1 Introduction

1.1 Territories-in-between

This dissertation aims to better understand the phenomenon of dispersed urbanisation across Europe. Although European countries have distinctive historical development patterns, a common phenomenon that occurred since the middle of the last century is that, 'most of Europe has been characterised by spreading of cities and increased population numbers, with people choosing to move out of inner cities to suburban and peri-urban areas (hybrid areas of fragmented urban and rural characteristics); this has resulted in the divide between urban and rural areas becoming increasingly blurred' (EUROSTAT, 2016). This change has resulted in more than half of the European population to reside outside of densely populated cities.

The following paragraphs explain why the term territories-in-between (TiB) was chosen for this dissertation and positions it within key discussions on sustainable urbanisation from the last couple of decades. Is there a need for a new and different term to describe the contemporary city or parts of it? Why not use terms like fringe, suburb, periphery, peri-urban? Despite the dominance in Europe of territories which blend both urban and rural characteristics, there is a widespread agreement that public policy mainly divides the world into simple 'urban' or 'rural' categories (Healey, 2007; Allmendinger and Haughton, 2009; Shane, 2005; Weber, 2010). Concepts which separate urban and rural, like sprawl, urban-rural relationships, suburbanization or peri-urban, do not reflect the diversity and complexity of dispersed urbanisation across Europe. Most concepts imply that there is only a gradient from urban towards rural or vice-versa, which are based on the dichotomy of both. In the highly urbanised and interconnected regions of Europe, the idea of a gradual transition from urban to rural is no longer sufficient to understand urban forms, processes and performances.

Dispersed urban areas have been forgotten and neglected by planners (Andexlinger et al., 2005).. (2013) Based on (Shucksmith 2010) Scott et al. describe the disintegration of planning as a critical characteristic of territories-in-between. This is partly due to the lack of analytical planning, design methods and related theories. One specific aspect of this problem is that most methods which assess the effects of urban growth and transformation towards sustainability either use administrative boundaries as analysing units or raster or grid cells (Laidley 2016; Oueslati, Alvanides, and Garrod 2015). Those boundaries omit crucial planning and design elements, such as landscape, urban morphology and other structuring spatial components.

All of the above terms have in common that they describe spatial phenomena, that evolves around and have close spatial and functional relationships and dependencies with cities or urban cores. Therefore, they represent the core-periphery model of urbanisation. While larger parts of dispersed urban areas may have developed in close relation with compact city cores, there is growing evidence that this model falls short in describing reality. Thus, the model also falls short in supporting spatial planning and policymaking. This observation is not new. As a consequence, city and related planning concepts have been adapted over the last century.

Geddes (1915) referred to the continuity of cities when talking about the Randstad area in the Netherlands. Peter Hall (1966) included in his 'World Cities', a 'polycentric type of metropolis'. Referring again to the Randstad and the Rhine-Ruhr area, the leading model of a polycentric metropolis was born, specifically in the multinational and multipolar EU. The polycentric model acknowledges that metropolitan regions are formed by a network of centres defined by a variety of different economic activities. They are the result of the processes of globalisation and a liberal market economy that relocated production and companies outside dense historic city cores.

Even though there are many representations of polycentric urban systems which are related to global networks, they fail to acknowledge the networked or relational nature and complexity of urban development within the metropolitan system(s). One centre with one periphery was just replaced by several centres with numerous peripheries, or a joined periphery around multiple centres, as seen in figure 1.1. In other words, a functional and zoning-oriented understanding of cities, urbanisation and urban planning has persisted. The countless, and often uncritical references to the UN (2011) World Urbanization Prospects, 'that more than 50 per cent of the world's population is living in cities', can also be taken as an example of a persistent city countryside dichotomy. The more recent shift, to overcome the urban-rural divide, by looking at urban-rural relations (Arango et al. 2017) and a related urban-rural continuum, as advocated by the United Nations New Urban Agenda, acknowledges that it's crucial to overcome the urban-rural dichotomy and work across the complete spatial planning continuum from the neighbourhood to the supranational level.

Nevertheless, the continuum is often replaced by a gradient from urban to rural, with the dominating idea of having an urban core and a rural hinterland. The persistence of the dichotomist way of thinking can be seen in the illustration used in the report with the title: implementing the new urban agenda by strengthening urban-rural linkages (Arango et al. 2017), as shown in figure 1.1. The report identifies on one hand, one way towards sustainable development by 'developing an idea of mixed spaces, combining urban and rural characteristics 'and on the other hand, examples like urban agriculture or rural manufacturing are either simplistic transfer from typical rural/urban to the other and neglect, at least for the European case, the already existing complexity of functional mix in territories-in-between.

To a certain extent, all of this is quite surprising, as already in 1902, Wells stated that the general 'distribution of the population in a country must always be directly dependent on transport facilities'. Therefore, he questioned if the urbanisation process would further lead to higher concentrations of people and further densification of large cities, or if a different, diffused form of population distribution would prevail. He also described the city countryside diffusion and the idea of a continuous urbanised landscape or landscape city: 'The city will diffuse itself until it has taken up considerable areas and many of the characteristics, the greenness, the fresh air, of what is now country and this leads us to suppose also that the country will take to itself many of the qualities of the city' (ibid).
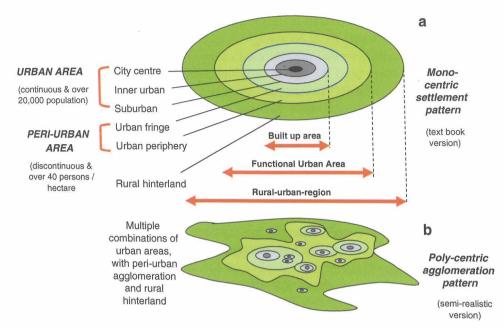
FIG. 1.1 The polycentric representation of a metropolitan area and its hinterland by the PLUREL project (2007)

The choice of the term 'territory' in territories-in-between was made to emphasise the relational nature of dispersed urban areas, which are the result of systems of relations. They sometimes interact with each other and sometimes operate in complete ignorance of each other. On the other hand, a territory cannot be thought of without boundaries or control over geographic spaces. This means that it allows us to locate, map and understand the interaction of different systems within boundaries. And it also allows us to identify, plan and design them based on physical structures as a territory and even as an artefact of past interactions of relational systems.

The choice of the term 'in-between' is an apparent reference to Sieverts'(2001) Zwischenstadt, for the author culturally the closest of the many concepts dealing with dispersed urbanisation at the end of the last century. Sieverts described the Zwischenstadt as a new form of urbanisation, which resulted from the above-described interrelation of global and local systems and through time and space. It exists independently and differs from the traditional European dense city and countryside. He proposes that the Zwischenstadt, not the compact city nor the countryside, is better understood and planned as an 'urbanised landscape'.

Sieverts advocated that this new form of urbanisation also requires new ways of regional planning, which contrasted, for example, Koolhaas (1995), who postulates that planning had become irrelevant for the generic city. Sieverts, argues that the Zwischenstadt (Cities without Cities) can be understood and designed to be a structured whole through 'a re-articulation of development strategies that take into account the plurality of factors, all that are in some way correlated: from the realignment of economic opportunities between city centres and peripheral areas, to the prospect of renewing policies for the preservation of natural areas towards forms of mediation between economic development expectations of local populations and safeguarding requirements of environmental resources and the stewardship of natural capital, to a more efficient articulation of administrative functions and competencies between different levels of government in the region' (Giecillo, 2004).

Precisely due to this conviction that a new form of planning requires a better kind of understanding, describing and designing territories in-between is the crucial driving thought behind this dissertation. Therefore, the four papers that build this dissertation present new or adapted ways of analysing and understanding TiB and the processes forming them. The aim is to contribute to a non-dichotomist way of understanding of 'where we live now', to cite the later and better translation of Zwischenstadt (Sieverts 2008), and to understand which sustainable urban development potentials are within TiB. The quest is not to find out whether the compact city or the dispersed city is more sustainable, but how to develop both of them to be more sustainable, or even better how to develop the systems both of them are part of, towards sustainability.

Before presenting the research design in chapter 2, three subsections are introduced in the dissertation. The scientific and societal relevance is shown through: (i) introducing key concepts developed at the end of the last century, which deals specifically with the challenges of dispersed urban development in Europe, (ii) demonstrating the sheer extension of dispersed urban development in Europe and its relational nature, (iii) presenting the widespread call for new planning approaches in spatial planning and related disciplines in order to overcome the compact city versus sprawl discussion. All three subsections are kept brief in order to avoid too much overlap with the articles that form the body of this dissertation.

1.2 Netzstadt, Horizontal Metropolis and Zwischenstadt - key concepts of an understanding of dispersed urban development

The three ideas presented in this section are examples of non-mainstream approaches of sustainable urban planning and design, which all overcame the urban-rural divide. They aim at connecting spatial planning with an ecosystem approach or with an industrial ecology approach, and they all acknowledge the relational nature of the contemporary urbanisation pattern.

In Europe, the spatial focus of this dissertation, the majority of the urbanisation of the second half of the last century did not take place in the traditional compact city cores but in different forms of dispersed (Kasanko et al. 2006) urban development. Therefore, it is not surprising that ideas of multi-functionality and overlapping of functions on the same location became more and more common in Europe starting in the 1980s and 1990s. Only later on, ideas like the Patchwork Metropolis (Neutelings, 1994) show a first dissolution of thinking about city and countryside as opposites. Neutelings demonstrated that functional arrangements in the Dutch province of South-Holland, are more diverse and, from the functional zoning perspective, sometimes even paradoxical.

Three concepts stand out, because they influenced both planning and design practice and research: Netzstadt (Baccini & Oswald, 2008a; Oswald, Baccini, & Michaeli, 2003; Campi et al., 2000), "territories of dispersion" which developed into the Horizontal Metropolis (Viganò 2012; Viganò et al. 2017; Viganò, Cavalieri, and Barcelloni Corte 2018) and Zwischenstadt (Sieverts 2001, 2003, 2008; Sieverts and Bölling 2004). All three have in common a shared understanding of the design and planning of the territory, based on seeing the 'urban landscape as a large interlocking system rather than as a set of discrete cities surrounded by countryside' (Bruegmann, 2005). All three have also in common that they cross what Scott et al. (2013) call 'the alternative paradigms of spatial

planning and ecosystem approach' for policy decisions. All three should also be understood as both metaphors and models, which provide ways to perceive, analyse and interpret basic patterns of spatial organisation. But they go beyond observation and analysis as they also propose urban design and planning strategies and interventions.

1.2.1 Netzstadt

Oswald, Baccini and collaborators (Baccini & Oswald, 2008b; Oswald et al., 2003) presented the idea of the Netzstadt (net-city), a framework for regional strategic planning that integrates, what they call 'architectural' morphological and 'scientific' physical disciplines. Perhaps, it is best interpreted as an extended urban metabolism approach (Kennedy, Pincetl and Bunje, 2011) that integrates aspects of urban planning and design with elements of industrial ecology. It was the result of the transdisciplinary research project called Synoikos. The framework is based on the understanding that the contemporary urbanised region is characterised and formed by a continuously changing and enormous amounts of flows of people, goods and information, which concentrate at the nodes of the net. The large system of nodes and paths of moving materials, people, information and capital results in new problems and a variety of scales and locations. Next to nodes and paths, they also define borders that delimit the network in a spatial, organisational and temporal manner.

The Netzstadt is proposed as a planning approach that presents five criteria of urban qualities (Oswald, Baccini, and Michaeli, 2003). Identification describes the capacity of a territory to provide images and icons of identification for its inhabitants. Diversity describes the morphological and functional variety of a territory. Flexibility represents the level of additivity and resilience towards changing circumstances. Self-sufficiency describes the dependency of a specific area on a hinterland for resource supply. Finally, resource efficiency describes the relationship between the benefits and efforts of human activities.

Netzstadt is also presented as a planning approach, which Aravot (2003) summarised in 'five methodological phases: first, the identification of the urban system in terms of the model. Then, three analytic steps structure the system into selected activities, shape it on the basis of key resources and represent it according to types of territories. The final stage is an evaluation. Following these steps are participatory cycles, and only after that the planning syntheses of projects rather than comprehensive modernist plans. For the evaluation step, Oswald and Baccini introduced four morphological indicators that describe density, coherence, fragmentation, grain size and accessibility.

The Netzstadt approach was, on the one hand, praised for its analytical and graphic quality, which were crucial to start the (Swiss) discussion about an urban system within an infrastructure steered regional landscape. On the other hand, it was explicitly criticised for the use of the quantitative morphological quality criteria. The developed indicators were normatively influenced by the authors. But this influence was not very transparent and made it difficult for the reader to draw the same conclusions as the authors did from the material presented (Bölling, 2007).

The Horizontal Metropolis

The Horizontal Metropolis (HM) is for Viganò (2018) 'both an image and a conceptual device through which to criticise, apprehend and imagine the contemporary city and its future challenges'. The Horizontal Metropolis as a discursive project focuses on dispersed urban conditions and the related social, economic and environmental processes that generated it. The focus lies on those aspects, which can be understood as an asset or potentials for future sustainable development. In addition, understanding dispersed settlement patterns on a territorial scale, has a focus that contrasted mainstream planning and design, put on the 'horizontality (as opposed to vertical centre-periphery relations) and on territorial complementarity (as opposed to dependency, dominion and submission)' (Viganò, 2018) in order to go 'beyond the idea of a centre and a periphery, but also beyond the idea of balanced regions where cells would live in a supposedly stable order' (Viganò, 2018). The HM has been developed based on the understanding that it is the result of the (inter)action of many socio-technical and socio-ecological systems.

The aim is to requalify the relations between (i) urban morphological properties, such as open and built space, (ii) landscape morphological properties such as soil, water, forest, and (iii) physical-functional properties for example production, consumption and related flows (resources, goods, people and waste). In order to tackle the most pressing questions of urban development such as social justice, environmental degradation, climate change and increased mobility.

The following paragraph provides a brief review of the contribution of Secchi, Viganò and their team in the making of the vision for the Metropolitan Area of Brussels 2040. In addition, as the prototype of how the concept of HM is brought into planning practice. The fundamental hypothesis is that the Metropolitan Region of Brussels can be understood as a horizontal metropolis, which is an extended urbanised territory with an isotropic, but diversified typological structure. The diversification is generated by topography in which three valleys which cross the area, along with major train lines, several urban and spatial figures. Those spatial figures are for example historical and contemporary centralities, as well as parks and forest, which have identity providing functions.

The vision for the HM aims to manage a balanced development of the city of Brussels and its surrounding territory while developing more sustainable. Following the above-described reading of the HM, this vision starts from re-developing biodiversity in the three valleys and related river basins. At the same time, the vision aims to establish a system of green spaces that provides sufficient space for future and more frequent as well as intensive flooding events. Thereby, there is a proposal for additional eco-system services and high qualitative open spaces for poorer and disadvantaged parts of the population. Based on this structure of green and open spaces, a diversified transit system in the form of a fine mesh should be developed, which is not only a network for transportation of people and goods but its stations also become key locations that facilitate social and economic exchange. Thereby, these places are going to contribute to the identity of the HM. The combination of an isotropic transportation system, high qualitative open spaces and a mix of functions should ideally lead to a situation where cars eventually become obsolete as a primary means of transport.

The main criticism towards the HM, as Grosjean (2018) puts it, is the risk that it leads to the idea of a generic city as 'we tend to highlight similarities rather than differences and to recognised it everywhere'. This is partly caused by using isotropy as an underlying concept, which should not be misinterpreted as homogeneity and stability, as this would not provide the dynamics of dispersed urban development justice.

Zwischenstadt

The final key concept was introduced earlier as Zwischenstadt. In his personal Rereading of the Book 'Zwischenstadt After Twenty Years' (in Viganò et al., 2018), Sieverts (2018) states that in our times of uncertainty, it is crucial to provide space for experiments which allow for the 'polycentric urban cultural landscape to become a personality, with a character, which speaks to you and which invites you to experience it with all your senses'. He, very humbly, stated that the International Bauaustellung (IBA) Emscherpark was the first modest example of such an experiment. Therefore, the following paragraphs are dedicated to the fundamental principles and projects that were developed and tested during the IBA Emscherpark. This was part of a ten year long (1989-1999) process to ecologically, socially and economic requalify a part of the Rurhgebiet after decades of decline in the former mining area. Sieverts was one of the directors of the IBA, which was commissioned by the state of North Rhine-Westphalia.

The whole programme was organised around five aspects, two of which had a clear regional and systemic character to generate a shared understanding and a vision in an area with two million inhabitants, 17 towns and cities with a complex governance system. The other three were individual but related local projects.

First, the Emscher Landscape Park ha(s)d the aim to establish a, what we would call today, a regional green infrastructure. It connects the predominantly north-south oriented, large and disconnected existing areas of green space. Today, the landscape park is managed by 20 cooperating cities, which developed into the Masterplan Emscher Landschaftpark 2010. It set out for more than 300 projects which will be established until 2020.

The second regional and systemic project that was brought forward by the IBA Emscherpark was the ecological regeneration of the Emscher River system. During the IBA demonstration, projects were developed and implemented, which combined a new sewer system with the re-establishment of a river ecosystem and development of a regional leisure infrastructure. The legacy of the IBA is the systematic implementation of the same ideas and principles by the Emscher river management association with investments of more than 4.5 billion Euro, based on the 2006 developed Emscher-Zukunft master plan.

The other three critical aspects of the IBA Emscherpark, were (i) working in the park, which aimed at developing business parks with high ecological and architectural construction standards in derelict areas as incubators for future economic development. (ii) Housing and integrated urban development, which transformed traditional and abundant or substandard worker's housing into high-quality urban environments with higher environmental, social and design standards. (iii) New uses for industrial buildings and industrial monuments, which had the aim to preserve and put to new use many of the most famous buildings and monuments of the region's industrial past. Iconic transformation projects like the Landscape Park Duisburg-North (on a former blast furnace) or the Gasometer Oberhausen (an exhibition location in an old industrial Gasholder), the world heritage listed coal mine ensemble Zollverein and the conversion of a former steelworks gas-turbine-hall to the festival-hall (Jahrhunderthalle), are among these projects.

Sieverts wrote Die Zwischenstadt (1997) partly based on his experience during the IBA and further developed the ideas on how to requalify the Zwischenstadt with a multi-disciplinary team during a research project from 2002 to 2005 which led to multiple publications (e.g. Bölling & Christ, 2005; Bormann, Koch, Schmeing, Schröder, & Wall, 2005; Körner, 2005). Bölling's (2007) dissertation, on decoding the image and identity of the Zwischenstadt and thereby contributing to the qualification of the Zwischenstadt, stays until present the most complete and complex work on the

Zwischenstadt. Key conclusions are that the Zwischenstadt is not at all faceless, but has a history of identity by providing 'icons' which are manifold and includes old cores of villages, infrastructure of agricultural production such as different forms of irrigation systems, leisure facilities from horse riding courts to golf courses and fun parks to various forms of shopping malls. He points out that with every increase in general affluence, a new urban expansion wave follows and that every wave has its own icons. The icons or their remains and ruins of the earlier waves are under discussion during all successive waves and contributes to the overall identity of the Zwischenstadt. This is crucial, considering that after the financial crisis of the last ten years, the beginning of such a wave of expansion is appearing again in many parts of Europe.

Although the concept and related theories of Zwischenstadt travelled and influenced planning theory and practices across Europe and beyond (Vicenzotti and Qviström, 2018), Sieverts himself stays rather critical: 'the practical impact of the book on politics, administration and the reality has been minimal: Neither has it led to — at least not in Germany — a political-administrative reform in the direction of regional governance, nor a cohesive development-policy for the urban-cultural landscape of this kind of polycentric city-landscape. The reality of the " Zwischenstadt " has not been turned into vital images and visions in the eyes of its inhabitants: the " Zwischenstadt " is still a cognitive abstraction!'

1.2.4 Learning from the three concepts

The three concepts described above have their similarities and dissimilarities, which are crucial as a starting point for this research. The terms state that the contemporary urbanisation processes are the result of interlinked dynamic systems, which can only be understood from an integrated physiological as well as a morphological perspective. The authors agree that it is crucial to understand urbanised territories through a multitude of scales that spans from a building or plot beyond the region. And that the dynamics in TiB are most influenced by what is connected to each other compared to what is next to each other. All state that dispersed forms of urbanisation have a distinct identity.

The three concepts also have distinctions, mainly in how to read the territory and, how to interpret the relation between landscape and technical infrastructure. The Netzstadt approach sees the network, related nodes and flows in the networks as the key characteristics of understanding and design, the horizontal metropolis instead understands the dialogue between the mesh of ideally isotropic infrastructure and crucial landscape features. Whereas, the Zwischenstadt focusses on a new figure that is developed between infrastructure and dense urban areas.

All three concepts also acknowledge what Grosjean (2018) identifies as two types of dynamics which 'are true characteristics of these territories: 1. the important flows that run through them (people, goods, information); and 2. a form of instability over time, an organisational malleability'.

1.3 The vast extent and relational nature of dispersed urban development across Europe

This section illustrates the physical manifestation of the complexity of TiB at a continental scale because 'it is important to understand - urbanised - territories not' as a container, and a bounded closed unit but instead conceptualise the city as a multi-scalar system which multiple highly specialised cross-border economic circuits circulate. This idea can be applied to cities and the environmental dynamic. In this case, the city is a multi-scalar system in which multiple specific socio-ecological circuits traverse. It is not a closed system. Cities are amalgamations of multiple "damage" circuits, "restoration" circuits and policy circuits' (Sassen, 2009: 49).

Two maps, which were produced early in the dissertation research work, guide the discussion on the extent and relational nature of TiB. The first map depicts the continuous and discontinuous land cover according to the Coordination of Information on the Environment (CORINE) of the European Environmental agency, see Figure 1.2. The CORINE land cover classification distinguishes two types of land cover to characterise the urban (residential) fabric. The critical difference between the continuous (black) and discontinuous (red) is that the first is covered by more than 80% of impermeable surfaces, while the latter is covered by 30 to 80 per cent of impervious surfaces. Figure 1.2 clearly shows how much more widespread the discontinuous urban fabric is in larger parts of Europe. In comparison to the continuous urban fabric can only be found in the historical centres and some of the 19-century extensions of (large) cities.
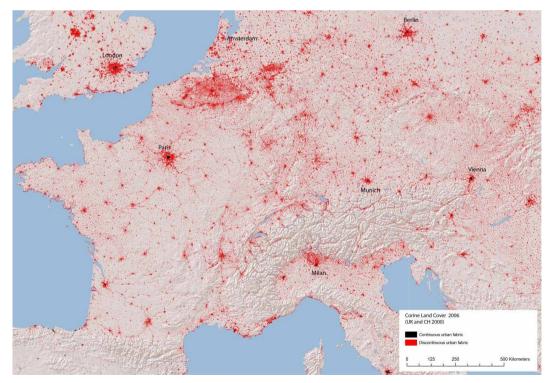

FIG. 1.2 Continuous and discontinuous urban fabric of parts in Europe 2006. Created by Author (2009). DATA Source EEA.

The sheer dimension of the discontinuous urban fabric and their distance to, or the absence of, dense city cores as seen in Figure 1.2 references Secchi (2010), who states, 'It was not something that was born in the city and, from the city, radiated outward into the territory. The novelty was the 'diffuse city', something that had its roots in the territory, its inhabitants, and their history' (translated from French). Figure 1.2 also reveals that, when looking at the regional scale, there are different forms of dispersed urban regions. The most prominent example is the difference between Flanders and the West of the Netherlands. A certain similarity between Paris, London and Berlin can be observed. The alpine valleys and the coastlines show both a linear form of a dispersion. The most widespread pattern is seen in larger parts of Europe that are comprised of a typical network of small cities and towns that seem to cover the whole continent.

TiB do not only occupy a large amount of the area of Europe but they are also home to a large population, dwellings and workplaces. The latest EUROSTAT (Regional statistics team, 2013) urban-rural typology update shows that most NUTS 3 (Nomenclature des Units Territoriales Statistiques) regions in Europe fall in an 'in-between' category, which covers 38.7 per cent of Europe's land surface and hosts 35.3 per cent of the EU population. These numbers are low estimates considering that large parts of the areas classified as predominantly urban are actually low-rise dispersed urban developments with an intermingling of built and green spaces, like the metropolitan areas of the Randstad in the Netherlands, parts of Flanders in Belgium, the Ruhrgebiet in Germany, and the suburban and peri-urban areas of larger European metropolitan areas, like Milan, Paris, Prague, Vienna, Lisbon and Oporto, to name just a few examples. An interesting fact is that there is no area classified as a continuous urban area in the Netherlands.

Recalling, that many authors describe globalisation, decentralisation of economic functions, mass mobility and increasingly affluent population as crucial drivers of dispersion, the question arises whether behind the different spatial patterns there may be actually a similar gestalt, which includes physiological and symbolic elements to the physical ones, when investigating these areas on the regional scale.

The key physiological structures are streets, railway tracks, rivers, canals, power lines, tubes and pipelines, in which most of the people, resources and goods flow. The network of transnational infrastructure is also one of the key instruments and results from the polycentric and territorial cohesion-oriented policy of the European Union. Figure 2, which presents an overlay of the motorways and railway tracks onto the NASA nighttime image shows clearly the differences in the density of the infrastructure network in different parts of Europe, with the highest density. Therefore, connectivity, accessibility and the number of flows is highest in England, the BENELUX, along the Rhine in Germany, France and Switzerland, the north of Italy, around Paris and along the Mediterranean coast. It also reveals a denser network of infrastructure in eastern Europe compared to France and Spain, specifically along the corridor Budapest, Katowitze, and Warsaw.
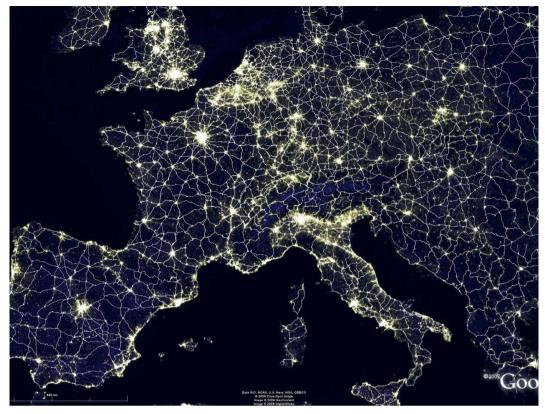
FIG. 1.3 Overlay of NASA nighttime image with motorways and national railway tracks in Europe. Created by Author (2010). Background image: Google, 2007. Data source:openstreetmap.org

Both figures 1.2 and 1.3 clearly show that the morphology and the physiology of the TiB are profoundly interrelated. Therefore, the relationship between infrastructure, settlement patterns and sustainability are present in all four papers. This way, the dissertation adds to the knowledge about the spatial structure and performance of dispersed forms of urbanisation in Europe and focuses on a network centred approach. There is a gap in the existing body of knowledge, as Robinson (2005) pointed out, "there has been little evidence of work that approaches the city as both a place (a site or territory) and as a series of unbounded, relatively disconnected and dispersed, perhaps sprawling activities, made in and through many different kinds of networks stretching far beyond the physical extent of the city" (Ward, 2009: 9). It also adds to the discussions on 'planetary urbanisation' (Brenner and Schmid, 2011, 2015), 'complete urbanisation' (Lefebvre, 1970), 'totale Landschaft (Sieferle, 1997, 2003) and 'Network Urbanism' (Dupuy, 2008; Rocco, 2008; Rooij, 2005). These include theories about realms that are traditionally classified as being outside the urban condition. Brenner (2013: 95) talks about 'small- and medium-sized towns and villages in peripheralized regions and agro-industrial zones, intercontinental transportation corridors, transoceanic shipping lanes, large-scale energy circuits and communications infrastructure, underground landscapes of resource extraction, satellite orbits, and even the biosphere itself'. Therefore, TIB are characterised not only by dispersed settlement patterns but also by networks and functions that feed the present urbanisation process. Chapter 3 deals in more detail with this aspect.

1.4 Don't call it sprawl: the need for new planning instruments for sustainable development of TiB

TThe concept of sprawl and planning instruments that aim to avoid or retrofit sprawl are dominating the discussion on how to achieve sustainable development. However, the concept is ill-defined and is often used rather superficially in describing any form of low-density urban growth.

'Don't call it Sprawl', borrowed from Bogart (2006), stands exemplary for the one-sided discussion about the sustainability of dispersed urban development, which is furthermore dominated by North American studies. Schneider et al. (2008) showed a comparison of urban growth between 25 cities, that 'researchers, land managers, urban planners and the like have been quick to label any low-density urban expansion or fringe development around the world as sprawl. …. … The amounts and patterns of land development in non-American cities are, in reality, quite different phenomena …, none of the cities in the samples shows any trend towards the dispersion or low population densities common to nearly all US cities.'

The concept of sprawl is too limited, primarily because of its negative connotations, to stimulate the discussion about more sustainable development of territories-in-between. According to Richardson (2004), most of the planning approaches which deal with sprawl or urban dispersion have as primary aim to curb or prohibit sprawl through urban containment.

The policy discussion in Europe is often based on scientific studies which do not consider European cultural circumstances. Not only is Europe different from North America, but many parts of Europe are substantially different from each other. The diversity of history, geography, cultures and socio-economic conditions across European countries and regions is striking. For these reasons, Europe justifies its own research and its own body of theory on this topic (Couch et al., 2007). What Couch et al. (2007) state for the theory on sprawl can also be applied to a broader understanding of dispersed urban development. By conducting a cross-case comparison on territories-in-between, the research adds to the growing body of knowledge of this spatial development process in Europe.

The dissertation is based on the assumption that urbanisation and cities have to be seen as part of the solution to our environmental and social problems. They cannot just be seen as a problem in terms of their negative effects. The discourse on sprawl in relation to sustainable development in Europe has been rather one-sided. More recent and multi-disciplinary research questions the linear link between sprawl and unsustainable development but focuses on the missing policies for sustainable and dispersed urban development. Couch and Leontidou (2007) for example, compared sprawl across Europe and concluded that 'maybe sprawl is not anything sustainable, but again, it is no more unsustainable than other types of urban development. Environmental policy for sustainability in sprawling areas of our city case studies was weak or non-existent, except perhaps in some instances in the North'.

Nevertheless, as Dehaene (2018) emphasises that 'more than elsewhere, actors have been able to externalise the social and environmental cost of their individual choices. The distribution patterns of the Horizontal Metropolis have been successful in diffusing the consequences of urbanisation'. He further states that the related challenges, which are related to 'water, energy, nutrient and soil cycles, localised food production' are rather new 'to urbanists, who traditionally focus on housing and mobility' (ibid).

Torres, Jaeger and Alonso (2016) point out that it is too simplistic to understand 'some metrics of sprawl […] assumed to be valid surrogates of the ecological impacts of transport development like landscape fragmentation'. As this relation is among others, it is highly dependent on both the spatial arrangement of the development and the relief. The first is crucial, as it relates to the environmental impact of multiple spatial design and planning disciplines. The second is relevant when comparing and selecting cases.

The assessment that dispersed territories require a distinctive reading, understanding and planning was confirmed by a survey among 136 experts on spatial planning across Europe that was undertaken by MCRIT (2010). More than 80 per cent agreed that the European territory is mostly 'middle landscapes'. More than 50 per cent expressed the opinion that planning policies have to be reformed to consider the many implications of this distinctive form of spatial organisation.

After reviewing more than 60 papers, Geneletti et al. (2017) identified that 'traditional land–zoning is considered to act as barriers to sustainable development' because it neglects the dynamic reality and ' is often unable to support the need of multi-functionality to cope with social and environmental challenges'. Furthermore, they state that masterplans and other proposals at the neighbourhood scale are seen highly sceptical as they are not able to understand TiB as a whole and in a systemic way. This leads to solutions that are often ineffective and/or cause problem shifting. In contrast, planning approaches at the regional scale have not been criticized. However, they concluded that there is an absence of good indicators and a lack of available data (ibid).

Therefore, this research aims to produce a better understanding of the key issues for sustainable development of the territories-in-between and to develop methods on how to assess those issues, starting from the regional scale but doing this with a rather fine-grained resolution.

1.5 Problem statement

To summarise, the key problems this dissertation aims to tackle are:

— There are several key challenges and potentials for a more sustainable development of TiB which are often ignored or approached in a rather simplistic way due to the application of functionalist and/or compact city planning principles in developing plans for the TiB.

— Mainstream planning is either neglecting or underestimating the extent as well as the specific complexity, identity and dynamics of TiB in Europe. This is partly due to a rather uncritical acceptance of theories from the United States, which ignore the cultural diversity of Europe.

— There is an absence or underdevelopment of planning approaches and related methods that bridge the fields of spatial planning and ecosystems approach to deal with the complexity of the urbanised landscapes of TiB.