ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

TARGETED ANALYSIS //

IMAGINE

Developing a metropolitan-regional imaginary in Milano-Bologna urban region

Scientific annex 1 // Regional Portrait. Report-atlas presenting the functional characteristics of Milano Bologna urban region

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Abbreviations

AD	Amministratore Delegato (Chief Executive Officer)
AdE	Agenzia delle Entrate (Revenue Agency)
AGCOM	Autorità per le Garanzie nelle Comunicazioni (Authority for Communications Guarantees)
AIM	Associazione Interessi Metropolitani
ANCI	Associazione Nazionale Comuni Italiani (National Association of Italian Municipalities)
ASIA	Archivio Statistico delle Imprese Attive (Statistical Archive of Active Firms)
BO	Bologna
CCIAA	Camera di Commercio, Industria, Artigianato e Agricoltura (Chamber of Commerce)
CEMAT	Conference of Ministers responsible for Spatial/Regional Planning
CENSIS	Centro Studi Investimenti Sociali
CEO	Chief Executive Officer
CLLD	Community Led Local Development
CNAO	Centro Nazionale di Adroterapia Oncologica (National Center of Oncologic Androtherapy)
CNCC	Consiglio Nazionale dei Centri Commerciali (Shopping Centers National Council)
COR	Committee of Regions
COVID-19	Coronavirus disease 2019
CRPE	Comitato Regionale per la Programmazione Economica
DASTU	Department of Architecture and Urban Studies, Politecnico di Milano
DEGURBA	Eurostat Degree of Urbanisation
DG REGIO	Directorate General for Regional and Urban Policy
EC	European Commission
EEN	Enterprise Europe Network
EGTC	European Grouping of Territorial Cooperation
ESPON	European Territorial Observatory Network
ESRI	Environmental System Research Institute
EU 13	European Union countries that joined after 2004
EU 15	European Union countries that were member states prior to 2004 (incl. UK)
EU	European Union
Eurostat	European Statistic Office
FR	France
FUA	Functional Urban Area
G&L	Globus & Locus
GVA	Gross Value Added
HSR	High Speed Rail
ID	Industrial District
IFAB	Big Data and Artificial Intelligence for Human Development Foundation
ISTAT	Istituto Nazionale di Statistica (Italian National Institute of Statistics)
ISUD	Integrated Sustainable development
IT	Italy
ITI	Integrated Territorial Investment
JRC/EC	Joint Research Centre of the European Commission
KIBS	Knowledge intensive business services
LAs	Local Authorities
LAU	Local Administrative Units
LMA	Labour Market Areas
MC	Monitoring Committee
MEF	Italian National Ministry of Economy and Finance
METREX	Network of European metropolitan regions and areas
MI	Milano
MIT	Italian National Ministry for Infrastructures
MNE	Multi National Enterprises
MR	Metropolitan Regions
NeWSps	New Working Spaces
NUTS	Nomenclature of Territorial Units for Statistics

OECD	Organisation for Economic Co-operation and Development
OMI	Osservatorio del Mercato Immobiliare (Real Estate Market Observatory)ù
PC	Piacenza
PIC	Piano Intercomunale Bolognese
PIM	Piano Intercomunale Milanese
PL	Poland
PNRR	Piano Nazionale di Ripresa e Resilienza (National Recovery and Resilience Plan)
POLIMI	Politecnico di Milano
PON METRO	National Operational Program Metro
POPSU	Observatory platform for urban projects and strategies
PRIN	Progetti di ricerca di Rilevante Interesse Nazionale (Research projects of significant national interest)
PTR	Piano Territoriale Regionale
PUMS	Piano Urbano della Mobilità Sostenibile (Urban Sustainable Mobility Plan)
PV	Pavia
RLM	Regione Logistica Milanese (Milan Logistic Region)
RP	Regional Portrait
SC	Synthetic Control
SI	Spatial Imaginaries
SLL	Sistema Locale del Lavoro (Local commuting area)
SME	Small and Medium Enterprise
SNAI	Strategia Nazionale Aree Interne (National Strategy for inner areas)
TPL	Trasporto Pubblico Locale (Local Public Transport system)
VP	Visual Platform
WP	Work Package

Introduction

The Regional Portrait (RP) is one of the IMAGINE Targeted analysis project's main outputs and can be considered an atlas presenting the main socio-spatial-economic characteristics of the Milano Bologna urban region.

The RP is built by combining various theoretical and analytical approaches to explore the drivers of regionalization along the Milano-Bologna corridor and in the wider urban region.

It is composed of three chapters that combine different points of view on the region:

1. ***Chapter 1 Milano-Bologna urban region: a regional portrait.*** It presents the Atlas of the Milano-Bologna urban region. It reports the results of an intense data analysis work aimed at exploring and interpreting the urban region by introducing innovative analytical perspectives that overcome traditional territorial and functional categories. The Regional Portrait is composed of 39 maps of the Milano-Bologna urban region that are used to explore in detail the seven research questions presented in the following seven subchapters.
2. ***Chapter 2 Milano-Bologna from a EU perspective: a brief overview.*** It includes a reflection on this urban region within a more comprehensive EU framework. There is a long tradition of comparison between competing city or city-regions in Europe. But when it comes to clustering of cities, part of wider urban regions, it is more challenging to identify comparative studies helping explain the socio-economic-spatial organization and compare the performances of such socio-spatial formations. This section does not aim to fill in this gap but to provide some interesting elements for a reflective comparison at the EU scale.
3. ***Chapter 3 Milano-Bologna from an inner perspective: mapping local spatial imaginaries.*** It explores the region from a local perspective, mapping how spatial imaginaries on the region have been historically developed and consolidated in the public discourse, paying particular attention to the interaction between expert knowledge and institutional visions and solutions.

1 Milano-Bologna urban region: a regional portrait

1.1 Introduction to the Regional Portrait

The construction of the Regional Portrait builds upon the hypothesis - supported by a large stream of literature - that today's era might be defined as one of *regional urbanization*, one in which urban regions are substituting cities on the international economic scene and in their roles in the world economy (Soja, 2001)), sometimes supported by explicit policies (see the role of EU in promoting Regions and Macroregions (McCann, 2017). Within this perspective, the literature highlights how, despite cities are still a crucial asset in economic development, the production of wealth has become more and more diffused across uneven territories and distributed in long value-chains. On the one hand, there is the city's territory; on the other, the flows (of activities made in the world, and hence perennially on the move; of the non-resident migrant population) that seem to be growing in all directions within and between territories. In this perspective, "corridors" are at the centre of new attention in so far, they can be seen as the result of the changing economic base of contemporary cities in the direction of the "economy of speed" (Perulli et al., 2017; Garavaglia, 2017). They answer the growing need to speed up any aspect of the economic life, from production to distribution, as the new information technologies have made time compression possible in an "instant" exchange of information. Cities are opening to new geographies both of "industrialization of knowledge" and "territorial development": the crossover between these two dimensions, which used to occur in the urban environment, today extends, on the one hand, over new and broadened city-regional scales, on the other, along corridors.

Within this perspective, the Regional Portrait explores the Milano-Bologna urban area, focussing on the role that the HSR corridor has been playing in the process of regional urbanisation since its implementation. At the same time, it looks at the regional dimension of the urban as one able to better understand the role of the HSR offer within a consolidated infrastructural corridor. In this respect, on the one hand, the regional portrait does not take for granted that the Milano-Bologna urban area is an urban region, reifying it before studying it; instead, it looks for signs and evidence of a functional integrated urban area. On the other, the Regional Portrait deserves special attention to the role that mobility infrastructures and services play in the regionalisation dynamics, considering the HSR offer as a further development step in the history of a consolidated infrastructural corridor.

The Regional Portrait is mainly inspired by a recent and challenging literature debate which goes under the name of "infrastructure turn" (Glass, Addie & Nelles, 2019, p. 1651), as "a new wave of interdisciplinary inquiry into how the functions and impacts of infrastructure are shaping urban and regional space". Authors are referring to this strand of literature look at infrastructures as far as they "reveal(s) how regions are experienced differently by diverse social groups: by dispelling any vestigial notions of infrastructure as a set of technocratic and neutral networks, we may move toward regional research that provides the basis for both economic development and social equity" (Glass, Addie & Nelles, 2019, p. 1655). Moreover, they look at infrastructures as a "'new optic field' through which we can examine the lived dimensions of urban society (Chattopadhyay, 2012) and the statecraft shaping contemporary forms of territorialization (Easterling, 2014)" (Addie et al., 2019, pg. 11). "Rather than examining regional infrastructures as distinct objects of analysis, we are interested in the relations between infrastructure and regions (each broadly conceived) and their capacity to effect new spatial imaginaries and political subjectivities" Addie et al. (2019, pg. 12). In this respect, Addie et al. reconstructing the debate, highlight how "regionalizing the infrastructure turn involves the complementary but distinct projects of applying a regional perspective to the infrastructure turn (thinking about infrastructure through the region) and engaging infrastructure as empirical and conceptual problematic to interrogate regional processes (thinking about the region through infrastructure)" (2019, pg. 12).

1.1.1 Research questions of the Regional Portrait

Following the implications of such a research perspective, the Regional Portrait looks at infrastructures "as matter that enables the movement of other matter' (Larkin, 2013, p. 329) (..); (They) exist(s) in space (as specific 'spatial products' and more abstract and endemic 'infrastructural space') and produce(s) space through their function as sociotechnical 'operating systems' (Easterling, 2014, pp. 11–14)" (Addie et al. 2019, pg.12). The Regional Portrait develops upon the following key questions:

- *What makes the region*? (Regionalisation of the urban). Regions are social constructions, but what are the materials that construct them in practices? *"*How, by whom, and through what materials is it constructed in practice?' (Metzger, 2013, pp. 1368–69; cited in Parker & Harloe, 2015, p. 365, quoted in Addie et al. 2019, pg.16). Under this section, the regional portrait collects a description of the material and immaterial elements that, along the infrastructural corridor, allow a regional dimension on the life of its inhabitants (Figure 3 and 4). Then it presents a synthetic picture of processes of regionalisation of the urban, exploring key socio-economic indicators (RP1.1- Regionalisation of the urban).
- *Living like an urban region*? (Regionalisation of mobility). Regions are social practices, behaviours, and lifestyles structured upon a regional scale, often based on infrastructures that allow the organisation of everyday life. Under this section, the Regional Portrait investigates people's mobility as an indicator and a proxy of an integrated functional urban space. This section presents a synthetic picture of processes of Regionalisation of mobility practices (RP2.1) and introduces a specific focus on the role of HSR in supporting regional mobility practices (RP 2.2 – Potential accessibility to railway services and RP 2.3 – Change in potential accessibility to railway services).
- *Is the HSR corridor a regionalisation machine*? (Regionalisation dynamics). Infrastructural corridors can be conceived as "operational landscapes" (Brenner, 2014), where infrastructures are vectors of dynamics of socio-economic transformation at the regional scale. A space that produces space because of its technological function and modifies societies. The regional portrait explores trends and dynamics over the last 20 years, exploring key socio-economic dynamics and trends (RP 3.1 – Regionalization dynamics and RP 3.2 – Regionalization dynamics (change)).
- *Growing like an urban region? (Regional competitiveness).* According to the literature, urban regions substitute cities on the economic scene (Soja, 2011). They are competitive actors, made of dense networks of relationships: companies, clusters, short and long-distance chain-link materially and immaterially the territories along the Milano-Bologna corridor with the rest of the country and to a broader global scale. This is a crucial resource for competing under the current capitalistic organisation of the economy. The Regional Portrait tries to map the degree of competitiveness that characterises Milano-Bologna urban region and adds some general reflections about the role of the Industrial districts within the area (RP 4.1 – Regional Competitiveness).
- *Resources?* (*Public investments and resources).* "The regional fabric that shapes how urbanization and urbanisms are constructed is mediated by investment and disinvestment in varied infrastructures (Knight, Sharma, & Sinclair, 2017; O'Brien, O'Neill, & Pike, 2019; Zimmerman, 2009)" (Addie et al., 2019, p. 17). The Regional Portrait explores the Milano-Bologna region as a space of distribution of public resources generated under the EU framework and depicts the financial autonomy of municipalities. As such, it tries to investigate the potential of activation of the Milano-Bologna public actors (RP 5.1 – Public investments and resources).
- *Acting or seeing like a region? (New spatial imaginaries need /Institutional cooperation potential*). Regions as social constructions are a political object, a policy space (if not of a political space), a policy arena populated by actors that move on a regional scale. The Regional Portrait focuses on the role played by institutional actors (cooperation networks, metropolitan governments, public utilities, and agencies) in activating a supralocal, if not a regional scale. They are reconstructed in so far, they engender or hinder the possibility to "see like a region", whereas "they shape how territories are constituted as functional 'regional spaces' and rendered visible and governed as political 'spaces of regionalism' (Jones & MacLeod, 2004)" (Addie et al., 2019, pg.16) (RP 6.1 – New spatial Imaginaries need and RP6.2 – Institutional cooperation potential).
- *Transitioning like a region? (Environmental fragility).* The regional environmental ecosystem is undergoing several threats that originated both internally and out of the region itself. Air pollution, soil consumption, hydrogeological risks are intertwined challenges that cannot be tackled without a transcalar strategy of ecological transition. In this picture, regions can play a pivotal role an deploy development trajectories "that aim to maximise intra-regional movement and cohesion, enhance the eco-efficiency of the processes of production, exchange and consumption that are constitutive of regional economies, and construct more resilient regions" (Hudson, 2008, pg. 174).

1.1.2 Key indicators

The Regional Portrait is composed of a total of 39 maps of the Milano-Bologna urban region that are used to explore in detail the seven research questions just presented in the following seven subchapters.

For each research question, we first selected and mapped several key indicators, and then we developed synthesis maps capable of grasping the spatial dimension of the interplay between different variables. The overall picture produced by these indicators could be described in terms of regionalisation of the urban performance indicator: each indicator tests the area against key features of being an urban region.

The selection of the indicators and the construction of the maps aimed at verifying the research hypotheses result from three work phases.

1) The first phase consisted of the collection and integration of municipal data from different datasets and databases. The collection took place starting from an extensive list of indicators reported in the Inception Report. Other indicators resulting from more recent explorations have been added to these pre-selected indicators. The complete dataset consists of over 230 indicators organized by thematic areas.
2) The second phase consisted of the selection of crucial indicators capable of responding to the research questions. The outcome of this work was shared with the project stakeholders during the Regional Portrait Workshop. The presentation to the stakeholders was followed by an internal discussion within the working group in which the key indicators most capable of producing effective and updated summary elaborations were selected.
3) In the third phase, the 26 selected indicators were mapped according to the ESPON standards, and 11 synthesis maps were developed.

Question/Portrait Chapter	**Indicator 1**	**Indicator 2**	**Indicator 3 (optional)**	**Synthesis Map**
1- What makes the urban region?	RP 1.1.1 – Population density	RP 1.1.2 – Number of households served by high-speed Internet connection	RP 1.1.3 – Business services location quotient	RP 1.1 – Regionalisation of the urban
2. Living like an urban region?	RP 2.1.1 – Ratio between generated trips and resident population	RP 2.1.2 – Share of generated trips directed outside the local commuting area (SLL)	RP 2.1.3 – Share of generated trips with public transport or non-motorized	RP 2.1 – Regionalisation of mobility
	RP 2.2.1 / 2.3.1 – Road distance from active railway stations	RP 2.2.2 – Railway services		RP 2.2 – Potential accessibility to railway services
		RP 2.3.2 – Change in railway services		RP 2.3 – Change in potential accessibility to railway services
3. HSR corridor as a regionalisation machine?	RP 3.1.1 – Personal average income	RP 3.1.2 – Housing prices		RP 3.1 – Regionalization dynamics
	RP 3.2.1 – Population change	RP 3.2.2 – Change in house prices	RP 3.2.3 – Change in personal average income	RP 3.2 – Regionalization dynamics (change)

Question/Portrait Chapter	Indicator 1	Indicator 2	Indicator 3 (optional)	Synthesis Map
4. Growing Like an urban region?	RP 4.1.1 – Number of active big firms	RP 4.1.2 – Value added per employee	RP 4.1.3 – Employees in high-tech sectors	RP 4.1 – Regional competitiveness
5 Resources?	RP 5.1.1 – EU Cohesion policy investments (per capita)	RP 5.1.2 – Municipalities' financial autonomy		RP 5.1 – Public investments and resources
6. Seeing like a region?	RP 6.1.1 – Levels of peripherality	RP 6.1.2 – Housing dispersion	RP 6.1.3 / 6.2.3 – Number of shares in public utilities per municipality	RP 6.1 – New spatial imaginaries need
	RP 6.2.1 – Municipalities included in Metropolitan Cities	RP 6.2.2 – Municipalities included in Unions of Municipalities or Mountain Communities		RP 6.2 – Institutional cooperation potential
7. Transitioning like a region?	RP 7.1.1 – Consumed soil	RP 7.1.2 - Air pollution (NO2+ PM10)	RP 7.1.3 - Population in flood hazard zones	RP 7.1 – Environmental fragility

Table 1 - Key indicators and synthesis maps of the Regional Portrait

1.1.3 Sample of analysis

The maps are built upon the ESPON standards and report data referred to three samples of analysis.

1. For most of the calculations, the statistical domain includes all the municipalities of Northern Italy (Valle d'Aosta, Piemonte, Liguria, Lombardia, Emilia-Romagna, Veneto, Friuli-Venezia-Giulia, Trentino-Alto Adige) and two regions of central Italy which are in railway continuity with the Milano-Bologna axis (Toscana and Marche).
2. For the other calculations, the statistical domain was limited only to the municipalities located within the Urban Region analytical frame (rectangle 300 x 100 km) or only to the cities of Lombardia and Emilia-Romagna with data available.
3. The HSR Buffers of 15 km and 30 km are sub-analytical domains aimed explicitly at questioning the relationship between the phenomena observed through statistical data and the HSR line. The HSR Buffer of 30 km is always represented as a spatial-dimensional reference in all the maps which compose the Regional Portrait.

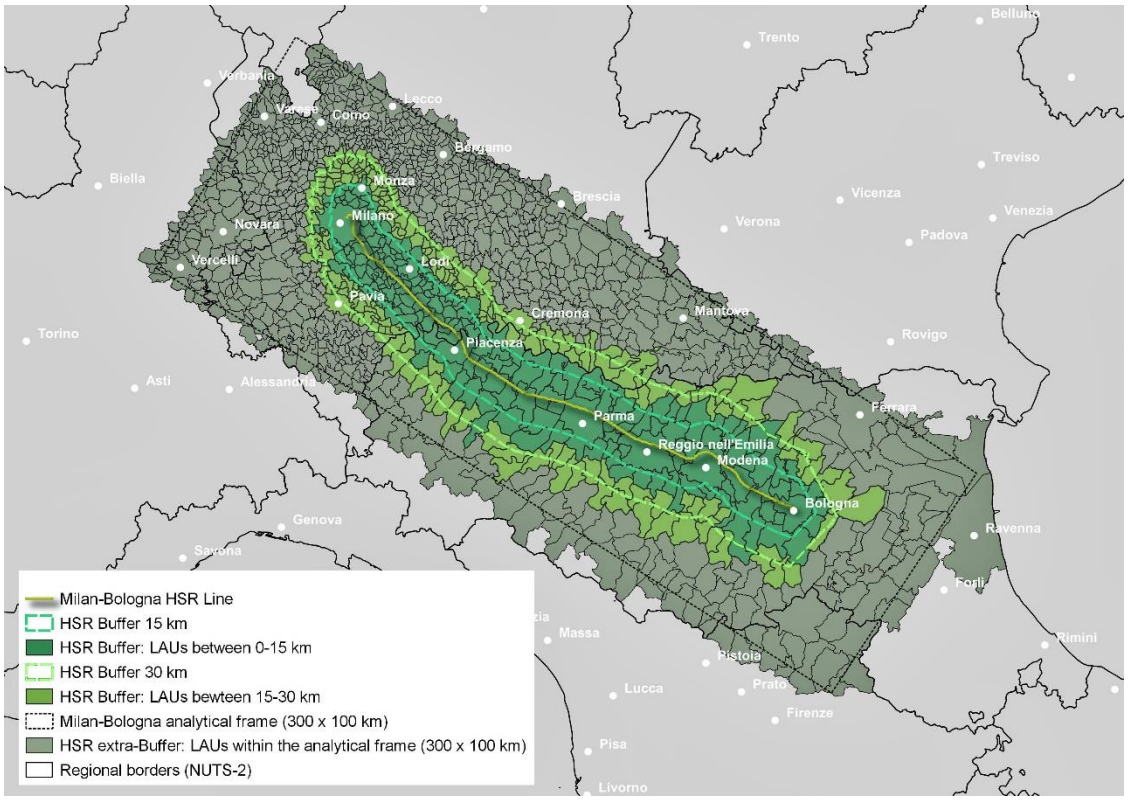


Figure 1 - Milano-Bologna analytical frame (300 x 100 km) and HSR buffers (15 km and 30 km)

1.1.4 Synthesis Maps

The Regional Portrait includes maps representing a single key indicator and synthesis maps representing the interaction between different variables.

The synthesis maps included in the Regional Portrait are constructed by creating textual sequences composed of 3 characters (only in one case they were limited to 2) with binary variability (dummy: +; -); each character of the string returns, for each of the selected fundamental indicators, the highest (+) or lowest (-) ranking concerning the median of the statistical domain. The threshold value is zero for flow indicators with a negative median (+ if greater than or equal to 0; - if less than 0). Instead, for the basic categorical indicators, a textual string without positive or negative polarity was opted for. Only for some numerical indicators expressed in absolute value was the threshold chosen according to non-statistical rationalities, therefore not using the median but a benchmark value.

Thus produced summary maps present, in most cases, a legend made up of eight classes built starting from the three related basic indicators. In the maps constructed with the statistical-quantitative method, the warm colours were assigned to the classes with at least 2 two positive values (+ + +; + + -; + - +; - + +); the cold colours were instead assigned to the classes at least 2 negative values (+ - -; - + -; - - +; - - -). The red colour has always been assigned to municipalities classified as “+ + +”, while the blue colour has always been assigned to municipalities classified as “- - -”.

1.1.5 Visual Platform

The IMAGINE Project implemented a Visual Platform (VP) to support the development of spatial imaginaries of the Milano-Bologna urban region. The general purpose of the VP is to increase the accessibility of the spatial analyses and elaborations developed in IMAGINE and support the debate regarding the exploration and selection of critical indicators for the targeted analysis.

A visual platform is a key tool in the development and sharing of new metropolitan-regional spatial imaginaries. Spatial imaginaries are essential because they are a special kind of social imaginaries: they are collective social constructions that enable communities to imagine themselves as such (Davoudi, 2018). In this perspective, spatial planning tools and visualization methods play a crucial role in the same processes

of the social construction of spatial imaginaries. According to Fedeli (2020, pg. 189) “from the point of view of spatial planning, spatial planning processes and arenas are those under which spatial imaginaries are still largely produced, both at the national or local level [..] the production of spatial imaginaries grounded on the traditional understanding of spatial planning and the legal and normative framework under which spatial planning works could hinder rather than enhance a post-metropolitan vision”. To challenge the hegemony of traditional spatial representations, IMAGINE introduced a visual platform as an additional tool that could support the debate over the regionalization of the Milano Bologna urban region.

The VP aims to offer spatial visualizations at the regional level, adopting methods capable of overcoming the traditional boundaries of spatial representations. For this purpose, the VP provides macro-regional visualizations of data aggregated at municipal and provincial scales, allowing to explore the impact of relevant socio-demographic phenomena a large amount of data available at different scales.

The VP is expected to expand the opportunities for interactions of various social and technical actors using a common and accessible analytical tool. In this manner, IMAGINE hopes to enable new hybrid spatial planning arenas where different kinds of spatial knowledge can find common ground to establish a dialogue.

In IMAGINE the platform is implemented together with the development of the Regional Portrait.

During the initial stage of the regional portrait, the VP enabled and made accessible early spatial visualisation of the key indicators (starting from the initial list presented in the inception report) and supported selecting key indicators and synthesis maps that compose the portrait itself. Once the regional portrait consolidated, the VP has been organized consistently with its structure and data models to offer visualization of both key single indicators and synthesis maps (compare Table 1 - Key indicators and synthesis maps of the Regional Portrait). The VP will be a pivotal instrument for further developing new imaginaries and scenarios of the development of the Milano-Bologna urban region, providing a common base of accessible spatial knowledge and supporting stakeholders and territorial actors in the debate. Finally, the VP will evolve throughout the final stages of the project and will remain as a repository of the elaborations and outputs of IMAGINE, accessible by stakeholders and by the public interested in exploring the primary urban and territorial dynamics of the Milano-Bologna urban region.

The VP is created and managed through the Esri ArcGIS Online platform. It is implemented using the ArcGIS Dashboard service to collect different typologies of geographical information. It can be explored through two different tools: the IMAGINE Dashboards (based on ArcGIS Dashboard) and the IMAGINE WebApp (implemented and edited using the ArcGIS webapp builder application).

Further details on the VP are available in a dedicated Annex to the Final Report of ESPON IMAGINE.

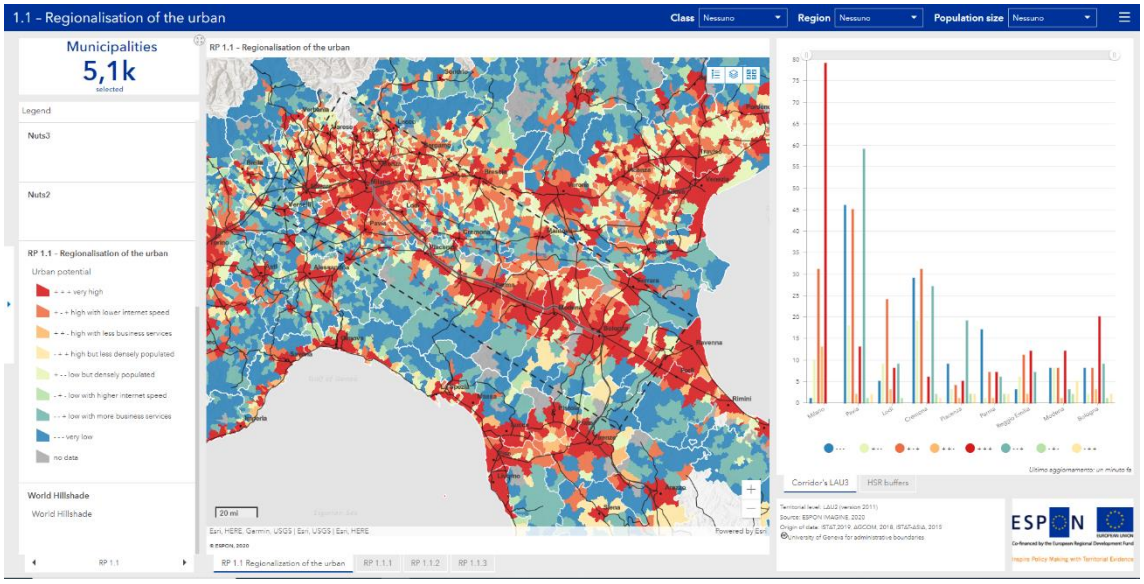


Figure 2 - Imagine dashboard screenshot

1.2 What makes the region? Exploring the material and immaterial elements that feed a regional dimension

Regions are social constructions, but what are the materials that construct them in practices? "How, by whom, and through what materials is it constructed in practice? (Metzger, 2013, pp. 1368–69; cited in Parker & Harloe, 2015, p. 365)" (Addie et al. 2019, pg.18). Under this section, the regional portrait first collects a description of the material and immaterial elements that, along the infrastructural corridor, allow a regional dimension on the life of its inhabitants (compare Figure 3 and Figure 4). Then, it presents a synthetic picture of processes of Regionalisation of the urban, exploring key socio-economic indicators (Map 1 - RP 1.1 Regionalization of the urban)

The urbanised area between Milano and Bologna is one of the wealthiest areas in contemporary Europe and Italy. According to some observers, it is the core of a "new industrial triangle", a crucial engine of the economic development of the entire country (Milano-Bologna-Padova). Indeed, it is one of the oldest and most infrastructured inter-metropolitan axes in Italy. This axis intercepts and divides the Po Valley, one of the wealthiest agricultural plains in the country transversely, and is crossed by the ancient roman *Postumia* road that connected *Genua* to *Aquileia*. On its edges, respectively, to the south-west and north, the Apennines and the Alps mountains delimit the urban area and determine the peculiar hydrography of the Po river's many tributaries that cross or lap many cities in Emilia Romagna and Lombardia. In this sense, the Po river is a peculiar natural element connecting and dividing cities and regions and the central feature of one of the most fertile plans in Europe. This exceptional interaction between a fertile plain, two mountain systems, and a densely urbanised and prosperous region has been recently described in terms of a Bioregion.

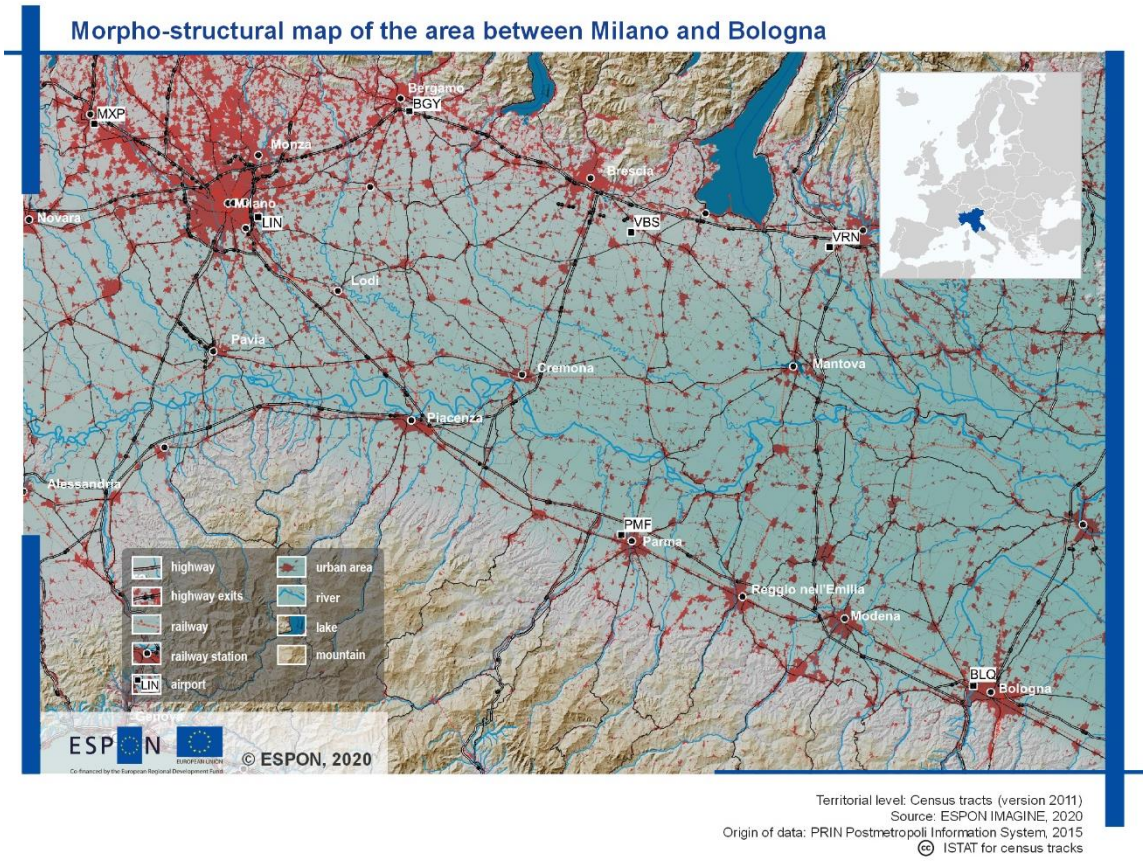


Figure 3 - Morphological, infrastructural, and urban structure of the area between Milano and Bologna (source: PRIN Postmetropoli Information System)

The regional urban structure, mainly lying on the plain, is characterized by the encounter between the historic Via Emilia's linear polycentric urban system from Rimini to Piacenza, and the Lombard historic radio-centric polycentrism (with the inclusion of Novara, in Piemonte region) having Milano at its centre. More recently, a wider conurbation developed around Milano urban area, including a regional space home to more than 8

million inhabitants, including the provinces of Bergamo, Brescia, Como, Varese, Pavia, and Lodi. This conurbation is characterised by a diversified and specialised industrial pattern in the northern section and a more intensive agricultural pattern in the southern one. This area is also part of a wider urban regionalisation process, described since the '60es as *megalopoli padana* (Turri, 2000) and more recently in terms of *città infinita* (Bonomi & Abruzzese, 2004), *postmetropoli* (Balducci, Fedeli & Curci, 2017) or *urbanoid galaxy* (Fregolent et al., 2017).

Overall, both the Via Emilia linear polycentric system and the Milano Urban Region form a polycentric network of medium and large cities. Both urban systems have a high degree of urbanization, while the intermediate and connecting area between Pavia, Piacenza, Lodi, and Cremona is characterized by more rural features (Eurostat, 2011). This area has, in fact, a very high share of Used Agricultural Land (SAU) and a consolidated specialisation in intensive agriculture and breeding, constituting what literature defines a proper 'operational landscape' (Brenner, 2014), with a high interconnection between the primary sector and the agri-food industrial system.

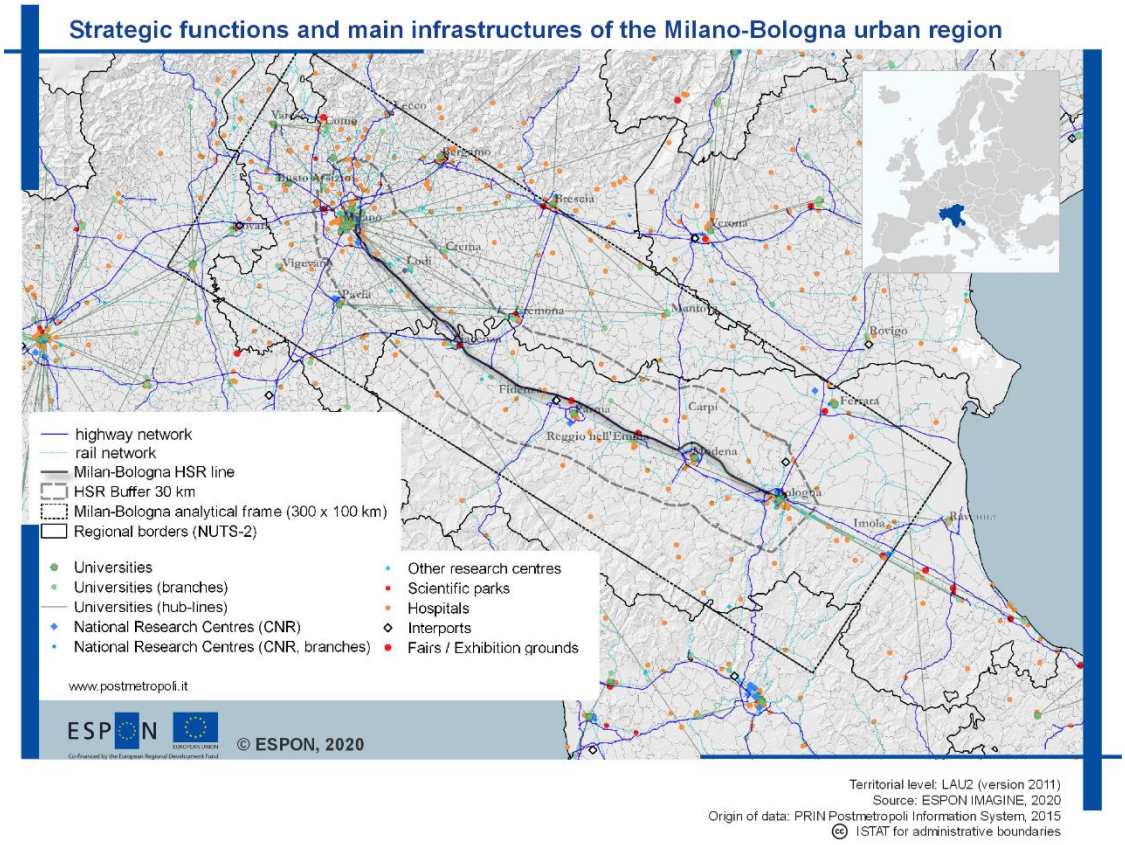


Figure 4 – Strategic functions and main infrastructures of the Milano-Bologna urban region (elaboration based on PRIN Postmetropoli Information System)

The area between Milano and Bologna is characterized by the presence of essential segments of the Italian motorway network (Autostrada del Sole, Autostrada del Brennero, Autostrada Torino-Brescia) both in terms of extension and flows, but also for its essential railway equipment. As a matter of fact, this is one of the most strategic infrastructural corridors in the country. While Milano is a real hub on the Torino-Venezia route, Bologna is the most important Italian transport hub for connecting different regional spaces, between North and South and between East and West. The high connectivity and accessibility of the corridor are complemented by the presence of some of the most important national airports, localised in the Milano urban region (Linate City Airport, fifth in Italy), Orio al Serio (Bergamo, third in Italy), and Malpensa (Varese, second in Italy) and by the presence of regional hubs like the Bologna airport (seventh in Italy for the number of travellers in 2019) and the airport of Parma (thirty-fifth in Italy).

This accessibility has also generated a crucial asset for the logistic industries: Parma, located between Milano and Bologna, hosts a vital freight yard, seventh in Italy for the number of established operators and

sixth for total area[1]. The Bologna freight village, located north of the city in the Municipality of Bentivoglio, is sixth in Italy for the number of established operators and third for the total area. The whole urban region of Milano is characterised by a series of logistic hubs that serve the area; more recently, both the province of Piacenza and Pavia have attracted new logistic operators.

The high level of infrastructures, as well as large flows of goods and people, have favoured in the second half of the XX century the establishment in this area of various exhibition centres with different specializations in Modena, Reggio Emilia, Parma, Piacenza, and Cremona, even though nowadays these are all challenged by the hegemony of the Fair System of Milano, which is the largest exhibition centre in Europe.

The Milano-Bologna region is also characterised by a solid and consolidated offer in the high education system and in the health sector. The oldest European and Italian university was created in Bologna in 1088, while Pavia has for centuries been the University city in Lombardia, substituted only in the XIX century by developing a large offer in Milano is now home to 12 universities, public and private. At the local level, the historical presence of the university in Parma has been complemented by the development of university or university seats in Modena-Reggio Emilia and Piacenza (here as branches of Milanese universities). Milano and Bologna collect about 17% of the students enrolled in Italian universities (Miur, a.y. 2017/2018), while Modena-Reggio Emilia, Parma, and Pavia individually amount to around 1.5%.

About 11% (6.9 million) of the Italian population (2019) lives in the 30 km buffer of the Milano-Bologna high-speed line corridor; 23% lives within the UR analytical frame (compare Figure 1 - Milano-Bologna analytical frame (300 x 100 km) and HSR buffers (15 km and 30 km)). But the most interesting data, also in relation to the HSR and its effects, is related to demographic trends and dynamics: 31% of the net positive demographic balance recorded between 2011 and 2019 concentrates in the HSR's 15 km buffer. From the point of view of firms' demography, around 10% of Italian firms and about 12% of employees are concentrated in the 15 km buffer from the High-Speed Railway (Istat, 2016). These percentages rise to 14% and 16%, respectively, if the 30 km buffer zone is taken as a reference. 28% of the Italian firms and 24% of employees are located within the UR analytical frame. Despite covering only 10% of the national surface, this urbanised area contains about 1/4 of the national population and activities. If we look only at the HSR 15 km buffer, even though it weighs only 2% in land area, it contains about 1/10 of the national population.

1.3 What makes the urban region: exploring the regionalization of the urban

Density, complexity, and diversity are key features of urban milieux. Nevertheless, many differences can be observed between single urban systems due to geographical, cultural, and social specificities. Besides human density and diversity, several theories of urban growth emphasize the importance of service industries, innovation capacity, connectivity, and productivity in defining what is urban. Moreover, according to Soja (2011), an urban region, is a dense, polycentric, interconnected urban formation, where strategic economic functions are widely distributed and the traditional urban features localization do not respect the traditional density gradients (higher in the core, lower in the peripheries).

This subchapter investigates the Milano-Bologna region intending to synthetically map its urban regionalization dynamics thanks to the overlapping of three indicators elaborated at the LAU level. In choosing these three indicators, in addition to considering their temporal updating, we have favored stock indicators capable of expressing the urban potential of each municipality regardless of administrative or functional centrality or land-use factors. It was also decided not to use data related to the foreign population as a proxy for urban diversity since, in recent decades, the foreign population has consistently grown even in rural areas. We found other data on the social mix to be either too dated or unable to express urban potential in a positive sense deterministically.

The Milano-Bologna urban area shows good continuity in terms of regional urban charge. When comparing this area with the Torino-Milano-Venezia macro-region, the latter offers a greater "thickness" (due to high rates of urbanization) but also more fragmentation due to the many intermediate municipalities with a high population density but lower levels of digital connection and presence of business services. Moreover, the synthesis map "Map 1 - RP 1.1 Regionalization of the urban" shows the enormous urban potential of the

[1] http://dati.mit.gov.it/catalog/dataset/interporti/resource/aa1ef83b-a3dc-4276-993e-afb395878d87

entire Via Emilia (and beyond, up to the Adriatic coast of the Marche region), which copes well with that of the Milano urban region where many intermediate municipalities between the capital cities have lower levels of digital connection. The overall image also shows how the Po river course, located between the two urban macro-regions Torino-Milano-Venezia and Milano-Bologna, marks an apparent break in urban continuity but shall also be read for its specific nature of an "operational landscape" (Brenner, 2014), as one of the most historical cultivated and anthropized plans in the country, essential to its urban dynamics. On the other hand, this agricultural and naturalistic territory works as a cultural and landscape resource for the entire macro-region. In this respect, it cannot be read as a simple void or rupture, instead, it should be considered a complex and integrated anthropized natural landscape.

A closer look at the indicators producing the synthetic map allows us to highlight how the density gradients are conforming to a regionalization pattern: in fact, if we analyse the overall density gradient (expressed as the ratio between density and distance from the central city) considering as outliers the largest cities of Milano and Bologna we can notice that density remains high along the corridor, among the highest all over EU (Eurostat, 2011). The same can be seen observing the density gradient for each city (between 200 and 400 inhabitants/km2). We can even monitor high levels (more than 500 inhabitants/km^2) between Parma and Modena – this latter characterized by the high densities of its urban belt. Furthermore, along the Via Emilia, it can be noticed a sort of asymmetry between the less densely populated southern Apennines' margin (less than 100 inhabitants/km^2) and the northern Pianura Padana which stretches with discrete densities to the edges of the Po river.

Map 1 - RP 1.1 Regionalization of the urban

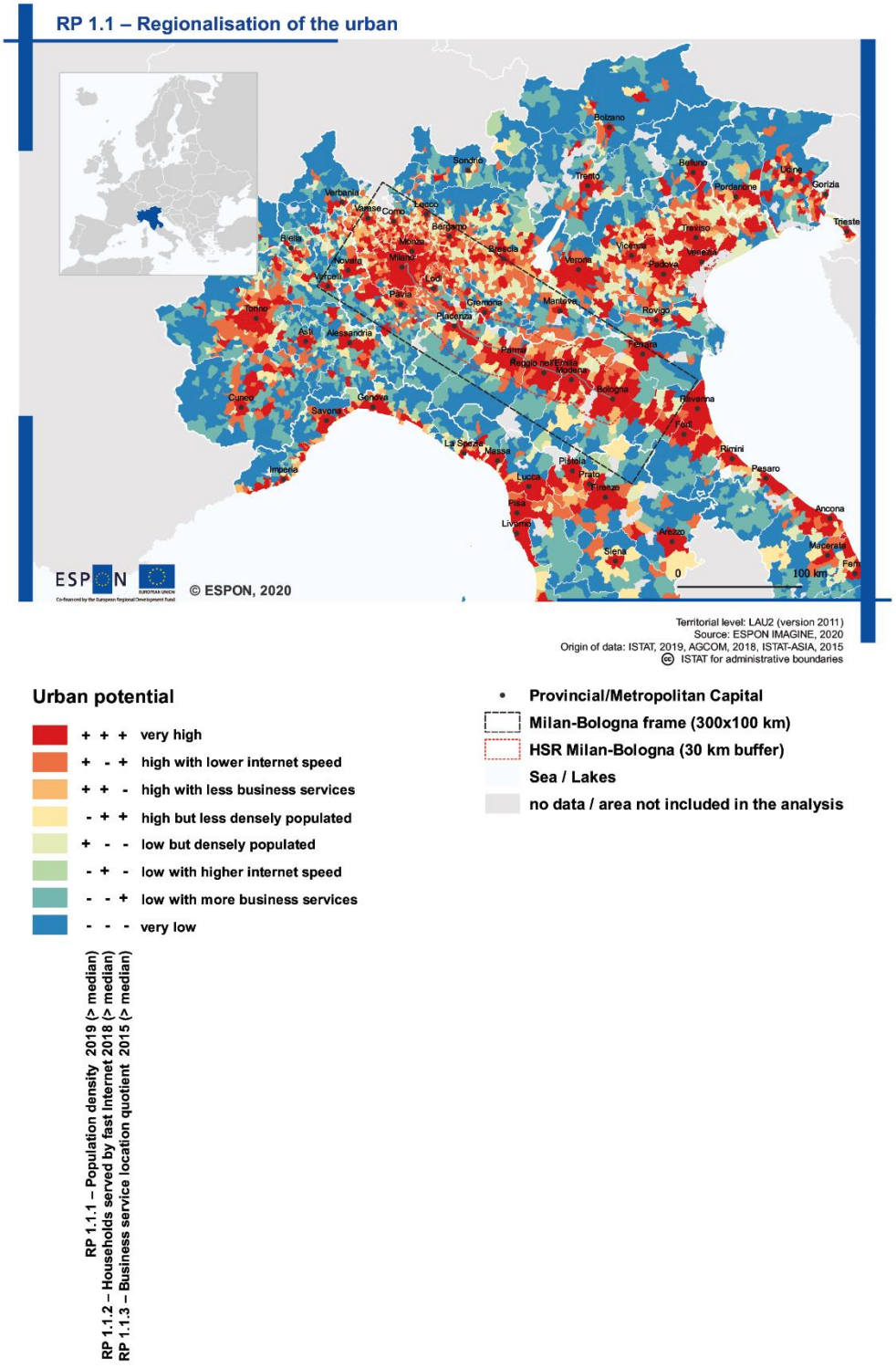
- **RP 1.1.1 – Population density**, as a traditional indicator of spatial concentration of people and activities that can also work as a proxy for other urban features.
- **RP 1.1.2 – Number of households served by high-speed Internet connection**, as an infrastructural indicator related to innovation capacity and connectivity requested to competitive urban spaces. This indicator maps theoretically expected max speeds connection faster than 500 Mbps, which is enough to support buffer-free video streaming and multiple device connection at once.
- **RP 1.1.3 – Business services location quotient**, as an economic indicator correlated to economic heterogeneity, dynamism, and productivity. Location quotient (LQ) has been calculated comparing the concentration level of business services in every municipality to that registered at the national level.

In the synthesis map "Map 1 - RP 1.1 Regionalization of the urban" based on these indicators, the warm tones represent the municipalities with at least two of the three indicators with values higher than the median (calculated in the LAU domain of the whole of Northern Italy with the addition of Tuscany and Marche regions). The deepest red is reserved for municipalities with values above the median for all three indicators ("+++").

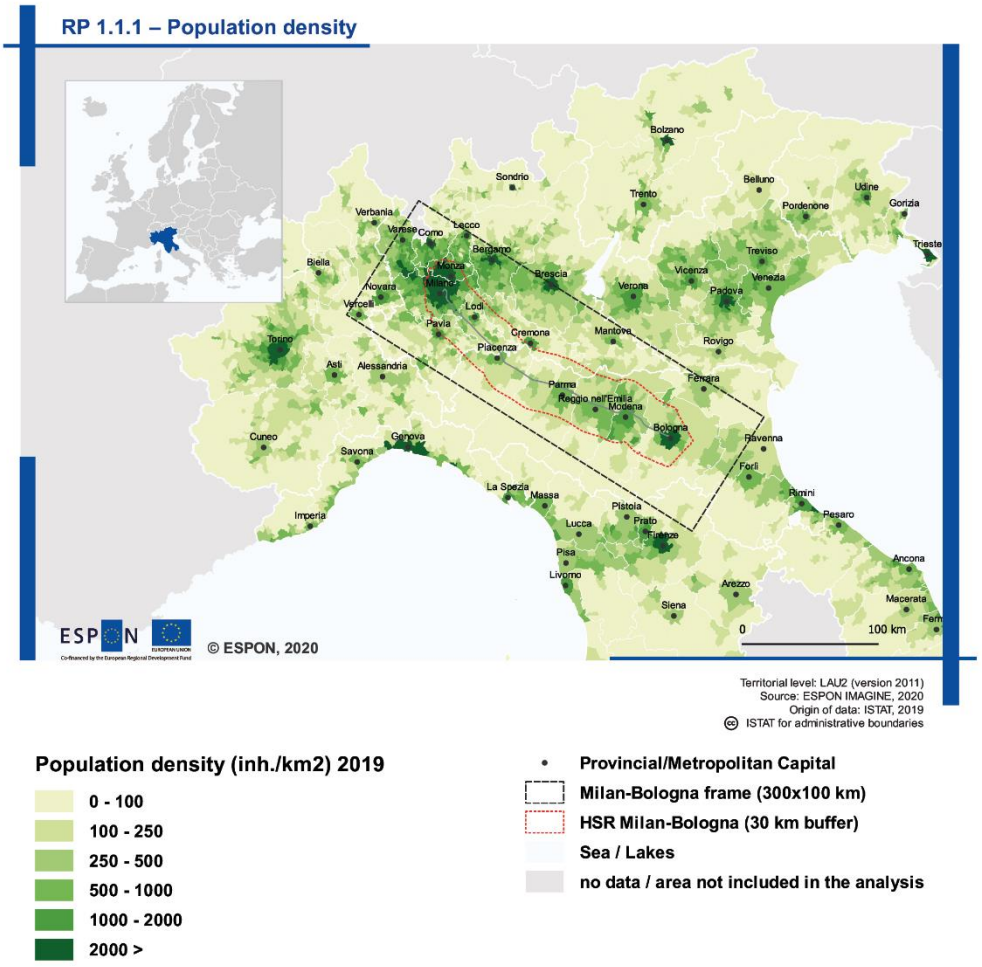
Regarding connectivity, the second indicator, the *number of households served by high-speed Internet connection*, somehow confirms the previous image: the Milano-Bologna axis appears one of the most equipped with fast internet connections. This axis appears better infrastructured than the Milano-Venezia urban region, whereas the provincial capitals, particularly Bergamo, stand out for significantly higher values than the in-between territories. Even the Milano urban region appears less cohesive and homogenous, while there is a good, albeit "subtle", continuity along the Milano-Torino corridor. As for the previous indicator, the entire Via Emilia is decidedly more cohesive than the Lombard agricultural territory south of Milano.

Finally, the regionalization pattern is only partially confirmed by the localization quotient of business services, which elaboration returns a more fragmented and complex image. However, it is possible to recognize a better distribution and a more explicit continuity between Milano and Bologna than between Milano and Venezia. In fact, along the Milano-Venezia corridor, the capital cities show a more decisive role than their surrounding areas. The Milano area shows a post-metropolitan behaviour where it is the central city that stands out and the intermediate territories. Along the Milano-Bologna corridor we can find a more balanced and regionalized pattern, with a better symmetry between the Apennines towns and the towns on the plain. It is also interesting to note that along the Po river, there are peaks in the belt towns of the provincial capitals (Alessandria, Piacenza, Cremona, Mantua) rather than in the centroids. This fact is probably an effect of the

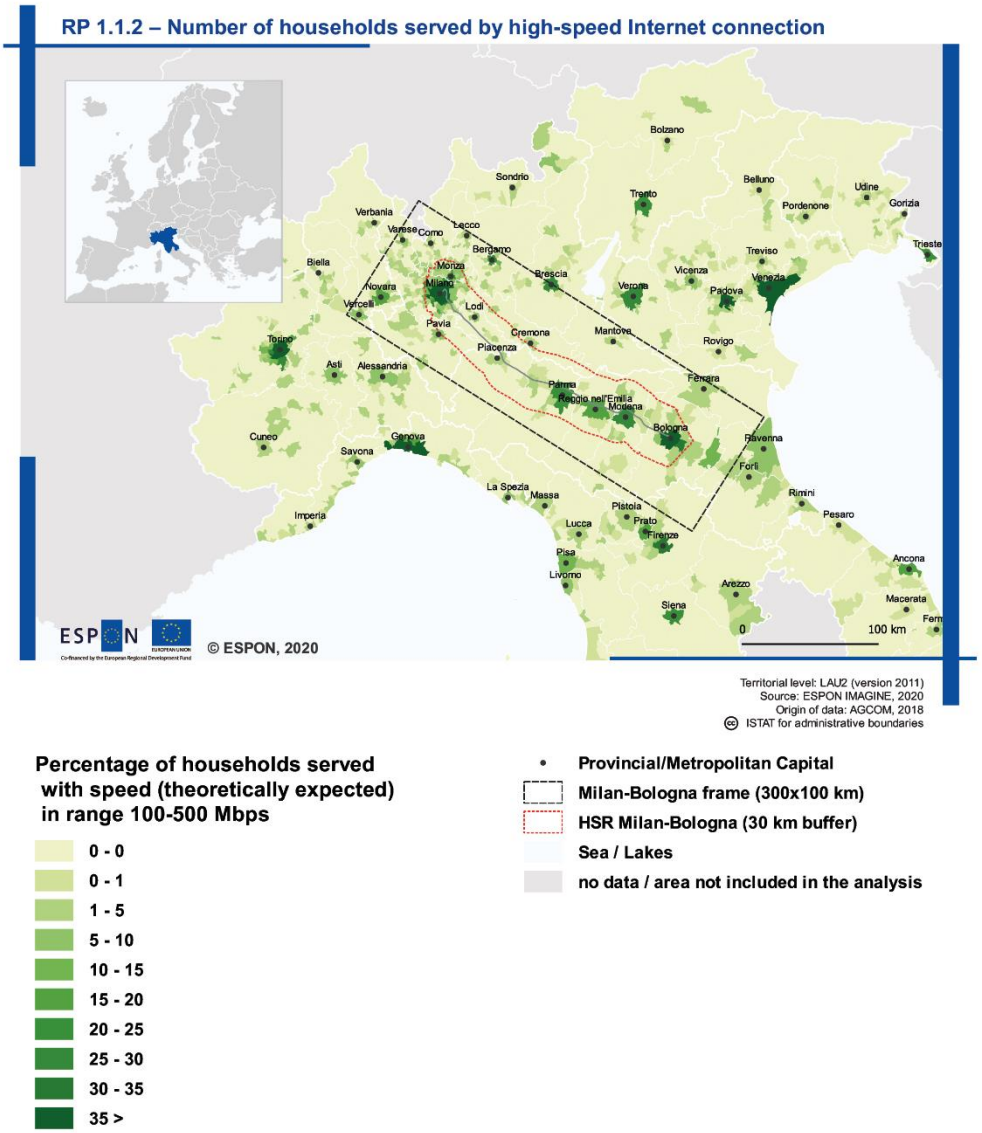
growing logistical appeal of these areas and their traditional agro-food vocation, which determines the localization of tertiary activities in highly productive rural areas.



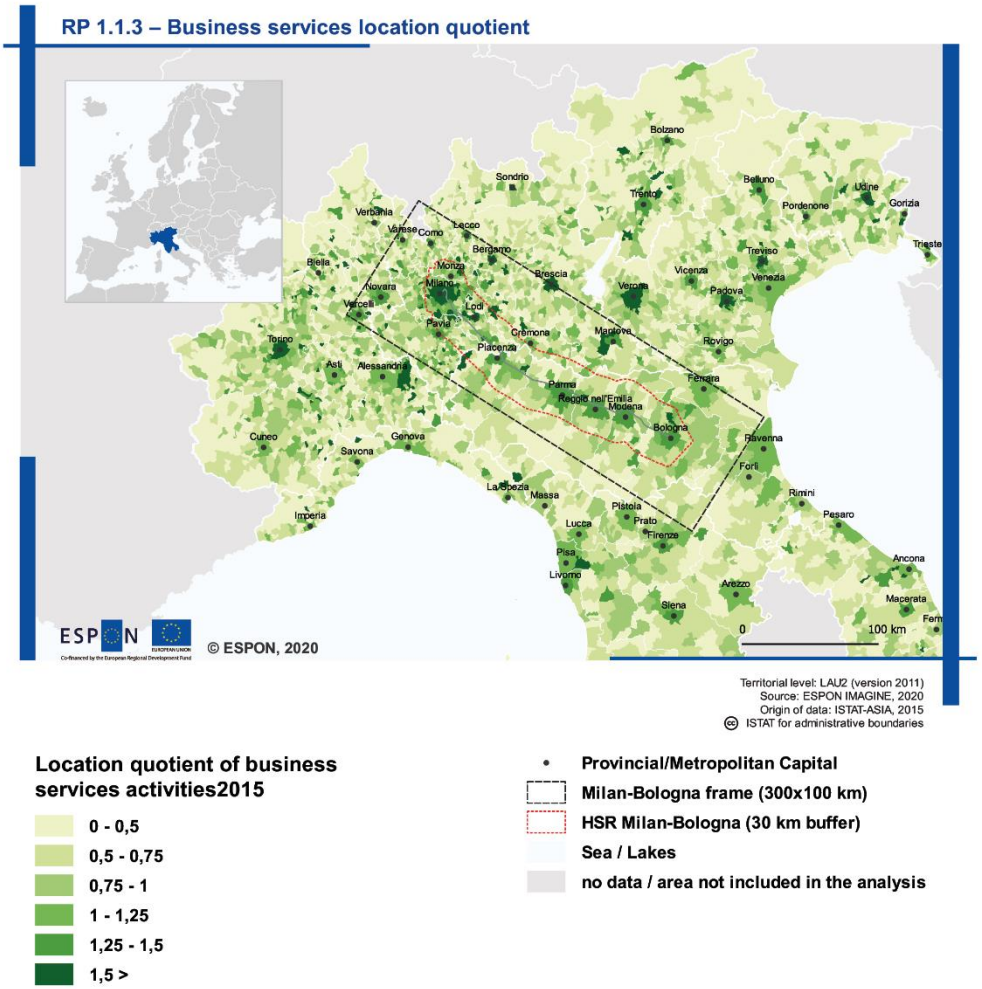
Map 1 - RP 1.1 Regionalization of the urban



Map 2 - RP 1.1.1 Population density



Map 3 - RP 1.1.2 Number of households served by high-speed Internet connection



Map 4 - RP 1.1.3 Business services location quotient

1.4 Living like an urban region: exploring the regionalisation of mobility

“In Simone’s (2015, p. 375) terms, infrastructural lives disclose the ways ‘People figure themselves out through figuring arrangements of materials, of designing what is available to them in formats and positions that enable them vantage points and ways of doing things” (Addie et al. 2019, pg. 20). Regions are social practices, behaviours, and lifestyles structured upon a regional scale, often based on infrastructures that allow the organisation of everyday life. Under this section, the Regional Portrait investigates people's mobility as an indicator and a proxy of an integrated functional urban space. This section presents a synthetic picture of processes of Regionalisation of mobility practices (RP2.1) and introduces a specific focus on the role of HSR in supporting regional mobility practices (RP 2.2 – Potential accessibility to railway services and RP 2.3 – Change in potential accessibility to railway services).

Regions are social practices; they are produced by behaviours and lifestyles that are structured upon a regional scale, often based on infrastructures that allow the organisation of everyday life. Networks, practices, discourses, relations, connections, can produce a region, going beyond boundaries, through history (Paasi, 2010): Allen et al. (1998, pg. 50) suggest that a region is ``the product of the networks, interactions, juxtapositions, and articulations of the myriad of connections through which all social phenomena are lived out'' (quoted in Paasi, 2010, pg. 2299). Of course, it is pretty complicated to map and analyse such factors. This chapter investigates people's mobility as an indicator and a proxy of an integrated functional urban space.

Mobility is a multidimensional phenomenon, made of origins, destinations, timing, travel purposes, modal choices, etc. To work in this dimension, we have analysed three characteristics: the level of mobility, the level of interconnectedness, and the level of non-private transport, which is typical of cities, also at the territorial scale and we have identified three clusters, which interpretation is not strictly “from best to worse”, as the three indicators have different meanings according to the context.

Map 5 - RP 2.1 Regionalisation of mobility

- **RP 2.1.1 – Ratio between generated trips and resident population:** The ratio between the generated trips for working reasons of a municipality and the total population. The indicator represents how **active** is the population of the municipality. Areas with high shares of elderly or high unemployment will have a low value, while areas with a high share of active and employed population will be high.
- **RP 2.1.2 – Share of generated trips directed outside the local commuting area (SLL):** The share of working trips going out of the SLL. The more a commuting area is self-contained, the lower will be the indicator. Interconnected job markets will have instead a high value as workers are not directed solely to internal attractors. Consequently, the indicator may represent how an area is **interconnected** or locked in terms of commuting.
- **RP 2.1.3 – Share of generated trips with public transport or non-motorized:** The share of **sustainable** mobility (public transport plus non-motorized). This indicator is expected to be the highest in cities where public transport is used and the lowest in extra urban areas where car dominates the mobility. Intermediate values might characterize remote areas, where walking trips are significant but public transport is scarce.

The indicators of every municipality are normalized using the median of the study area (Northern Italy

The first group (+++ / active-interconnected-sustainable) typically includes main cities and sometimes their surroundings. These places have higher mobility, and this mobility is not limited to the SLL they belong to but spread outside of it. They also have higher shares of public transport and active modes. They are somewhat similar to group ++-, where the only difference is that mobility and connectivity rely more on a car than in the previous group. Mountain and remote areas tend to belong to the groups of “inactive”. In this case a “+” for the second indicator should be interpreted more in the sense of dependence from other SLLs rather than from a positive belonging to a network of interconnected SLLs. A third group is that of the “active” but “locked” (+-+ and +--). These places generate many working trips, but these trips are mainly directed to their SLL and consequently to their main local attractors. They are the territories of work but with a typical local dimension.

The geography of Northern Italy resulting from the analysis is quite interesting and not completely obvious. The corridor Milano–Bologna is perfectly recognisable and somewhat different from other potentially similar corridors (the Milano-Venezia in primis). All the corridor cities belong to the +++ group, except Pavia and Lodi, which are “active” and “sustainable”, but with shallow values of interconnectivity. Some towns surrounding Emilian cities are “active” and “interconnected” like the main cities and have just a higher car use, which is not surprising in a sparse territory. Along the Milano-Venezia corridor, on the contrary, the cities (except Verona) have a lower number of generated working trips/population for the Emilian corridor. Moreover, the commuting areas of all main cities are “locked”, which means that they tend to work near hometown. Except for the Trentino Alto Adige area (which is entirely different in terms of orography and population), the via Emilia corridor is the only large and nearly continuous area made of +++ and ++- municipalities.

In conclusion, the analysed corridor is characterised by a ratio of working trips over mobility and interconnectedness of local commuting areas (SLL) well above the median. The extra-urban areas, typically characterised by high working trips ratio but of local scale, are here less present than in the rest of Northern Italy. This can confirm the hypothesis under which the Milano- Bologna corridor is the backbone of a regionalised mobility profile, less dependent on the main regional cities and based on a dense mobility relationship stretching beyond the local mobility systems.

To further test this hypothesis, we have elaborated a specific map dedicated to exploring the *Potential accessibility to railway services*. Rail transport can have a structural role for an urban corridor or region, especially when distances between cities are in the range of dozens of km and infrastructure is adequate. But, at the same time, the infrastructure alone is not sufficient to measure the effectiveness of the system and its attractiveness. For this reason, the corridor was analysed under the lens of potential accessibility to rail services. Map RP 2.2 Potential accessibility to railway services allows appreciating the two central regional systems: one around Milano (for fifty and more km) and the other between Parma and Bologna. Intermediate cities like Cremona, Mantova, Piacenza, etc., have lower accessibility as services are less frequent and less varied (for example from Cremona are relatively frequent just towards Milano). However, the map considers the long-distance services, which “explode” the scale of Milano and Bologna and keep slightly visible places such as Fidenza.

This dipolar structure, clearly focusing on the two capitals (both of regional and faster trains), is relatively young and possibly a result of the evolution of the historical corridor due to the introduction of the HRS opening (but not necessarily a unique consequence of it). In general, Milano and Parma-Bologna extended their leading role in accessibility, as a clear strategy, especially of the long-haul segment. More in particular, the accessibility of the second circle of towns around Milano is due to the extension of the S-lines system and the line Parma-Bologna, thanks to the capacity freed up of the traffic moved to the HRS line, has been strengthened. Instead, the in-between areas of Piacenza and Cremona saw their role further reduced, making them more marginal than twelve years ago.

As a final comment to this section, we could conclude that, on the one hand, the Milano Bologna corridor shows signs of regionalisation, due to a highly networked pattern of mobility, on the other that the HSR opening has worked as an accelerator of connectivity at national level but at the same time has limitedly improved the regional connectivity and produced a hierarchisation on specific cities, at the expenses of others, working like a pipeline rather than a backbone (at least in its initial phase).

Potential accessibility is a well-known place-based accessibility measure. It keeps together the cost (road distance, in this case) of reaching a range of places (the j stations of the network, in this case) from a place i, and the opportunities available at those places (the number of trains per day from the station, in this case) in a certain year y.

$$ACC_{i,y} = \sum_{j} trains_{j,y} \cdot e^{-\beta \cdot distance_{ij}}$$

This synthetic measure is able to increase the informative power of commonly used distance buffers from stations, with the "interest" of that station for a user represented by the number of daily trains. In addition, it allows to differentiate the role of the station, which is extremely relevant in this case, between secondary stations supplied only by regional trains and main stations served also by long-distance services. To do that we differentiate the types of trains r in the calculation to produce maps of accessibility to regional transport, to long-distance transport or to rail transport in general.

$$ACC_{i,y} = \sum_{j,r} trains_{j,r,y} \cdot e^{-\beta \cdot distance_{ij}}$$

A key parameter is □, which can be interpreted as a decay factor. A high beta, in fact, will quickly reduce (in terms of distance) the interest of a place. A small beta, instead, keeps a destination interesting even if it is far (typically because not substitutable by a near one). We chose □=0.0005 for regional trains, making them basically not-influent to the accessibility already at 5km (see **Error! Reference source not found.**). T o the contrary, long-distance trains are typically reached even from farther places, as they are not present everywhere; for this reason, we use a □=0.0001.

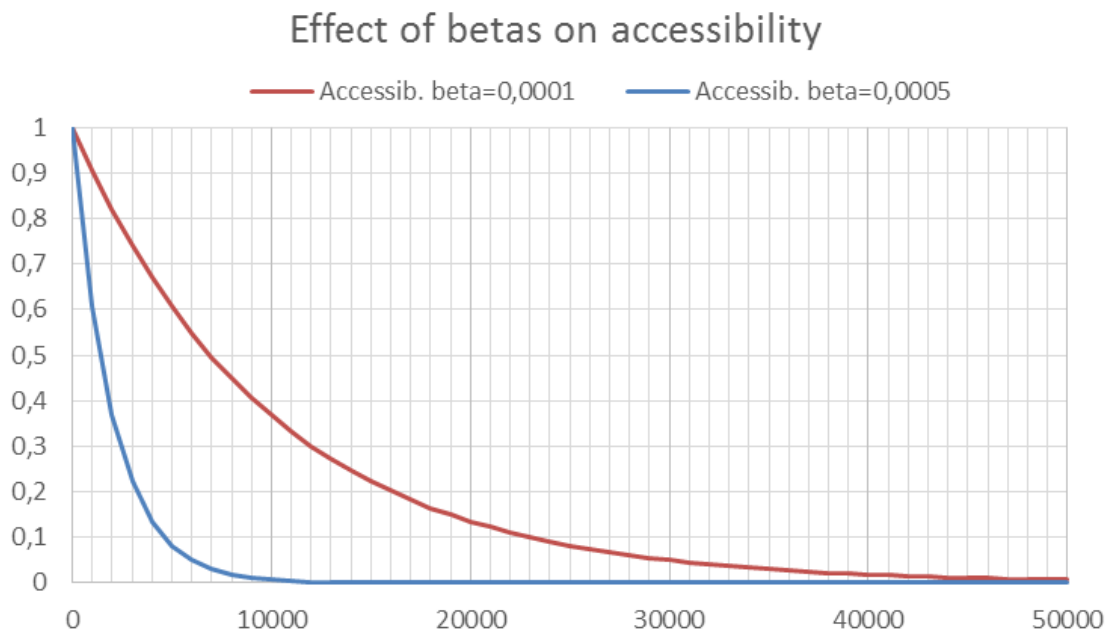
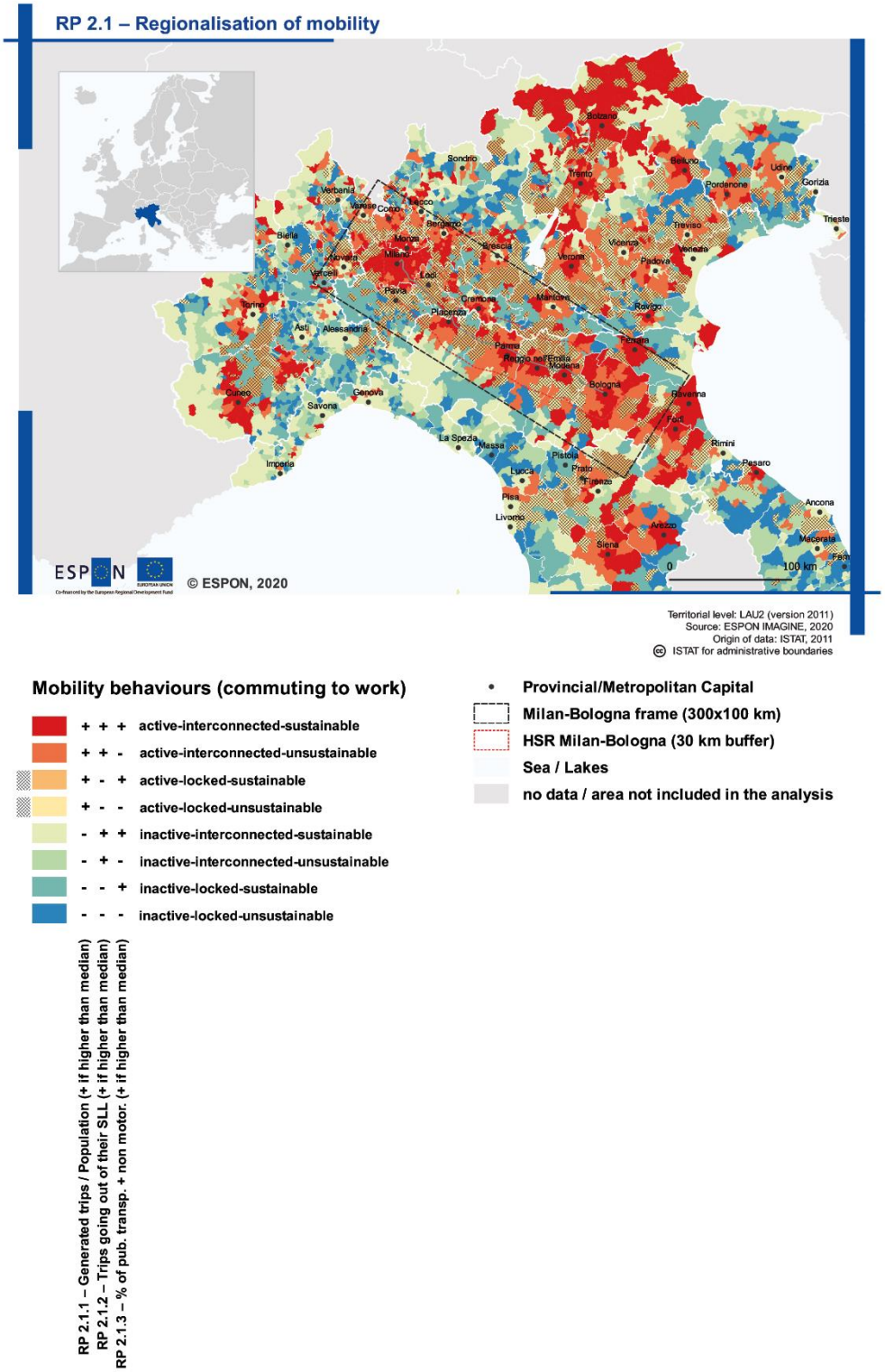


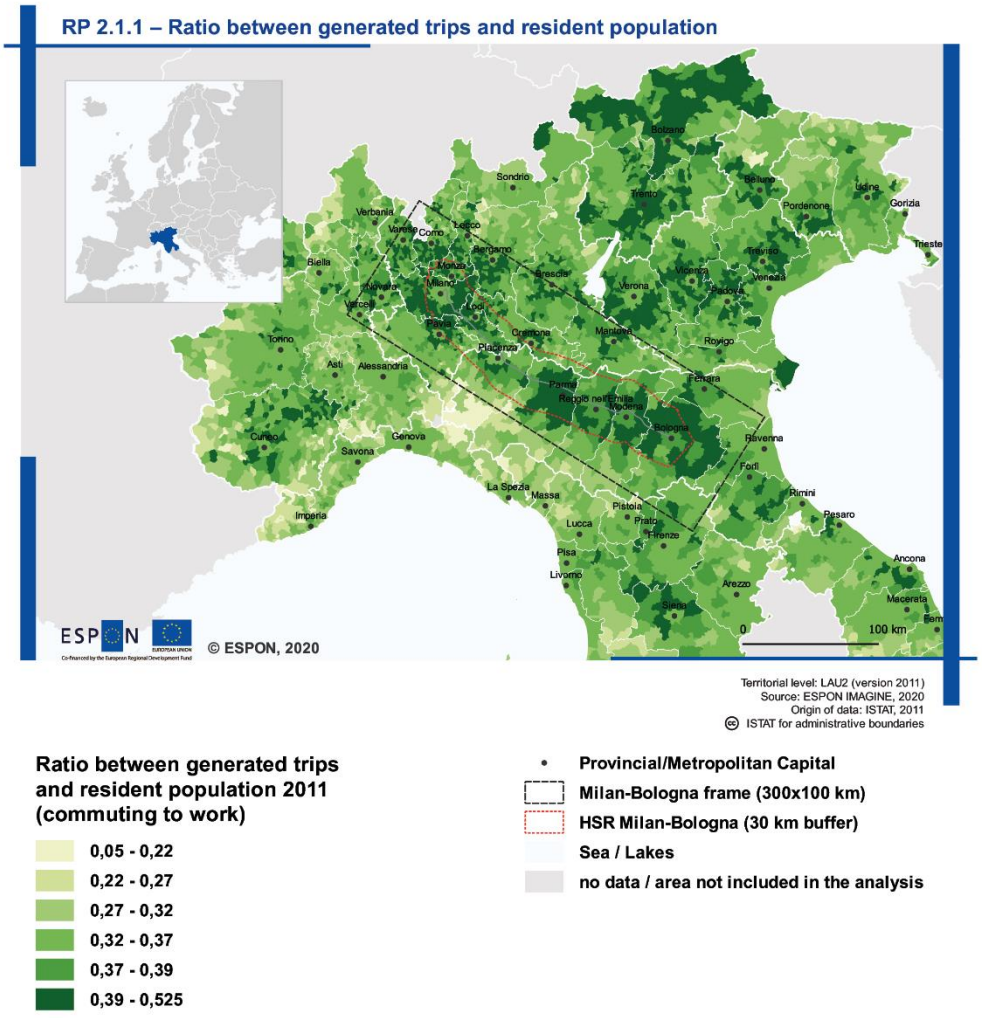
Figure 5. Effect of betas on accessibility (distance in metres)

The number obtained from the potential accessibility formulas does not have a physical meaning and a measure unit. For this reason, it is often presented and mapped as normalized (to the maximum or to the average). In this particular case we prefer to show the pure number (that ranges between less than 1 and about 640) because another map (Map 12 – RP 2.3 Change in potential accessibility to railway services) is drawn representing the difference between accessibility of 2020 (the timetable before COVID crisis) and 2008 (the last timetable before the opening of the entire high-speed line)

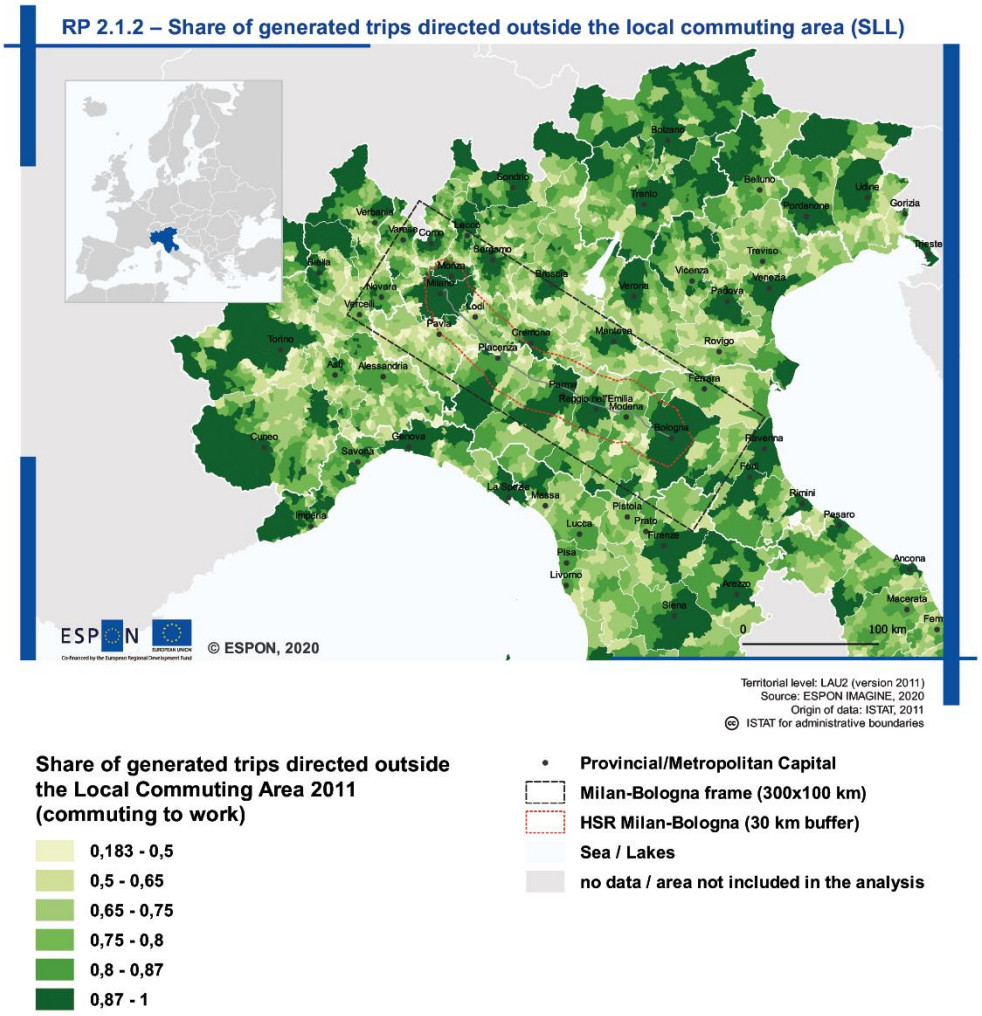
$$\Delta ACC_i = ACC_{i,2020} - ACC_{i,2008}$$



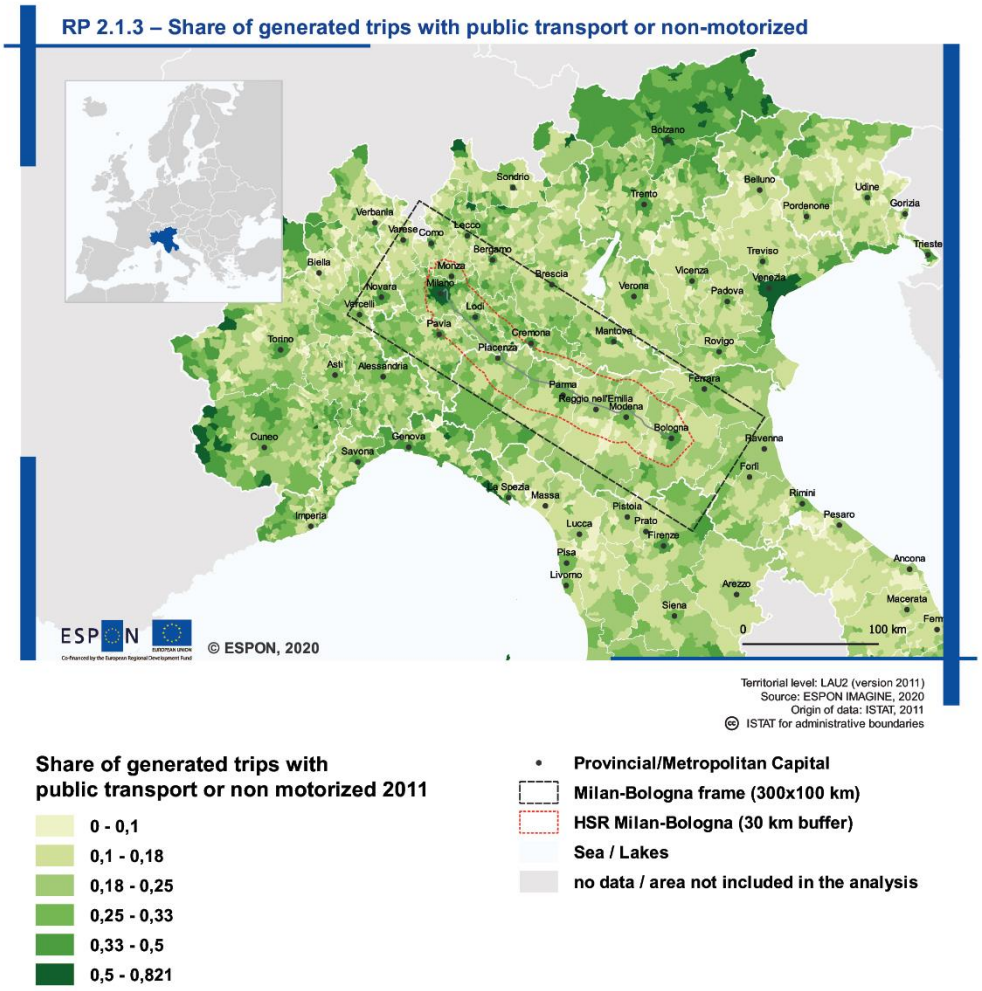
Map 5 - RP 2.1 Regionalisation of mobility



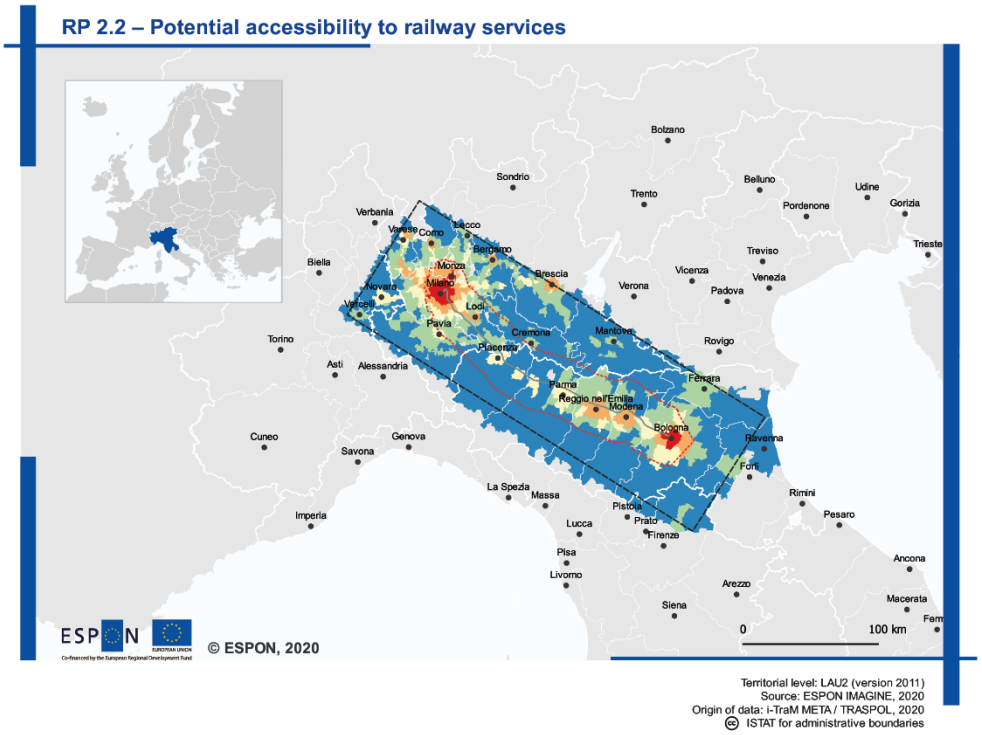
Map 6 - RP 2.1.1 Ratio between generated trips and resident population



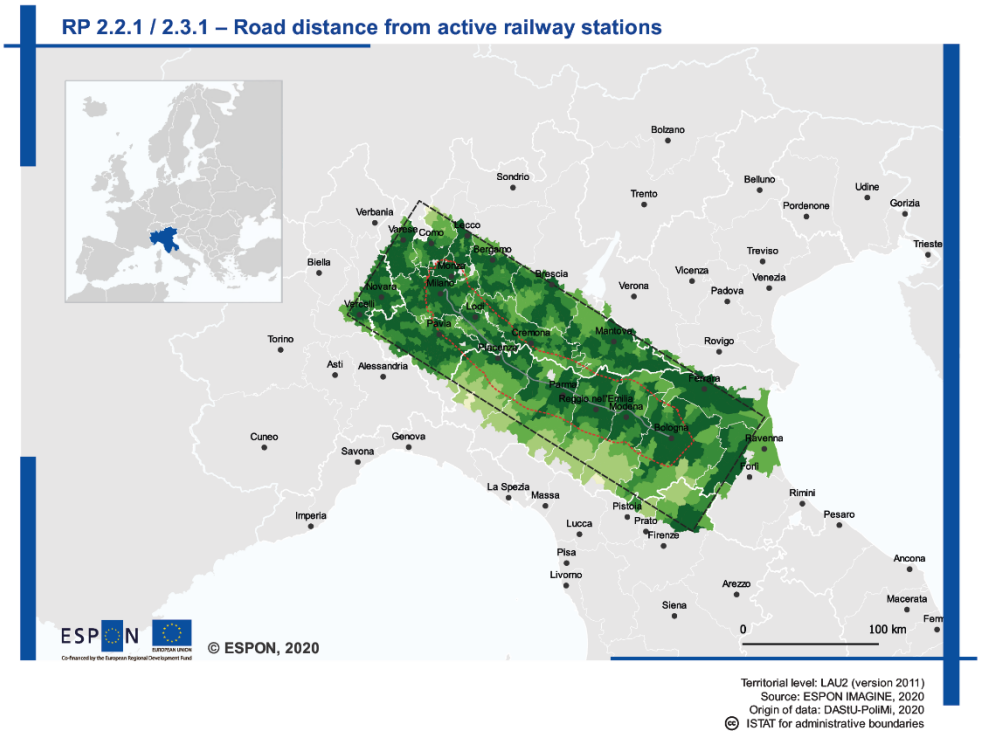
Map 7 – RP 2.1.2 Share of generated trips directed outside the local commuting area (SLL)



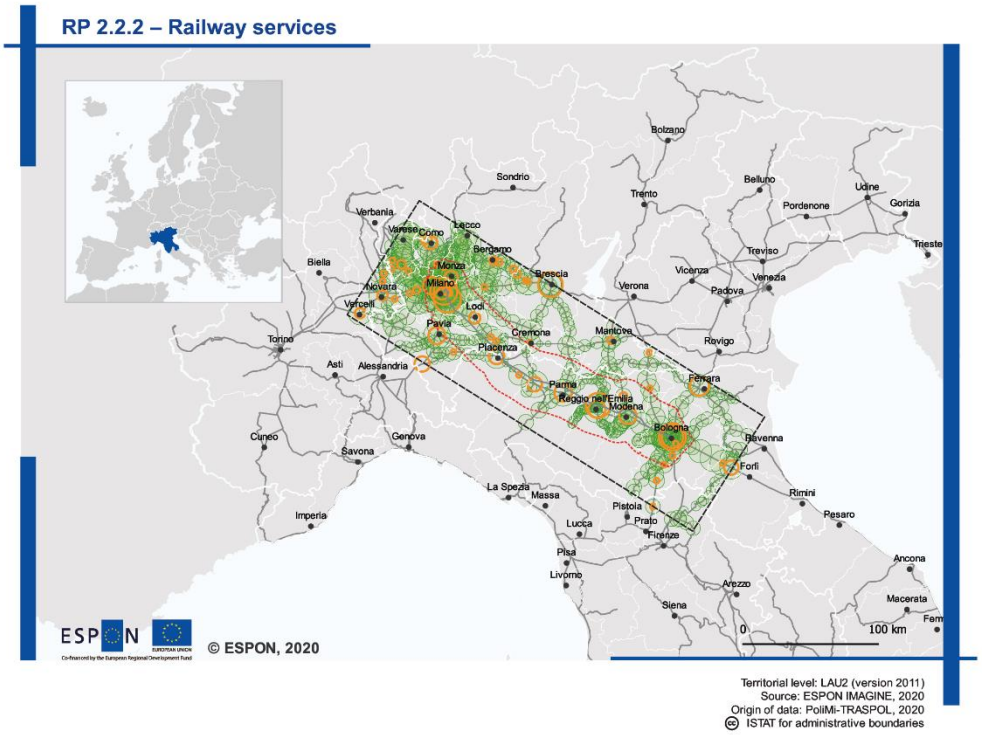
Map 8 - RP 2.1.3 Share of generated trips with public transport or non-motorized



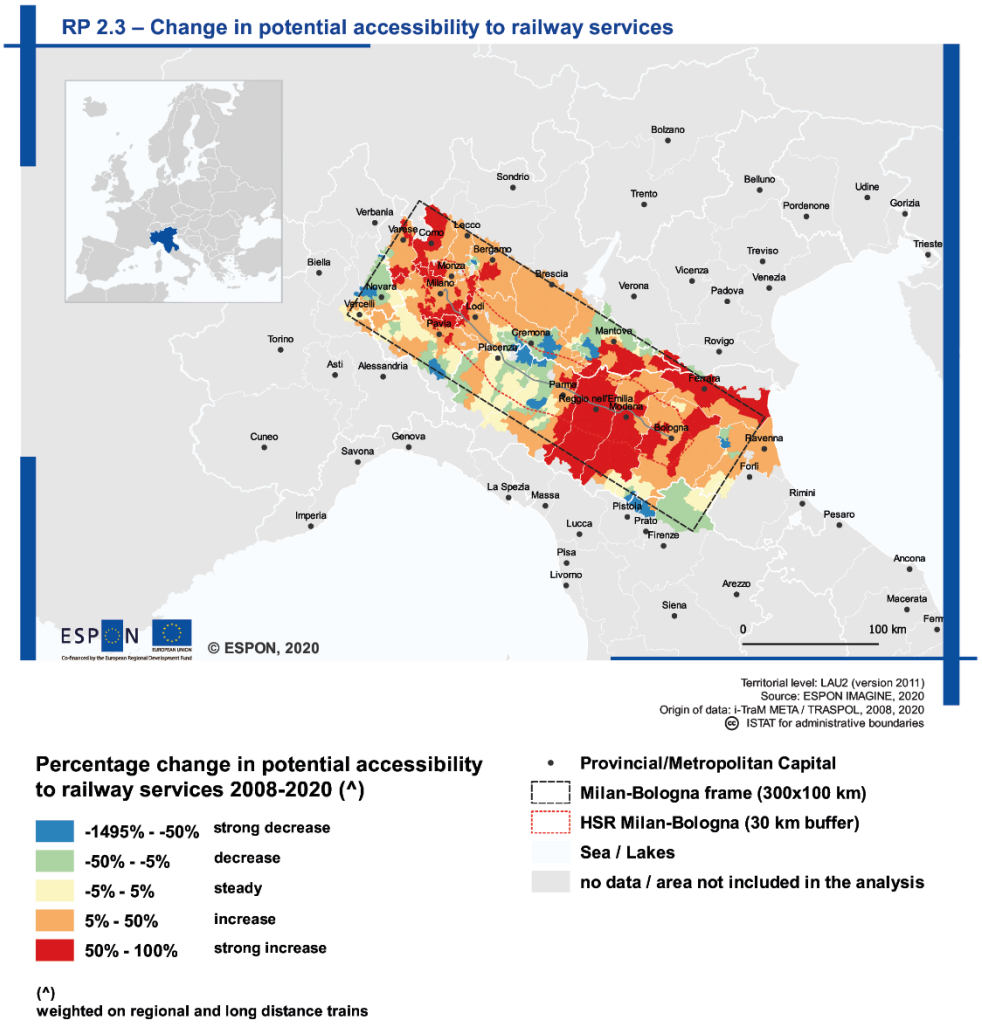
Map 9 - RP 2.2 Potential accessibility to railway services



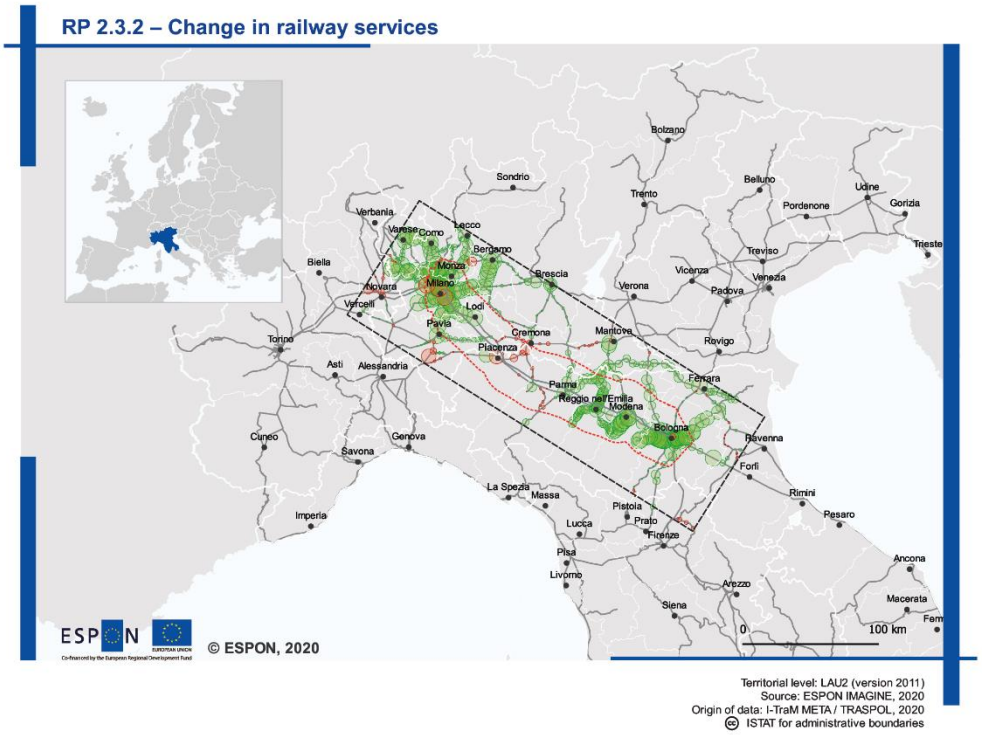
Map 10 - RP 2.2.1 / 2.3.1 – Road distance from active railway stations



Map 11 - RP 2.2.2 – Railway services



Map 12 – RP 2.3 Change in potential accessibility to railway services



Map 13 - RP 2.3.2 – Change in railway services

1.5 HRS corridor as a regionalisation machine: exploring the regionalisation of socio-spatial dynamics

Infrastructural corridors can be conceived as “operational landscapes” (Brenner, 2014), where infrastructures are vectors of dynamics of socio-economic transformation at the regional scale. A space that produces space because of its technological function and modifies societies. The regional portrait explores trends and dynamics over the last 20 years, exploring fundamental socio-economic dynamics and trends (RP 3.1 – Regionalisation dynamics, in Annex 1, and RP 3.2 – Regionalisation dynamics (change)).

This subchapter focuses on the socio-demographic transformation of the Milano-Bologna urban region, observing trends and dynamics that have been consolidating along the last decade, trying to understand, on the one hand, if there are continuity patterns referable to a macroregional scale, and, on the other hand, to what extent these have been influenced and conditioned by the establishment of the HSR corridor. This is done by simply analysing traditional socio-demographic indicators. Chapter 3 will also add to this direction, introducing some preliminary results of counterfactual analysis.

We first analyze the Map RP 3.1.1 – Personal average income. The Milano-Bologna region, especially within its buffer, is one of the country's richest areas: residents’ per-capita income is generally above 22,000 euro yearly. Within this general wealthy context, some cities stand out (per-capita income > 26,000 euro, in dark green), such as Milano, Lodi, Parma, Modena, and Bologna. If we look at Map RP 3.1.2 – Housing prices, we can identify the role of the two biggest cities, Milano and Bologna, where the real estate markets are more dynamic, and the prices exceed the 2,400 euro per square meter, with a peak in the Alpha global city of Milano. In the sub-urban LAUs around these two poles, residential buildings remain more expensive (1.600-2.400 euro/sqm) than those in the other municipalities within the corridor. The proximity and accessibility can explain this in relation to the metropolitan cities, which allow workers to commute towards the poles. Overall, it can be observed that the urban region between Milano and Bologna shows good continuity in terms of private wealth. Indeed, if we exclude some fringe areas in light blue, the remaining LAUs present at least one indicator above the median. Besides, the cities located along the Via Emilia are characterized by both relatively high per-capita income and relatively high average prices of residential buildings.

Moving from these general data, specific attention has been devoted to change in the above-mentioned indicators.

In a context of general growth of the population in almost the entire area around the buffer (30km), we observed a significant demographic change in the city of Milano and (to a lesser extent) its southern metropolitan municipalities, with a trend that extends to include the provinces of Lodi and Pavia. On the other side, slower demographic growth is shown by the cities that form the heart of the Emilian urban system, which appears stronger in Parma, average in the cities of Bologna and Reggio, and weaker in Modena, where it is however balanced by the growth of the population in the peri-urban area. Finally, a place of demographic degrowth can be detected in the provinces of Piacenza and Cremona, where, except for the provincial capitals, it is possible to observe decreasing population in the municipalities along the river Po.

Map 17 - RP 3.2 Regionalization dynamics (change)

Three key indicators at the municipal level are considered and analysed in their correlation, in order to obtain a synthetic map of the main socio-demographic trends of the macro region

- **3.2.1 - Population change** concerns the percentage change of the population between 2011 and 2019.
- **3.2.2 Change in house prices:** it explores the percentage change in real estate values in the period between 2012 and 2019
- **3.2.3 Percentage of change in personal average income** between 2012 and 2018

All in all, we can notice a polarization trend, even more evident when we refer to change in house prices, where it appears clear that the whole region has suffered from a generalized decrease in values but with consistent territorial differences. The city of Milano and the southern area of the metropolitan city, with relevant growth in real estate values, are the main exception to the generalized decline, together with the peri-

urban area of Modena. A relevant decrease characterizes the municipality of Piacenza, Parma and the surrounding municipalities, and the cities in the north/west area of Bologna's metropolitan area. A symmetric path is visible concerning the corridor axis. On both sides of the 30km buffer is noticeable a general decrease in the part between Piacenza and Bologna, which is more robust in the side oriented towards the Apennines.

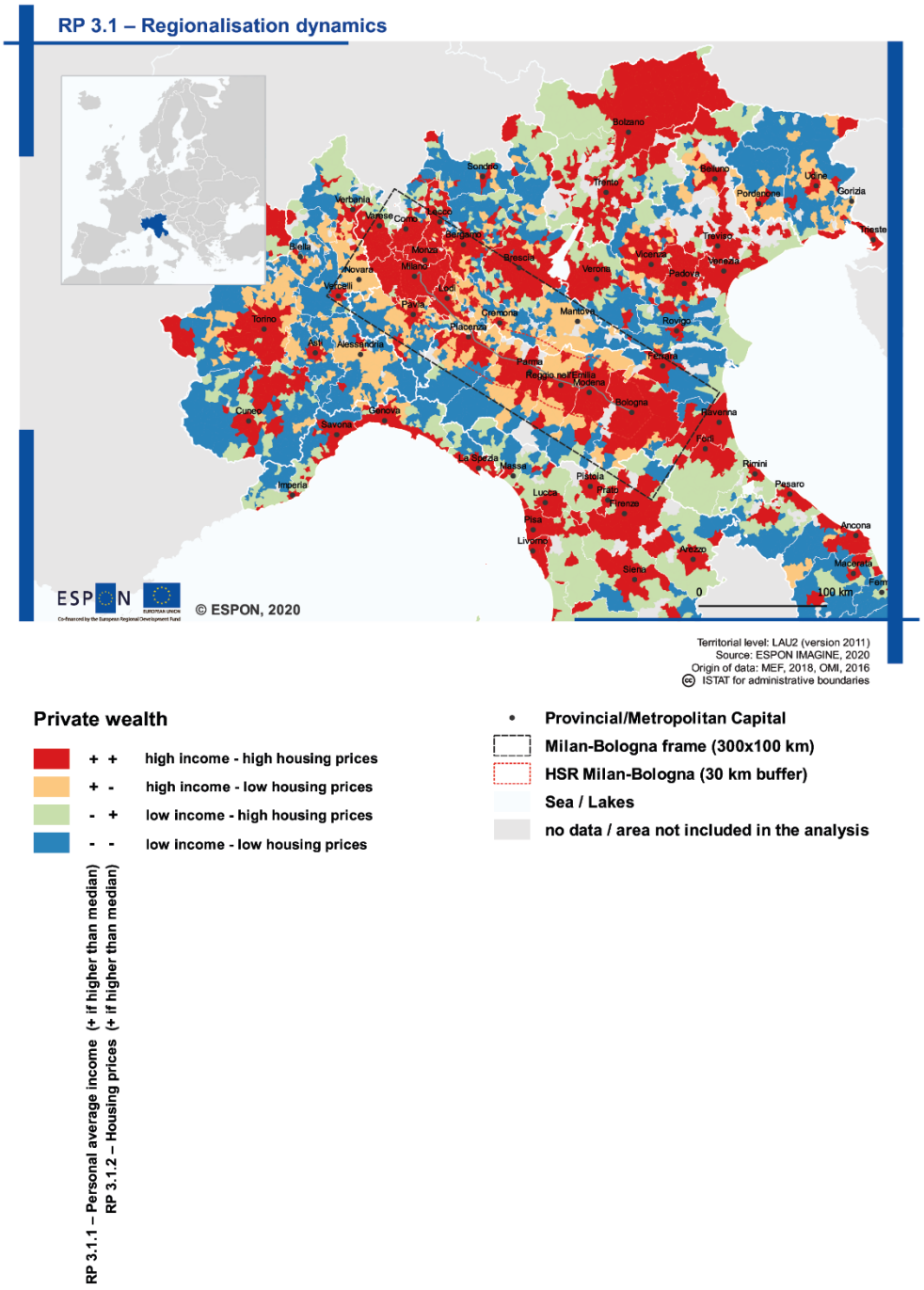
Analysing the percentage change in personal average income, the buffer and the entire macro-region, as well as northern Italy itself, are characterized by a generalized growth, with a consistency and continuity along the HSR corridor axis that is not possible to detect in any of the other macro-regions observable in the map (i.e., along the axis Torino-Milano or Milano-Venezia). Nonetheless, it is also possible to observe some differentiations, which are also worth interpreting while considering the data related to the distribution and concentration of wealth on the territory. Income growth is distributed evenly around the axis but not along with it. Indeed, the Milano metropolitan area is characterized by a weak growth that increases starting from the province of Piacenza and along the whole via Emilia. The provincial capitals often behave in contrast with the relative province, as in the case of Milano, where average incomes have been growing to a greater extent than in the peri-urban municipalities. Parma and Piacenza are the axis cities with the lowest growth rates (and with a behaviour like the cities of Lodi, Cremona, and Pavia).

Reading these trends in an aggregated form, we can observe how the sociodemographic dynamics seem to follow different behaviours along the Milano-Bologna axis, where three main poles clearly emerge.

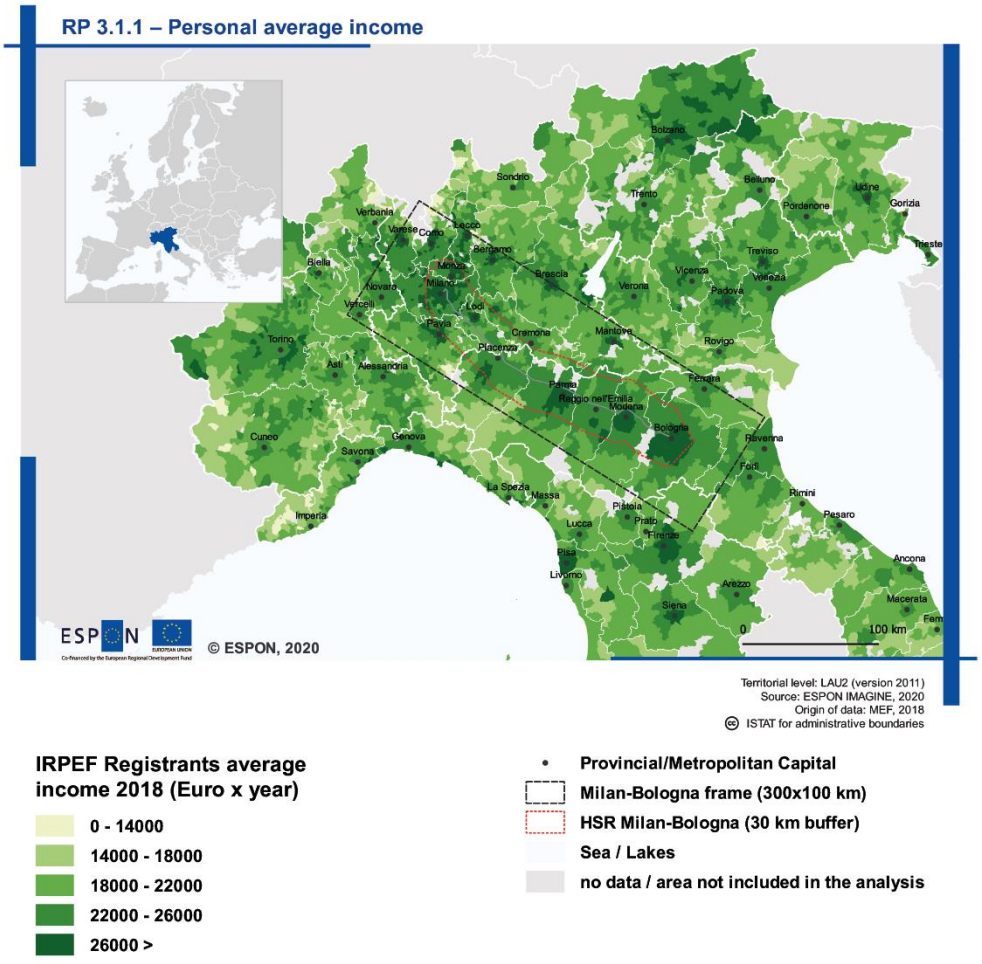
- The first is the Milano pole, the only one clearly characterized by a strong growth of all indicators in the city and a capacity to influence the metropolitan area and beyond, particularly in the area south of the city, up to the provinces of the city of Lodi and Pavia.
- The second is the territorial system organized around the cities of the Via Emilia, which, although behaving differently depending on the indicator, reveals a certain concordance of growing indicators regarding income and population, but not the real estate market. It should be noted here that the peripheral areas have shown faster growth than the provincial capitals. In particular, the dynamism of the peri-urban area of Modena, characterized by strong growth, is observed. These can be considered wealthy territories but still with an accessible cost of living, and in this sense as spaces with significant potential growth and potentially new relocation dynamics.
- The third element is the area that develops around the river Po and includes the provinces of Piacenza and Cremona (and in part also the area north/west of Parma), characterized by a generalized decrease in real estate values and population where only in some cases, relative income growth can be observed.

If, on the one hand, there is no linear continuity along the HSR corridor, on the other hand, the socio-demographic trends appear continuous and consistent around the axis itself, with an important symmetry of intensity on both sides. Without willing to generalize and anticipate conclusions concerning the spatial coherence of the socio-demographic transformations observed, it is, however, worth emphasizing that in the Milano-Bologna urban region these same phenomena can be visualized with a more continuity than in the other "macroregions" of northern Italy (Milano-Torino and Milano-Venezia), which appear much more fragmented and discontinuous.

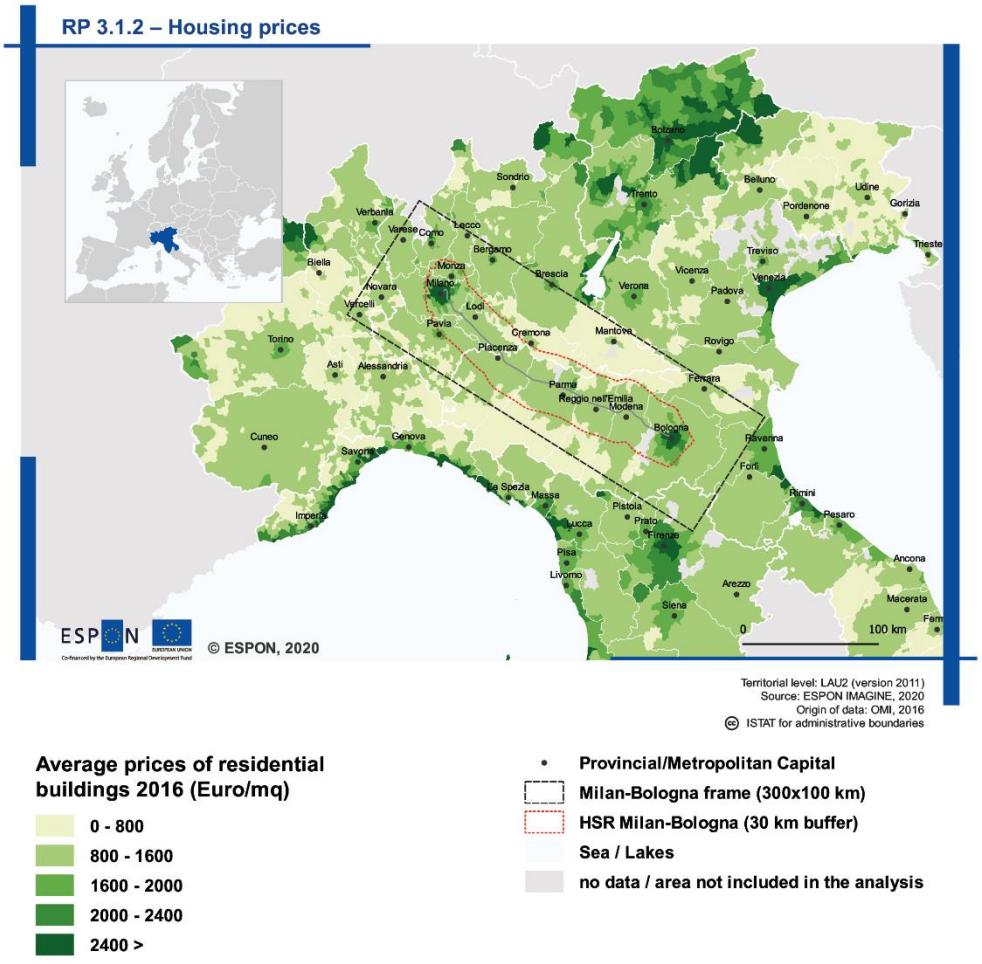
In this respect, an important conclusion is related to the fact a certain homogeneity of socio-demographic trends apparently characterises the Milano Bologna area. Still, more in-depth research unveils patterns of socio-economic differentiation that can contrast with its territorial cohesion. Certain territories, in fact, have been benefitting more than others from the reinforcement of the infrastructural corridor. Others have been suffering from further peripheralization. Finally, we can notice an intermediate space that is characterised by the availability of wealth at the individual level, with reduced living costs. We can expect that these areas can play a central role in the future growth of the area and show potential frictions between request and offer of quality of living conditions and integration in the urban region.



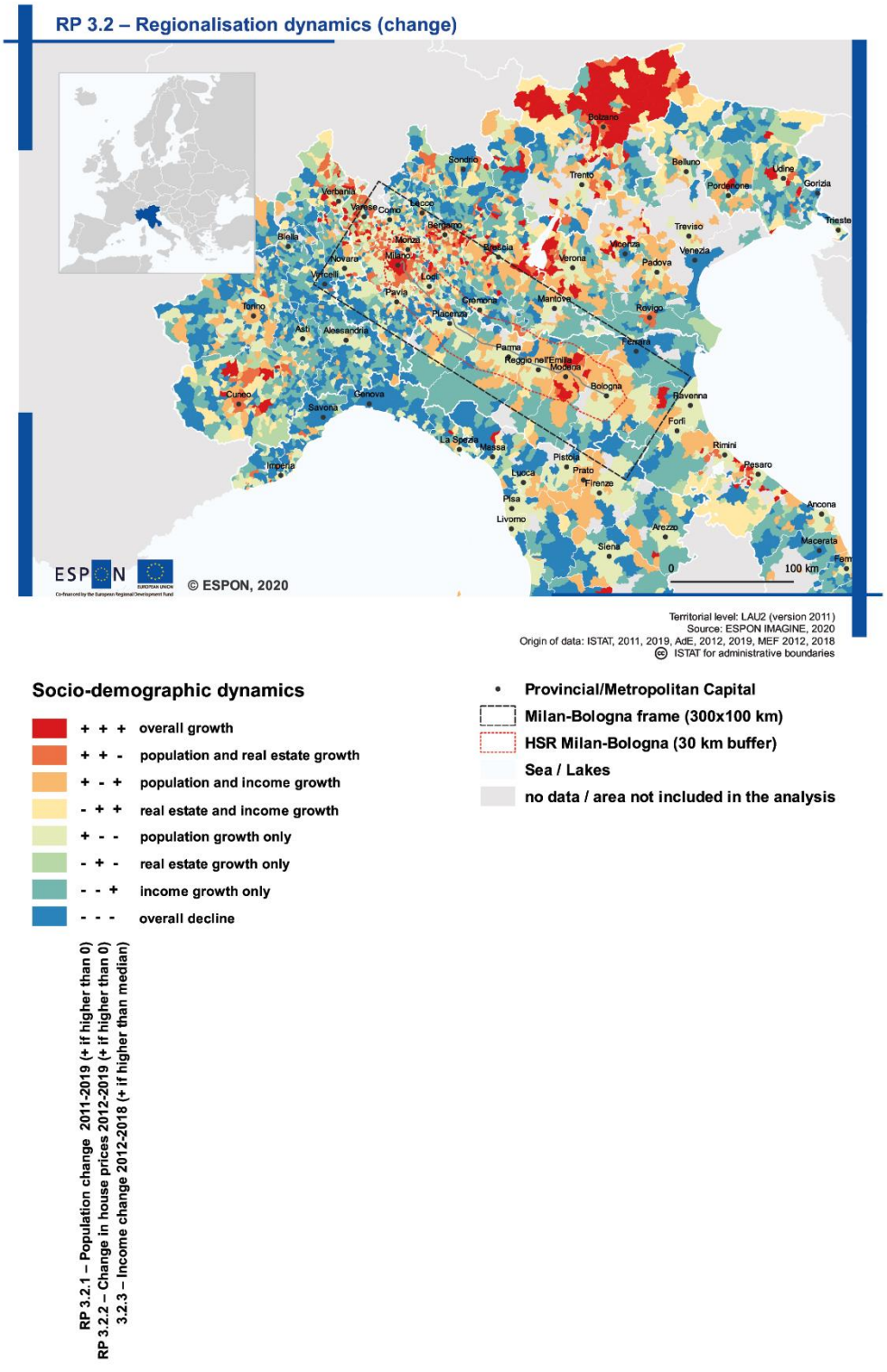
Map 14 - RP 3.1 – Regionalization dynamics



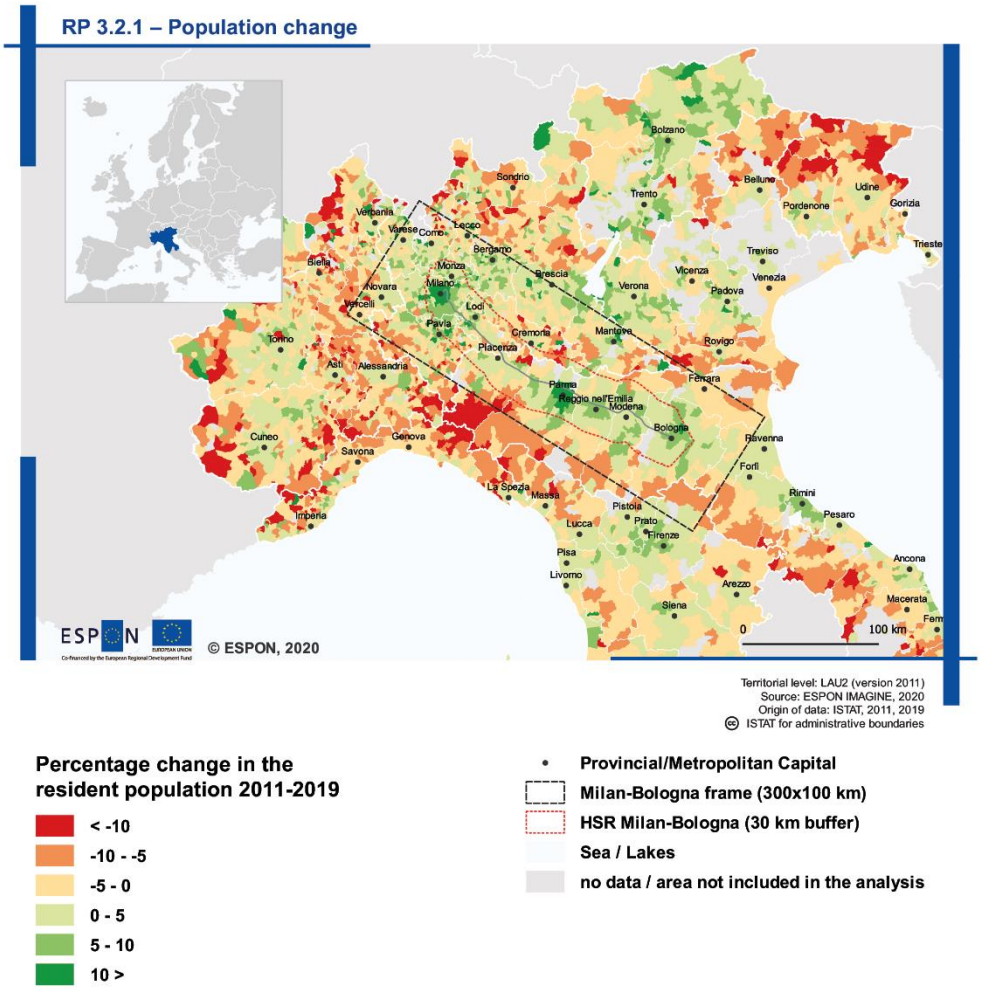
Map 15 - RP 3.1.1 – Personal average income



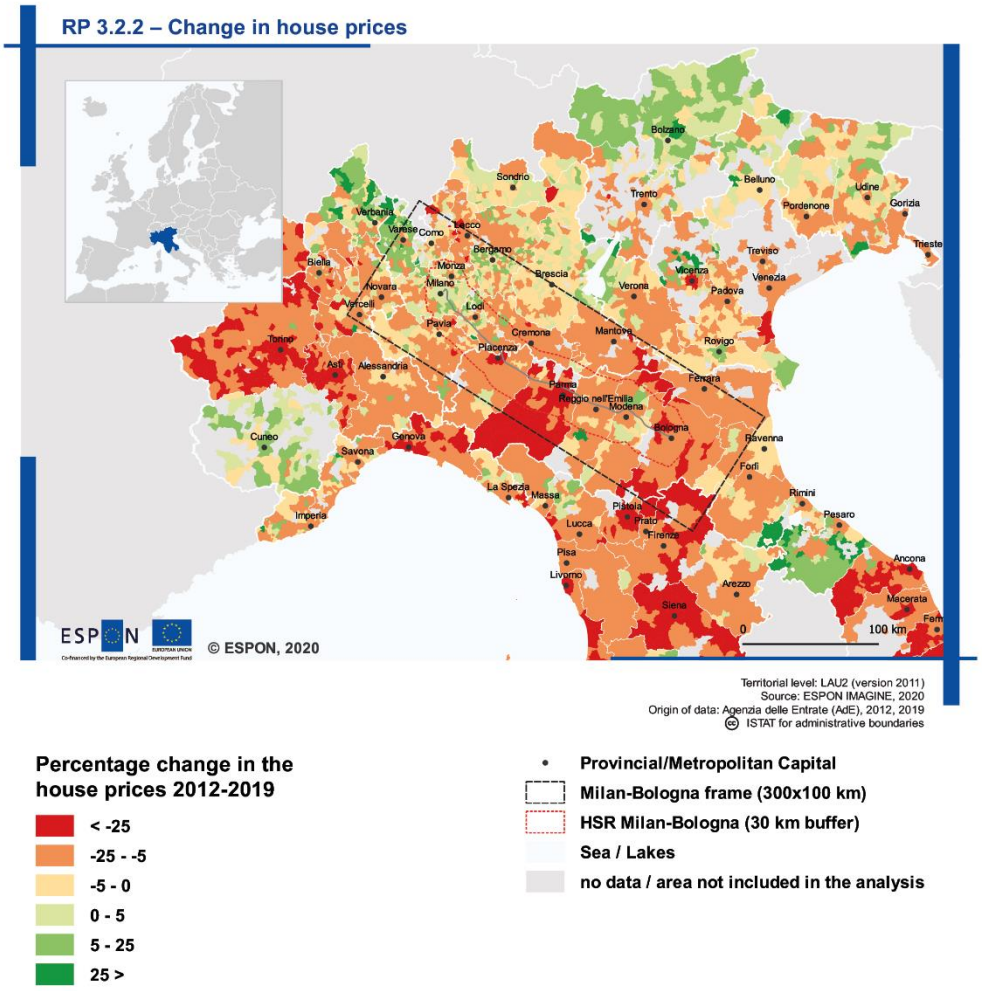
Map 16 - RP 3.1.2 – Housing prices



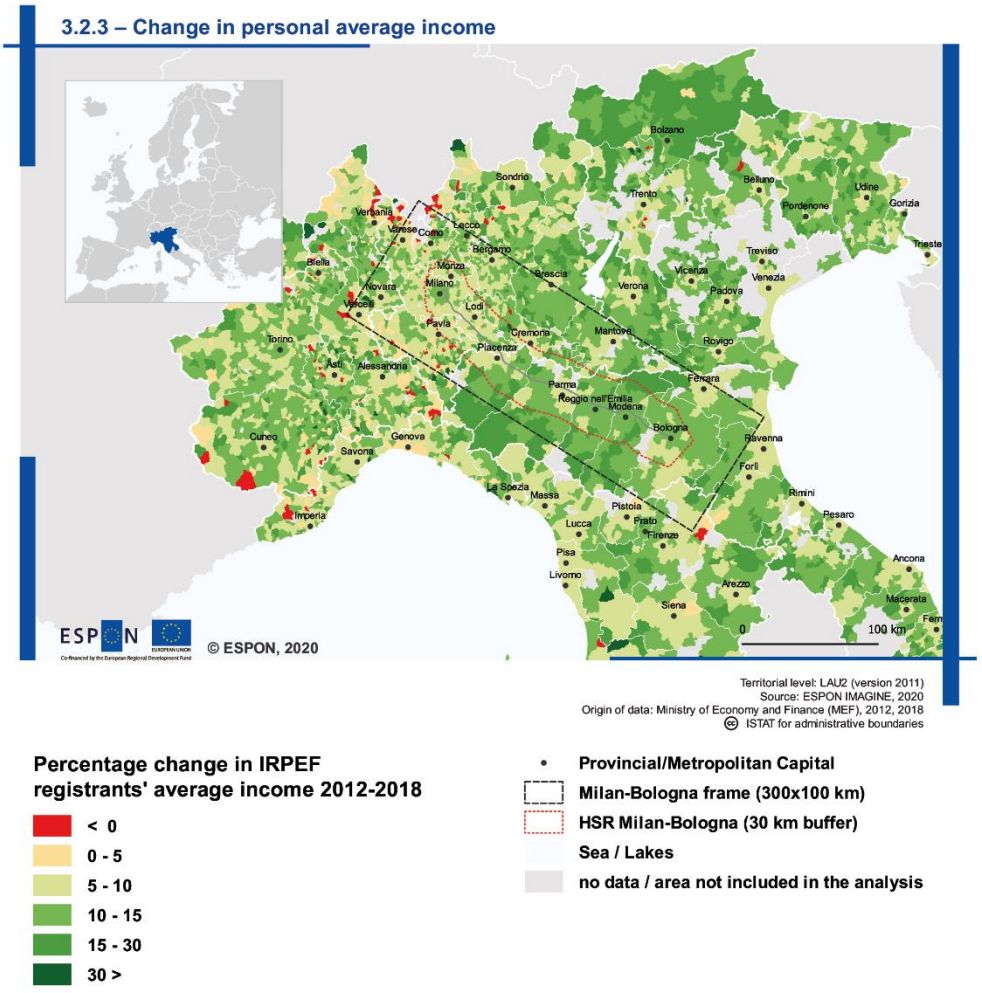
Map 17 - RP 3.2 Regionalization dynamics (change)



Map 18 - RP 3.2.1 – Population change



Map 19 - RP 3.2.2 – Change in house prices



Map 20 - RP 3.2.3 – Change in personal average income

1.6 Growing like an urban region: exploring regional competitiveness

According to the literature, urban regions substitute cities on the economic scene (Soja, 2011). They are competitive actors, made of dense networks of relationships: companies, clusters, short and long-distance chain-link materially and immaterially the territories along the Milano-Bologna corridor with the rest of the country and broader global scale. This is a crucial resource for competing under the current capitalistic organisation of the economy. The Regional Portrait tries to map the degree of competitiveness that characterise the Milano-Bologna urban region and adds some general reflections about the role of Industrial districts within the area (RP 4.1 Regional Competitiveness).

Map 21 – RP 4.1 Regional Competitiveness

The degree of competitiveness of the Milan-Bologna corridor is presented by summarizing the following three key dimensions at LAU-2 scale:

- **RP 4.1.1 – Number of active big firms:** number of big firms with 250 employees or more (2018 as reference year); data are retrieved by the database of local units of active firms from the Italian Statistical Institute (ISTAT).
- **RP 4.1.2 – Value added per employee:** value added per employee (labour productivity) in thousands of € (2016 as reference year); are retrieved by the ISTAT data warehouse and the economic activities total was considered.
- **RP 4.1.3 – Employees in high-tech sectors:** percentage of employees in the high-tech sectors over the total employment (2015 as reference year). The value related to the percentage of employees in the high-tech sectors comes from an experimental database of the ISTAT and it is computed by considering some NACE Rev. 2 subsectors of manufacturing and services macro-categories

For all the considered variables, the weight of the provincial city capitals and of the metropolitan city capitals of the corridor is often higher than the values of the surrounding areas.

Most large firms are in the pole areas of Bologna, Milano, Reggio Emilia, Modena, and Parma, which host over 50 big firms each. On the other hand, a lower intensity of big firms characterises other provincial capitals (Cremona, Piacenza, Lodi, and Pavia), falling within the 30km buffer of the corridor, which host from 20 to 50 big firms each. Data show that it is impossible to identify a real continuum within the corridor in terms of big firms' location. Specifically, while the Bologna-Parma axis almost shows a spatial continuity, also including the second-order municipalities, the same does not happen in the rest of the corridor, both considering the 30km buffer and the larger frame, where the presence of big firms is often lower than 5, or even absent, especially in the western side of the corridor.

In terms of *value-added per employee,* the value-added is commonly considered an appropriate proxy to describe the degree of productivity of a specific area. Considering the macro-regional urban corridor of Milano-Bologna, high levels of productivity arise. As opposed to what happens for the big firms' dynamics, a clear continuum within the whole Milano-Bologna corridor emerges, except for the municipalities of Pavia, Lodi, and Piacenza. In this case, as visible in the following chapter 3.3, the role of HSR was also essential to encourage a sprawl of economic activities that is not only circumscribed to the pole metropolitan and provincial capitals, but that is also a prerogative of smaller surrounding municipalities that are located both within and beyond the 30km buffer of the corridor line. Moreover, the intensity of high values for the added value indicator in the corridor is very noticeable if compared to the other HSR corridors in northern Italy, such as Torino-Milano, Milano-Venezia, or Bologna-Venezia. In other words, the productivity of the Milano-Bologna axis is very high, and this acts as an activator of further heterogenous spillovers for the interested areas.

Both the presence of large firms and labour productivity is related to the location along the corridor of the Italian industrial districts (IDs), specialised in the *Made in Italy* sectors. The latest classification of the Italian

IDs by ISTAT[2] identifies 141 IDs specialising in 11 macro sectors. IDs represent about a quarter of the productive Italian system in terms of local labour systems, jobs, and local units, and IDs' manufacturing employment represents more than a third of total Italian employment. Specifically, Lombardia hosts 29 (20.6%) IDs and Emilia-Romagna 13 IDs (9.2%) (together about 30% of the Italian IDs). As far as the district sectors are concerned, both regions are mainly specialised in the mechanical industry (11 IDs in Lombardia hosting 45.5% of total employment of Italian IDs in this sector, and 7 in Emilia Romagna, hosting 15.7% of total employment of Italian IDs in this sector) and Lombardia also in textile and clothing (7 IDs, hosting 42.3% of total employment). It is worth underlying that the mechanical industry, which absorbs more than 60% of the ID's employment in Emilia-Romagna and 68% in Lombardia, showed better performance in terms of growth and profitability if compared to other district industries[3]. Moreover, the IDs in the mechanical industry exhibit a high innovation capacity also concerning the adoption of 4.0 technology: about one-fifth of the district firms patent, thus showing a higher value than that of non-district firms in 2018. These IDs in the mechanical industry are mainly composed of small and medium-sized firms collaborating with big players, able to significatively influence the areas of internationalisation and innovation.

The value related to the *percentage of employees in the high-tech sectors* allows to analyse the degree of technological specialisation that a specific area may have regarding the two pillar sectors of the Italian economic system, meaning manufacturing and services. Similar to what happens to large firms, the high-tech specialisation is mainly a trait of larger areas, which often correspond to the provincial capitals of the corridor, with Milano in the top position. However, partial differences can be glimpsed by the larger Milano metropolitan area, which exhibits several municipalities within the Milano-Monza-Lodi triangle with high percentages of highly specialised employees, which are mainly related to the location of Italian and foreign multinational enterprises (MNEs), in the suburban area of the Milano metropolitan city. Specifically, Milano and Lombardia region specialize in medium-high and high technological intensity sectors (pharmaceutical, chemical, mechanics, electric, electronic and optics), rubber and plastic products, and the publishing industry. Moreover, Lombardia region and Milano exhibit the higher internationalisation degree in Italy in terms of inward Foreign Direct Investments (FDIs) (45.6% in 2019) – undertaken by foreign MNEs in these areas – and of Outward FDIs (32.7% in 2019) – undertaken by MNEs having the headquarters located in Lombardia and Milano –[4]. Among the first forty foreign MNEs investing in Italy, seventeen have the head office settled in Lombardia according to the number of workers employed in their affiliates. Among those, eleven in the Milano Metropolitan Area[5].

Map 21 – RP 4.1 Regional Competitiveness summarises the main features of the variables described above. The median values of such variables can provide a synthetic graphical representation of the Milano-Bologna corridor's competitiveness. It appears pretty evident that, within the 30km boundary from the HRS line, there is a spatial discontinuity when the provinces of Lodi, Pavia, Piacenza, and Cremona are considered, where the overall competitiveness is broadly lower than the other provincial and metropolitan capitals of the corridor. Moreover, polycentric competitiveness of the Milano metropolitan area and the neighbouring provinces emerges. At the same time, at the other side of the corridor, higher degrees of competitiveness are mainly visible within the linear axis of Emilia Romagna's provincial capitals of Bologna, Modena, Reggio Emilia and Parma. In the latter case, outside of the 30km buffer, there are decreasing levels of competitiveness, both at the eastern and the western side of the HSR, and this is due to the closeness with the inner areas (in particular for what concerns the Apennine hillside) that are characterised by lagging development dynamics as described by the Strategia Nazionale Aree Interne (SNAI), the national urban strategy for Inner Areas.

To sum up, although it is evident that the Milano-Bologna corridor exhibits higher competitiveness if compared to other Italian corridors, something more should be done to foster the competitiveness of outer border areas, that are lagging under multiple perspectives, if compared to the main pole areas.

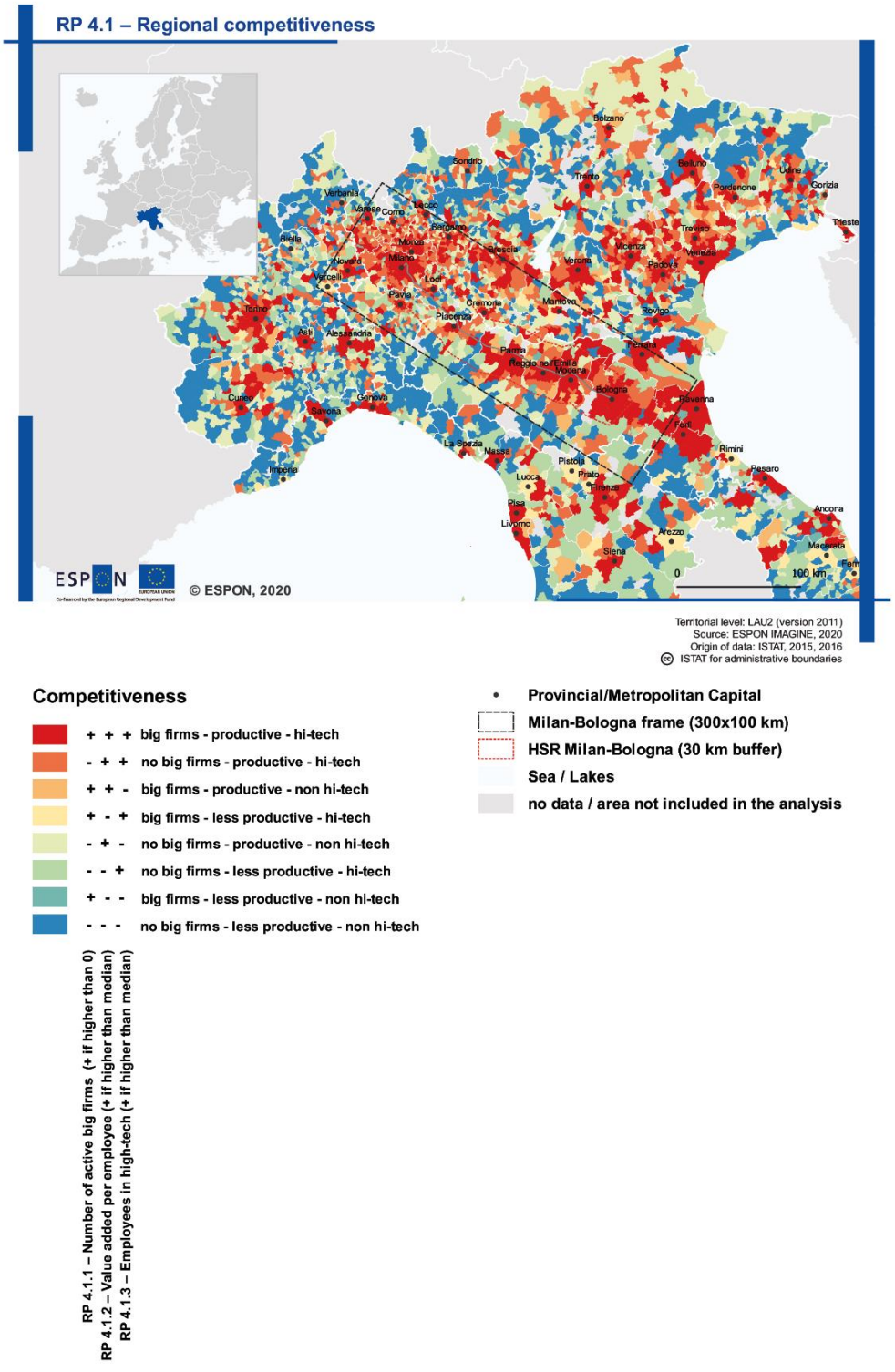
[2] ISTAT (2015). 9° Censimento dell'Industria e dei Servizi e Censimento delle Istituzioni Non Profit: I Distretti Industriali 2011. ISTAT, Rome, Italy.

[3] Intesa Sanpaolo (2018), Economia e finanza dei distretti industriali. Rapporto annuale - n. 11, Direzione Studi e Ricerche.

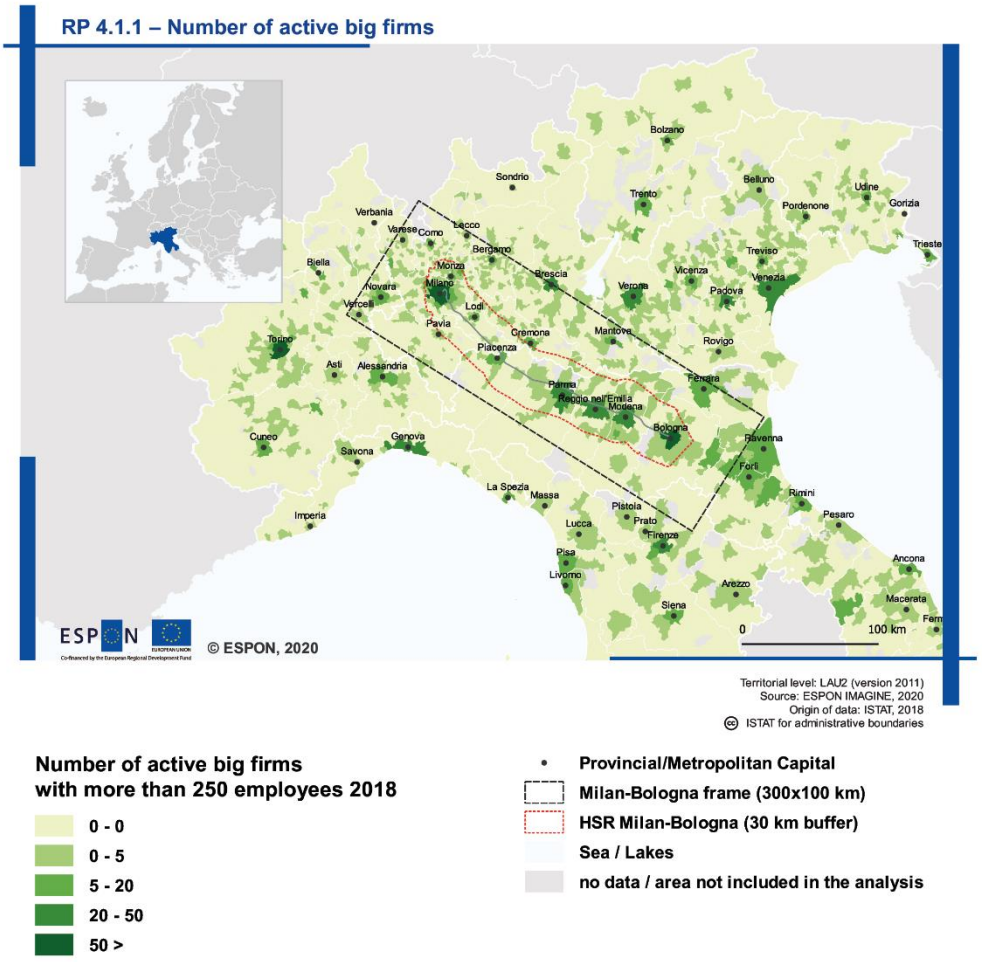
[4] Camera di Commercio di Milano, Monza Brianza, Lodi (2020), MILANO PRODUTTIVA, 30° Rapporto, Milano (https://www.milomb.camcom.it/Milano-produttiva); Mariotti S., Mutinelli M. (2019), Italia Multinazionale

2019, Ice, Roma (https://www.ice.it/it/studi-erapporti/rapporto-italia-multinazionale).

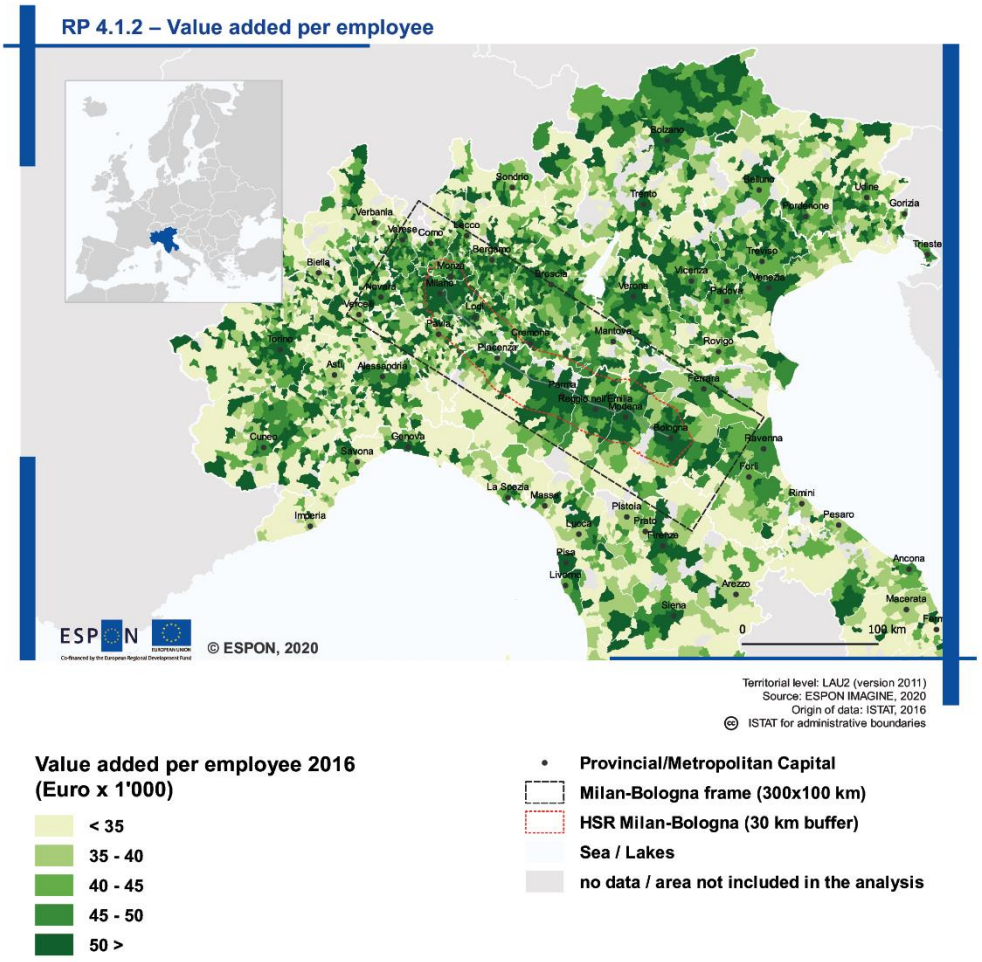
[5] Mariotti I. (2018), "The attractiveness of Milano and the spatial patterns of international firms". In Armondi S., Di Vita S. (eds.), Milano: Productions, Spatial Patterns and Urban Change. Routledge: London-New York, pp. 48-59.



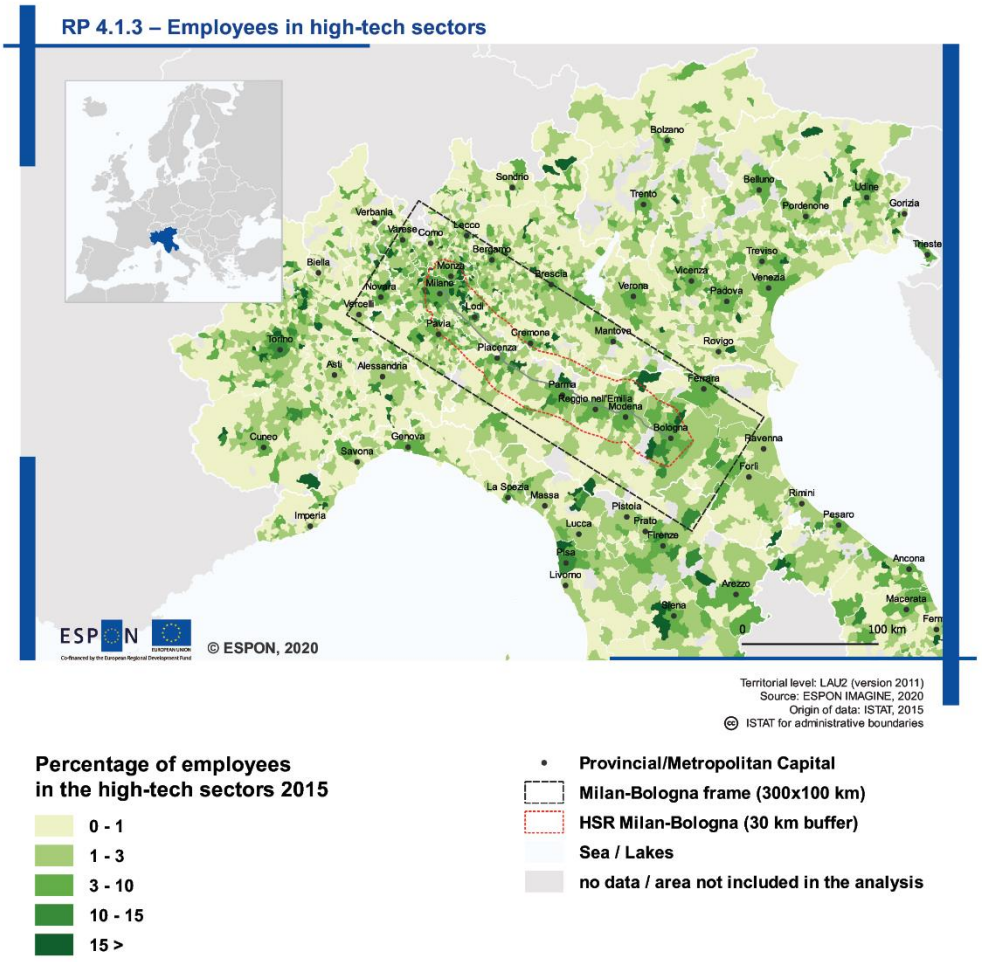
Map 21 – RP 4.1 Regional Competitiveness



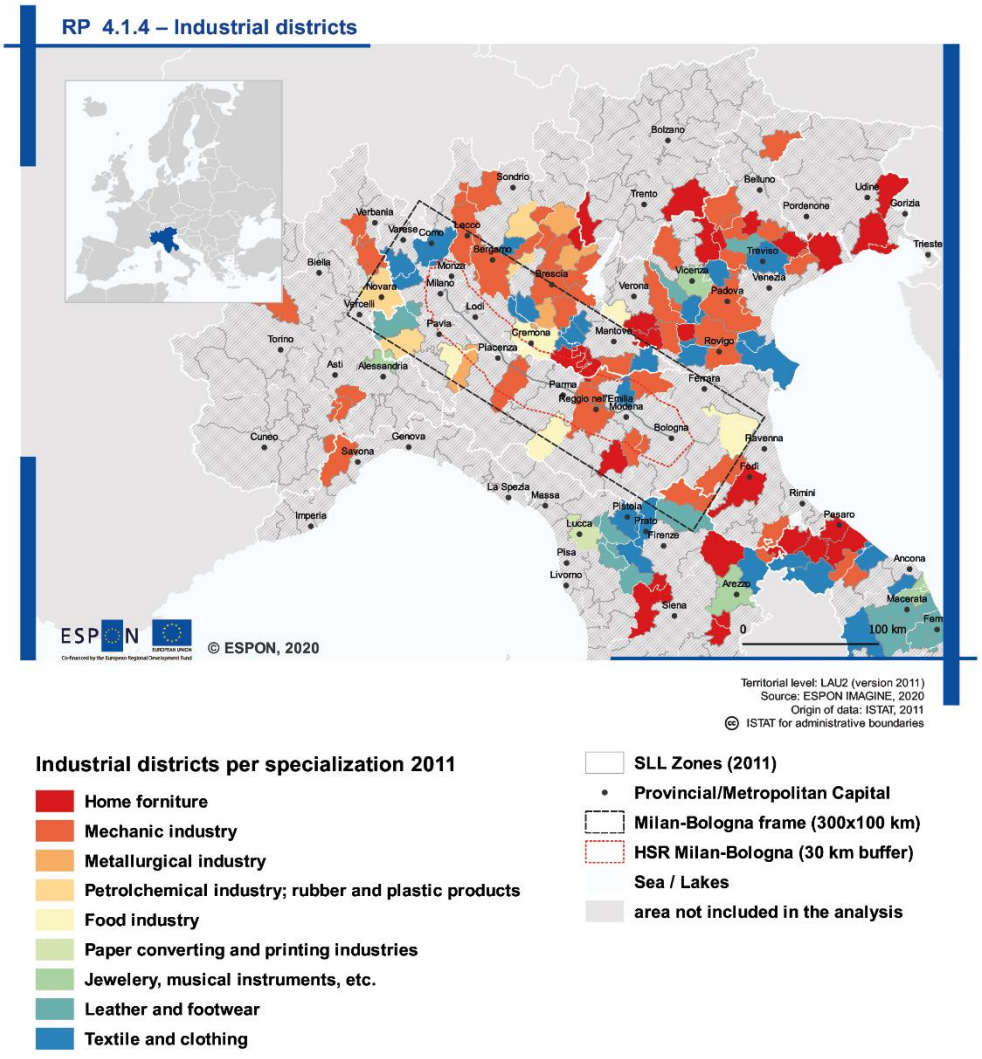
Map 22 – RP 4.1.1 – Number of active big firms



Map 23 – RP 4.1.2 – Value added per employee



Map 24 – RP 4.1.3 – Employees in high-tech sectors



Map 25 - RP 4.1.4 - Industrial Districts

1.7 Public resources: exploring the regionalization of public investments

"The regional fabric that shapes how urbanization and urbanisms are constructed is mediated by investment and disinvestment in varied infrastructures (Knight, Sharma, & Sinclair, 2017; O'Brien, O'Neill, & Pike, 2019; Zimmerman, 2009)" (Addie et al. 2019, p. 17). The Regional Portrait explores the Milano-Bologna region as a space of distribution of public resources generated under the EU framework and to depict the financial autonomy of municipalities. It tries to investigate the potential of activation of the Milano-Bologna public actors (RP 5.1 – Public investments and resources).

To provide a general overview of the public investment trends in the two regions (Lombardia and Emilia-Romagna), the "Conti Pubblici Territoriali" dataset has been first analysed (*Territorial Public Accounts*, hereafter CPT). The dataset is released by the Italian Agency for Territorial Cohesion. It covers annual data, in nominal terms, of revenues and expenditures flows by the Italian Public Administration (PA) and by the Enlarged Public Administration (Enlarged PA).

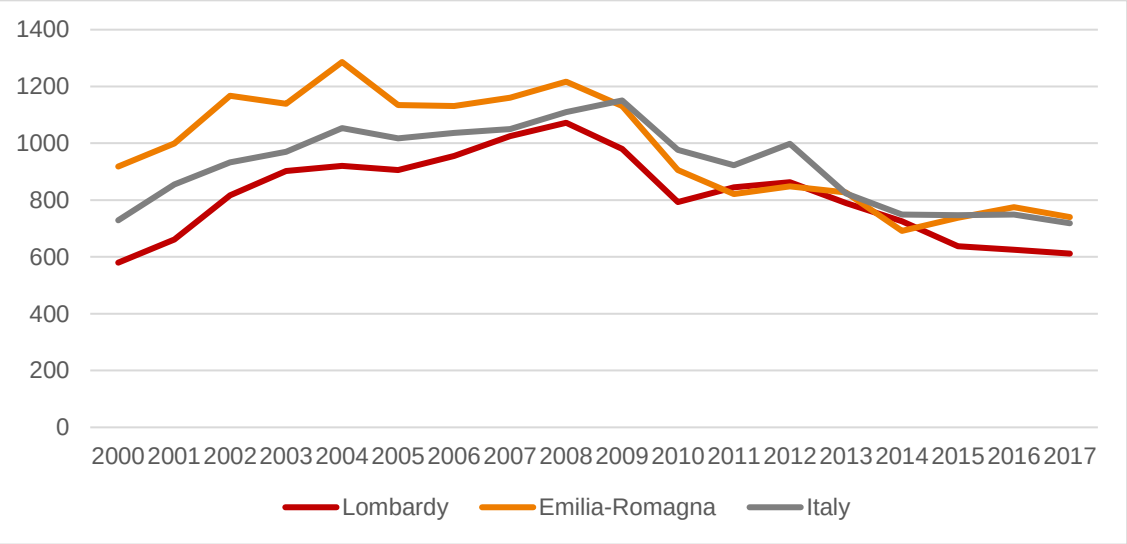


Figure 6 - Per-capita public investment by Enlarged PA (in euro)[6]

Public investment (expenditure in infrastructure, machinery, and equipment) is a component of public capital expenditure. As depicted in Figure 6 - Per-capita public investment by Enlarged PA (in euro), the per-capita public investment trend in the two regions follows the national one, increasing until 2008, followed by a strong decrease in the next nine years[7]. In 2017 the Enlarged PA's public investment in Lombardia was almost €6 bn in absolute value (€611 per-capita), while in Emilia-Romagna was €3.3 bn (€740 per-capita). Instead, the maximum peak was recorded in 2004 in Emilia-Romagna (€5.2 bn in absolute value; €1286 per-capita) and in 2008 in Lombardia (€10 bn in total value; €1109 per-capita).

At the beginning of the considered period (2000), 60.5% (49.4%) of the public investments in Lombardia (Emilia-Romagna) were made by the PA. Instead, in 2017 the situation was reversed mainly: 63.1% (62.8%) of public investment in Lombardia (Emilia-Romagna) was made by public companies.

[6] *Source: CPT and Istat data. Figure created by the authors*

Data are consolidated, namely net of intergovernmental financial flows such as transfers among levels of government. For further information, see "Conti Pubblici Territoriali (2007), Guida ai Conti Pubblici Territoriali (CPT). Aspetti metodologici e operativi per la costruzione di conti consolidati di finanza pubblica a livello regionale".

For purely operational purposes, CPT has chosen the threshold of 30% for public shareholdings, below which it is generally presumed that public control does not exist. Concerning CPT data on investment by public companies: both private and purely public financial resources can be used to contribute to investment.

[7] For further information on public investment in Italy, see Cerniglia F., Rossi F. (2020), Public investment trends across levels of government in Italy. In Cerniglia F., Saraceno F. (eds.) The State of Public Investment: An European Outlook, Open Book Publishers.

Looking at the Enlarged PA investment by sector, in Lombardia, most investments in 2017 were in transport [8] (27.7%, or €1.6 bn), energy (13.4%, or €0.8 bn), and roads, highways, and motorways (10%, or €0.6 bn). In Emilia-Romagna, most investments in 2017 were in transport (17.7%, or €0.58 bn), energy (16.3%, or €0.5 bn), and manufacturing and craft (1%, or €0.4 bn).

As a second step in the direction mentioned above, we have elaborated a synthetic map based on two indicators.

Map 26 - RP 5.1 Public investments and resources

- **RP 5.1.1 – EU Cohesion funding availability per municipality per capita:** the indicator is related to the amount of EU funded resources received by a single municipality; it is calculated on the base of the database provided by the official database published on the website opencoesione.it and it refers to the two last cohesion policy cycles (2007-2014/2014-2020)
- **RP 5.1.2 – Municipality Financial Autonomy:** the indicator measures to what extent a municipality is able to cope with its own necessities without the support from the state, the region and other public bodies. It considers the quota of its own revenues over the total amount of current incomes. It is calculated in percentage (%) the largest is the percentage, the most elevated is the fiscal autonomy of the municipalities in defining its own budget. Formula: [fiscal revenues (Titolo I) + extrafiscal revenues (Titolo III) / Total current revenues (Titolo I + Titolo II + Titolo III)] * 100: the indicator source and original elaboration is the website Openbilanci.it and the indicator is calculated on the year 2012.

In the synthesis map RP 5.1 Public investments and resources, municipalities are divided in four typologies, distinguishing between the municipalities which have benefitted the most from EU funds and whose indicator of financial autonomy is higher; those which have benefitted the least and have shown the lowest degree of financial autonomy.

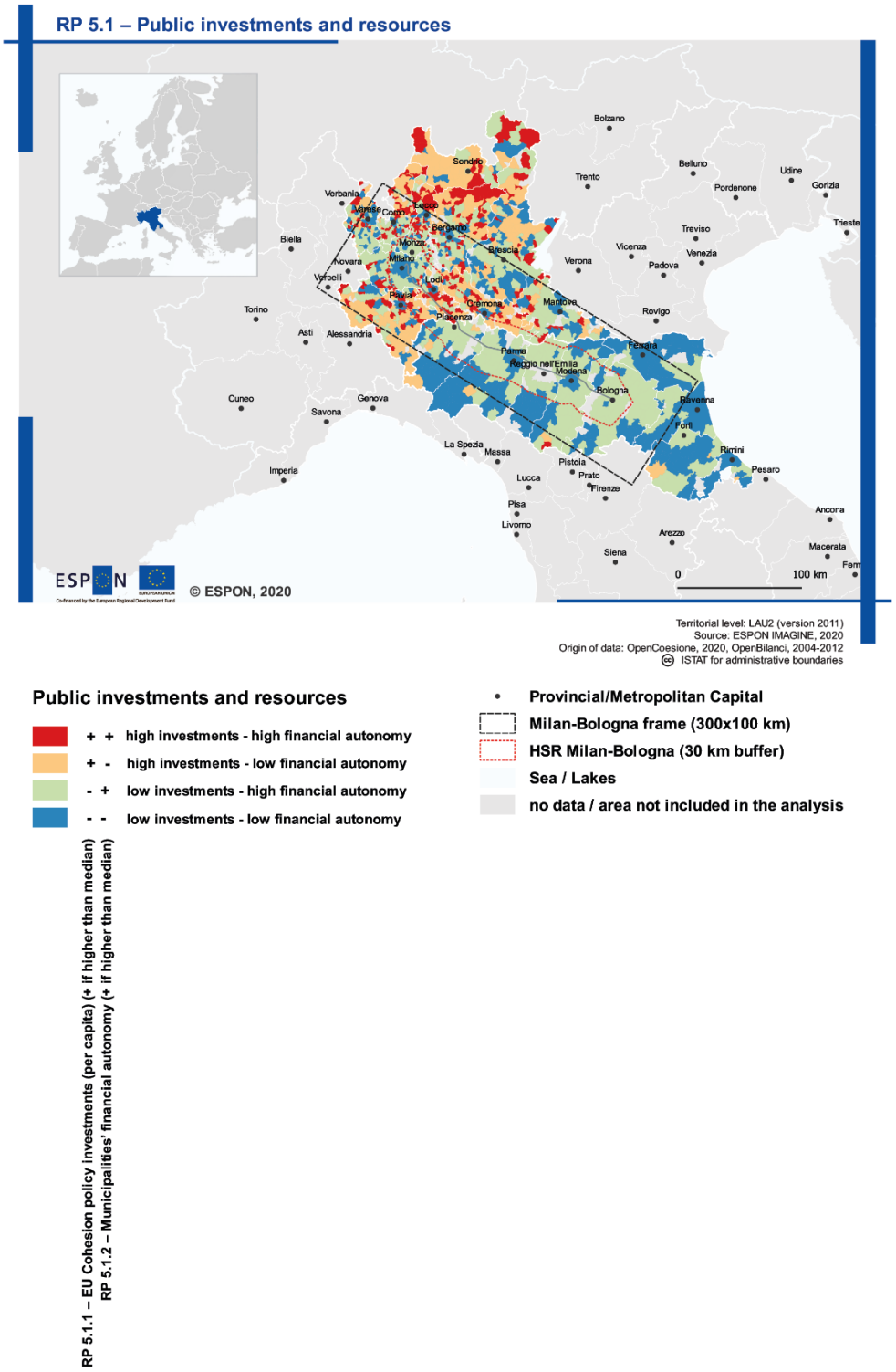
Exploring the per capita distribution of EU resources per municipality, based on the OpenCoesione database, we can notice that the two regional profiles are remarkably different. This is primarily due to the differences in the density of population of the municipalities in the two regions examined. Nevertheless, let's consider this indicator as officially provided by the Agency of Territorial Cohesion. The data represents a significant concentration in the municipalities of the inner areas in both regions, with a narrow focus on the corridor, excluded the border municipalities of Emilia Romagna and partially Lombardia. In Emilia Romagna, it is also visible a significant concentration on the corridor but investing more in the intermediate municipalities rather than on the regional capitals.

Exploring the Financial autonomy indicator, this appears higher along the corridor if compared to the rest of the territory analysed, and higher in the municipalities around the provincial capitals. However, data related to financial autonomy should be carefully considered and interpreted. In fact, from 2010–2015, Italian sub-national governments were subject to the so-called Internal Stability Pact. According to this law, sub-national administrations were only allowed to spend revenues collected during the fiscal year, while savings accumulated over the previous years were “frozen” at the Central Treasury in Rome. This created the need for a budget surplus. However, since the existing, immediately available public revenues were just enough to cover the current expenditure, public investments collapsed. Moreover, in 2016, the Internal Stability Pact was substituted by a new fiscal rule (law 164/2016), requiring a non-negative budget. Under this new framework, the control of debt once again prevails over the aim of relaunching investments since debt (the main

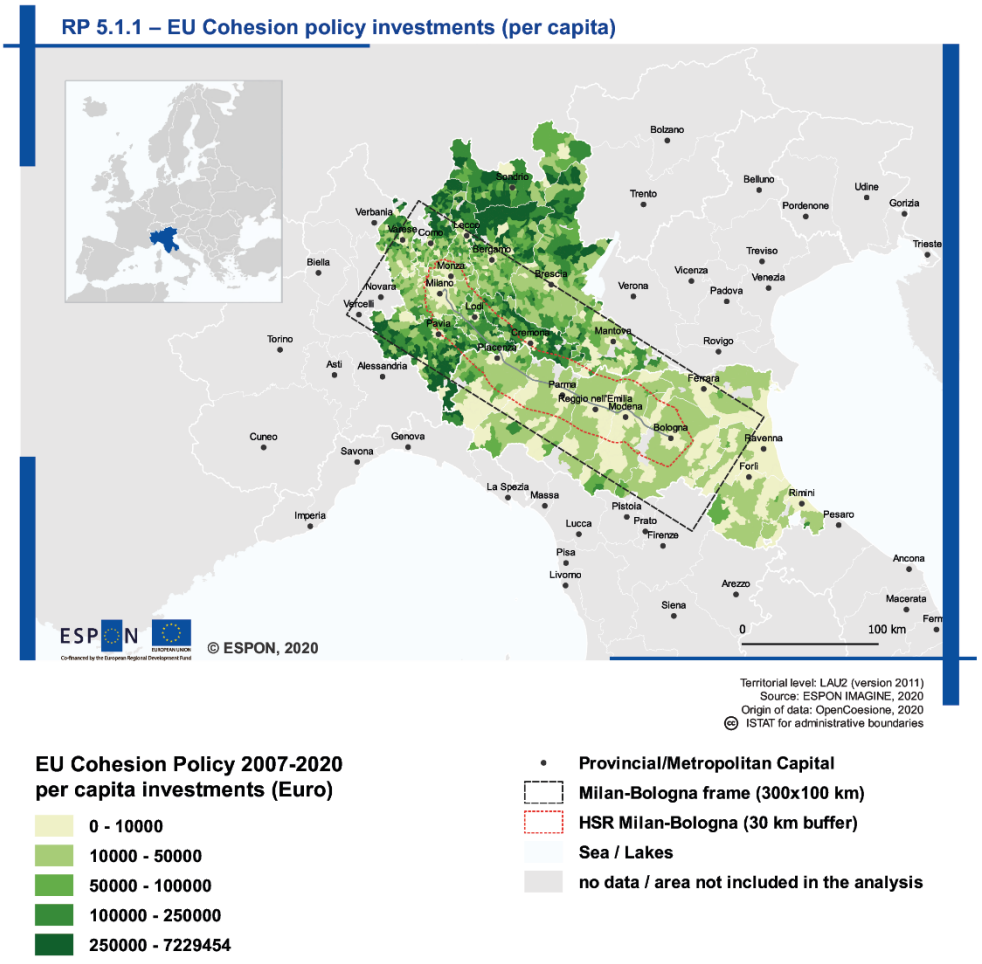
[8] These investments concern the building, running and maintenance costs of the following transportation infrastructures: rail, maritime, aviation, lake, river, including ports, airports, stations, and freight villages.

source for financing public investment) and the use of surpluses are excluded from calculating the “final budget”.

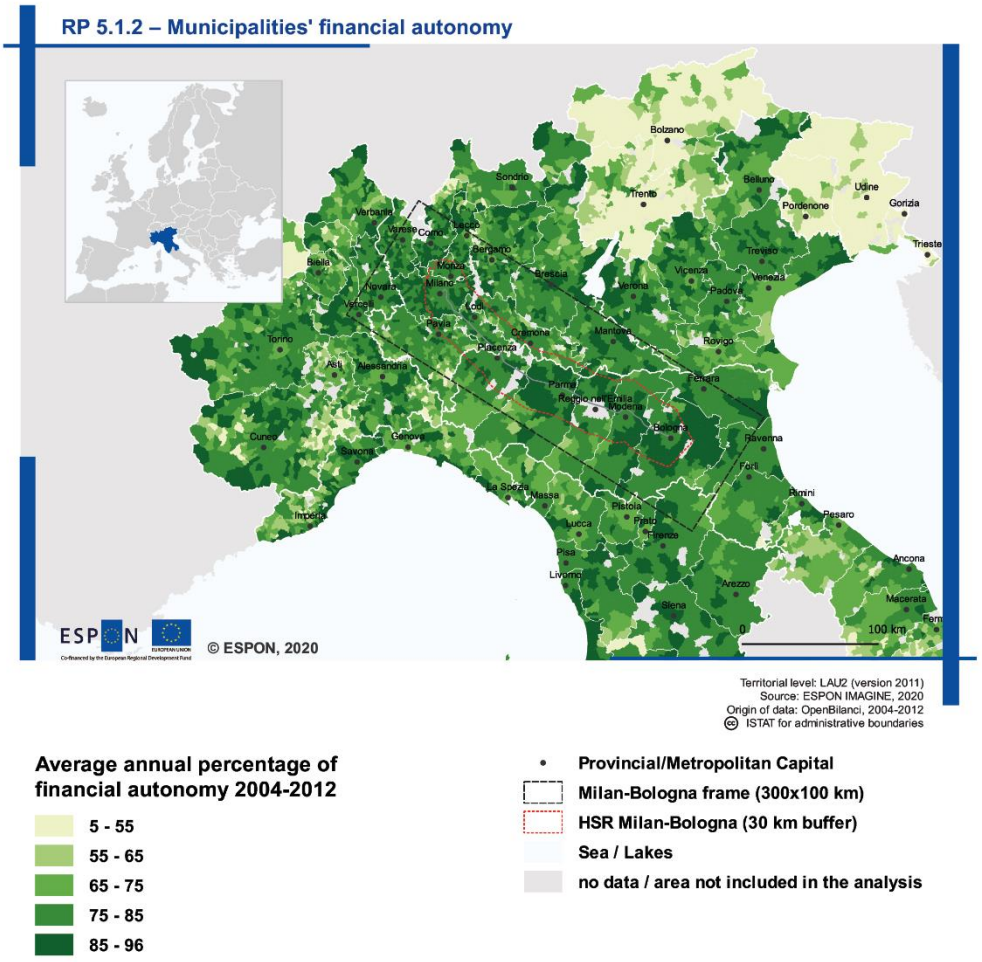
The synthetic map provides a very contrasting picture. On the one hand, higher resources per capita from EU funding and higher financial autonomy seem to be concentrated in the alpine municipalities and in the southern cities of Lombardia. Conversely, in Emilia Romagna, we find lower resources per capita received by municipalities but higher financial autonomy along the corridor.



Map 26 - RP 5.1 Public investments and resources



Map 27 - RP 5.1.1 – EU Cohesion policy investments (per capita)



Map 28 - RP 5.1.2 – Municipalities' financial autonomy

1.8 Seeing like a region: mapping institutional forms of supralocal cooperation/governance

Regions as social constructions are political objects, policy spaces (if not political spaces), policy arenas populated by actors that move on a regional scale. The Regional Portrait focusses on the role played by institutional actors (cooperation networks, metropolitan governments, public utilities, and agencies) in activating a supralocal, if not a regional scale. They are reconstructed in so far, they engender or hinder the possibility to 'see like a region", in so far, "they shape how territories are constituted as functional 'regional spaces' and rendered visible and governed as political 'spaces of regionalism' (Jones & MacLeod, 2004)" (Addie et al. 2019, pg.16) (RP 6.1 New spatial Imaginaries need and RP6.2 Institutional cooperation potential).

In the Italian context, Regions have been officially instituted in the early seventies, in a regionalized state or incomplete federalism framework. Despite their growing powers, Regions have contributed in a limited way to developing innovative approaches to regionalism, being originally instituted adopting pre-existing statistical boundaries rather than on the base of critical reflections. On the contrary (Dematteis, 2011), the regions' institution has implicitly or explicitly contrasted the success of forms of metropolitan governance. Similarly, a diffuse interpretation of municipalism as autonomy and isolation has worked against the construction of supralocal spatial imaginaries, as we have reconstructed in the Inception Report. More recently, the institution of Metropolitan cities and the new support to unions of municipalities provided by Delrio law in 2014, has opened some exciting space for innovation, even if the limited powers of metropolitan cities and the intermittent support to inter-municipal cooperation (in particular, at regional level) have often reduced their impact.

Other institutionalized sub-forms of "regional spaces"," political 'spaces of regionalism" (Jones & MacLeod, 2004) have emerged, sometimes implicitly, to contrast the adverse effects of municipal fragmentation. It is the case of public multi-utilities companies, which have flourished in the last decades in consortia or public-private companies: their essential aim is to deal with the provision of public services, like energy and water supply, waste management, etc. Originally based on a municipal model, during the last decade, following functional logics, they have often assumed that regional or sovra-local scale that institutional forms have not often supported explicitly and effectively. In the meantime, some of them have become quite important economic actors, playing a significant (sometimes critical) role in decision-making and provision of services and public goods.

Mapping, against the official three tiers institutional model (Regions, Provinces, Municipalities), these recent institutional forms can help to identify institutional networks/actors possibly enabling new supralocal spatial imaginaries; in fact, the emergence of geographies of coordination/governance can be seen as the possible cradle of new spatial imaginaries or assemblages/alliances, or at least as forms of resistance and reaction to the problems generated by fragmentation and lack of a supralocal vision/governance.

A traditional and straightforward calculation of the institutional fragmentation index in the two regions, calculated either in terms of the absolute number of municipalities (Cutler and Glaeser, 1997) or the number of local councils weighted for the general regional population (Dolan, 1990) highlights some problematics.

Lombardia Region is the most populous in terms of the number of municipalities (1506 municipalities over 10.060.965 inhabitants, 69% under 5000 inhabitants), while the Emilia Romagna profile is more balanced (328 municipalities above 4.467.118 inhabitants, 42% under 5000 inhabitants). This, however, can be a very simplified proxy of a fragmented administration model, which, if on the one side, might allow the proximity of the local governments to people, could, on the other, mirror the problems of small cities and towns in coping with complex challenges, due to limited financial capacity, knowledge resources, etc. Several OECD publications have focused on this potential "governance gap, implicitly suggesting that administrative fragmentation may hinder economic growth if the gaps are not adequately filled (Charbit, 2011; Charbit and Michalun, 2009)" (OECD,2015, pg.6).

First, this subchapter investigates the Milano- Bologna region intending to synthetically map a *"new spatial imaginaries need"* thanks to overlapping three indicators elaborated at the LAU level. Secondly, it investigates the Milano-Bologna region planning to synthetically map its *"institutional cooperation potential"* thanks to overlapping three indicators elaborated at the LAU level. As a third step, the portrait provides a *Geography of the prominent public utility companies with a sovralocal geography*, exploring more in-depth the geography of principal public companies/utilities, selecting those that are participated by more than 50 municipalities) in four main sectors: water, energy, waste, local public transportation.

Map 29 –RP 6.1 New spatial Imaginaries need

- **RP 6.1.1 – Levels of peripherality,** it expresses the level of peripherality and centrality based on municipalities' capacity to play a territorial role in the delivery of public services. It has been elaborated within the framework of SNAI (Strategia Nazionale aree interne) identifying as *poles* the municipalities which act as poles, inter-municipal poles, *peripheral* those that have been classified as an intermediate, peripheral, ultraperipheral pole)
- **RP 6.1.2 – Housing dispersion,** it expresses the ratio between the number of dwellings in a census section classified as "disperse housing" (*case sparse*) and the total number of housing units. It indicates the ratio of housing units in a municipality located in non-urban or rural contexts. On this base, we have identified dense and dispersed municipalities
- **RP 6.1.3 / 6.2.3 – Number of shares in public utilities per municipality,** it is an original elaboration based on the MIT database of municipalities' participation to sovralocal public companies (in particular, public utilities or multi-utilities in the energy, water, waste, and local transport sectors, MEF 2017). The indicator identifies *as locked* those municipalities with participation quota in less than five public inter-municipal companies/public utilities; networked with more than ten participation quotas in public inter-municipal companies/public utilities.

The results of these elaborations clearly show the coexistence of a condition of density and centrality of municipalities localised along the main corridor (and a certain degree of propension/need to cooperate) and one of peripherality and dispersion, with municipalities which are often not even supported by a sovralocal governance framework. The corridor is characterized by pole (either dense or diffused) and interconnected municipalities: the main exception can be noted in the Pavia-Piacenza area, where several municipalities appear quite loose in terms of participation in sovralocal public utilities. The cities located south of Milano appear more locked and dispersed, while in the Regione Emilia Romagna, they are interconnected. The Apennines municipalities on the western side of the corridor are the most dispersed, locked, and peripheral, while the eastern municipalities in the plain are dispersed but quite interconnected

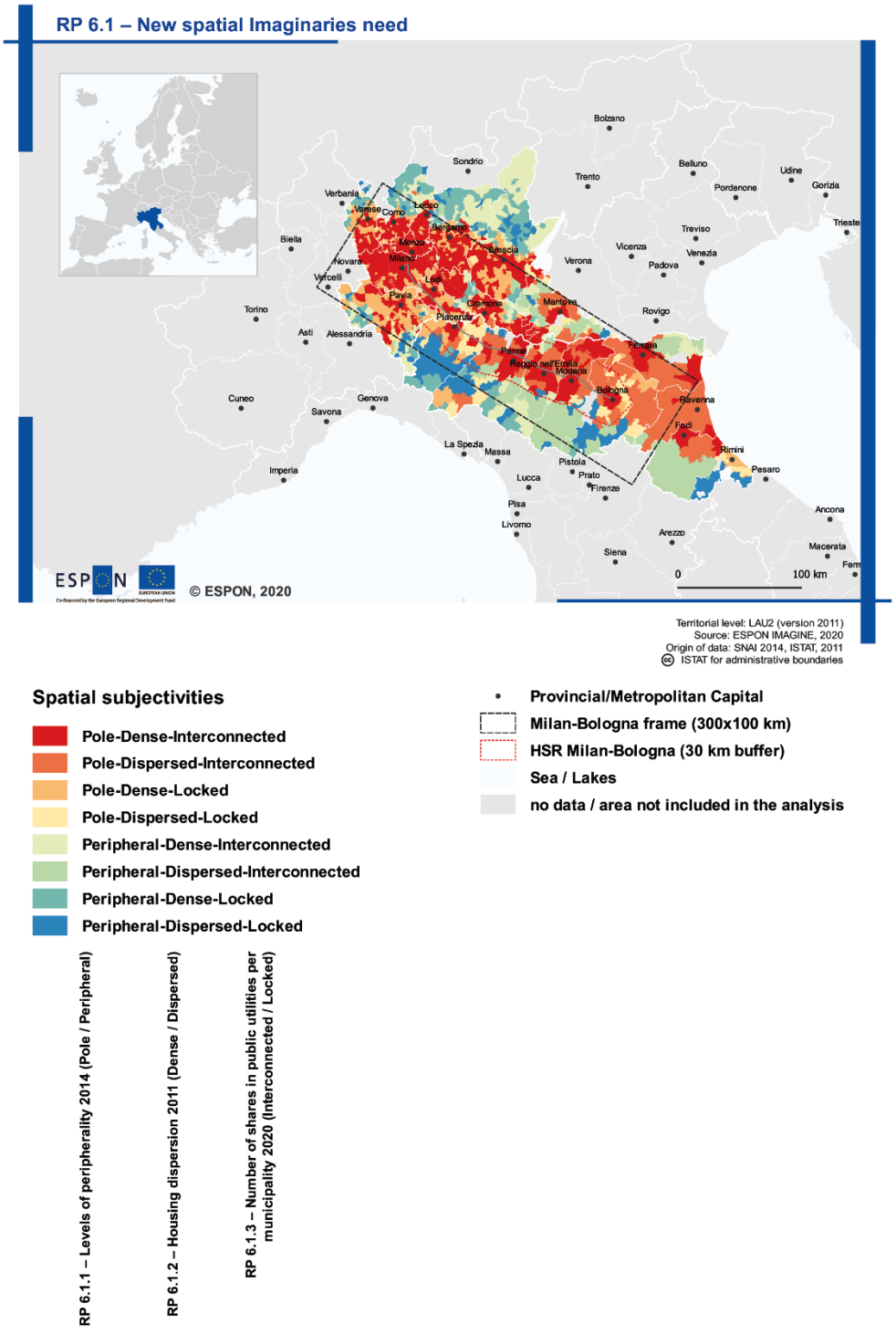
In terms of "institutional cooperation potential", the second elaboration allows appreciating the offer/demand of sovralocal governance in the different regional contexts. This offers a sort of simplified Propensity to institutional cooperation Index, which is, of course, much dependent on the political orientation of the Regional governments towards supporting inter-municipal cooperation. This second mapping activity clearly shows the main differences between the Lombardia Region and the Emilia Romagna Region. The first is characterized by the sporadic presence of unions of municipalities and mountain unions; the second is almost covered by forms of cooperation between municipalities, reinforcing the Bologna governance model's metropolitan city. The Metropolitan city of Milano stands practically isolated from other forms of institutional cooperation, tough highly networked: while the Lombardia northern municipalities are scarcely cooperating

Map 33 – RP 6.2 Institutional cooperation potential

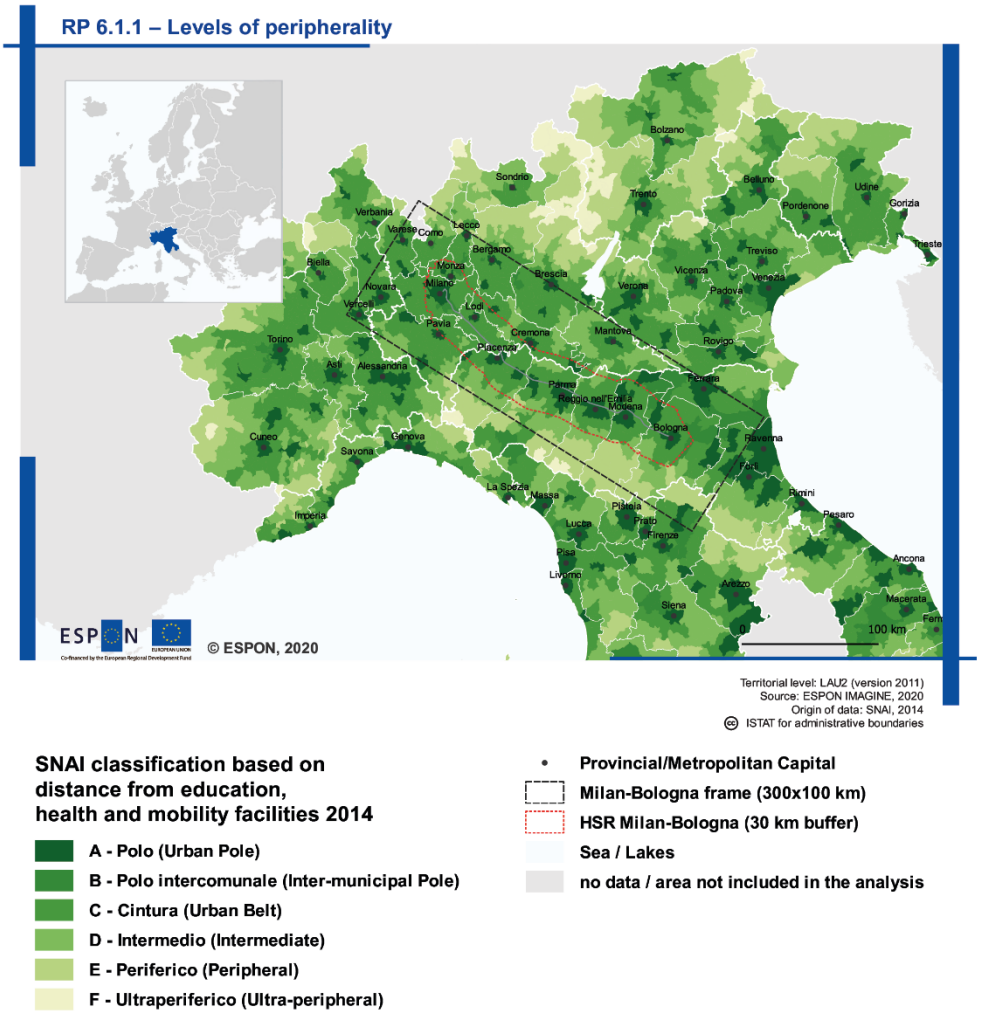
- **RP 6.2.1 – Municipalities included in Metropolitan Cities** (metropolitan/ non-metropolitan)
- **RP 6.2.2 – Municipalities included in Unions of Municipalities or Mountain Communities** (cooperating/non-cooperating)
- **RP 6.1.3 / 6.2.3 – Number of shares in public utilities per municipality** it is an original elaboration based on the MIT database of municipalities' participation to sovralocal public companies (in particular, public utilities or multi-utilities in the energy, water, waste, and local transport sectors). The indicator identifies *as locked* those municipalities with participation quota in less than five public inter-municipal companies/public utilities; networked with more than ten participation quotas in public inter-municipal companies/public utilities.

and non-metropolitan, but networked, the southern ones, included in particular those between Pavia and Piacenza, are not even taking actively part in the sovralocal geography of public utilities.

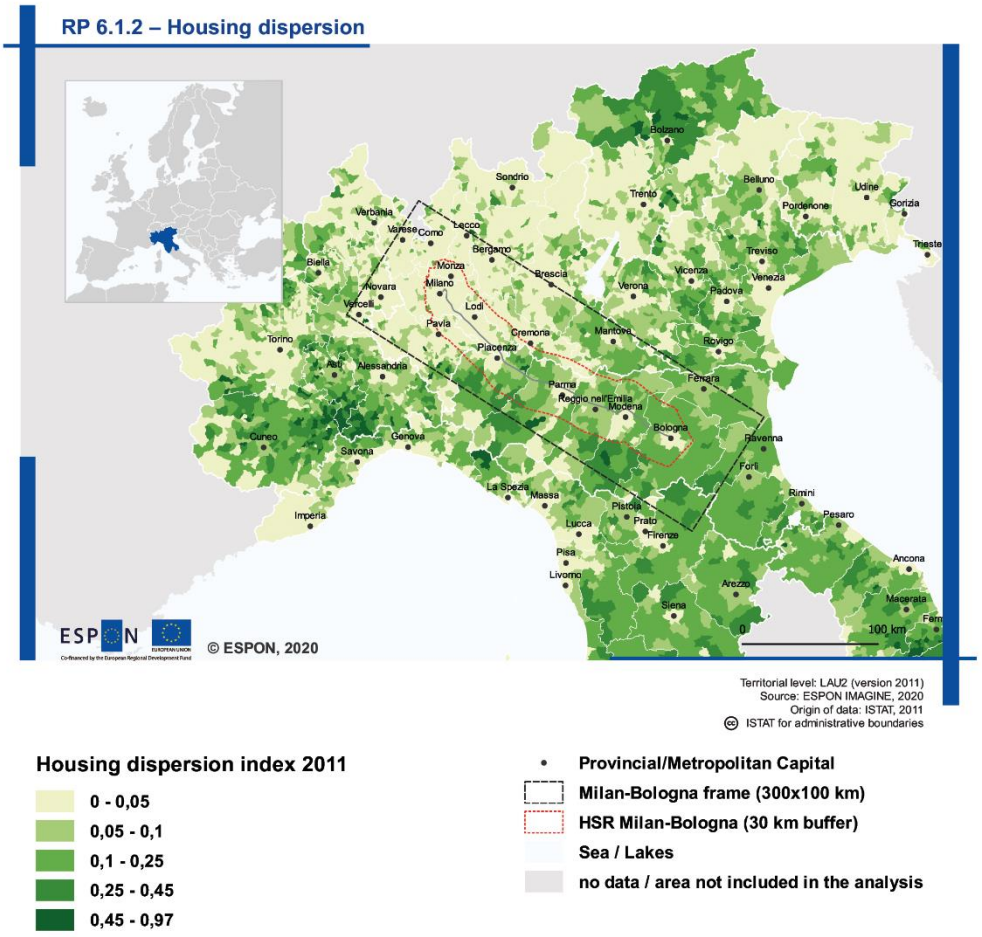
An additional elaboration *Geography of the Prominent public utility companies with a sovralocal scope* (see Figures 7 to 10), explores more in-depth the geography of the principal public companies/utilities, selecting those that are participated by more than 50 municipalities in four main sectors: water, energy, waste, local public transportation. These maps allow for identifying the emergence of crucial functional actors based on subregional geography. The geography is characterized by important sovralocal actors that almost cover all the regional spaces in the water provision and treatment field. In the field of energy provision, huge companies like Iren, Hera, A2A have pretty a large structure. At the same time, in local public transportations, the sovralocal scale is more developed in Regione Emilia Romagna and almost missing in Lombardia. Finally, in the field of waste treatment, the main cities of Emilia Romagna are served by the same company, while there is a scattered offer all over the rest of the region. Compared with one exploring the municipalities served by the same public utilities, this map could also highlight the passive or active role that cities can play in detaining (or not) a (small or large) participation quotas. Finally, it must be noticed that this map does not represent some important actors, which are participated by a few municipalities or bodies and that nevertheless play a strategic role despite are not generating a specific potential for regional cooperation.



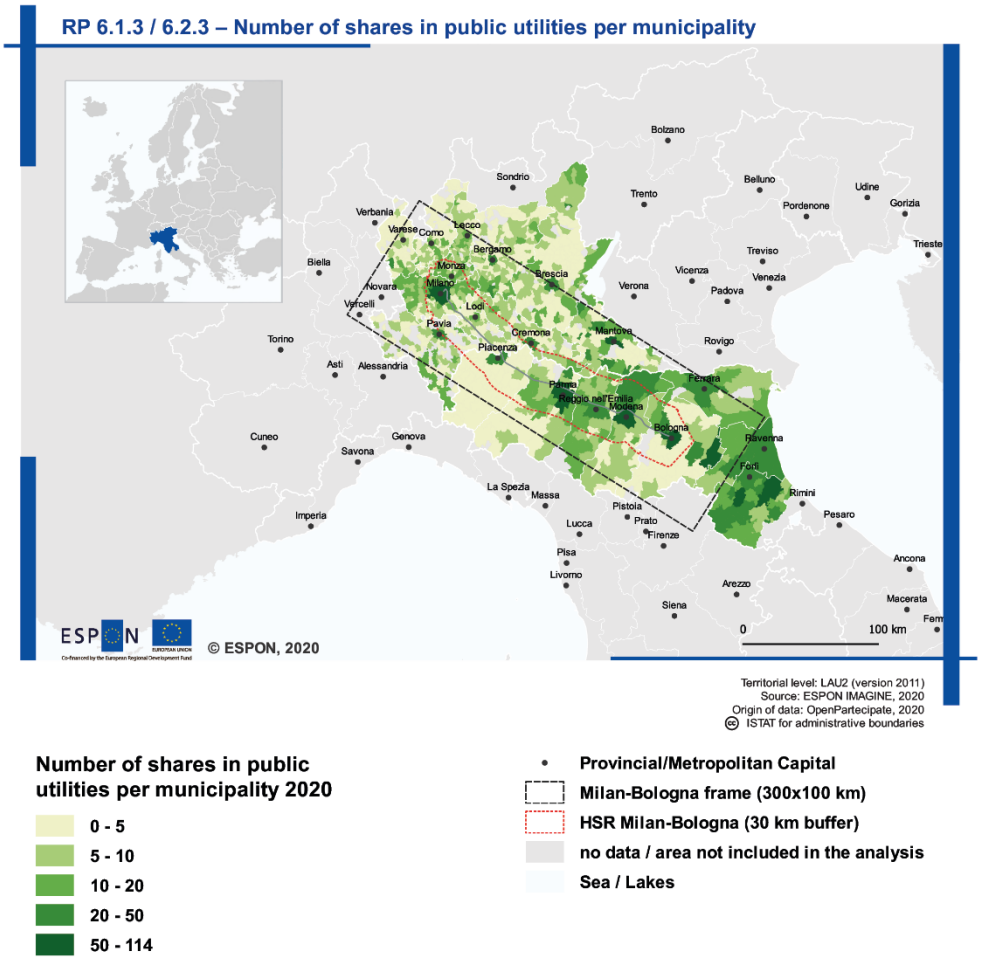
Map 29 –RP 6.1 New spatial Imaginaries need



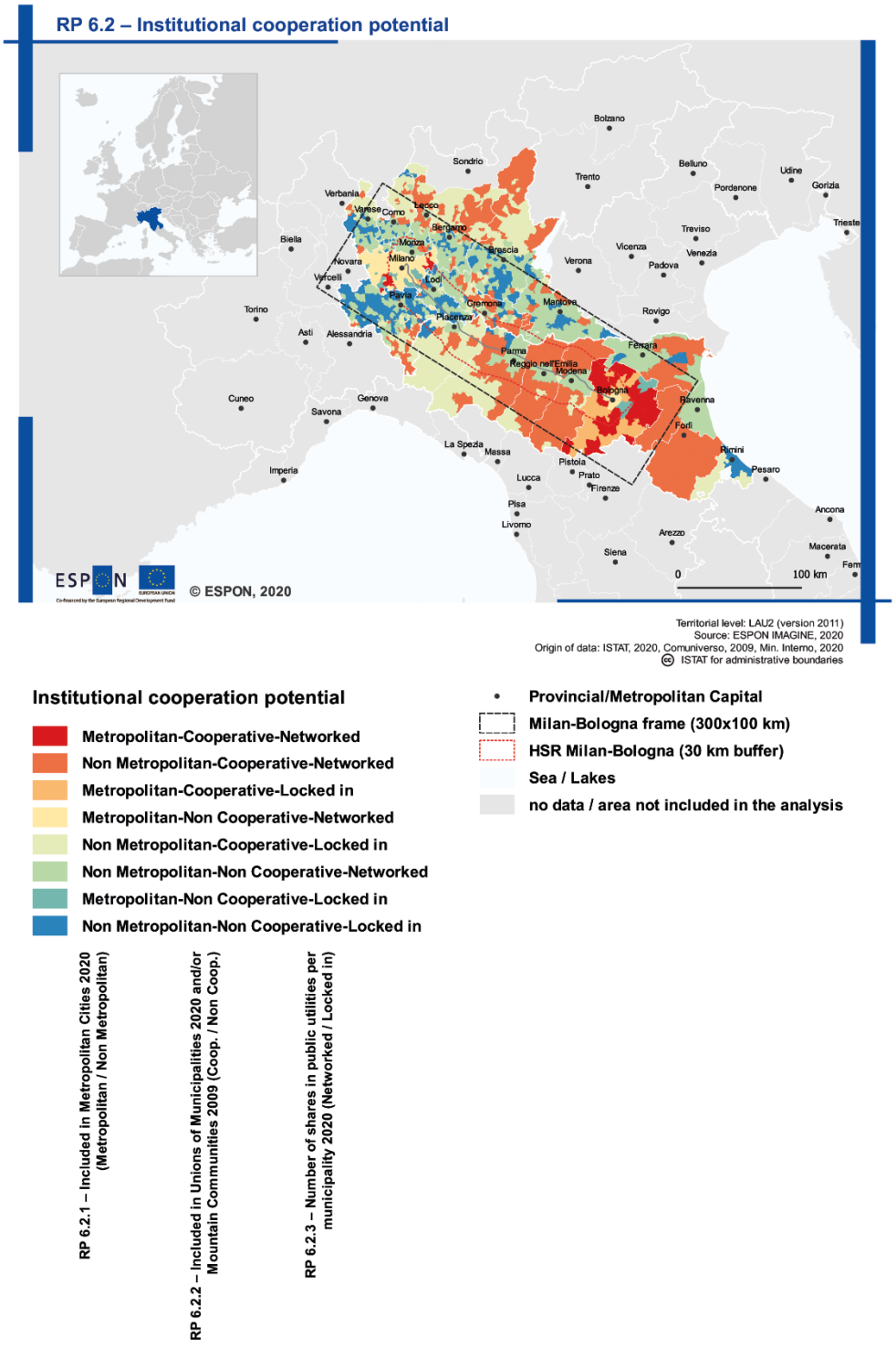
Map 30 –RP 6.1.1 – Levels of peripherality



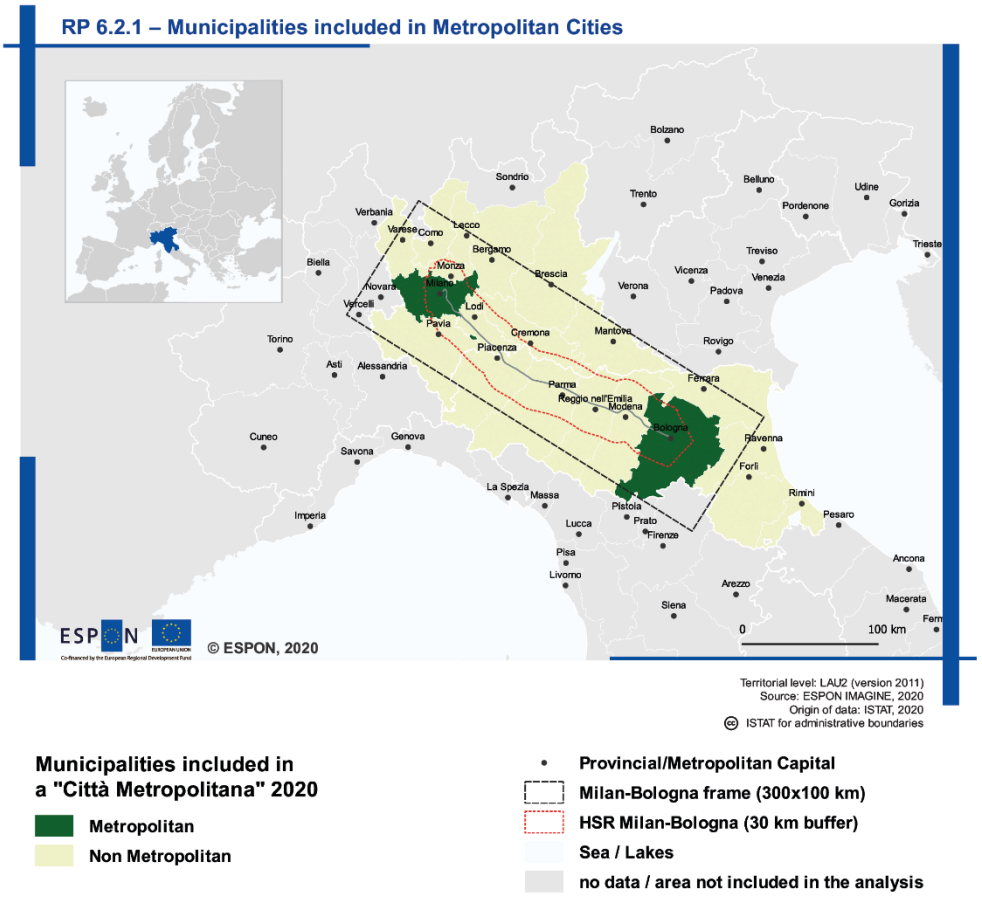
Map 31 – RP 6.1.2 – Housing dispersion



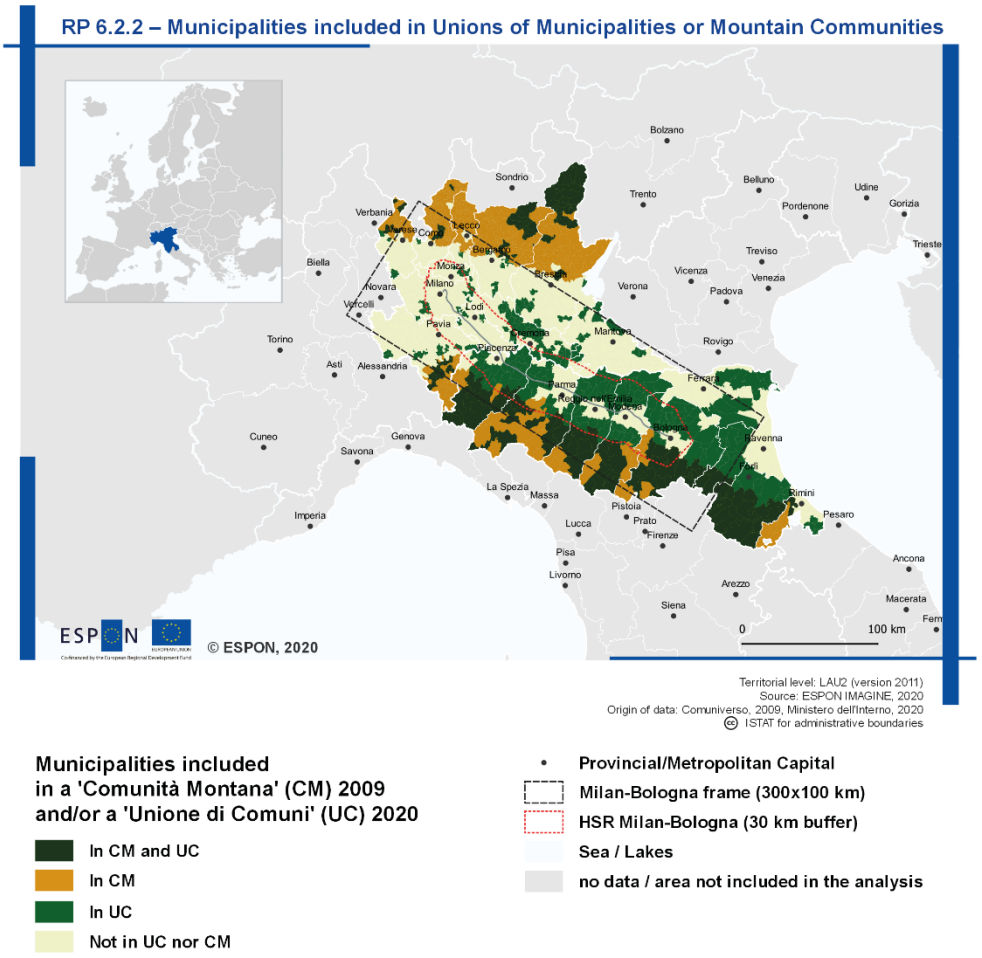
Map 32 – RP 6.1.3 / 6.2.3 – Number of shares in public utilities per municipality



Map 33 – RP 6.2 Institutional cooperation potential



Map 34 – RP 6.2.1 – Municipalities included in Metropolitan Cities



Map 35 – RP 6.2.2 – Municipalities included in Unions of Municipalities or Mountain Communities

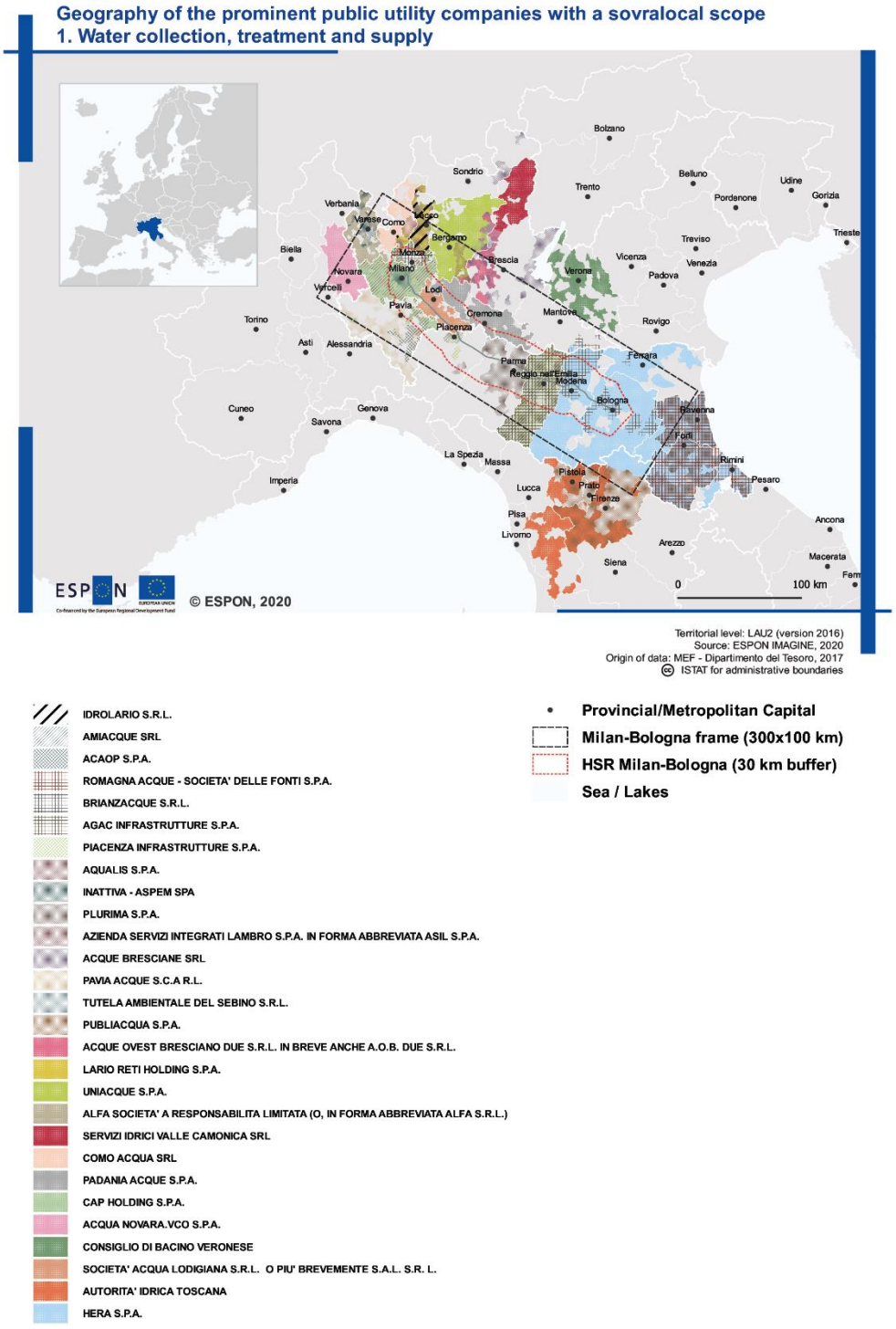


Figure 7 - Geography of the utilities – Water treatment, collection, and supply

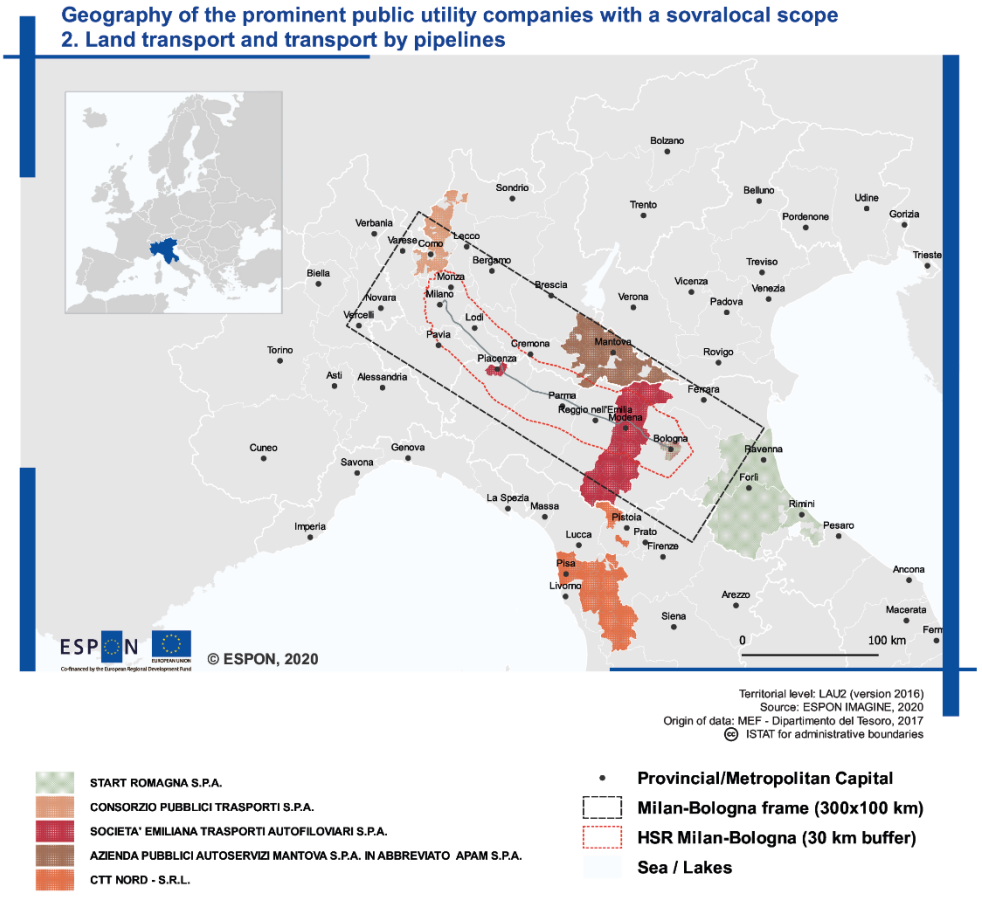


Figure 8 - Geography of the utilities – Land transport and transport by pipelines

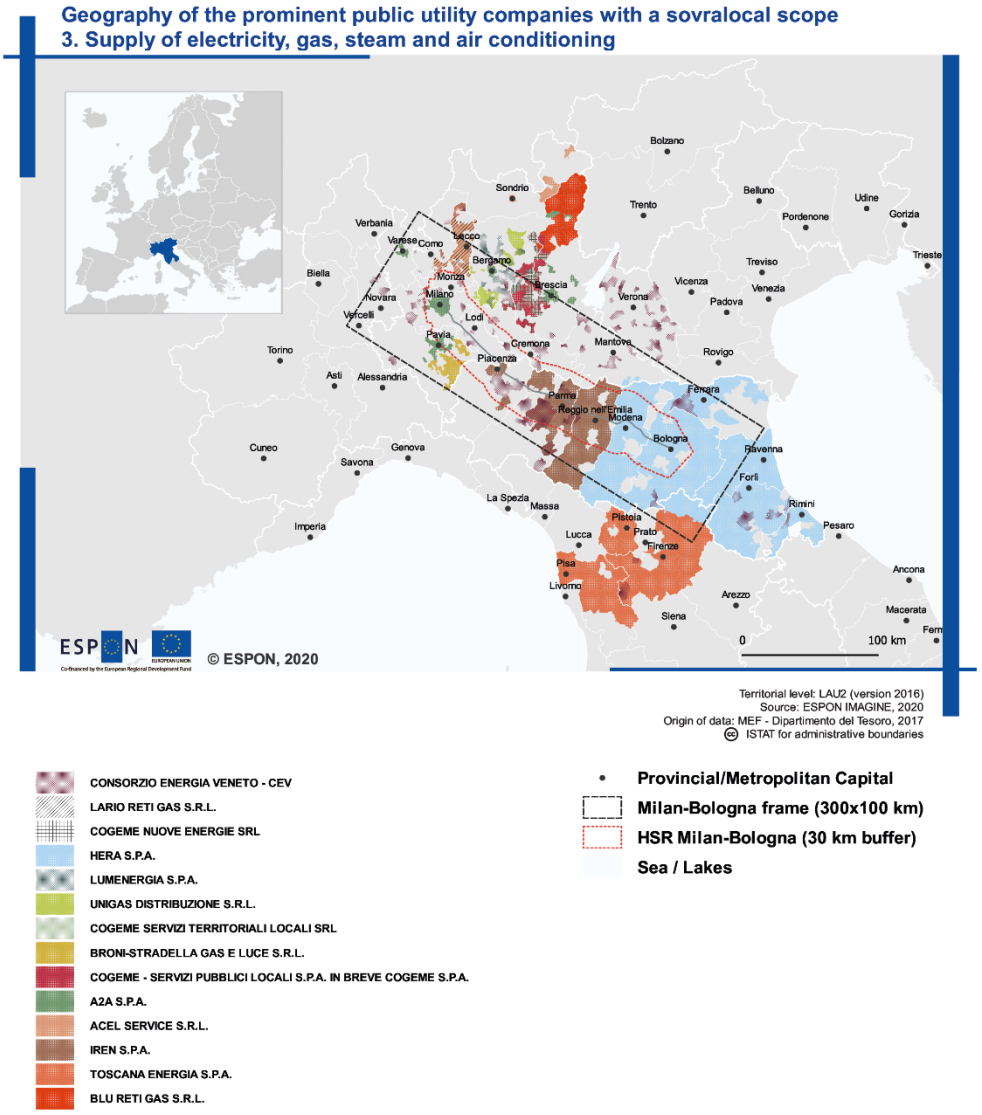


Figure 9 - Geography of the utilities – Electricity, gas, steam, air conditioning

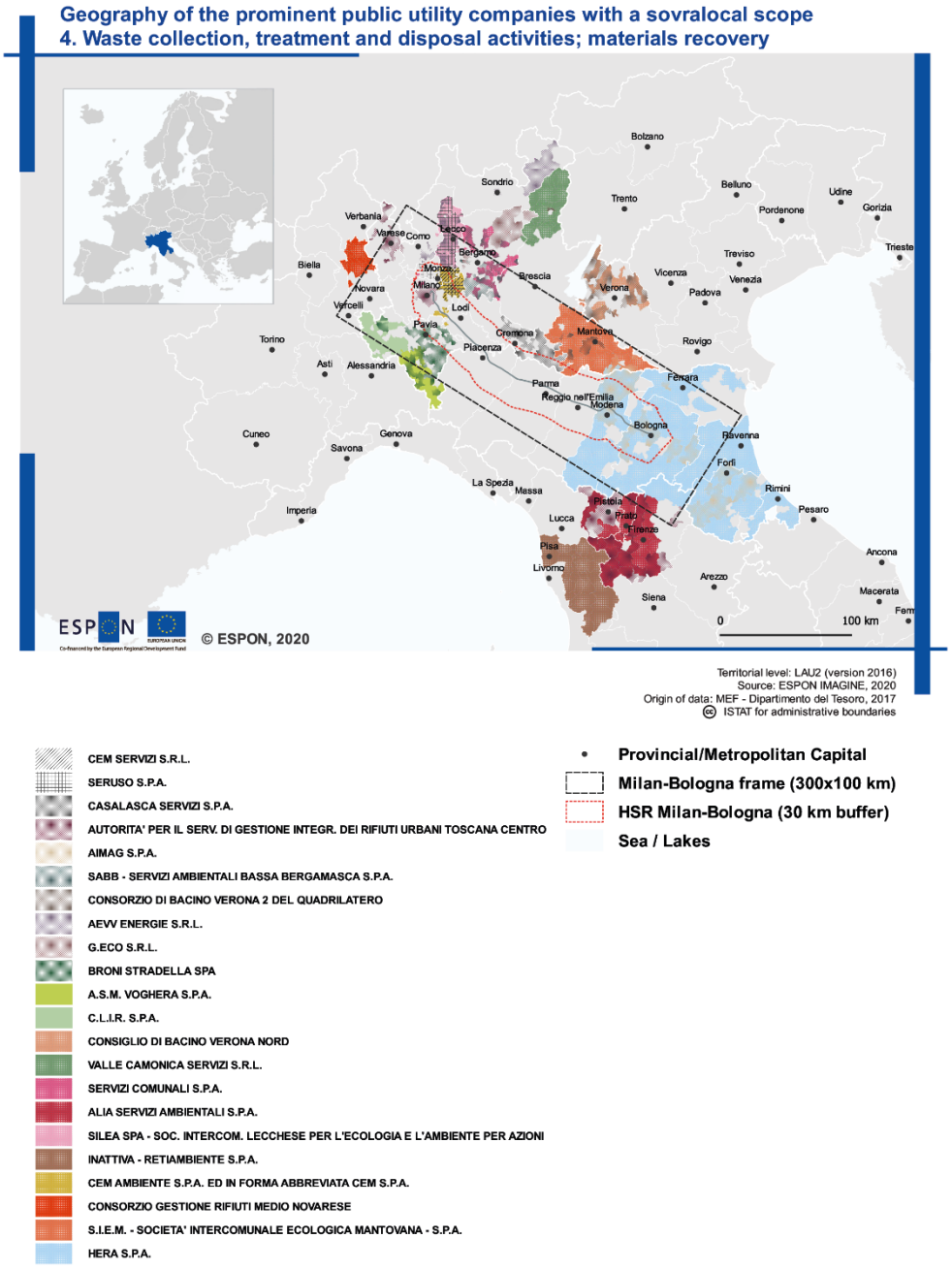


Figure 10 - Geography of the utilities – Waste cycle management

1.9 Transitioning like a region: mapping environmental fragility

The regional environmental ecosystem is undergoing several threats that originated both internally and out of the region itself. Air pollution, soil consumption, hydrogeological risks, agricultural pollutants, etc., are intertwined challenges that cannot be tackled without a transcalar strategy of ecological transition. In this picture, regions can play a pivotal role and deploy development trajectories "that aim to maximise intra-regional movement and cohesion, enhance the eco-efficiency of the processes of production, exchange and consumption that are constitutive of regional economies, and construct more resilient regions" (Hudson, 2008, pg. 174).

Map 36 – RP 7.1 – Environmental fragility

The map on environmental fragility is built upon four different indicators:

- **RP 7.1.1 – Consumed soil:** reports the % of the administrative area of each municipality that has been urbanized. The data refers to 2018 and is calculated upon ISPRA data
- **RP 7.1.2a – Air Pollution (NO2):** refers to the amount of air pollutant nitrogen dioxide (NO2) detected in the atmosphere, calculated in mg/m3. The data has been collected in 2016 and data source is the EEA
- **RP 7.1.2a – Air Pollution (PM10):** refers to the amount of air pollutant particulate matter 10 (PM10) detected in the atmosphere, calculated in mg/m3. The data has been collected in 2016 and data source is the EEA
- **RP 7.1.3 – Population in medium flood hazard zones:** refers to the percentage of population at risk located in medium flood hazard zones, as of 2017 and is calculated upon ISPRA data

The indicators of every municipality are normalized using the median of the study area (Northern Italy plus Tuscany and Marche). In the synthetic map based on these indicators (cfr. Map 36 – RP 7.1 – Environmental fragility), the warm tones represent the municipalities with at least two of the three indicators with values higher than the median (calculated in the LAU domain of the whole of Northern Italy with the addition of Tuscany and Marche regions). The most intense red color is reserved for municipalities with values above the median for all three indicators ("+++").

If a policy dimension needs to be handled on a broader scale, it is the environmental dimension. The issue of ecological transition has entered increasingly forcefully on the political agendas of European governments in recent years. both the specialized literature of ecological sciences and scholars of spatial planning have highlighted the inadequacy and weakness of environmental policies overly localized, in the face of the enormous challenges posed by phenomena often originating on a different scale than the municipal or provincial one, when not a consequence of choices made in other territories. In particular, the literature dedicated to urban metabolism has shown the need to consider the complex interplay that provides the ground for the contemporary urban world (see, among others Gandy, 2004). at the same time, the debate on ecosystem services, has highlighted the need to consider sustainability from a transcalar perspective (Potschin, Haynes-Young, Fish , Turner, 2016).

The regional portrait of IMAGINE approaches the topic of ecological transition by observing the deployment of different environmental phenomena with the macro-region lenses, analyzing how environmental challenges are shared within the whole territory between Milano and Bologna.

The first indicator RP 7.1.1 – Consumed soil focuses on soil consumption and provides a relatively predictable picture, with metropolitan areas having significantly higher indexes than in-between areas. In particular, the metropolitan area of Milan has a high degree of soil consumption, although contained in the south by the Parco Agricolo Sud Milano, which represented a recent barrier to further consumption with its institution in the nineties. Observing Map 37 – RP 7.1.1 Consumed soil, it is also evident how the consumption index remains high along the entire corridor. Only on its western side, towards the Apennines, it falls decisively. It is worth underlining how this map represents a picture of the state of the art (and therefore keener to portrait the state of the environmental ecosystem of the region). At the same time, the observation of the increase in land consumption in recent years would probably show different results, for example, by accentuating the weight of consumption in most virgin areas.

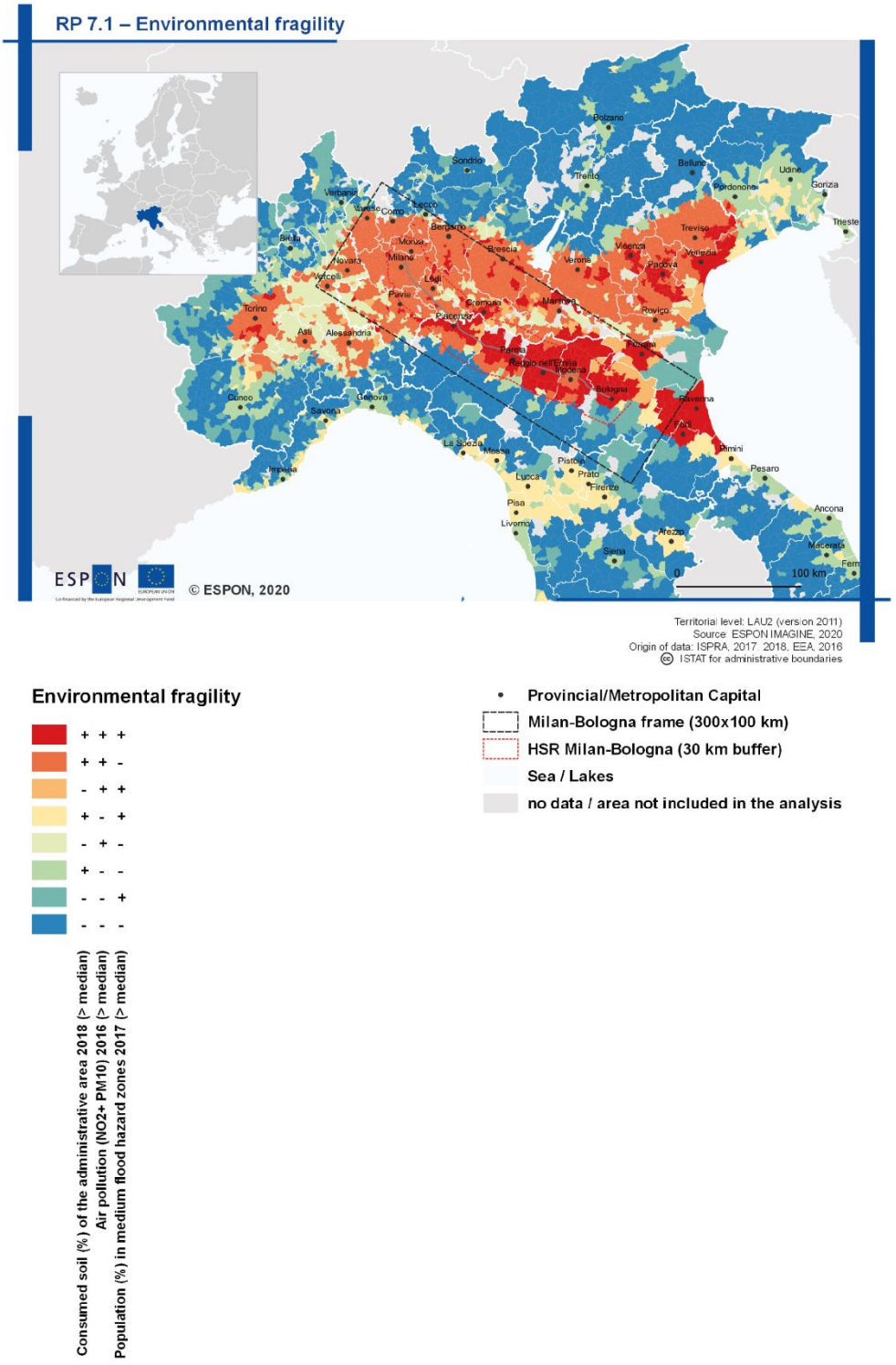
The second and third indicators (RP 7.1.2a – Air Pollution (NO2) and RP 7.1.2a – Air Pollution (PM10) are closely related and can be commented together as they both refer to the concentration of air pollutants (mg

/ m3). Both maps represent a critical situation for the Milan-Bologna urban region, even if the phenomenon of atmospheric pollution recurs with similar characteristics over most of northern Italy and with an even greater concentration on the axis looking at the east of Milan. It could be helpful to remind the different nature of these two pollutants. Nitrogen dioxide (NO2) is produced by all high-temperature combustion processes (heating systems, vehicle engines, industrial combustion, power plants, etc.), oxidation of atmospheric nitrogen, and, to a small extent, oxidation of nitrogen compounds contained in fuels. PM10 is a composite pollutant made of particles, solid and liquid, with various physical, chemical, geometric, and morphological characteristics. The sources can be natural (soil erosion, marine spray, volcanoes, forest fires, pollen dispersion, etc.) or anthropogenic (industries, heating, vehicular traffic, and combustion processes in general)[9]. Consequently, the correlation between polluting NO2 and the infrastructural corridor appears more evident.

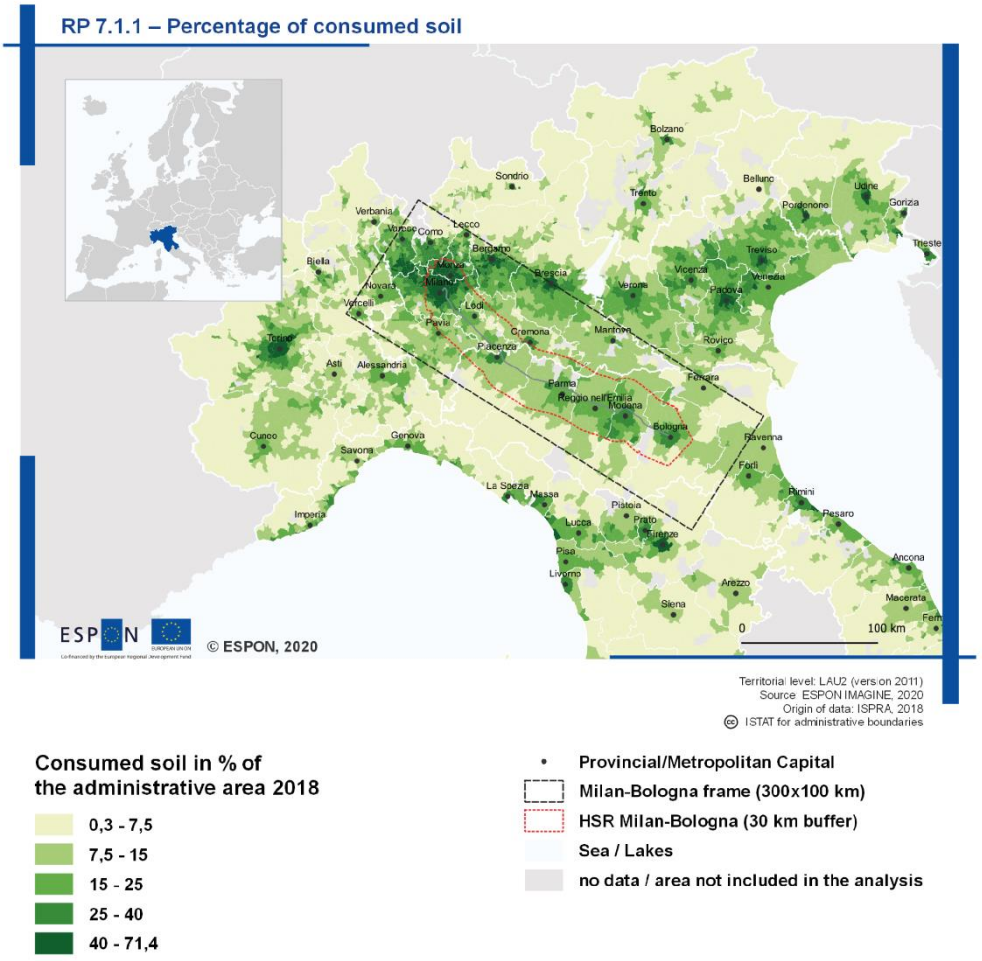
The third indicator RP 7.1.3 – Population in medium flood hazard zones, represents the hydrogeological risk factor, calculated on the percentage of the population resident in areas considered at flood risk. As can be seen in map Map 40 – RP 7.1.3 – Population at risk located in medium flood hazard zones, while the Lombard part of the macro-region does not present a significant risk, this increases exponentially along with the via Emilia from Piacenza onwards, drawing on the map a sort of cone that also includes the provinces of Ferrara and Ravenna. As the map emphasizes, this high-risk factor, although not directly correlated with the infrastructural corridor, appears as a characterizing element of the whole macro-region that is unique in the panorama of northern Italy.

The summary map resulting from the composition of the indicators mentioned above seems to identify the environmental challenges of the macro-region. Risk factors of human origin and closely linked to the intense urbanization of this territory and its crossing by a dense infrastructural corridor are grafted onto the hydrogeological fragility that natively characterizes the macro-region. Even with internal differentiations, it is evident that common environmental challenges cross the entire macro-region, posing a demand for transition strategies that require adequate medium and long-term planning and governance tools. In this respect, it must be mentioned that the environmental challenges associated with the whole Pianura Padana are significant concerns at both EU and local level: on the one hand, the Pianura Padana is one of the Italian regions identified at the EU level for their infraction to EU directives on quality of air; on the other side this urgent policy problem has been the object of a peculiar initiative, a supraregional agreement, signed by regional institutions of the Pianura Padana (among which Lombardia and Emilia Romagna) aimed to share of methodologies and tools for tackling with the problems of quality of air. However, the issue remains one of the most urgent to be addressed.

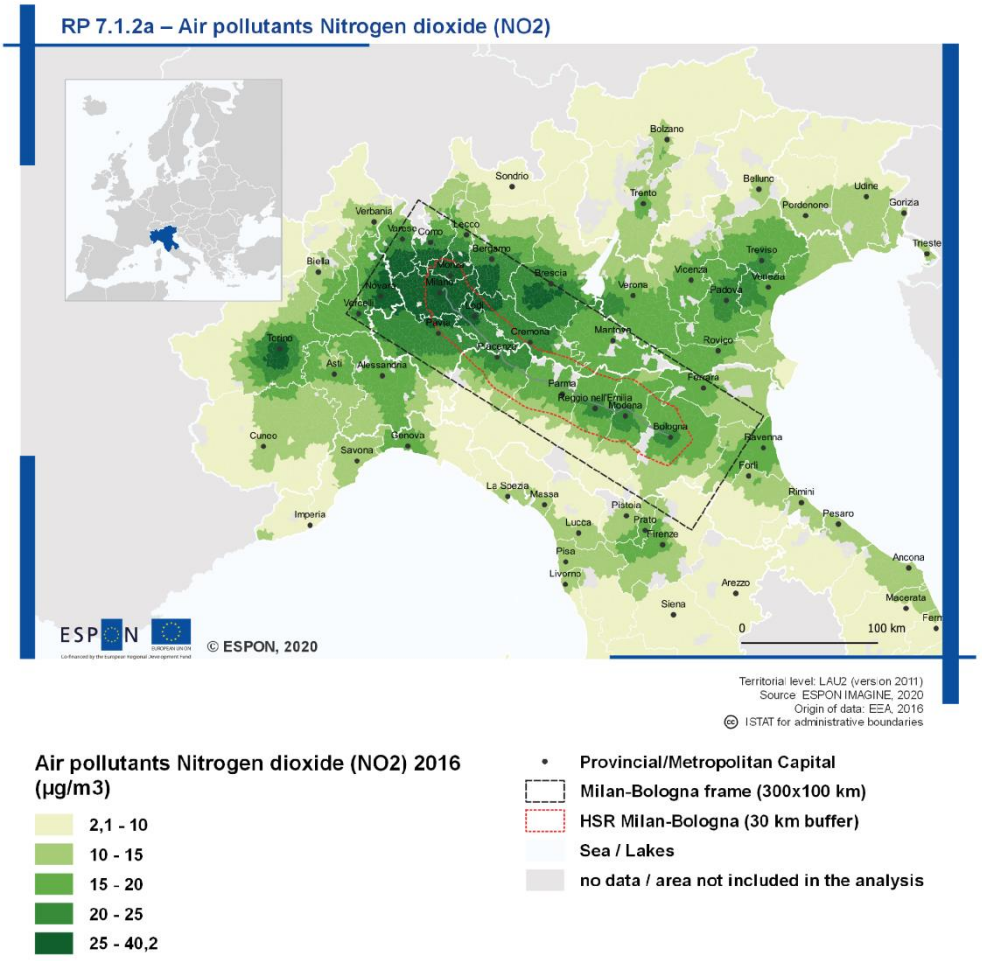
[9] https://www.arpalombardia.it/Pages/Aria/Inquinanti.aspx



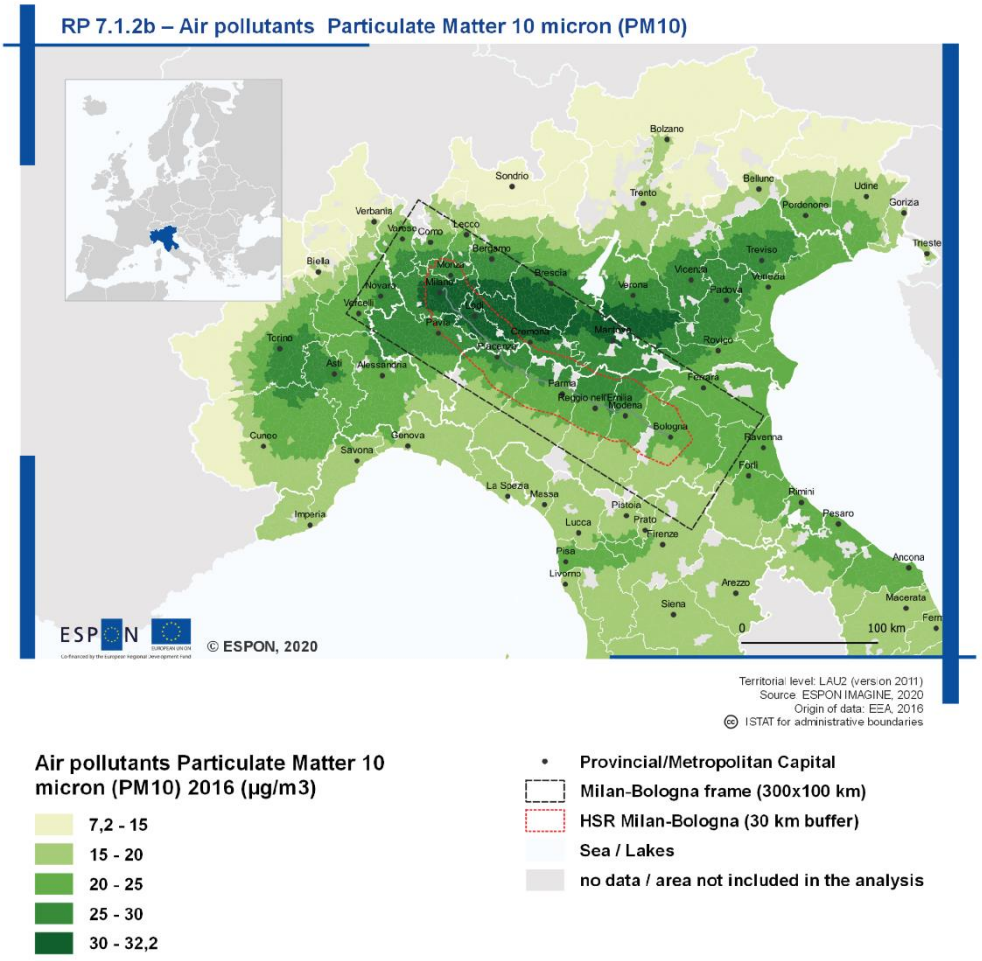
Map 36 – RP 7.1 – Environmental fragility



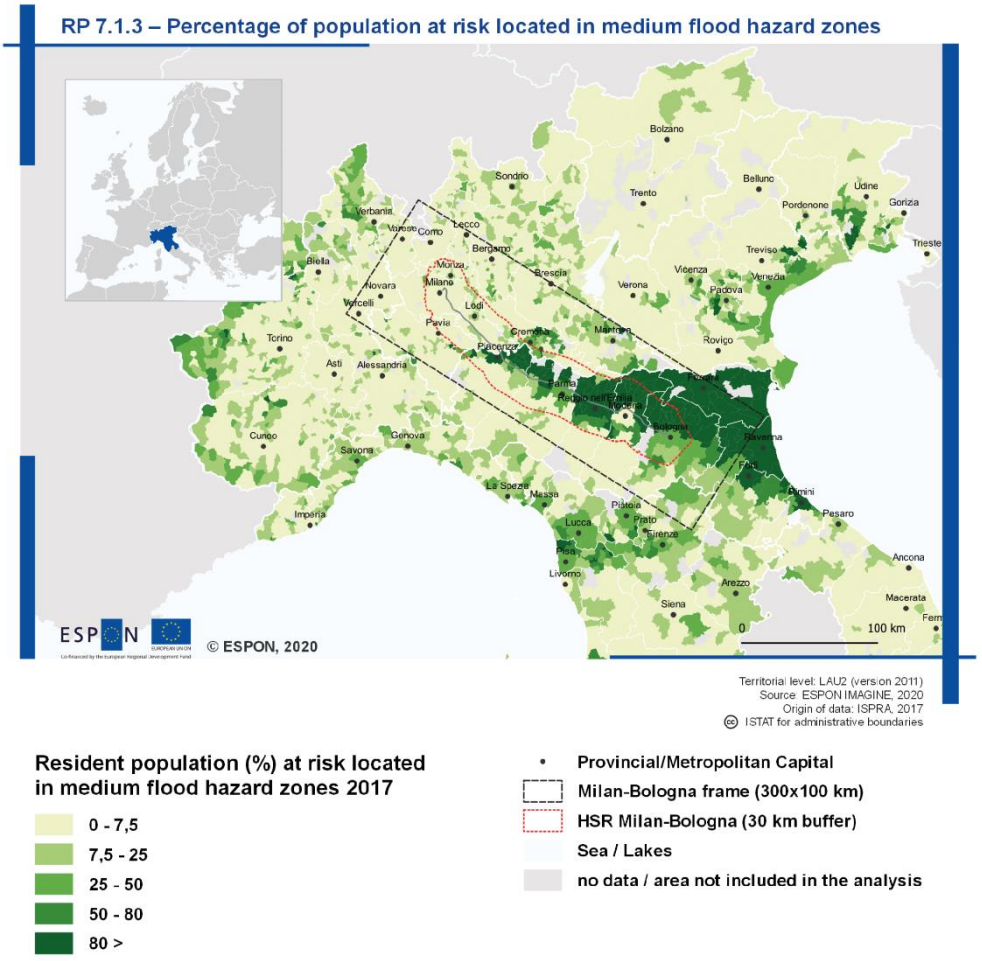
Map 37 – RP 7.1.1 Consumed soil



Map 38 – RP 7.1.2a – Air pollutants – Nitrogen dioxide (NO2)



Map 39 – RP 7.1.2b – Air pollutants – Particulate Matter 10 micron (PM10)



Map 40 – RP 7.1.3 – Population at risk located in medium flood hazard zones

1.10 Main findings of the regional portrait

When reinforced by relevant infrastructural projects like the construction and activation of an HSR service like the one observed in this report, processes of regional urbanization may act for or against territorial integration and cohesion, producing specialization and growth and introducing discontinuities, fractures, and cleavages. Following the suggestion of "the infrastructure scramble as an explanatory heuristic" (Kanai, Schindler, 2019) and the idea of "infrastructures as regionalization machinery," we tried to explore on the one hand the general conditions under which the urban agglomeration area between Milano and Bologna has been invested by processes of regional urbanization, producing highly interconnected polynuclear conditions. On the other hand, the direct and indirect impacts of the consolidation and development of one of the oldest and most strategic infrastructural corridors of the country in a modern technological space, potentially destined to confirm the role of this urban region as the backbone of the country and a crucial resource with the EU territorial framework.

Regionalization processes can produce significant integrative effects in large urban agglomerations, generating positive impact on economic development wealth, quality of life, and competitiveness. Simultaneously, the restructuring of the regional space can produce unintended negative effects on the dynamics of contemporary urbanization, where "places and their inhabitants may not fully benefit from urban centrality (economic development, access to services, comprehensive infrastructure support). However, they are still impacted by the spatial effects of urban extension that are the counterpart to increased agglomeration in cities, receiving various surpluses such as increased traffic, waste, and pollutants. They are subject to new forms of dispossession and violence" (Addie et al., 2019).

Moving from these assumptions, and drawing from the previous chapters, a synthesis of the main results of the investigation can be now introduced, trying to highlight the main observed trends and processes which are taking place favouring/confirming or hindering a process of functional integration generating a polycentric and integrated urban region.

Favouring and consolidating regionalisation:

- **A polycentric urban region.** The exceptional interaction between a fertile plain, two mountain systems, and a densely urbanized space makes it a peculiar urban region, with high proximities and connections between different settlement patterns. The whole urban area is densely populated and interconnected, organized in a polycentric structure that can count on an offer of highly qualified urban and regional infrastructures. On the one hand, a historical infrastructural corridor, recently consolidated by the HSR offer; on the other hand, a series of regional and urban strategic functions (universities, research and development poles, airports, exhibition areas) makes it a clear example of a polycentric urban region, based upon the interaction of the Milanese urban region and the polycentric system of mid-size cities of the via Emilia corridor. However, the distributive patterns of strategic functions do not correspond to an integrated strategy but are the outcomes of diverse local actors.
- **Regionalization patterns**. The overall density gradient (expressed as the ratio between density and distance from the central city) considering as outliers the largest cities of Milano and Bologna remains high along the corridor, among the highest all over EU (Eurostat, 2011); the same can be noticed observing the density gradient for each city (between 200 and 400 inhabitants/km2). This, on the one hand, confirms the Eurostat classification of the area as a predominant urban region mixed with a relevant intermediate region condition. It is also a crucial indicator of potential urbanity and urban complexity distributed over a regional scale and challenging a traditional identification of cores, peripheries, and marginal and central areas. The **regionalization dynamics** are also partially confirmed by the localization quotient of business services, where intermediate territories strongly interact with the provincial capitals.
- **Discontinuities (or not?).** The Po river course, located between the two urban macro-regions Torino-Milano-Venezia and Milano-Bologna, marks an **apparent, evident break in urban continuity**, but shall also be read for its specific nature of the Pianura Padana as an "operational landscape [Brenner, 2014]", as one of the most historical cultivated and anthropized planes in the country. On the other hand, this agricultural and naturalistic territory works as a cultural and landscape resource for the entire northern Italy macro-region. In this respect, it cannot be read as a simple void or rupture rather than an integrated and complex anthropized natural landscape.

- **Demographic positive dynamics are evident along the entire area around the buffer** (30km), with picks in Milano and (to a lesser extent) the southern area of its metropolitan city, with a trend that extends to include the provinces of Lodi and Pavia. The heart of the Emilian urban system shows a slower trend, stronger in Parma, average in Bologna and Reggio, and weaker in Modena, where it is balanced by the growth of the population in the peri-urban area. Degrowth can be detected in Piacenza and Cremona's provinces - except for the provincial capitals and mountain municipalities.
- **One of the wealthiest areas of the country.** Suppose we exclude some fringe areas, the remaining LAUs present at least one indicator above the median. Besides, the cities located along the Via Emilia are characterized by relatively high per-capita income and relatively high average prices of residential buildings. The Milano urban region again works as an outlier.
- **Regionalization of lifestyles**. The Milano-Bologna area is characterized by a ratio of working trips over mobility and interconnectedness of local commuting areas (SLL) well above the median. The extra-urban areas, typically characterized by high working trips ratio and local scale, are here less present than in the rest of Northern Italy. We are in the presence of **a model of everyday life organization, based on a solid local and regional mobility**, based on less hierarchic and polarised mobility patterns than in other urban areas.
- **Productivity as a regional continuum.** As opposed to what happens for the big firms' dynamics, where it is difficult to identify a real continuum, a clear corridor emerges, except for the municipalities of Pavia, Lodi and Piacenza, as far as the value-added per employee is concerned if compared to the other HSR corridors in northern Italy, such as Torino-Milano, Milano-Venezia, or Bologna-Venezia. The Milano-Bologna axis's productivity is very high, and this acts as an activator of other heterogenous spillovers for the interested areas.
- **A competitive economic corridor.** The Milano-Bologna corridor exhibits higher competitiveness if compared to other Italian corridors. However, something more should be done to foster the competitiveness of outer border areas, which lag under multiple perspectives, if compared to the main pole areas.
- **A mix of centrality and networked attitude at the institutional level**: the whole area is characterized by the diffusion of different kinds of polarities, playing the role of service providers under other conditions (metropolitan, territorial). At the same time, some of them have developed several experiences at sovra-municipal scales to address societal challenges. However, attitude to cooperation is mainly diffused in the southern municipalities of Emilia Romagna, while quite scarce in the Lombardia region. Metropolitan governance is trying to conquer a role in supporting territorial cohesion, while new functional actors are emerging with supralocal functional geography that could generate some innovative spatial imaginaries.
- **Common environmental challenges** characterize the region, of both internal and external origin. For the intense urbanization of this territory and its dense infrastructural corridor, the high level of air pollutants, and the hydrogeological risks that natively characterize it, the region is a territory under ecological threat. Even with internal differentiations, relevant environmental problems go across the entire macro-region, posing a claim for transcalar strategies of ecological transition that could tackle them and for an ecosystemic approach.

Hindering regionalisation

- **The environmental potential at risk.** The urbanization and anthropization dynamics, favoured by the accessibility and the economic prospects of the area, have progressively eroded the mountain areas' environmental potential and plans. Although this area de facto works as a bio-region along the Po-river hydrological basin, its environmental role is consistently challenged by the pressure of urbanization dynamics and economic ones. Processes of regional urbanization taking place can definitely impact the area's territorial resilience, exposing it to critical natural risks, with impacts on the socio-economic sphere. Pollution of the soils and waters produced by industry, vehicular traffic, and intensive agriculture, and livestock farming makes it one of Italy's most problematic environmental regions.
- **Threats to territorial cohesion.** From the socio-demographic point of view, **not all municipalities are experiencing positive growth and economic development trends** along the corridor. On

the one hand, the corridor attracts more consistent wealth in its immediate surroundings, like a magnet, producing potential demographic and economic shrinkage along the Apennines and the plains. A certain homogeneity of socio-demographic trends characterizes the Milano Bologna area, but more in-depth research unveils socio-economic differentiation patterns that contrast with its territorial cohesion. Certain territories have been benefitting more than others from the reinforcement of the infrastructural corridor. Others have been suffering from further peripheralization.

- **Growth differentials.** Within the 30km boundary from the HRS line, there is a spatial discontinuity when the provinces of Lodi, Pavia, Piacenza, and Cremona are considered, **where the overall competitiveness is broadly lower than the other provincial and metropolitan capitals of the corridor**. Moreover, the polycentric competitiveness of the Milano metropolitan area and the neighbouring provinces emerges. In contrast, at the other side of the corridor, higher degrees of competitiveness are visible within the linear axis of Emilia Romagna's provincial capitals of Bologna, Modena, Reggio' Emilia, and Parma. Decreasing levels of competitiveness are visible both at the eastern and the western side of the HSR.
- **The role of intermediary spaces.** We can notice an intermediate space characterized by the availability of wealth at the individual level, with reduced living costs. We can expect that these areas can play a central role in the future growth of the area and show potential frictions between request and offer of quality of living conditions and integration in the urban region in terms of accessibility.
- **The negative impact of HSR on the regionalization of mobility.** The introduction of the HSR has powered the accessibility only in those cities directly served by HSR stations while reducing the direct national connectivity of cities which HSR stations do not serve. This is particularly true along the corridor in the border contexts between the two regions and the regional capitals not supported directly by the corridor. The analysis of the impact of the HSR so far conducted, however, shows that the regionalization of mobility practices has been negatively impacted: HSR has worked as an accelerator of connectivity at the national level but at the same time has limitedly improved the regional connectivity and produced a hierarchization on specific cities, at the expenses of others, working like a pipeline rather than a backbone (at least in its initial phase).
- **Public resources distributed, but without a clear supraregional strategy**. Exploring the per capita distribution of EU resources at the municipal level, the two regional profiles appear different. Data provided by Agenzia per la Cesione territoriale represent a significant concentration of EU funds in the municipalities of the inner areas in both regions, with a narrow focus on the corridor, excluding Emilia Romagna's border municipalities partially Lombardia. Emilia Romagna also shows a significant concentration on the corridor but investing more in the intermediate cities than on the regional capitals.
- **Financial autonomy is an issue for small and big municipalities.** Exploring the financial autonomy indicator, municipalities along the corridor are more robust than in the general Milano-Bologna area, with values that seem higher in the municipalities around the provincial capitals. On the one hand, a careful investigation of these data could confirm the decentralization process's positive effects **on intermediate municipalities. On the other, the more problematic conditions under which small-medium size cities and large cities**.
- **Institutional fragmentation is high**. A consistent number of small municipalities are locked in and poorly networked, especially in the mountain areas in-between Milano and Bologna. Cities are more reluctant to cooperate. New functional actors are emerging on a regional scale, which has limited visibility but a growing strategic role in promoting a sovralocal imaginary. At the same time, smaller municipalities have generated or have been attracted by participation in sovralocal public utilities to provide services and facilities. The whole area is characterized by the coexistence of a condition of density and centrality of municipalities localized along the main corridor (and a certain degree of propension/need to cooperate) and peripherality and dispersion municipalities, which are often not even supported by a sovralocal governance framework. The corridor is characterized by poles (either dense or diffused) and interconnected municipalities: the main exception can be noted in the Pavia-Piacenza area, where several municipalities appear pretty loose in terms of participation sovralocal public utilities. The municipalities located south of Milano appear more locked and dispersed, while in the Regione Emilia Romagna, they are interconnected. The Apennines' municipalities on the western side of the corridor are the most dispersed, locked, and peripheral, while the eastern municipalities in the plain are dispersed but quite interconnected.

2 Milano-Bologna from a EU perspective: a brief overview

There is a long tradition of comparison between competing city or city-regions in Europe. But when it comes to cluster of city-regions, it is more challenging to identify comparative studies helping to explain the socio-economic-spatial organisation and compare the performances of such socio-spatial formations. What makes any comparison difficult is the lack of a univocal definition and identification of the objects to be reached. However, to support the reading of the Regional Portrait from a wider European perspective and help local stakeholders compare their situation from a comparative perspective, a brief overview of the current state of the debate has been developed. Of course, it does not represent a complete review of the literature, but it is meant to support the construction of a transcalar spatial imaginary.

2.1 Polycentric metropolis and polycentric urban regions

The foundational contribution in the early XXI century to the debate comes from the work of Hall and Pain, in the book "The polycentric metropolis. Learning from mega-city regions in Europe", which in 2006 identified six such urban formations in Europe (South East England, the Randstad (The Netherlands), Central Belgium, Rhine Ruhr, Rhine-Main, the European Metropolitan Region (EMR) Northern Switzerland, the Paris Region and Greater Dublin) characterised by a specific organisation. Indeed, a *Polycentric metropolis* is identified as "a series of anything between 10 and 50 cities and towns, physically separate but functionally networked, clustered around one or larger central cities, and drawing enormous economic strength from a new functional division of labour. These places exist both as separate entities, in which most residents work locally. Most workers are residents, and as parts of a wider functional urban region (FUR) connected by dense flows of people and information carried along motorways, high-speed rail lines, and telecommunications cables: the 'space of flows' (Castells, 1996, pp.376-428) with major implications for sustainable development (Blowers and Pain, 1999). It is no exaggeration to say that this is the emerging urban form at the start of the 21st century" (Hall and Pain, 2006, pg. 3).

Let's compare the six areas identified by Hall and Pain with the Milano Bologna region. We find that all in all, the Milano-Bologna analytical sample we have adopted covers an area of 34,709 km2 with a population of around 13 million inhabitants, with a rate of population change of 3.3% in the last decade.

MCR	Area km^2	Population 2000/2001	Population change % 1990/1991–2000/2001	Employment 2000/2001	Employment change % 1990/1991–2000/2001	Number of FURs
South East England	29,184	18,984,298	+13.5	9,040,000	+32.9	51
The Randstad	8757	8,575,712	+7.1	4,031,900	+29.0	25
Central Belgium	16,000	7,800,000	+2.6	3,320,000	+10.0	8
RhineRuhr	11,536	11,700,000	+1.1	5,4000,000	+3.4	47 (6)[a]
Rhine-Main	8211	4,200,000	+5.7	1,695,000	+1.7	6
EMR Northern Switzerland	13,700	3,500,000	+7.6	2,200,000	+6.7	8
Paris Region[b,c]	43,019	15,691,730	+2.9	7,660,880	+3.2	30
Greater Dublin	7814	1,637,267[d]	+9.3[e]	798,515[f]	+62.9[g]	1[h] (10?)[i]

Table 2 - Megacity regions in Europe (source: Hall and Pain 2006, p. 21)

		Area km²	Population 2019	Population Change % 2011-2019	Growth density pop./km2 2011-2019	Natural balance 2011-2018	Net Migration 2011-2018	Ageing index (LAU avg.) 2018	Ageing index change (LAU avg.) 2011-2018	Employment rate (LAU avg.) 2018
1	*HSR Buffer 0-15 km*	6.914	4.818.904	+ 6,2	+ 41	- 53.033	+ 336.598	156,3	+ 17,2	53,3
2	*HSR Buffer 15-30 km*	5.469	2.088.788	+ 3,0	+ 11	- 15.860	+ 79.686	168,1	+ 23,6	52,6
3	Extra HSR Buffers but inside the Mi-Bo analytical frame	22.325	6.157.226	+ 1,3	+ 4	- 78.627	+ 194.133	188,1	+ 24,3	50,9
Tot	**Mi-Bo analytical frame (300 x 100 km)**	**34.709**	**13.064.918**	**+ 3,3%**	**+ 12**	**- 147.520**	**+ 610.417**	**180,3**	**+ 23,1**	**51,5**

Table 3 - Core data of ESPON IMAGINE statistical samples

Since those foundational studies, literature has further developed the concept: in particular, the studies conducted by Meijers et al. (2018), proposed the definition of PUR, *Polycentric urban region*: "clusters of historically and administratively distinct but proximate and well-connected cities". "Moving from the assumption of "summing small cities does not make a large city" (Meijers et al. 2018, p. 2323), the study tried to map the integration between the cities that compose the polycentric urban region and the added value produced by the agglomeration. "The hypothesis is that those cities that are physically separate, but strongly functionally, culturally and institutionally knit together, resemble more single large agglomerations, and as such may be able to achieve higher levels of agglomeration benefits" (Meijers et al. 2018, p. 2323). Based on this hypothesis, the study adopts a morphological perspective, identifying those regions "that are characterised by a balanced size distribution of their urban agglomerations, with greater balance equated with higher levels of polycentricity" and uses the "Herfindahl (or Herfindahl-Hirschmann) index as a good, simple and novel measure to calculate polycentricity" (Meijers et al. 2018, p. 2323).

Country	Polycentric urban region	Polycentricity (Herfindahl–index)	No. of MUAs included	Population size[a] (x 1000)
DE	Rhein–Ruhr (Cologne–Dusseldorf–Essen–Dortmund)	0,12	39	12.190
IT	Napoli	0,42	10	3.714
IT	Venezia–Padova	0,43	3	1.401
IT	Firenze	0,39	6	1.090
IT	Parma–Reggio Emilia–Sassualo	0,31	4	675
IT	Messina–Reggio del Calabria	0,35	5	670
IT	Bari	0,51	7	584
IT	Lecce–Brindisi–Gallipoli–Nardo	0,43	4	532
IT	Ancona–Fano	0,24	6	494
IT	Trento–Bolzano	0,32	4	448
IT	La Spezia–Massa–Carrara–Viareggio	0,27	4	433
IT	Foggia–San Severo–Manfredonia	0,31	4	382
IT	Salerno	0,51	3	373
IT	Latina	0,26	5	320
IT	Cosenza–Lamezia Terme	0,53	2	313
IT	Agrigento–Caltanisetta	0,23	5	269
IT	Marsala	0,53	2	127
IT	Altamura	0,52	2	105
IT/CH	Milano	0,48	16	6.011
NL	Randstad (Amsterdam–Rotterdam–The Hague–Utrecht)	0,09	39	6.787
NL	Noord–Brabant (Eindhoven–Tilburg–Den Bosch–Breda)	0,11	17	2.083

Table 4 - Polycentric urban regions in Europe[10]

The study also highlights how the PURS is home to 25 percent of the population of the EU. On this base it identifies more than 100 polycentric urban regions, the most polycentric being the Randstad (Amsterdam-Rotterdam-The Hague-Utrecht and 35 other distinct cities), made by 39 cities, as well as the Rhein Ruhr. Interesting, Italy results as the country with the higher number of PURs, 18, followed by Germany (14). The

[10] Source: Meijers et al. 2018

Italian list of PURs comprises both Milan, considered as a PUR including part of Switzerland, and the Parma-Reggio-Emilia Sassuolo PUR. The first characterised by more than 6 million inhabitants, the second by more than 4.6 million. Summed together, they reach the largest identified PUR, that is the Rhein Ruhr with 12 million inhabitants, and show very high polycentricity indexes.

The same study tries to identify the correlation between integration in PURs and their performances: it so distinguished between PURs that perform significantly less in terms of hosting metropolitan functions that it could be expected, those that serve not significantly less; those who host more metropolitan functions than expected and those who perform considerably more than expected. The elaboration mapped below shows differentiated performances between Milano PUR, which seems to perform less than expected and the PUR Parma-Reggio Emilia-Sassuolo performs significantly more than expected. The result is interpreted based on three major groups of variables, basely functional, institutional, and cultural factors, arguing that functional integration has a more consistent correlation, followed by the institutional one (presence of a form of governance integration). In contrast, the third has less relevant role, despite associated with the others is a relevant factor. In this perspective, we can grasp the different characteristics of Milan PUR and Parma-Reggio Emilia-Sassuolo, where the unexpected results of the second can be easily explained by the combination of a stronger functional integration between mid-size cities embedded in economic districts, but also a long history of forms of cooperation and political alignment, differently from the more heterogenous and fragmented situation of Milano PUR.

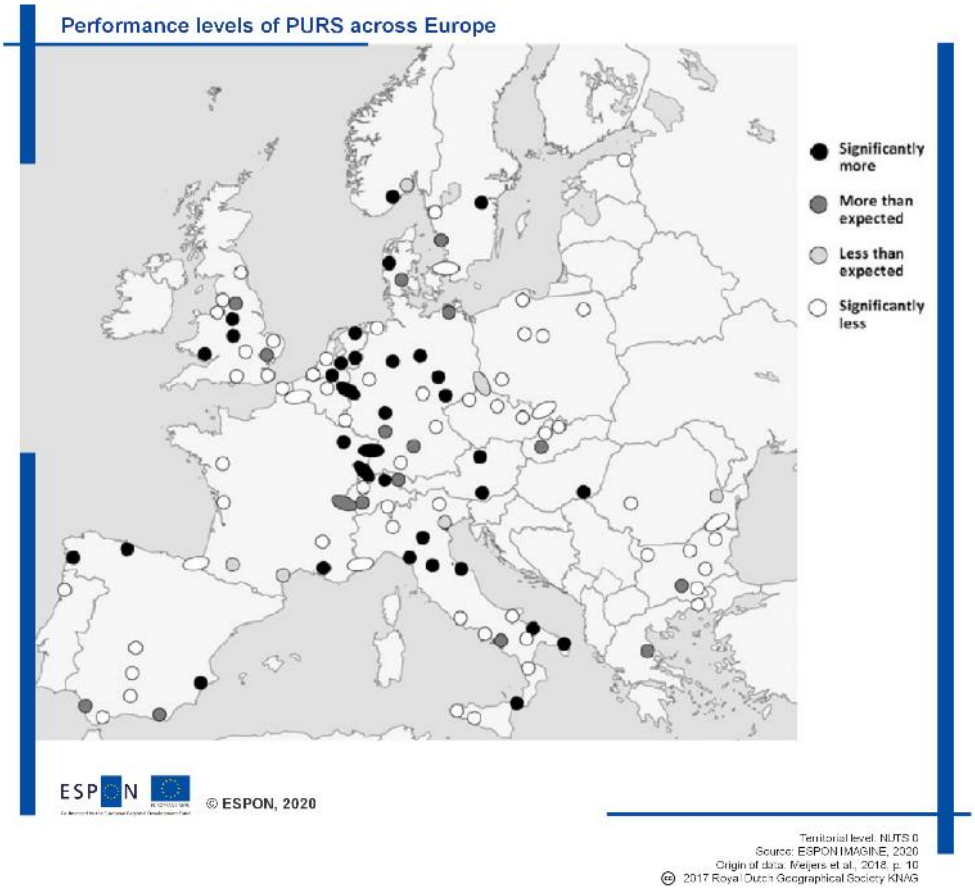


Figure 11 - Performance levels of PURS across Europe

Almost in the same years, Richard Florida's book, "Who's your city?", identified 11 megaregions in EU. The largest made by 60 million people inhabiting between Amsterdam, Brussels, and Antwerp. A 48 million people megaregion is recognized all over Italy, "the largest economic conglomerate in Europe and the seventh largest in the world". The study identifies a large urban region covering the north and the central regions, with no definite continuity solution.

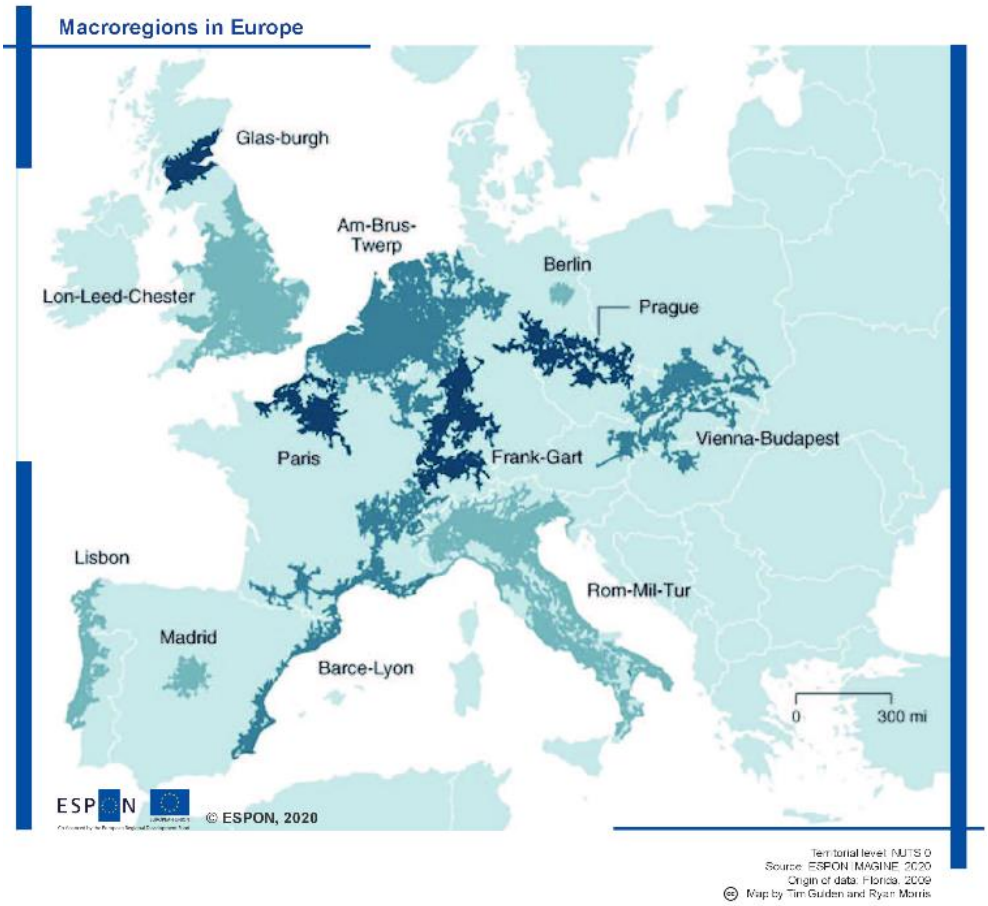


Figure 12 - Macroregions in Europe[11]

Florida's megaregion is based on two criteria: "it must be a contiguous lighted area with more than one major city or metropolitan region; it must produce more than $ 100 billion in LRP (Light-based Regional Product). By that definition, there are 40 megaregions in the world, covering 18% of the world population and producing 66% of its economic activity (Florida, 2008)" as quoted by Marull et al. (2013), which developed advanced analysis on the megaregions identified as below, according to the following methodology: "Given the definition of megaregion as an area characterized by substantial physical contiguity of human settlements, a minimum threshold of light intensity (DN = 8) and a minimum distance of 2 km grouping have been introduced. Using this methodological procedure in an accumulative way for a series of historical data (1992, 2001, 2007 and 2009)" and has proposed measurement of "the evolution of all megaregions in Europe", which for the Italian contest provides a picture of a continuous megaregion that seems to be covering the whole country, from Torino to Roma. Despite this picture could sound an extreme interpretation of the Italian polycentric system and its internal differentiation, it succeeds in suggesting the continuity and connectivity of the urban condition in Italy.

2.2 Eurostat Metropolitan typologies

Eurostat recently elaborated on the concept of metropolitan regions; they are identified as "NUTS 3 regions or a combination of NUTS 3 regions that represent all agglomerations of at least 250 000 inhabitants. These agglomerations were identified using the Urban Audit's Functional Urban Area (FUA). Each agglomeration is represented by at least one NUTS 3 region. If in an adjacent NUTS 3 region more than 50% of the population also lives within this agglomeration, it is included in the metro". According to this classification Eurostat,

[11] Source: Florida 2009

the Milano-Bologna urban region is interested in a series of metropolitan regions: Milan, Bologna, but also Parma and Reggio Emilia are listed as metropolitan regions.

Further to this, following Eurostat-OECD TERCET definition, in 2018 the whole country is characterised by the consistent presence, besides urban regions (36% in red) of intermediate areas (in orange, around 43%), data which are comparable to those of Germany (41 and 42 respectively) and France (35 and 35), while the urban regions are predominant in the UK and the Netherlands12.

The Milano-Bologna corridor in this respect is characterised mainly by an urban-rural typology, with a predominantly urban condition in the Milano urban area and a rural-urban one in the remaining. Actually, the Milano Bologna corridor presents interesting results. On the one hand, Milan stands out as "the largest functional urban areas (..) not centred upon a capital city (Italy; 5.1 million)" together with "the German urban agglomeration of the Ruhrgebiet (which includes, among others, Bochum, Dortmund, Duisburg, Essen, and Oberhausen; also 5.1 million) and Barcelona (Spain; 5.0 million)". At the same time, Emilia Romagna is one of the few exceptions where a noncapital region recorded the highest share of tertiary educational attainment (together with the Prov. Vlaams-Brabant (Belgium), País Vasco (Spain), Jadranska Hrvatska (Croatia). This speaks about an urban region that is characterised by an interesting high level of urbanity, as well as a sound economy. The report confirms the high level of "regional GDP per inhabitant in PPS terms" (…); in 2018, higher than average levels of GDP per inhabitant were primarily found in a band of regions that ran from the Nordic Member States, down through Germany and the Benelux countries into Austria and northern Italy, where the corridor is fully embedded". This positive picture is contrasted by data showing a compromised environmental situation, for example, related to the conditions of the mountainous regions, which are in the Apennines and Alps, ones with the highest levels of severe soil erosion by water.

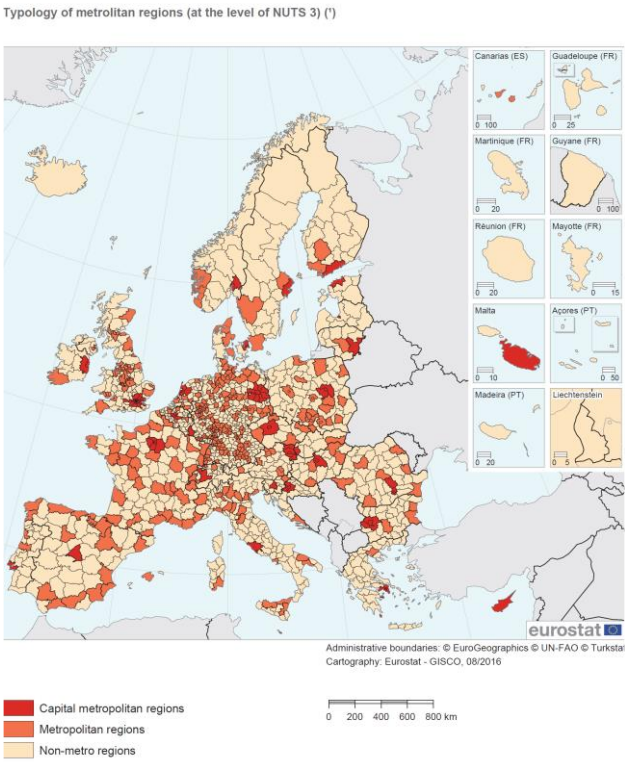


Figure 13 -Typology of metropolitan regions (NUTS 3)[13]

[12] https://ec.europa.eu/eurostat/cache/RCI/#?vis=urbanrural.urb_typology&lang=en; https://ec.europa.eu/eurostat/documents/3859598/9507230/KS-GQ-18-008-EN-N.pdf/a275fd66-b56b-4ace-8666-f39754ede66b?t=1573550953000

[13] Source Eurostat

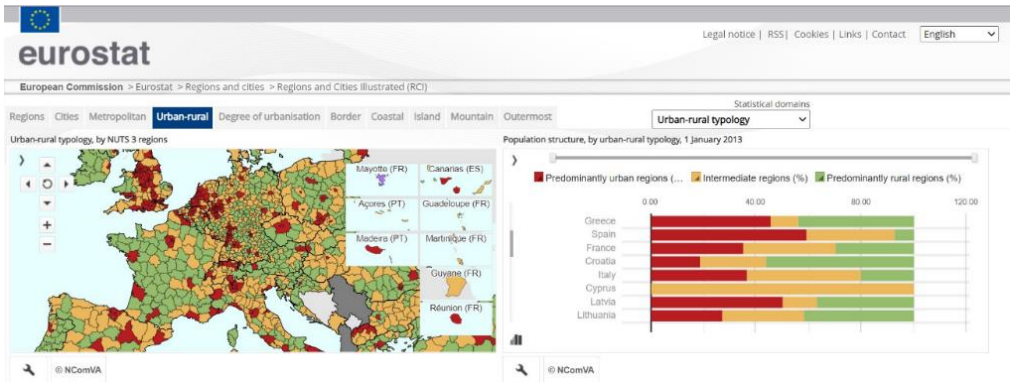


Figure 14 - Typology of metropolitan regions (NUTS 3)[14]

2.3 ESPON projects' efforts to map polycentric urban regions

Several ESPON projects have tried to address the issue of defining functional urban regions and polycentric urban development and the governance and policy-design challenges related to the emergence of regionalization processes[15].

- ESPON Urban areas as nodes in a polycentric development (ESPON, 2005): FUA.
- ESPON Study on Urban Functions (ESPON, 2007): FUA
- ESPON Best Metropolises (ESPON, 2013a): FUA
- ESPON FOCI (ESPON, 2010a): FUA
- ESPON Metroborder (ESPON, 2010b): FUA and MUA
- ESPON Polyce (ESPON, 2012a): FUAs, Core Cities and Metropolitan regions.
- ESPON GEOSPECS (ESPON, 2012b): provides definitions of territorial typologies: Mountains, Islands, Sparsely Populated Areas, Border Areas, Coastal Zones, and Inner Peripheries
- ESPON Ulysses (ESPON,2013b): LAU and NUTS delineations, and FUA
- ESPON M4D (ESPON, 2013c): MUAs and UMZ.
- ESPON Spima (ESPON, 2017a): 'Metropolitan Development Area' (MDA) for ten stakeholder cities.
- ESPON ACTAREA (ESPON 2017b) - explores the category of "Soft territorial cooperation areas", intended as flexible instances of territorial governance

More recently the ESPON FUORE (ESPON, 2020) project has proposed to identify metropolitan regions based on three main sources that provide complementary territorial perspectives, from urban/territorial functionalities to geographic specificities or Green Infrastructure (GI) potential:

- Territorial typologies from Eurostat (TERCET6)
- Areas of geographic specificities from ESPON GEOSPECS7 / ETMS8 projects
- Network of GI potential from ESPON GRETA9 project

Based on these three sources, the ESPON database has been organised to provide the opportunity for comparative data. It has recently been made available at https://fuore.espon.eu/, which offers interesting comparative tables to compare processes of regionalisation of the urban in different EU contexts.

A first interesting result can be formulated by observing the GDP at current market prices per inhabitants (2000-2015), where the continuity of the corridor can be identified, but also its different size if compared to other similar contexts, i.e., the German, the Dutch and the UK ones. The same can be observed for data

[14] Source Eurostat

[15] Source ESPON

related to Research and Development personnel (2005-2014). On another level, another interesting result can be found when observing that the identification of the Green Infrastructure functional region provided by ESPON GRETA (ESPON, 2019) and ESPON FUORE (ESPON, 2020) highlights the crucial role of the Apennines and the much weaker position of the Pianura Padana.

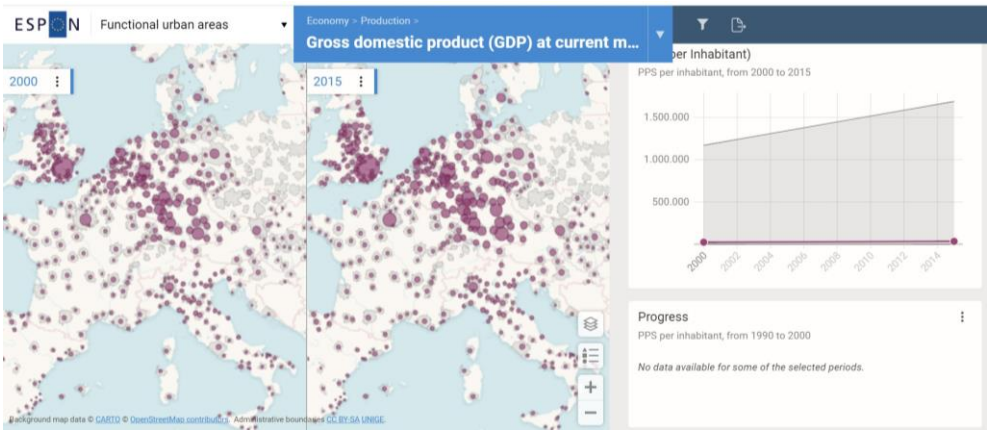


Figure 15 - Gross domestic product at current market prices/inhabitants, 2000-2015 (Source ESPON FUORE)

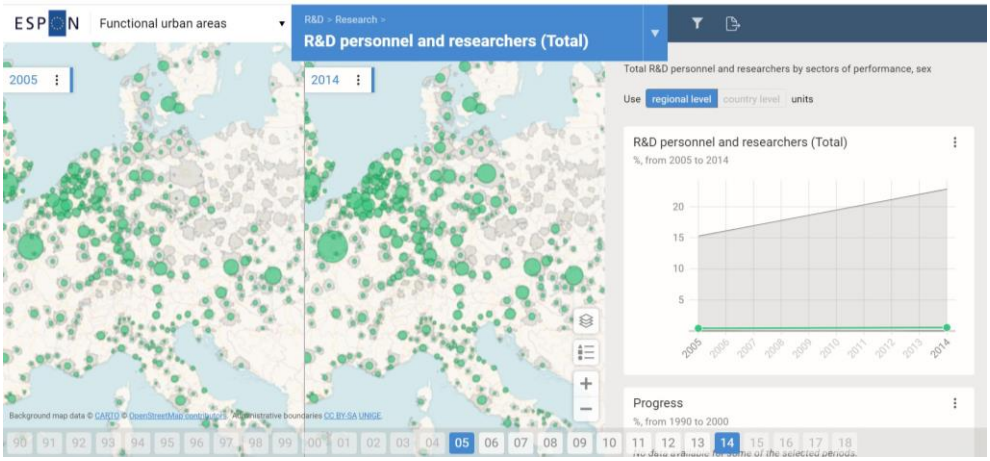
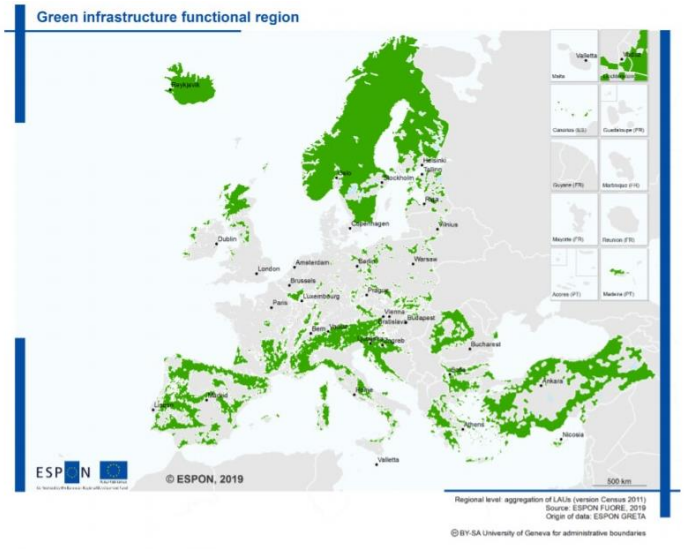


Figure 16 - R&D personnel and researchers, 2005-2014 (Source ESPON FUORE)



Source: ESPON GRETA, ESPON FUORE

Figure 17 - Green infrastructure functional regions (Source ESPON GRETA; ESPON FUORE)

Other interesting sources for comparing the Milano-Bologna Urban region are **European and Macro-regional Territorial Monitoring Tool — MRS. ESPON offers an online platform to observe the spatial**

development trends and patterns in Europe and its macro-regions. Milano-Bologna urban region appears in this context at the intersection of two macro-regions, the Alpine region and the Adriatic and Ionian region[16].

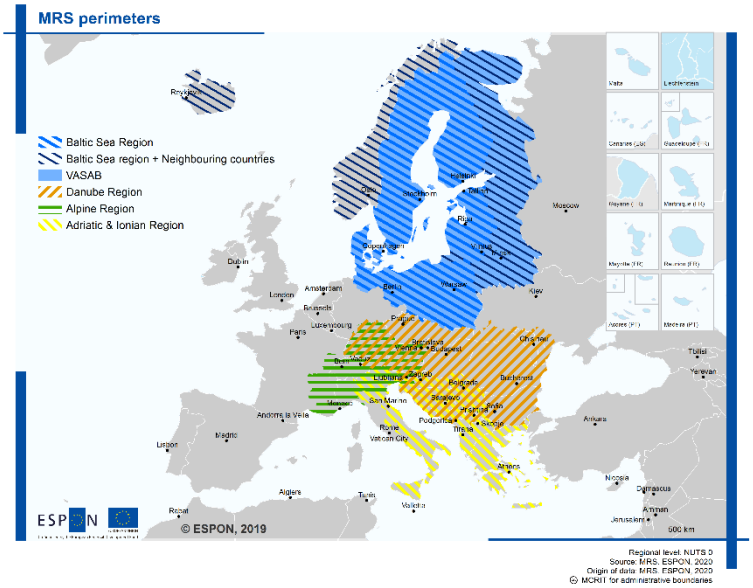


Figure 18 - Metropolitan regions perimeters, 2000-2015 (Source ESPON)

Data provided by this platform shows, in particular, the high accessibility of the Milano-Bologna urban region, when measured on the base of the functional urban areas here included, with higher value in Milan FUA, but generally high along all the corridor (based on 2020 data); while lower performances characterise data available for 2014 related to rail accessibility, despite consistently ranking relatively high in the EU context.

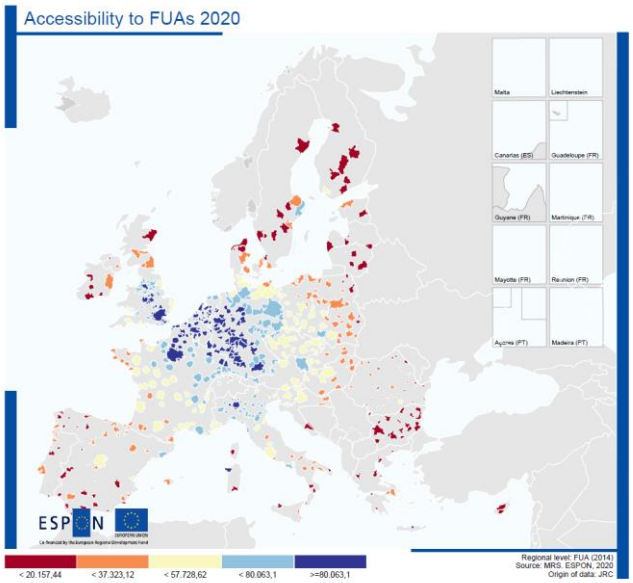


Figure 19 - Accessibility to FUA (Source ESPON)

[16] https://mrs.espon.eu/ESPON_SPACE/index.html

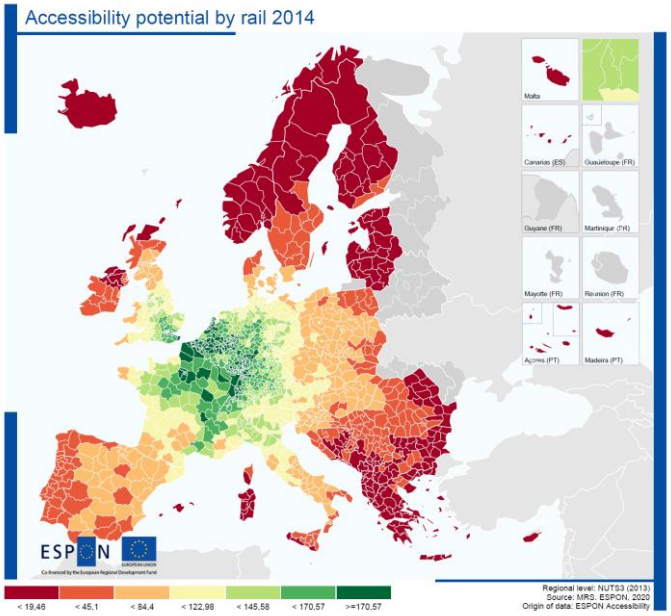


Figure 20 - Accessibility potential by rail 2014 (Source ESPON FUORE)

On a different plan, the results of ESPON PROFECY in 2017 clearly show a more contrasted picture when highlighting how all the area south of the Milano-Bologna corridor can be considered as an Inner periphery, based on the main driver being the lack of access to centres/ or services[17].

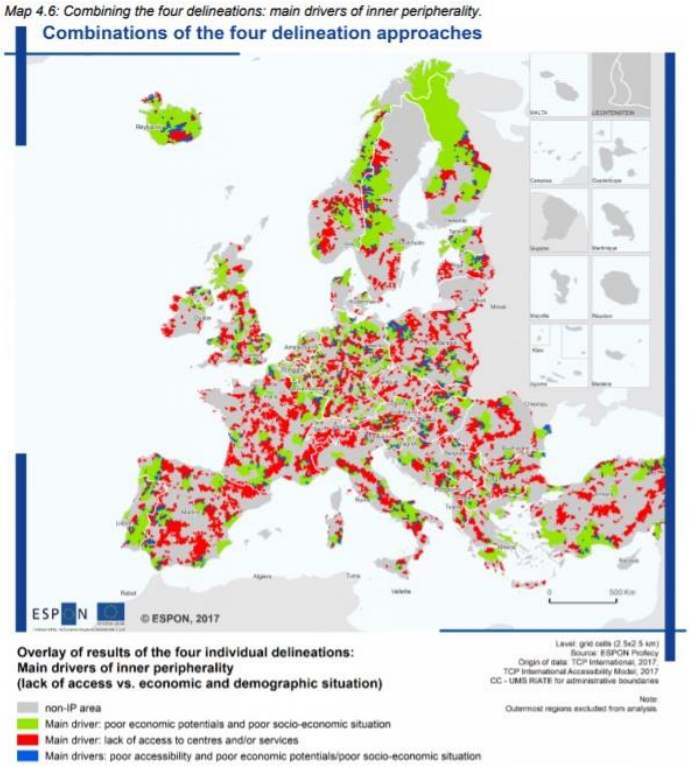


Figure 21 - Main drivers of inner peripherality (Source ESPON PROFECY)

[17] https://www.espon.eu/sites/default/files/attachments/D5%20Final%20Report%20PROFECY.pdf

An overall reconstruction of the specificity of Milano-Bologna urban region, can also be found in the ESPON project TOWN, where it can be perceived the coupling between Milan, classified as European Engine and High-Density urban clusters, but also territories of the dispersed population which identify a pretty peculiar situation.

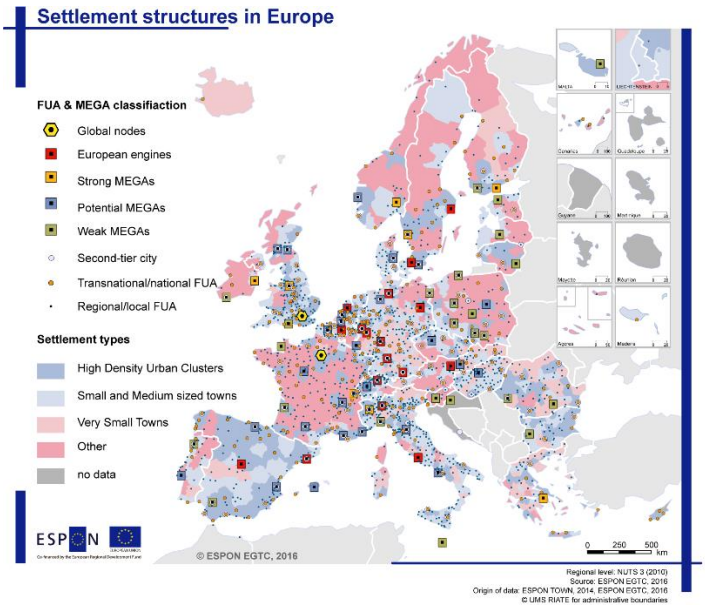


Figure 22 - Settlement structure in Europe (Source ESPON TOWN)

3 Milano-Bologna from an inner perspective: mapping local spatial imaginaries

Spatial imaginaries are a special kind of social construction: as such, they fulfill both **a representational and performative/normative role (Davoudi, 2018). On the one hand, they contribute** to sense-making and identity building; on the other, they provide collective representations of how the world should be, specifically from the relationship between places and people. A unique role has often been played by experts, mainly spatial planners, but also designers, architects, economists and researchers, and scholars, which have during times tried to suggest and contribute to the construction of socio-spatial imaginaries. Of course, more than that, social structures need society, which makes the construction of such things even more complex an issue. This third chapter builds upon a reconstruction of state of the art, trying to provide, on the one hand, a synthetic representation, mainly based on a critical review of existing policy documents and literature review.

3.1 Lagging behind: the fragility of a metropolitan/regional imaginary at the national level

From a general point of view, **urban imaginaries are central to constructing a European identity** and mainly based on a shared understanding of the tight and mutual interrelationship between the city and the countryside, the urban and the rural (Braudel 1979).

As De Matteis recalls us, the urban and rural, the city and the “contado”, have always been strictly considered a continuum, particularly **the Italian context** (De Matteis, 2015). According to the same author, this historical and fruitful nexus has been vigorously attacked when, in the ’60s and the ’70s, a fascinating debate about regionalism involving planners and urban scholars, as well as policy makers and politicians, succeeded in introducing the regional institutional level. If the early seventies were in fact a founding phase for a process of decentralisation based on a regionalist model, they also brought in a necessary but tricky simplification, which has been the object of reflective criticism in the following decades (see among others the work done by Fondazione Agnelli in the nineties). The institution of the Region, in the early seventies, on the base of a geography assumed from the existing statistical division of the national territory, rather than the outcome of a long process of experimentation based on the so-called “Comprensori”, **has de facto reduced the potentials of an advanced debate** on regionalism and the regionalisation of the urban. This has also set **the basis for a controversial role for the metropolitan-cities-to-be**, their future existence being confined to the little remaining space between the newly emerging regional authorities and the historical suspicion and diffidence versus metropolitan coordination on the part of large cites and small-medium cities and towns (De Matteis, 2015).

Despite that, even in Italy, during the last two decades, **a metropolitan perspective has slowly emerged in the institutional asset, trying to move beyond a city-centric approach and to deal with the emergence of new socio-spatial formations and urban questions** (Fedeli et al. 2020). Several attempts during the second half of the twentieth century developed a metropolitan perspective in light of growing governance/planning problems. The idea of introducing a metropolitan form of **government dates back to the sixties**, when it developed slowly and in a contested way in some of the largest urban areas in Italy, in particular in the Milano context, where the Piano Intercomunale Milanese produced a new spatial interpretation of the urban growth of the city of Milano, aiming at feeding a new planning process. Despite the interesting political effort and scientific contribution to the debate (see De Carlo et al.,1963, but also Quaroni, 1967), it failed to reach the results, primarily due to the excessive linearity expected by a new framework for action and the need of a planning tool to govern it (Balducci, 2004).

In the same years, the so-called **Progetto 80, l**aunched by the Ministry of Economic Development, tried to link developmental strategies and a new reading of the process of urban change in Italy, mapping 30 metropolitan systems, formed by nine metropolitan areas, six systems for re-equilibrium in the intermediate area and 15 alternative zones to develop ‘far from’ metropolitan areas to act as a counterbalance (Fedeli, et al. 2020).

Despite these exciting premises, metropolitan cities were to be instituted only in **the early '90s** and based on a quite traditional spatial interpretation of the emerging processes of urban change and idea of metropolitan government. The Law 142/1990 instituted first **a second-level territorial body,** the Provinces, based on the Roman provinces and Napoleonic geography, which were given territorial coordination. More interestingly, the same law established the possibility to institute 'metropolitan areas', but introducing a complicated and controversial institutionalisation process, de facto delaying their institution until 2015. Only in response to the need to reduce the effects of the 2007-2010 economic crisis by cutting public expenditure and the national deficit, the national government decided to invest more effectively in the institution of metropolitan cities. The outcome of this has been, so far, the still unfilled gap between the *de facto* city and the *de iure* city (Calafati, 2014).

Starting from 2015, thanks to an uneven (despite voluntary) convergence, between the 2014 Law and the National Operational Programme dedicated to Metropolitan Cities concentrating the ISUD (Integrated Sustainable Urban Development) resources (PON METRO), metropolitan cities have not only been instituted but have become operative. In particular, they were supposed to become a relevant vehicle to territorial cohesion, as suggested by one of the most strategic policy documents issued at the beginning of the current cohesion policy implementation period by the then Minister of Territorial Development (MIT, 2012). For the first time after decades, the national government was to conceptualise the emergence of a metropolitan dimension in Italy and focus on the related policy and governance challenges (MIT, 2012). The document provided an interpretation of the country as made of three different but highly interrelated conditions in need of specific developmental policies: metropolitan areas, inner areas and the southern regions. Actually, moving from that innovative ideas, a national strategy for internal areas has been designed (SNAI- Strategia Nazionale Aree Interne), as well as experimentation based on multilevel "city deals" in southern areas has been developed (called "Patti per il sud", in particular addressing urban areas in the southern regions, developing strategic visions). On the contrary, the country has not created a clear strategy for metropolitan areas (Urban@it, 2017).

Even more problematically, a national referendum to cancel the provinces and develop new regionally inspired governance and policy frameworks failed to provide a more systematic and efficient approach to the problem. At the same time, in the last ten years, a challenging debate has also involved the regional level. On the one hand, scientific societies like the Società dei Geografi, have tried to put forward the idea that the current regional geography should be revised under the light of a more reflexive approach to the historical as well as developing geographies of the country. On the other, at the political level, there are contradictory perspectives on the necessity to go towards a more clear-cut regional federalism, also differentiated, if necessary. Finally, the Covid-19 crisis has relaunched the critiques towards differentiation of powers between the existing regions, causing severe threats to territorial cohesion and equal access to resources and rights.

As in many other EU countries, the Italian situation **is characterised by a traditional model, under which metropolitan areas are still seen and treated as defined objects, rather than the agglomerational/concentrated part of more significant urban regions**). This can also be read through the nevertheless interesting contribution of reports produced by think-tank and research institutions during the last decade. While international studies paradoxically propose to think the Milano-Rome conurbation as an overall urban region[18], CENSIS, in its 47th report (CENSIS, 2013) still differentiated the Milano urban region (Milano, Bergamo Varese) within the typology "large urban regions" from the Bologna urban region (Bologna, Parma, Reggio, Modena)[19] part of the medium-size urban regions. Metropolitan boundaries remain the reference also for institutional reports (see, for example, the fascinating reports edited by the Presidency of the Council of Ministers, in 2015[20]), while the expert debate even at national level has definitely introduced the idea that the country is characterised by the emergence of large and complex urban regional formations, whose complexity cannot be grasped by the traditional metropolitan solutions (see among others, the concept of "città infinita", by Bonomi and A Bruzzese in 2005, until the idea of post-metropolitan territories by Balducci, Fedel and Curci, in 2017, a, b, c, d).

[18] http://www.creativeclass.com/_v3/whos_your_city/maps/#Mega-Regions_of_Europe

[19] https://www.censis.it/sites/default/files/downloads/6_-_Territorio_e_reti_2015.pdf

[20] http://www.affariregionali.it/media/170177/dossier-citt%C3%A0-metropolitana-di-milano.pdf for the Milano case and http://www.affariregionali.it/media/170175/dossier-citt%C3%A0-metropolitana-dibologna.pdf for the Bologna case

Moreover, a recent research work produced by OECD in 2019 [21] has highlighted in this perspective how metropolitan cities in Italy are far from displaying their potentials, both in terms of competencies and powers, agency, and resources due to several factors, among which their weak powers and the difficult relationship with the regions and the most important municipalities and the lack of resources, contributing to less than 1% to the public expenditures.

More recently, even the **National Statistic institute (ISTAT)**, working on the redefinition of Local Labour systems, highlighted the distance between the actual city and its institutional framework; the Milano urban region is taken as an example of how the functional urban region goes well beyond the metropolitan city boundaries, including a large part of the Provincia di Pavia [22]. The same report proposes to read the inter-relations between the "città del centro nord", a large urban region composed of major cities (Milano, Torino, Venezia, Bologna, but also Roma) and the "città diffusa" and the "città verde", composed by several local labour system that links together the largest dense conurbations with an extended form of urbanity or a more a rural vocation, among which we can find both Pavia and Piacenza labour systems.

In the background, this exploration should also include a reference to the role that programmes supported by EU cohesion policy or other regional policies have played: ITIs are a few in Italy, and mainly "used to support development in Inner areas, to develop urban-rural linkages; while Italy is, together with Slovenia, the only member states to use the ITI mechanisms for cross-border areas (the Gorizia – Nova Gorica territory)"[23]. In the past, Italy has experimented an exciting season, through the so-called "patti territoriali", which have probably been one of the most interesting operative frameworks trying to reconstruct action-oriented geographies, beyond traditional boundaries. Within the Interreg programme, finally, the urban region under scrutiny results mainly included in the Interreg Alpine Space and Adrion, which have provided some interesting elements for reflection, as well the Macro-region EusAlp and EusAir strategies, which intersect along the Milano Bologna urban region[24].

The outcome of this complex jigsaw is the **coexistence of weak metropolitan cities**, whose role is still to clarify, though officially due to developing strategic planning and translocal visions, **the persistence of provincial institutions**, mostly emptied by the reform and only partially redefined at regional level, **the growing role of regional institutions**, within the framework of what is defined incomplete federalism, still under question. As suggested by Piero Bassetti in a recent research project, Italy is probably experiencing a period under which there is much scope for a thorough revision of its territorial institutions, particularly moving ahead to a new regionalism[25].

This need is mainly made evident by an extensive literature available on the topic produced since the 2000s at least and a series of articles, also on newspapers, which are since then following the debate (see among the latest, in particular, the newspaper articles by Dario Di Vico[26]).

3.2 Sectoral policies towards new spatial imaginaries: the infrastructural corridors

In the last decades, several sectoral policies have implicitly or explicitly fed new spatial imaginaries, particularly regarding the spatial figure of "corridors", mainly regarding infrastructural policies.

In this respect a few but strategic corridors pass through the Milano-Bologna urban region, and during the last decades, the historical role of the via Emilia (SS9 National road), linking together since the Roman times, a polycentric urban system from Milano to Rome, has kept its national importance but has been reclassified in relation to EU strategies. It has been identified in fact as part of the **core network at the national level**,

[21] OECD, 2019, Studi economici dell'OCSE, Italia, Aprile 2019

[22] https://www.istat.it/it/files//2015/10/La-nuova-geografia-dei-sistemi-locali.pdf

[23] https://documents.worldbank.org/en/publication/documents-reports/documentdetail/611251580281503298/romania-catching-up-regions-organizational-models-forinterjurisdictional-agreements

[24] https://s3platform.jrc.ec.europa.eu/eu-macro-regional-strategies

[25] http://www.globusetlocus.org/Attivita/Progetto/Formazione/Macroregioni.kl

[26] https://www.corriere.it/cronache/17_settembre_17/alta-velocita-export-festival-89dd1130-9b23-11e780fc-22410b7aecf1.shtml

in front of the identification of a **series of strategic corridors at the EU level,** within the Trans-European Transport Network (TEN-T) policy, based on EU Regulation No 1315/2013 (that aims at addressing the development of a European network of railway lines, roads, inland waterways, maritime shipping routes, to strengthen social, economic and territorial cohesion in the EU). These corridors cross by the area under study: in particular the Baltic Adriatic corridor (which reaches Ravenna, from Venice to the Baltic Countries), the Mediterranean corridor (which links Portugal to Slovenia, passing through the Turin-Milano-Venice axis), the Rhine Alpine corridor, passing through Milano and connecting Genoa with Antwerp and Rotterdam, with the Brennero axis)[27]. Nevertheless, during the last 15 years, Italy has invested consistently in this corridor, promoting a High-Speed Railway System that links Milano with Bologna in one hour, heading to Rome and Naples, with an intermediate station in Reggio Emilia, called Medio-Padana and destined to serve one of the wealthiest and most productive territories of Italy. The station, opened in 2014, is a clear example of how the infrastructural policy has been inspired by a powerful socio-economic and spatial imaginary, implicitly based on the research that during the '80es has identified the so-called "Third Italy", a Marshallian districtual model based on advanced clusters of small and medium enterprises, highly specialized, competitive and localised, whose presence is particularly relevant in the urban region under study.

A similar role has been played by the investment, public and private, in the **logistic sector,** developed along the last decades **along the corridor**. A study conducted in the late 2000s by the Chamber of Commerce of Milano (CCIA Milano, 2009[28]), showed already the emerging importance of a logistic region around Milano, based on platforms serving Milano urban areas along its borders and of a 'Mediterranean logistic platform' linking Milano vs. Rome, Inside this perspective, the project launched in 2004 by the Italian Ministry for infrastructures had already identified, within the so-called "strategic territorial platforms", at the transnational, national and regional level, twelve "territori snodo", where pilot projects had to be developed able to link infrastructural accessibility to economic development. The elaboration of the project "Piacenza territorio snodo"[29], in those years, paved the way to the new logistic role of the city and the province, situated at the intersection between two crucial infrastructural corridors. It is possible to place within this framework also the Italian "Piano Nazionale della Logistica 2011/2020" (National Plan for Logistics 2011/2020) promoted in 2010 by the Italian Ministry of Infrastructures and Transport that identified 7 different "territorial platforms" in Italy. The Pianura Padana (Po Valley) area is divided in 3 platforms: North-West (Valle D'Aosta, Piedmont, Lombardy, Liguria); North-East (Veneto, Friuli Venezia Giulia, Trentino Alto Adige), Central and Northern (Emilia Romagna and Tuscany). The hinge between the North-West and the Central and Northern Platforms can be easily placed in the infrastructure beam developed parallel to the ancient Via Emilia (today, the SS9 National road).

From the people's mobility point of view, **data clearly show that mobility patterns are highly interrelated over the urban region** (Pucci et al. 2015). The last decades have seen a significant investment in the regional railway systems serving the two regions Emilia Romagna and Lombardia, under the new competence of the regional governments. If Pavia, in this respect, is still largely dependent on Milano for its main regional mobility, Piacenza clearly shows the need to deal with an intermediate position between the Milano and Bologna, gravitating by large on the Milano attraction area, rather than on the Bologna one. The lack of an interregional vision is lamented for a long time in this respect. In the last decades, the regionalisation of the competence has de facto augmented the existing contradictions, producing a regional metro system rather than an actual interconnection along the corridor and between the urban region.

The **urban renewal project of the Via Emilia**, launched by the Region Emilia Romagna in 2009[30], to regenerate the image of the national road supporting the polycentric urbanisation of the Regione Emilia-Romagna, investing in the construction of a new landscape and identity for the historical road, can be seen as one of the latest attempts to read it as a complex and interrelated urban system, while during the late '90s this system has been fragmented by a series of infrastructural projects and bypasses, functional to avoid the urban areas to be loaded by traffic, but quite irrespective of the identity of the historic road. Nevertheless, from a spatial imaginaries' construction point of view, the via Emilia is one of the oldest elements in supporting the collective imaginary of urbanisation processes in Emilia Romagna.

[27] https://ec.europa.eu/transport/themes/infrastructure/ten-t_en

[28] https://www.milomb.camcom.it/archivio-ricerche-2009-i-flussi-logistici

[29] https://www.comune.piacenza.it/temi/territorio/psc/psc-documento-preliminare/allegato-1-territorisnodo

[30] https://territorio.regione.emilia-romagna.it/paesaggio/studi-analisi-e-approfondimenti-tematici/viaemilia

An additional and crucial effort of working at macroregional scale, supported by a series of acts and policies, is related to the field **of air pollution**: the scientific evidence of the emergence of a large macroregion being affected by common environmental pollution factors, slowly emerged during the '90s, and finally succeeded in generating shared actions among the regions, included Lombardia and Emilia Romagna to tackle with the problem. In this respect, in the last decades, there is a growing awareness of the Pianura Padana as a socio-spatial-economical continuum generating problematic consequences of quality of health due to the interactions between processes of urbanisation, organisation of the manufacturing activities, as well as agricultural vocations of this complex region. In this respect, it is essential to remind that the need for regional cooperation on this issue has consistently appeared during the process of regionalisation of the country: the most interesting tools in that respect are deals/pacts which regions can use to go beyond regional boundaries and deal with shared problems, among which that of air pollution that affects the broader area of northern of Italy. This is the same ratio under which the initiatives supported by the Ministry of Environment (recently retitled under the title Ministry of Transition) are supporting a new dialogue between the metropolitan and regional scales in order to build agendas for sustainable development.

3.3 Experimentations from below and from above: the tension towards a regional/metropolitan imaginary

A third dimension, under which one can observe interesting elements for the construction of spatial imaginaries is the one generated by **local initiatives**, in particular, those elaborated and promoted by the core metropolitan cities along the corridor on the one hand, and by the medium-size cities, like Piacenza and Pavia, from their respective point of view. The absence of a national framework producing spatial imaginaries and vision is counterbalanced by a rich and interesting story of local working sites.

Both metropolitan cities of Milano and Bologna, on the one hand, share an interesting role (also impacting at the national level) in the construction of broader regional imaginaries. They both have been, in fact, the pivot of a regional urban scale reflection since the sixties (and even before).

With the promotion of the so-called Piano Intercomunale Milanese (PIM) at the beginning of the '60es, Milano started reflecting on its development from a regional perspective. PIM was a voluntary association of 35 municipalities that became 94 in 1968. The preliminary studies for the Plan led to the construction of two different territorial development hypotheses. The first one was the "Turbine" model proposed by Giancarlo De Carlo (with S. Tintori and A. Tutino) that prefigured an urban structure shaped like a turbine where wide green areas were preserved between the urbanized blades. The second proposal (by M. Bacigalupo, G. Corna Pellegrini e G. Mazzocchi) referred to the "Linear development" of the city following the main transport inter-regional infrastructures along the Alpine and Apennine foothills. The two alternatives were irreconcilable and never resulted in the construction of a real Inter-municipal Plan. In the following decade, the PIM assumed the role of a research centre. Still, the two proposals, especially the "Turbine" model by De Carlo became a cultural reference for the sovra-local planning activities in the area of Milano.

Despite a consistent cultural effort, along with the eighties and nineties, the city remained stuck in its municipal borders. Only **in the middle 2000s became again interested in the construction of new spatial imaginaries**. The public debate launched by the book Milano Nodo della Rete Globale in 2005, by the Chamber of Commerce, set the scene for the launch of a Strategic project for the Milano urban region, promoted and supported by the then Province of Milano, under the initiative of the Assessore al Piano Strategico Daniela Gasparini and with the collaboration of a team of expert of Politecnico di Milano. This was probably the highest point in the creation of a regional imaginary in the most recent history of Milano institutions, and part of a wider debate in which a series of local actors started collaborating in the light of a new spatial imaginary. AIM (Associazione Interessi metropolitani) for example, among others, already before those years and Globus et Locus, in the late 2000s, were key to investigate the new interrelated nature of the urban fabric. The same for Fondazione Irso, which, with the Progetto Nord, launched a space for a wider reflection at the regional level in those years.

A strategic patrimony of ideas and contributions, which, despite being still far from the institution of the metropolitan city, settled down the idea that Milano could no more be considered as a traditional city, being de facto a region home to 9 million people, going beyond provincial and regional boundaries, if not national ones. An urban region, as defined by the Strategic Project "Città di città" (Balducci, Fedeli, Pasqui, 2011), is part of a wider urban region and articulated in specific territorial and urban formation.

Despite the intensity of that season, the Strategic Project "Città di città" failed to become enforcing and feeding a renewed policy agenda and programme, notwithstanding the investment that the city of Milano, under the mayor Pisapia, made in the preparatory works for the parliamentary discussion of the 2014 law instituting metropolitan cities. After the constitution of the metropolitan city, the most recent years have seen Milano metropolitan city active in promoting the new institution but relatively weak in developing on metropolitan/regional imaginaries perspectives, primarily through its first and second Strategic plan[31], the tool through which metropolitan cities should structure their policy agenda and project every three years. Indeed, the metropolitan city is still highly compressed between a municipal government which has much invested on the new centrality of the "city" at national and international level and that nevertheless today remains constitutively its main engine (the Mayor of the metropolitan city, is by law, the mayor of the city, until when a local referendum will allow going for direct elections) and a regional one that still plays a limited role in devolving to metropolitan cities strategic competences. **The result is the lack of a clear investment on new spatial alliances**, despite the work done since the 2000s had seen a convergence between the scholarly debate, which had identified the necessity to look at the city as a part of a wider urban region (Balducci et Al. 2017)[32] and that of the stakeholders' contribution, focus on the emergence of a new metropolitan/regional dimension (see among others, the book Milano Metropoli Possibile, by Assolombarda, 2016). The final result is a paradox: although the city is aware of its broader regional dimension, there is little scope at the moment for a clear engagement in this perspective, as shown by the recent failure of a research proposal, developed by Globus & Locus to promote research on the topic[20]. The recent approval of the Piano territoriale Metropolitano, actually paves the way to the selection of key thematic strategies which could collaborate in a wider regional perspective.

In the background, powerful spatial imaginaries as those promoted by EU projects, like *the Interreg Alpine Space*, have forced the urban region to reflect upon its strong relationship with the Alpine arch, being the recent candidature to winter Olympics an unprecedent fact, that can be read in this perspective.

From the Regional perspective, the most interesting contributions can be detected in the preparatory work for the **Piano Territoriale Regionale and the Programma Regionale di Sviluppo**, and in particular in the work developed by the regional research institute Polis, in the early 2010, where the emergence of the environmental and economic interdependences between the northern regions of the countries has been strongly discussed[33] ("La macroregione del Nord") and studied. The most recent revision of PTR (Piano, Territoriale Regionale, 2019)[34], supports the idea of a polycentric region, able to counterbalance the metropolitan agglomeration of Milano. While the identification of emerging and historical polarities completely bypasses the relationship with Emilia Romagna, mainly including it in the Lombardy metropolitan system description, while including the EU corridors and some emergent polarities just aside and a new one emerging between Lodi, Cremona, and Crema. The central integrating factor between the two regions remains the Po River basin.

Bologna, on the contrary, can count on a history of clear symbolic and pragmatic investment on the metropolitan dimension. More cooperative and effective. The concept of **Bologna as a Metropolitan city** is rooted in the research activities that in 1964 led to the "Schema di sviluppo della regione Emilia-Romagna" by Comitato Regionale per la Programmazione Economica (CRPE) and in the contents of the Piano Intercomunale di Bologna (PIC), created between 1960 and 1967, that involved the first 17 municipalities that sor-

[31] https://www.cittametropolitana.mi.it/PSM_2016_2018/piano_strategico_metropolitano/

[32] see Balducci et Al. 2017, where the emergence of an urbanoid galaxy along the north of Italy has been identified and since the early nineties the works of Secchi, Macchi Cassia, Boeri, Marini and Lanzani among others),

20 https://www.regione.lombardia.it/wps/wcm/connect/6c3d50bb-ed45-4f93-8474-2bbda07d8d58/PTR++2+Documento+di++Piano+%28aggiornamento+2019%29.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-6c3d50bb-ed45-4f93-8474-2bbda07d8d58-m.8wtKF

[33] see in particular https://www.polis.lombardia.it/wps/wcm/connect/b12bfb1d-d292-4d9b-b7aa64181b55439c/La+Macro+regione+del+Nord+Italia+una+realt%C3%A0+concreta.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-b12bfb1d-d2924d9b-b7aa-64181b55439c-mmJJDUj

[34] https://www.regione.lombardia.it/wps/wcm/connect/6c3d50bb-ed45-4f93-8474-2bbda07d8d58/PTR++2+Documento+di++Piano+%28aggiornamento+2019%29.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-6c3d50bb-ed45-4f93-8474-2bbda07d8d58-m.8wtKF

round the core city, grouped in an administrative union called “Comprensorio”. It is a story of ‘tension’ between the polycentric structure of the regional territory, mainly organized along the Via Emilia as the historical development axis, and the will to establish new ‘perpendicular’ lines of development within the Pianura Padana (Po Valley area). Although never officially approved, the “Schema direttore” of the PIC continued to work in the next decades as a powerful reference for the planning activities in the area of Bologna.

During the ‘80es, the regional territorial plan “**Piano Territoriale Regionale” (PTR)** was developed and it was finally approved in 1990. The role of Bologna as the possible metropolitan city of Emilia-Romagna seemed to decline again in favour of the regional polycentric territorial structure. It resurfaced in 1994 when an agreement between Municipalities belonging to the Province of Bologna was signed and led to the voluntary creation of a metropolitan Conference of Mayors. The status of "metropolitan city" was assigned to Bologna by the PTR approved by the Emilia-Romagna Region in 2010 (and then finally confirmed by the national law in 2014). Among the regional plan strategies, there was the intention to overcome the polycentric conception of the regional territory favouring a vision of Bologna as a complex monocentric urban system. Today the Metropolitan City of Bologna comprises 55 Municipalities grouped in 7 “unions”, and its boundaries coincide with those of the former Province. The overall image and perspective of the new metropolitan city is currently driven by the “Piano Strategico Metropolitano di Bologna 2.0” (Bologna Metropolitan Strategic Plan 2.0[35]).

In the context of **Pavia,** there has been a new impulse to the formulation of a new spatial imaginary, based on the support of both the university and Aim, Associazione Interessi Metropolitani, a seminar held in 2018 at the premises of Triennale di Milano highlighted the need of critical reflection on a province and a city which present some criticalities. The city and the province can count on a historical characterisation linked with university and highly qualified health and research functions. The image of a knowledge-based city is still central but has started to be attacked by a highly dependency with the Milano urban region, which offers opportunities and risks. The seminar highlighted the need to develop a new strategic vision to deal with some current trends: the role of Pavia as an alternative to Milanese metropolis residential and commercial choices, without being part of the metropolitan city; the emergence of a cluster of logistic activities between Piacenza, Pavia and Milano; the lack of a shared vision among the local stakeholders and the relevance of the university actor as a mediator between public and private interests. Finally, the seminar was a milestone in redefining the potentials of an in-between territory, which wants to reflect on a broader regional scale[36]. As a matter of fact, Pavia, during the approval of law 142/90 considered the opportunity to become part of the Metropolitan city of Milano.

In the context of Piacenza, a more consistent dynamic role of local policymakers and stakeholders in promoting strategic visions towards the future since the nineties, often within forms of collaboration of the universities can be detected. Piacenza was one of the first cities in Italy promoting a process of strategic planning, the “Patto per Piacenza” in 2002, the “Provincia di Piacenza Vision 2020” (2006, in collaboration with the experts of Università Cattolica di Milano, among others), followed by the document “Piacenza Territorio Snodo” and the “Documento Strategico per lo sviluppo Locale” in 2014/16, also accompanied by other efforts of territorial strategic visioning (i.e. the one enhanced by Confindustria Piacenza with the document “Piacenza al future” in collaboration with Politecnico di Milano[37]). A clear awareness of being a joint territory between several territorial formations is evident for a long time. It has generated broad debate at the local level, with a relevant impact in regional and national policies.

From a different perspective, the Milano-Bologna urban region is also characterised by **a series of functional actors** which have played a crucial role in generating **de facto spatial imaginaries**: among the most interesting ones, the role played by the Airports for example in the wider Milano urban region is crucial, so much so that Piacenza is sometimes mentioned as one of the Milano airports, while Bologna remains less an integrative element and more oriented to serve the centre of Italy. Under the same perspective, the **role of Universities has emerged more and more strategic**: a recent research promoted in 2010[38] by AIM has

[35] https://psm.bologna.it/Engine/RAServeFile.php/f/documenti/Relazione_PSM_2.0.pdf

[36] file:///C:/Users/fedeli/Downloads/PER_LO_SVILUPPO_DI_UN_SISTEMA_MILANO_-PA.pdf

[37] http://www.confindustria.pc.it/notizie-open.asp?id=82756

[38] A. Balducci, F.Cognetti, V.Fedeli, Milano la città degli studi. Storia Geografie e politiche delle Università Milanoesi, Milano: Abitare Segesta 2010

mapped the polycentric strategies of territorial re-organisation of some of the most important universities in Milano (Cattolica and Politecnico, in particular, have a seat in Piacenza); in Bologna, where the Alma Mater has built several seats in many other regional cities[39], but also in Pavia, where the University has settled in several in-between small and medium cities. Finally, a **third relevant example is the one provided by the public companies** producing utilities, like energy production, water, and waste management: the Milano-Bologna urban region, in this respect, is characterised by the presence of 2 main actors, ones of the most potent multiutilities in Italy, with a regional integration role, A2A covering Milano, Brescia and Bergamo, and Hera, covering almost the region in Emilia Romagna, while the intermediate territories are served by LGH, Linea Group Holding, covering Pavia, Lodi and Cremona.

3.4 General conclusions: a jigsaw of spatial imaginaries

This brief overview on spatial imaginaries produced at the local level highlights three major problematic points:

1) **on the one hand, there is a general persistent gap between expert debates and institutional solutions**: much of what has been synthetised in this overview has been elaborated by planning officers and policymakers but has often remained far from a broader public debate.

2) this gap is amplified by **the fragile condition of metropolitan/regional imaginary at national level.** Lacking an overall frame for reflection, the local level has suffered and is suffering from the mismatch between the scale of the problems experienced daily and the capacity to see like a region. Despite some locally based attempts to elaborate in this direction, the situation is characterised by a jigsaw of spatial imaginaries, sometimes competing, sometimes collaborative. Still, all in all, they are unable to feed and inspire a new policy and governance agenda. Some sectoral policies have taken up the necessity to activate a transcalar dimension, but experimentations from below and above have not been able to hit the ground.

3) **Metropolitan cities, introduced in the nineties and constituted in late 2010, have little space for supporting a new phase, being essentially shaped on an inward perspective**. That is to say the an urgent need to coordinate spatial development processes in the largest urban areas in the country. However, their role now, more than ever, is probably that of being forward-looking and outward-looking, that is to say that of being a field of innovation and experimentation, able to feed a new generation of policies able to grasp the glocal nature of contemporary socio-economic processes and their spatial impact. In both cases, they have little tools to move in the inward and outward-looking direction, lacking a solid political base and clear competencies. This is a crucial vulnus for the country. Little opportunities so far to play a pivotal role in renovating spatial imaginaries and policies

Is there any possible future for metropolitan cities? Is there momentum for a new strategic role? What role can Regions play in this respect? So far, the conflictual relationship between metropolitan cities and regions has not helped in opening to new spatial imaginaries. In the meantime, the forces that every day reshape the country's economic organization are producing new spatial facts and imaginaries, generating new centrality and marginality patterns that can become opportunities or serious threats to territorial cohesion at the local and national level. The emergence of new logistic regions mainly based on peripheral localizations, the construction of a new economic strategic triangle between Milano, Treviso and Bologna superseding other historical geographies, just to provide few examples from the press, highlight the distance between administrative geographies, new and old ones, and the new scale and nature of contemporary territorial dynamics. Triangles, axis, networks still feed the debate, but there is a clear urgence to go beyond traditional Euclidean geometry and glossaries to deal with the scale, nature, features of contemporary Italy.

[39] In 2018, a €130 million loan was granted to the University of Bologna — the largest to an Italian university to date — to support the University's five-year investment plan, including the modernisation and expansion of the university campuses in Bologna, Forlì, Cesena, Ravenna and Rimini. Works include some 130,000 m2 of floor space and particular attention is to be paid to earthquake resilience and the energy efficiency of buildings https://www.eib.org/attachments/country/city_transformed_bologna_en.pdf [28] Due to the Covid-19 pandemic emergencies, and to the subsequent lockdown in Italy, all the interviews have been organized online (via Teams, Skype or other platforms).

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