supported initiatives to improve infrastructure, access to services, vocational training, and social inclusion in the most disadvantaged regions. With the introduction of the Green Deal in 2019, the European Digital Agenda, and the European Territorial Agenda in 2020, a perspective of a continent climate-neutral by 2050 has been outlined. This includes investments in renewable energy, energy efficiency, sustainable transportation, and climate change mitigation even in less urbanized areas, alongside a massive digitalization of both administrative aspects and citizens' daily lives (UN, 2015).

Several research studies developed to support the cohesion policies of member states have highlighted the level of accessibility to essential services as one of the significant factors in identifying disadvantaged areas where structural supports should converge. The following research is reported as good practice in the selection of essential services and criteria for measuring the degree of periphery from them.

3.2 *SeGI - Indicators and Perspectives for Services of General Interest in Territorial Cohesion and Development (ESPON2013)*

Officially since 2002, the European Spatial Planning Observation Network (ESPON) has been providing support to the territorial policies of European Union member states through numerous studies, reports, and indicators covering different areas. One of the research projects developed during the ESPON 2013 cycle was *SeGI - Indicators and Perspectives for Services of General Interest in Territorial Cohesion and Development*.

The research identifies how political, economic, environmental, demographic, and social contexts influences the capability of state and non-state organisations to maintain an adequate level of access to Services of General Interest (SGI). SGI were defined as Services of General Economic Interest (SGEI) and Social Services of General Interest (SSGI). SGEI included technical infrastructure as gas, electricity and energy supply, transport, water and waste management, ICT and communications. SSGI were defined as labour market services, education, healthcare, childcare, elderly care, social care, (social) housing and social assistance services (Rauhut et al., 2013).

The wide range of service types at different scales highlights the importance of conducting a thorough analysis of the provision of essential services to consider the specific characteristics that differentiate territories. At the same time, the existence of these services is connected to a balance between supply and demand, that is, between providers and users, which varies for each context.

Therefore, each territory corresponds to a specific level of essential services that can hardly be standardized. Although the essential services of SNAI are included in those proposed by SeGI, the possibility of expanding this provision to include additional levels of services could highlight a greater complexity than that currently rendered by the Inner Area classification.

3.3 PROFECY – Processes, Features and Cycles of Inner Peripheries in Europe. Inner Peripheries: National territories facing challenges of access to basic services of general interest (ESPON2020)

Another research project developed within the ESPON 2020 framework was "Inner Peripheries: National territories facing challenges of access to basic services of general interest." The research identified Inner Peripheries as areas not necessarily distant from urban centres but where levels of development, access to services of general interest, and quality of life of the population are worse than those of their neighbouring territories. In this context, Inner Peripheries expand the concept of Inner Areas proposed by SNAI to peri-urban areas. The aim of the research was to provide policy recommendations at the European, national, and regional levels to support the actions of local actors. Inner Peripheries were analysed under three main components: low economic potential, limited accessibility to SGI, and a lack of proximity relations (ESPON, 2017).

Figure 6. Outline intervention logic for areas with poor access to SGI (IP2)



Source: Inner peripheries in Europe Policy brief.

Regarding a low level of accessibility to SGI, the research highlighted how areas affected by such processes may have long suffered this deprivation due to their remote location or sparse population. Alternatively, they may be areas from which the population has drifted away in recent years, with associated effects on age structure, levels of economic activity, tax-raising potential, and old-age dependency. In this type of areas, we can observe that the interventions suggested by the research overlap with those proposed by SNAI (Figure 6), which indicates a good capacity to receive European guidelines in a strategic context²⁰. However, the relationship between providers and users emerges again as an inseparable factor. Methodologically, in fact, the concept of limited accessibility to SGIs was measured through an operational delineation based on the 1 km² grid provided by GEOSTAT with population data divided into cells (provided by respective national statistical institutes). Travel times by car were calculated from each population cell to the nearest city or public/private service facility.

The capillarity of this analysis allows to include the real distribution of the population over the territory by contemplating the possibility of fragmentation into several cores. As highlighted above, the SNAI classification, using the method of centroids of municipalities, cannot guarantee the restitution of the same capillarity. There is therefore a methodological discrepancy between the identification of areas and the proposed interventions that could be overcome with a revision of the measurement techniques.

4. Methodological update proposal

4.1 Hypothesis

The reduction of population marginalization is one of the main objectives of SNAI, but it has emerged that the current classification is unable to provide a realistic picture of this condition. Furthermore, even if implemented, the interventions envisaged by the Strategy may not be captured by the

²⁰ SNAI is indicated as a good practice by the research as a political focus of the national level to create or open channels of communication with the decision-making levels of the Inner Peripheries regions.

classification, as it is based on overly synthetic parameters. The European research presented has highlighted considerations that would justify a revision of the current technique for measuring the degree of remoteness, as well as an implementation of the included services. This possibility paves the way for a conceptual revision of the classification, which could include the paradigm of the *20-minute territory* as threshold.

The methodological update proposal of the measure of the degree of periphery from essential services in the classification of Inner Areas in Italy is based on two hypotheses:

- There exist nuclei of population with difficulties in accessing essential services within municipalities not considered as Inner Areas or classified as Poles.
- There are municipalities whose population has access to essential services, but which are classified as Inner Areas.

The research methodology considered by this article is constituted in the comparison of the results of the current centroid measurement method (the current classification) with a measurement using isochrones, which shows the travel time needed to reach each individual service (for every service scope) by car. These isochrones are then intersected and overlaid on the actual location of the population provided by the GEOSTAT population grid with ISTAT data, to assess which nuclei are or are not served by the services. The comparison is conducted in two stages:

1. Phase 1. Comparison of the centroid-to-centroid method with the isochrone's method using the current service selection criteria (DEA II, DEA I, Platinum, Gold and Silver level stations, High Schools and Technical/Professional Institutes) and the actual threshold value of 27,7 minutes of travel time as the limit for defining Inner Areas.
2. Phase 2. Comparison of the same methods with updated selection criteria for essential services and threshold value. Among the services are included hospitals with an emergency department (healthcare scope) and Bronze and those belonging to concessionary lines stations (mobility scope). As travel times, the *20-minute territory* paradigm is introduced, moving the threshold from 27,7 to 20 minutes.

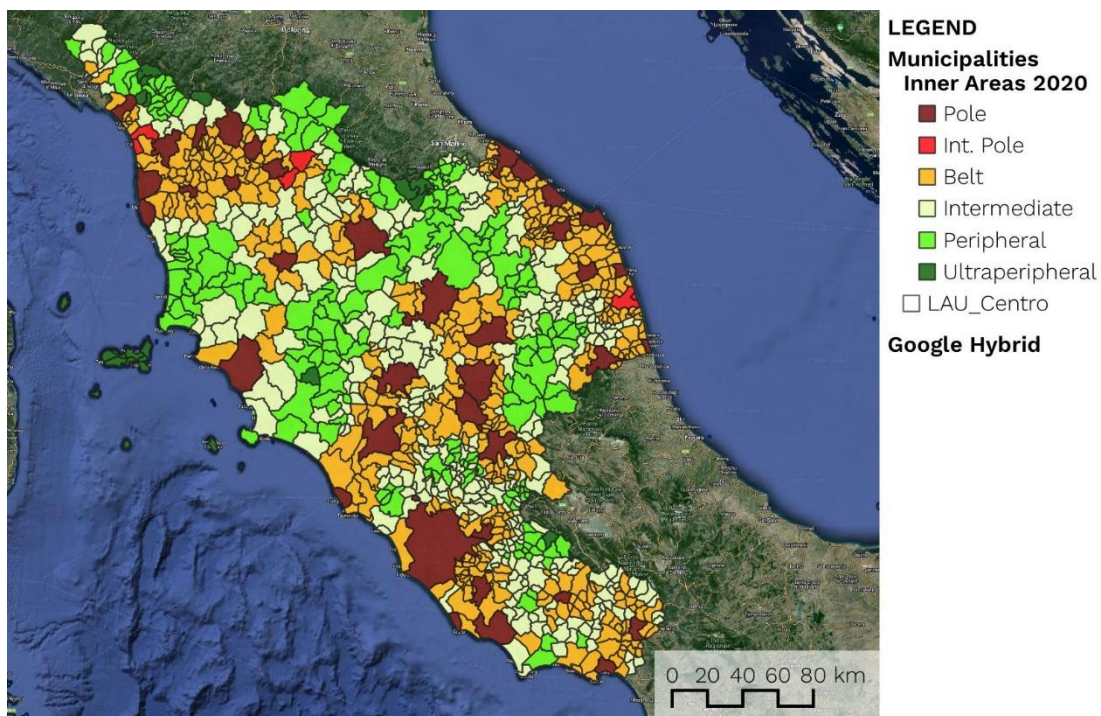
The data used for comparisons between the two methods and the integrated checks refer exclusively to territories identified as Centres by the Nomenclature of Territorial Units for Statistics (NUTS) at Level I. These correspond to four of the twenty Italian Regions (NUTS 2): Tuscany, Marche, Umbria, and Lazio.

4.2 Phase 1

In the territories under analysis, we can observe a slightly better condition compared to the national average, with 530 municipalities falling within Inner Areas, which correspond to just over half of the municipalities in the Centre (968) and just over half of the total territorial area, accounting for 56% of 58'027,68 km² (Figure 7). Similarly, the data of the population are below the national average, with 2'333'786 out of the total 11'724'035 inhabitants, equivalent to 20%, residing in Inner Areas. Additionally, it can be noted that the main distribution of the population effectively reflects the identification of not-Inner Areas municipalities (Figure 8).

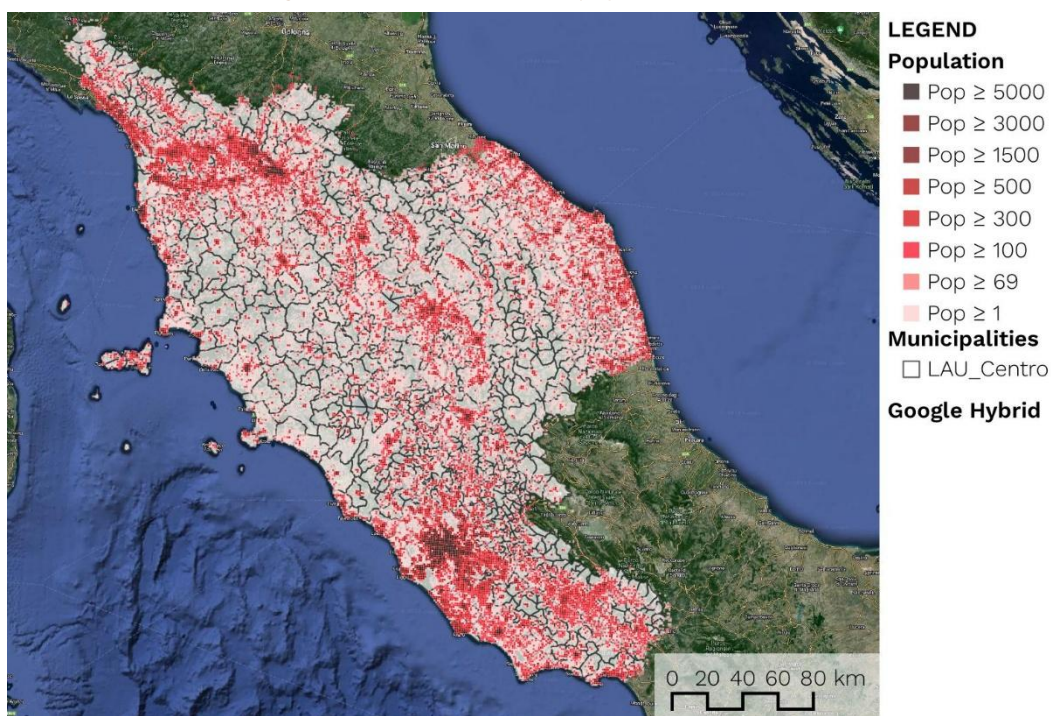
The distribution of essential services (as identified by the current classification) shows a high concentration between Florence and Livorno (a), to the north, and in the area around Rome (b), to the south. The Adriatic coast (c) also appears to be well-served, while in the Apennine area, Perugia (d), Foligno (e), and Terni (f) emerge as more isolated hubs. Less served areas are also highlighted, such as the territories of the *Colline Metallifere* and the *Val di Chiana* in Tuscany (g), much of *Tuscia*, *Etruria*, and the *Maremma* between Lazio and Tuscany (h), and the Apennine municipalities bordering Umbria, Marche, Lazio, and Abruzzo, severely affected by the seismic sequence in Central Italy from 2016 to 2017 (i) (Figure 9).

Figure 7. Inner Areas classification 2020 in NUTS1 Centro



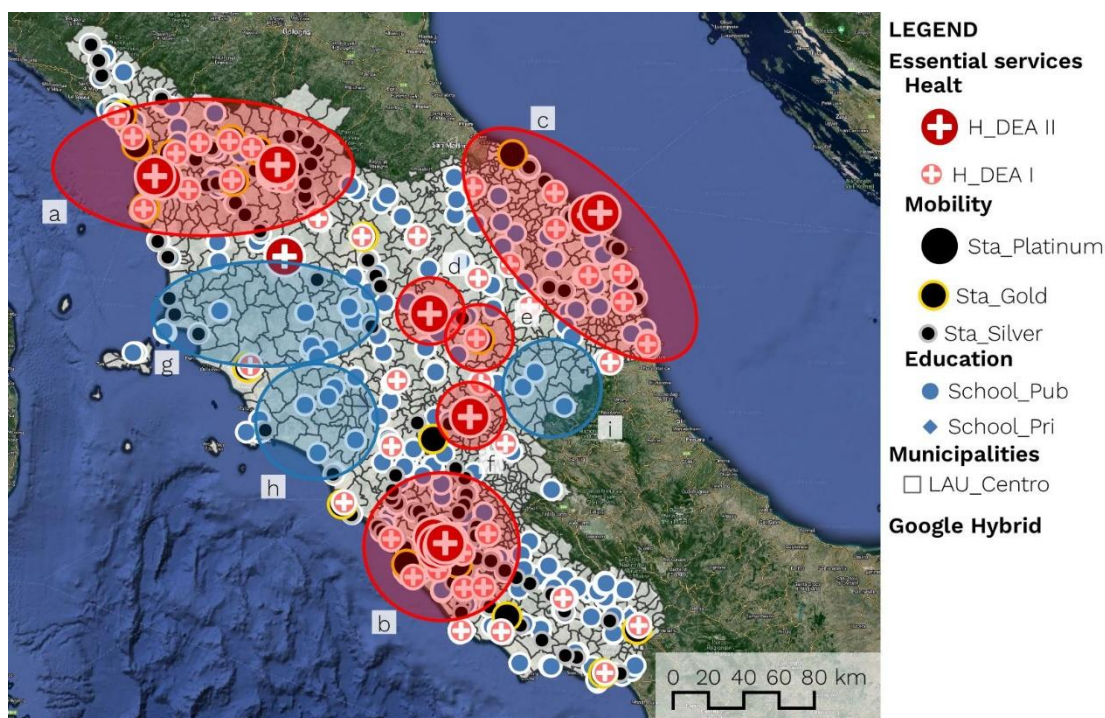
Source: Own elaboration on ISTAT data.

Figure 8. Distribution of the population in NUTS1 Centro



Source: Own elaboration on ISTAT data.

Figure 9. Distribution of the essential service (SNAI 2020) in NUTS1 Centro



Source: Own elaboration on MS, MIUR, RFI data.

Since only services within the analysed area were used in the database (and not those from neighbouring regions), the comparison between the two measurement methods will focus on central territories or those at an adequate distance from the perimeters of NUTS 1 Centro. The measurement of travel times through isochrones was developed using ArcGIS software, setting 27,7 minutes to the service as input parameters via car usage. No further specifications were added. The GEOSTAT grid, containing demographic data, was filtered to return only a density greater than or equal to 69²¹ inhabitants/km², and after divided into population bands to highlight the most populous nuclei.

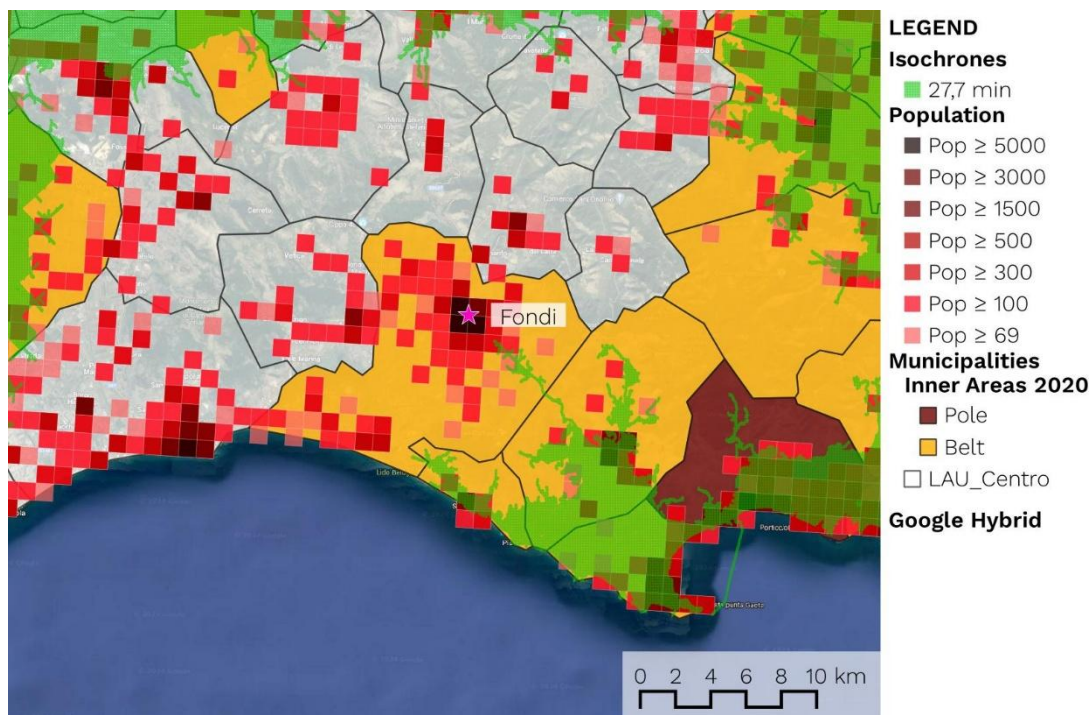
The analyses were conducted for each of the three types of services and subsequently intersected to identify areas with complete access to each category (and, conversely, those without). The disaggregated analysis of services allows, unlike the current classification, highlighting the most marginal areas for each scope, offering a potential tool for territorial planning for interventions on individual areas. The results show an almost complete coverage of the territory for Education (83%), more than half for Mobility (61%) and less than half for Health facilities (41%). Although significant for the topics addressed, the results of the disaggregated analyses will be further explored in subsequent articles and will be an integral part of the ongoing research. For the purposes of the hypotheses assumed in this article, the intersected results are sufficient to validate them. The land coverage of the intersected isochrones is 31%. In the first comparison, areas classified as Poles that are not completely covered by the isochronous intersection of services stand out. This seems an approximation error, but the GEOSTAT grid shows that the entire (or at least the majority) of the population resides in parts of the municipality that are fully served. A different observation can be made for municipalities classified as Belt²².

²¹ The value corresponds to the total population residing in the least populous municipality in the analysis area, Marcellini in the province of Rieti (Lazio).

²² Among the most evident there are: Castel Facognano (AR), Rapolano Terme (SI), Civitella Paganico (GR), Belmonte Piceno (FM), Monsampietro Morico (FM), Montottone (FM), Monte Vidon Combatte (FM), Gualdo Cattaneo (PG), Massa Martana (PG), Amelia (TR), Allerona (TR), Monte San Giovanni in Sabina (RI), Monteleone Sabino (RI), San Lorenzo Nuovo (VT), Capodimonte (VT), Orte (VT).

In fact, it is possible to notice municipalities or large population cores totally outside the isochrone area. The most emblematic case is represented by the municipality of Fondi (LT) where almost all its 39'507 inhabitants fall outside the isochrone (Figure 10).

Figure 10. Population overlaid to the isochrone of 27,7 minutes in the municipality of Fondi (LT)



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

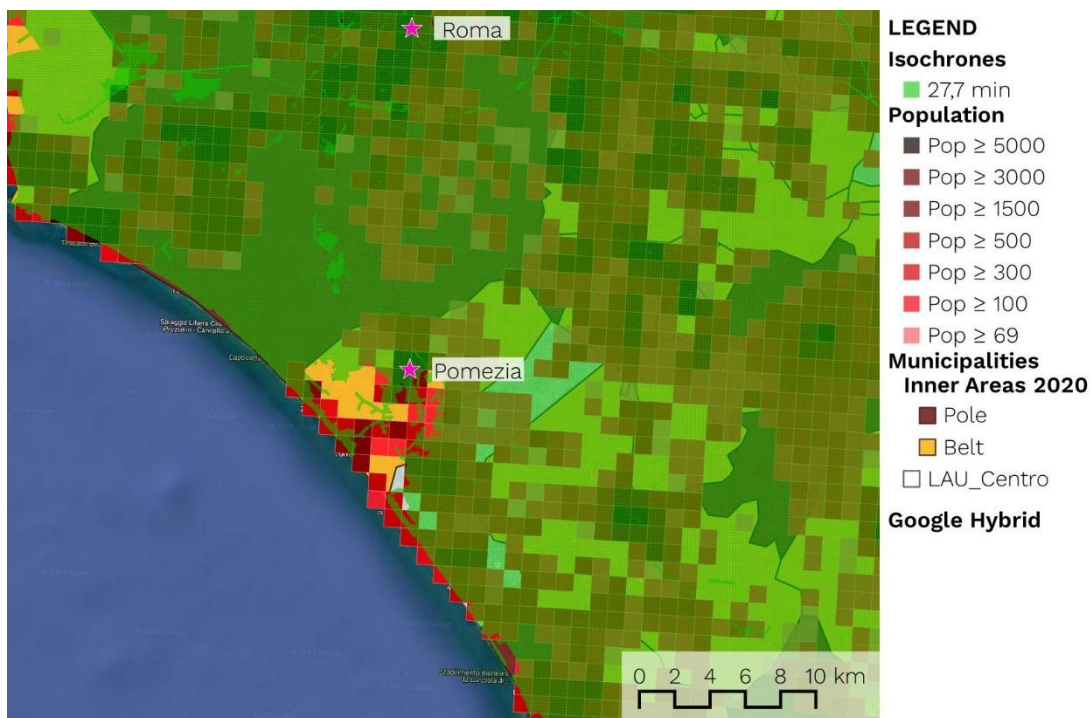
The municipality of Pomezia (RM) also deserves to be identified, where a large part of the population is at the threshold limit, even though residing in a territory directly bordering on the Pole municipality with the most services in Italy; Rome (Figure 11). This aspect introduces a question on the approximation of the entire territory of Rome as a single Pole (1'287.24 km²) which will be explored in subsequent articles and will be an integral part of the ongoing research.

At the same time, there are population cores in municipalities completely reached by the isochrone but classified as Inner Areas. This condition is the main effect of the proposed update. Measuring the distances to individual services reveals areas that are actually served, although not by the concentration of services in a single pole. This challenges the need to identify Pole municipalities within the classification, shifting the focus to the actual distribution of services. The highlighted areas are characterised by the presence of services belonging to only one or two scopes, while some municipalities have no "own" services at all.

The most evident example is situated on the border between Umbria and Marche, in the municipalities between Fabriano (AN) and Camerino (MC) (Figure 12). 23 municipalities with a total of 98'213 inhabitants classified as Inner Areas but having full access to all categories of services within 27,7 minutes. Another minor area is along the Autostrada del Sole (A1) between Arezzo and Florence (7 municipalities for 87'732 inhabitants).

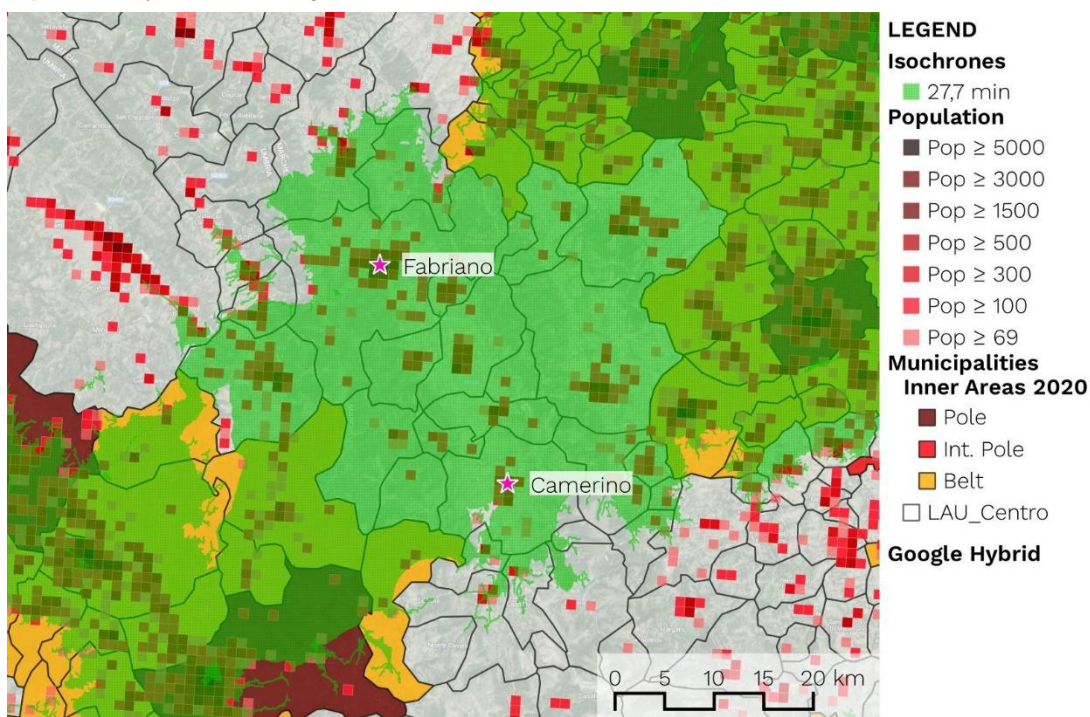
In conclusion, the two hypotheses premised have been validated. This first comparison highlights two potentially updateable features of the current classification. The first one is the measurement between centroids, which does not consider the actual population distribution on the territory, approximating the coverage of services in municipalities composed of several nuclei. The second is the calculation of the distance between the centroids of the hubs and not the individual services. It has been shown that a homogeneous distribution of services over the territory can be just as effective as their concentration in a single urban core, in terms of accessibility.

Figure 11. Population overlaid to the isochrone of 27,7 minutes in the municipality of Pomezia (RM)



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

Figure 12. Population overlaid to the isochrone of 27,7 minutes around Fabriano (AN) & Camerino (MC)



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

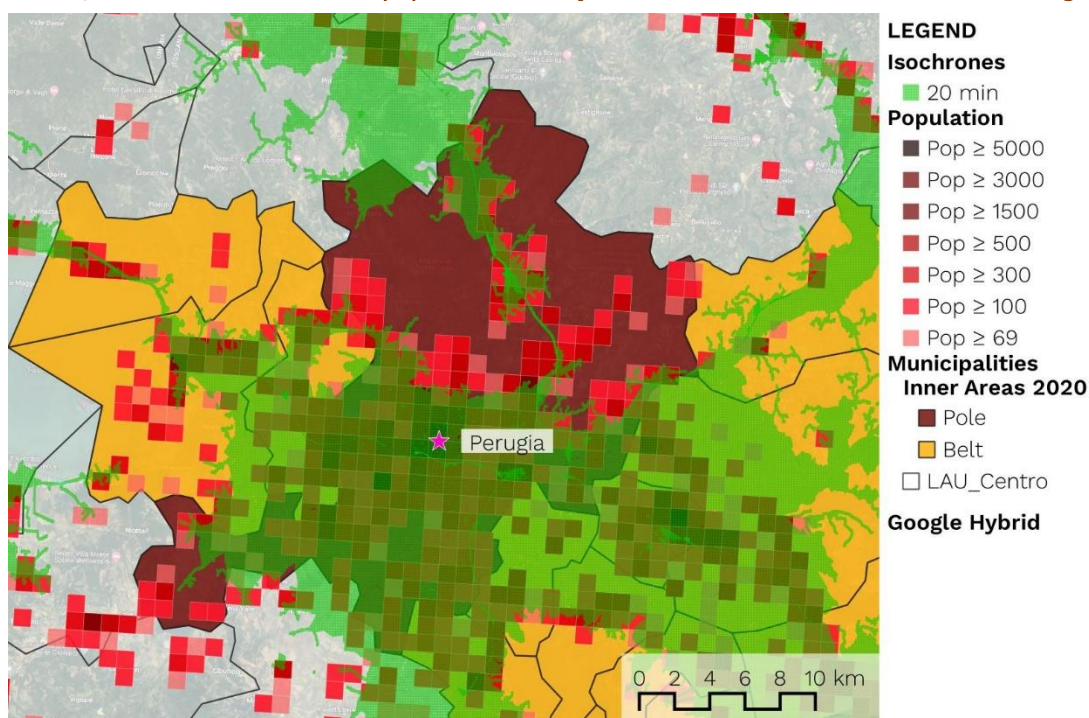
4.3 Phase 2

For the second comparison, the updated selection criteria for essential services and the 20-minute territory paradigm were introduced. As could be seen in the first comparison, the distribution of services over the territory can be a determining factor in assessing the degree of accessibility of the population. The possibility of widening the selection of services, introducing those of a lower level but still significant for a territorial scale, may yield results completely different from the current ones. The new perspective, no longer based on dependence on Poles, goes beyond their identification and introduces the conception of essential services as a network. On this new layout, an attempt can be made to move the threshold value to 20 minutes by proposing the vision of an interconnected territory that shares resources. The services added to the selection consisted of hospitals with an emergency department (50 health facilities) and Bronze and concessionary stations (233 and 120 stations). The schools considered remained high schools and institutes.

Despite the introduction of the numerous new services (403 in total), initial observations show a reduction in the level of accessibility, certainly influenced by the threshold imposed at 20 minutes, with an intersecting isochrone reaching a coverage of 27%. Among the three service areas, the one that reduced the most was Education with 12'962,54 km² less coverage, followed by Health with a reduction of 4'080,80 km² and finally Mobility with a reduction of only 2'723,20 km².

For Education, a substantial reduction was foreseeable since no additional facilities were added, at the same time their distribution over the territory is effective, covering 61% of the area under consideration. Different deductions can be made for Health, which despite the addition of hospitals with emergency rooms manages to cover only 34% of the territory, showing gaps even in areas classified as Poles. Thanks to the inclusion of the 353 minor stations, the coverage of Mobility almost does not change as travel time decreases, keeping more than half of the territory served (56%) and demonstrating good capillarity. In this second map, some Poles continue not to be completely covered by the isochrone, but this time significant population cores remain excluded. The most evident cases are that of Perugia, with 11'948 out of 162'362 inhabitants (7%) outside the accessibility threshold (Figure 13), and that Latina; 10'201 inhabitants or 8% of the population excluded (Figure 14).

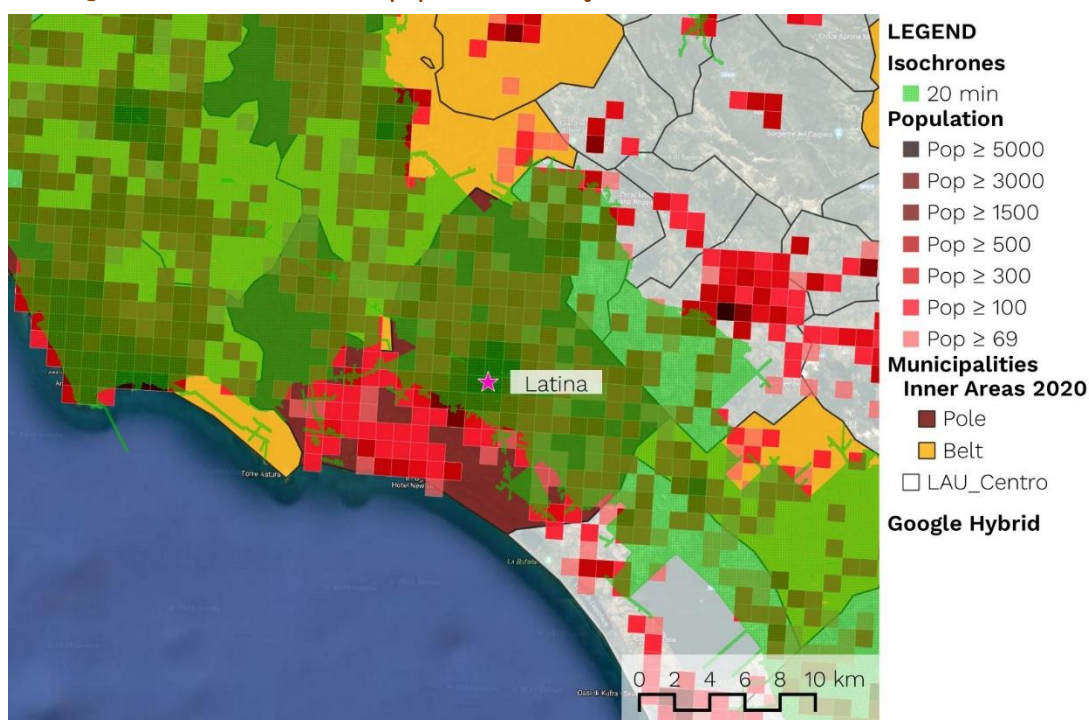
Figure 13. Distribution of the population overlaid to the isochrone of 20 minutes in Perugia



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

The Poles of Rome, Viterbo, Orvieto (TR) and Arezzo and of the Apennine belt, Foligno (PG), Spoleto (PG), Terni and Rieti, show a borderline condition, while the area of the Adriatic coast maintain a good coverage. In addition to the distribution of services, this scenario introduces a specific reflection on the planning of transport infrastructures. By taking car transport time into consideration, the effectiveness of road and motorway networks naturally emerges. Particularly between the poles of Orvieto (TR), Viterbo and Terni, the lack of cross-connection lines in relation to the “Autostrada del Sole” is highlighted. These considerations will also be explored in more detail in the ongoing research.

Figure 14. Distribution of the population overlayed to the isochrone of 20 minutes in Latina



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

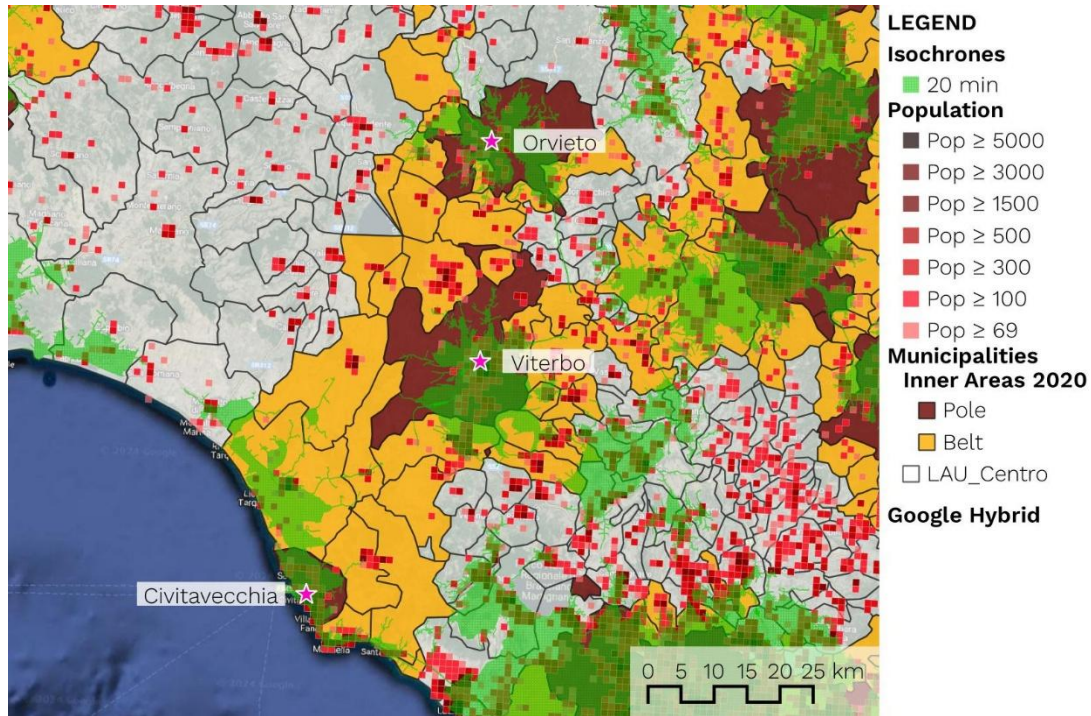
Concerning the Belt municipalities, the scenario is quite different compared to the current classification. Numerous municipalities and population centres appear largely outside the 20-minute travel time, challenging their dependence on the Poles and highlighting their effective periphery. While Rome confirms its role as an attractor just for the municipalities of “Castelli Romani”²³, losing contact from the peripheries to the east and north-east, the area between Florence, Pisa and Livorno denotes a distancing of the southern municipalities. Most exclusions are observed between Arezzo and Siena, around Grosseto and along the Apennine belt. Finally, the area of Belt municipalities which is mostly not covered by the isochrone is the one between Orvieto (TR), Viterbo and Civitavecchia (RM) (Figure 15); 24 municipalities in an area of 1'403.22 km² with a total of 87'311 inhabitants.

The new identification criteria, however, have the capacity to highlight municipalities that can potentially be identified as “minor Poles”, following the nomenclature of the current classification. These are municipalities, predominantly classified as Inner Areas, which, by the updated range of services, simultaneously guarantee all three typologies. Among the most obvious results are two of the municipalities previously presented, Bracciano (RM) and Fondi (LT), which contribute to the Rome and Latina poles, respectively. Many others are listed: Castelnuovo di Garfagnana (LU), Borgo San Lorenzo (FI), Volterra (PI), Cecina (LI), Piombino (LI), Orbetello (GR), Todi (PG), Narni (TR), Tarquinia (VT), Civita Castellana (VT), Bracciano (RM), Monterotondo (RM), Pomezia (RM), Colferro (RM), Aprilia (LT)

²³ Toponym of the Colli Albani hilly area on the south-eastern outskirts of Rome, comprising 17 municipalities.

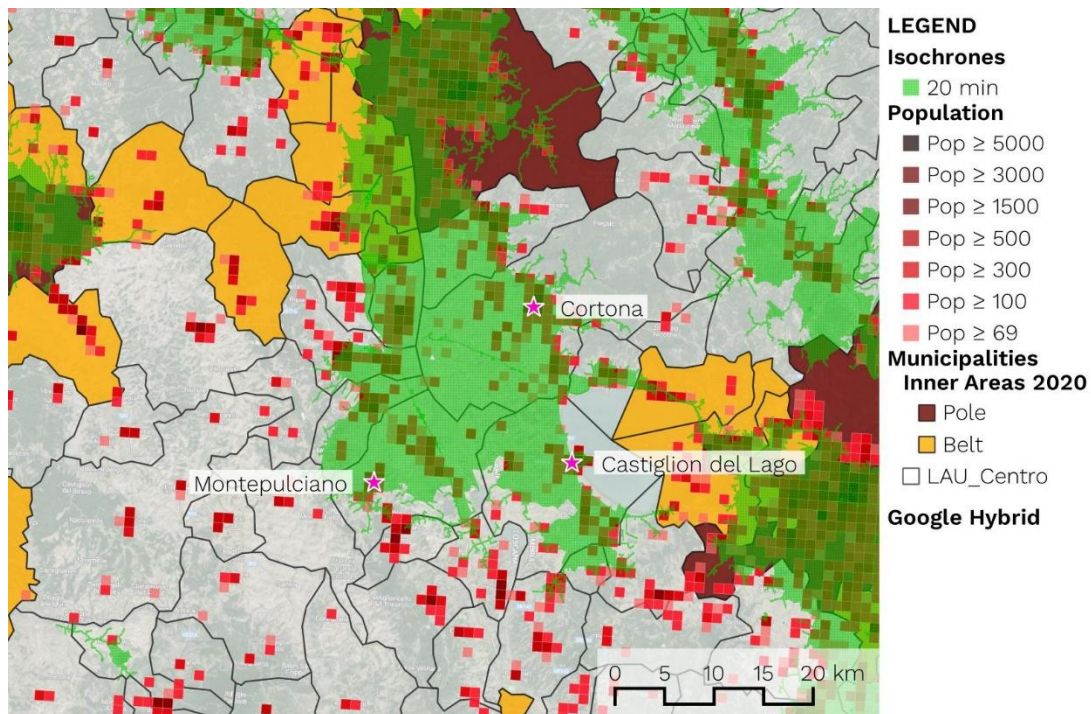
e Sora (FR). The most representative cases, however, are those of the centres Cortona-Castiglion del Lago-Montepulciano (CCM) (Figure 16) and Sansepolcro-Città di Castello-Umbertide (SCU) (Figure 17).

Figure 15. Distribution of the population overlaid to the isochrone of 20 minutes between Orvieto (TR), Viterbo and Civitavecchia (RM)



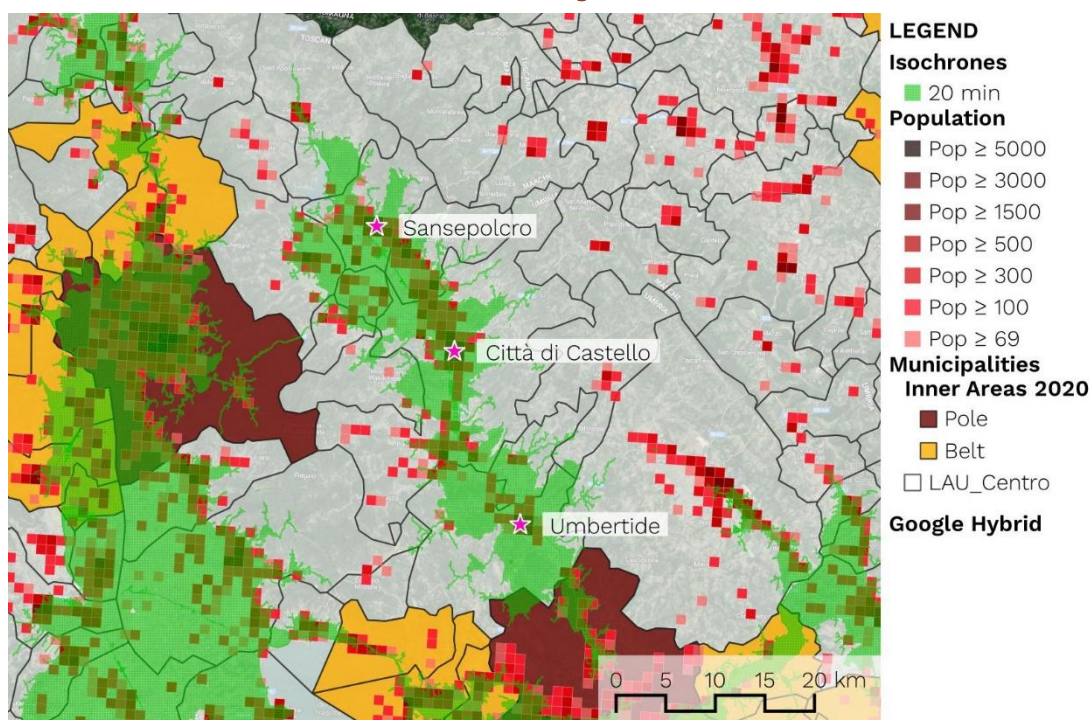
Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

Figure 16. Distribution of the population overlaid to the isochrone of 20 minutes surrounding CCM area



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

Figure 17. Distribution of the population overlaid to the isochrone of 20 minutes surrounding SCU area



Source: Own elaboration on data from MS, MIUR, RFI, ISTAT, GEOSTAT.

In addition to guaranteeing the three-service scope to their respective municipalities²⁴, the commensurate distribution over the territory and the effectiveness of the road connection networks allow access to essential services to 95'023 (CCM) and 97'252 (SCU) inhabitants. As proof of a well-functioning territory, the two groups of municipalities recorded a +0,1% (CCM) and +4% (SCU) growth in population between 1991 and 2021, and a taxable income growth of +14% in both areas between 2011 and 2021, in contrast to the dynamics of Inner Areas.

In conclusion, the results of this second comparison strongly question the need to identify territorial poles, proposing groups of services, more or less homogeneous, as a more effective alternative. The updating of the accessibility threshold, on the other hand, has highlighted how a condition of periphery can also be identified near major urban centres, especially when they are poorly connected by adequate mobility infrastructures. Finally, the validation of the hypotheses was proved and strengthened by the identification of two examples that respond to the paradigm of the *20-minute territory* facing the trends of Inner Areas.

5. Conclusions

We live in a post-industrial era, where the need to migrate to the big city and live there is no longer justified by the reasons for which the great internal migrations took place back in the mid-19th century. In the age of digital communications, big cities are no longer the place where relations and flows are concentrated, but it is the rich and vast heritage of medium-sized and especially small villages that is the key to territorial rebalance and environmental sustainability. However, to trigger strategies for the recovery and enhancement of fragile territories and small towns, it is essential to revise the national territory classification criteria.

²⁴ In the municipality of Città di Castello there is a level 1 DEA hospital, one of the health structures that is not included in a Polo.

The indicators proposed by SNAI alters the degree of accessibility to essential services, both in the concept of identifying centralised service Poles and in establishing an accessibility threshold based exclusively on statistical parameters. The paradigm of the *20-minute territory*, correlated with updates of territorial services and measurement techniques, was verified as being more efficient in restoring the degree of periphery of territories. The possibility of an update of the Inner Areas classification suggests a deeper methodological revision. Such a revision could expand the results of this article to the prioritisation of homogeneous groups of municipalities/populations that share Economic, Social or Environmental characteristics, defining the areas of subsequent strategies. Furthermore, by bringing the detailed analysis currently conducted in the selection of pilot territories into the classification, those municipalities that spontaneously develop the greatest potential for development or suffer from the most significant threats could be highlighted.

At a political and decision-making level, a tool that meets these needs would be a valid guideline for territorial planning, supporting the top-down approach of the strategy (SNAI action level I). At the same time, the capillarity of the information reported would guarantee the effectiveness of a bottom-up approach, by more easily identifying the territorial contexts whose local development strategies could be shared (SNAI action level II).

Finally, the constant monitoring of the identified indicators, connected to the sudden updating of data, would guarantee the use of a dynamic and adaptive tool, able to follow the developments of Inner Areas, overcoming the static representation of the evolution of complex territories. The iteration of this process could therefore provide an experimental basis on which involve other EU Member States, strengthening the classification model and evaluating its effectiveness by repositing it on other fragile territories across Europe.

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Authorship

The choice of topics discussed in the article is the result of the collaboration of the two authors as well as the structuring of the chapters. Specifically, Author 1 edited the chapters: 2, 3 and 4 with all related sub-chapters. Author 2 edited the chapter 1 with all related sub-chapters. The conclusions (chapter 5) are the result of joint work.

Conflict of interest: The authors declare that there is no conflict of interest.

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