Understanding the Planning of Open-Spaces in Territories-in-Between: Dupuy's Network Urbanism Approach Applied to Areas in-between Urban and Rural

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1. Introduction

This paper reviews the framework proposed by Dupuy (1991, 2008) on the analysis of network operators in relation to the strategic planning of urbanized regions. Dupuy makes a distinction between [i] technical networks, [ii] consumption and production networks and [iii] networks operated by individual urban households in relation to the spatial organization of urban environments. This paper further investigates how this framework could be used to describe and understand strategic planning tasks concerning the transformation of open spaces in Territories-in-between (TiB). Territories-in-between (TiB) are areas where new functions, uses and lifestyles arise as a result of the on-going interaction of urban and rural elements (Garreau 1991; Sieverts & Bölling 2004; Viganò 2001). They cannot solely be explained as an intensification of urban functions in the rural environment, but have specific spatial and programmatic features that set them apart. Zwischenstadt (Sieverts, 2001), Tussenland (Frijters & Ruimtelijk Planbureau, 2004) , City Fringe (Louis, 1936), Città Diffusa (Secchi, 1997), territories of a new modernity (Viganò, 2001), Stadtlandschaft (Passarge, 1968), Shadowland (Harmers in Andexlinger *et al*., 2005) Spread City (Webber, 1998) and Annähernd Perfekte Peripherie (Campi *et al*., 2000) are names given to this spatial phenomenon across Europe. This variety of names is an indication of the diversity of TiB, which has to be considered when investigating this spatial phenomenon.

Terms and concepts like suburbanisation, urban-rural relations, sprawl or peri-urban do not reflect the diversity and complexity of these territories. Most of the mentioned concepts imply a gradient from urban towards rural or vice-versa. In the highly urbanized and interconnected regions of Europe, a gradual transition from urban to rural is no longer tangible.

> The metropolitan region is not just a spatial form of unprecedented size in terms of concentration of population and activities. It is a new form because it includes in the same spatial unit urbanised areas and agricultural land, open space and highly dense residential areas: there are multiple cities in a discontinuous countryside. It is

> a multi-centred metropolis that does not correspond to the traditional separation between central cities and their suburbs (Castells, 2010: 2739).

Therefore, we use the term territories-in-between as an umbrella term to avoid lapsing into often locally manifested assumptions and ideas related to, to our mind, outdated concepts referring to the dichotomy urban and rural.

TiB are essentially defined by an intermingling of built and unbuilt spaces from the very local level on (see Wandl, Nadin, Rooij, Zonneveld, forthcoming). An accumulation of infrastructure, mainly related to transport but also to the disposal and treatment of waste, water and other goods is also present. This infrastructure connects the regional and further scales and predominantly segregates the local scale. This is reinforced by uses like distribution centres, large shopping malls and similar “big box” uses which are typical of TiB. These regional-oriented urban facilities often have closer economic relations to areas outside of the TiB, than to functions located in the direct neighbourhood of these facilities. Nevertheless, together they provide an often-surprising mix of uses. Wandl *et al.* (forthcoming) located TiB in twelve case studies across Europe using a GIS-based method that combines a range of maximum population density (inhabitants plus workplaces) of 150 to 5000 people per square kilometre with land cover classes that correspond to the above described characteristics. Figure 1 shows areas and locations of TiB in four case studies, and give an impression of their size and location.

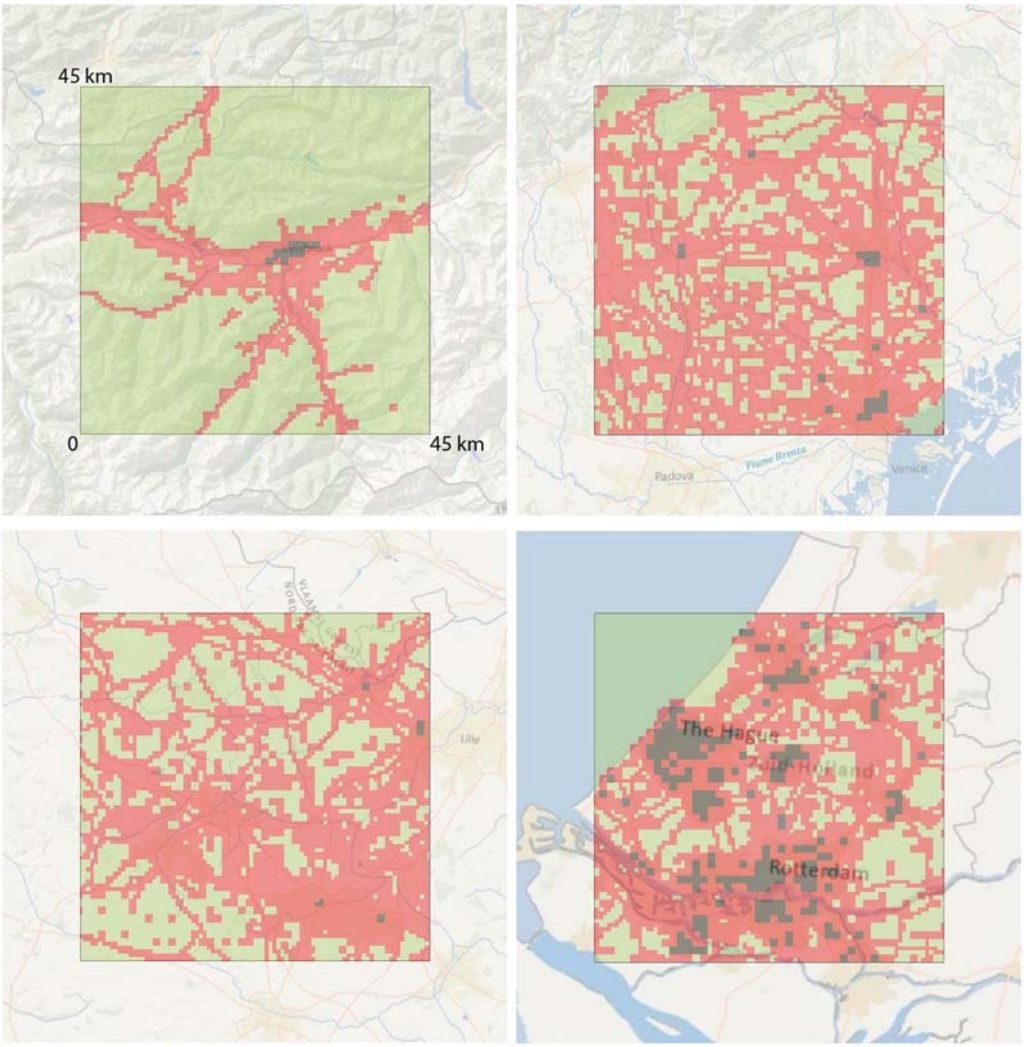

Figure 1: TiB are marked in red, in four case-study regions across Europe. On the top left-hand side, parts of the Tyrol (Austria); on the bottom left-hand side, the area west of Lille (France), on the top right-hand side, parts of the Veneto (Italy) and finally on the bottom right-hand side, parts of South-Holland (The Netherlands). The green-marked areas are rural areas, and the black-marked areas are the urban ones.

Viganò (2011) emphasises two important aspects of landscape urbanism, which enrich the on-going debate on city and territory. 'The first is (…) that it tackles and defines possible strategies when the conditions are such to raise doubts about existing design and planning tools' (Viganò, 2011: 12). The second 'is the role of the open space in the construction of the contemporary city, (…) of a diffuse urban condition in which the void, in its various declinations (…) becomes part of the design of the new habitat.' (Viganò, 2011: 12). Open spaces in TiB are torn between the conservation of landscape under the threat of urbanisation on the one hand and the need to diversify the services/amenities provided by open spaces for people living in TiB on the other. Therefore, analysing TiB from the perspective of open spaces offers an interesting viewpoint on the planning in TiB, as a dominant spatial characteristic of TiB is the intermingling of built and unbuilt.

In this paper, we take Dupuy's network urbanism approach and unfold it in relation to the problem of emerging regional urbanising structures, as this approach combines a relational understanding of space and an actor focused approach, allowing us to link the physical space and social space in a meaningful and useful analytical model. In section 2, we show why this network-thinking approach is

appropriate and relevant for understanding and assessing today's urban and regional developments. In section 3, we elaborate on the nature and role of open spaces in planning networked city regions, resulting in a typology of open spaces in TiB. For each type we describe, assess and prioritize the planning tasks based on the Dupuy's network urbanism model in section 4. We test whether the Dupuy model can be used to better understand the crucial planning tasks of the transformation of open spaces in TiB. In the final sections we draw conclusions and discuss if and how the network approach gives an improved understanding on the planning of open spaces in TiB.

2. Theoretical background: Regional planning and the urbanism of networks

The words 'sprawl', 'dispersal' and 'suburbanisation', which are often used to describe space in TiB, represent major societal and spatial changes. According to Shane (2005: 305), 'the city is a chaotic situation of competing systems (…) produced non-centrally by actors designing systems across vast territories, without regard for each other's decisions, each adding their own system as a new layer to existing topography, historic structures, and landscapes.' While administrative borders become less and less crucial for urbanizing processes and the driving actors of urban development, planning and other spatial policies are often bound to legal and administrative boundaries. Allmendinger and Haughton (2009: 619) propose that 'adopting the tactics of "soft spaces" and "fuzzy boundaries" ' is one way of delivering the objectives of planning.

> If it [planning] is to reflect the more complex relational world of associational relationships, which stretch across a range of geographies, planning also needs to operate through other spaces, and it is these we think of as `soft spaces'. The argument here is not that planners are shifting from one set of spaces to another, but rather that they are learning to acknowledge that they must work within multiple spaces (…) (Allmendinger & Haughton, 2009: 619).

The 'working within multiple spaces' mentioned by the authors will require a new conceptualisation of planning concepts and instruments. In order to facilitate and improve the communication and discussion between different actors, and allow planners to operate through these different spaces, we believe new tools have to be developed. Therefore we adopt Dupuy's network urbanism approach, as it combines a relational understanding of space and an actor focused approach. It allows us to combine physical space and social space in a meaningful and useful analytical model. We categorize the various types of open spaces in relation to hypothetical planning tasks and we test whether this model can be used to better understand the crucial planning task of the transformation of open-spaces in emerging city-regions. Open spaces in TiB are torn between the conservation of landscape under the threat of urbanisation on the one hand, and the need to diversify the services/amenities provided by open spaces to people living in TiB on the other.

2.1. Network urbanism as a relational planning oriented approach

In choosing TiB as object of investigation, a relational understanding of space and place becomes explicit, as the separation between rural and urban is based rather on a Euclidean understanding of space. In the in-between territories, it goes without saying that a variety of network characteristics

and time-space regimes are prevalent, creating a variety of 'Lebenswelten' (or 'life worlds', a concept advanced by Habermas, 1995). Therefore, there is a growing attention to integrating notions of relations, flows, dynamics and adaptability into explaining urban development and into strategic spatial planning at the regional level. 'With their clear focus on localities, planners arguably have a key-role to play in bringing a clearer spatial dimension to the integration of a wide variety of policy sectors, such as economic development, health and education, and transport, and the way they interact and play out differently in different places' (Kidd in Allmendinger and Haughton, 2009: 620).

Network approaches in urbanism are not new. Cerdà's plan for the extension of Barcelona (1858) or Otto Wagner's study on *Die Grosstadt* for the expansion of Vienna (1910) and Frank Lloyd Wright's vision for a decentralised future of the American *Broadacre City* (1920-1960) are only some examples of how urban planners and designers have anticipated the effects of new technologies and have transformed them into spatial plans and policies. Despite these early appearances of network urbanism, its underlying ideas were suppressed by functional urbanism, which is based on the ideas of CIAM and the charters of Athens. Arguably, this has become the dominant school of spatial planning and design of the 20th century. But with the continuing growth of individual personal mobility (by car, airplane, high-speed train) and the advent of the internet and other information and communication technologies at the beginning of the 1990s, a network-based understanding of advanced societies started to regain importance outside the domain of spatial planning and design, most prominently through sociologist Manuel Castells and his book *The Network Society (2004)*.

Urban networks connect people and places. The network city therefore refers to a society in which social, economic and cultural structures are not solely determined by the shared use of a certain space, but also (primarily) by the connections that an individual actor (person, company, institution) has with places, persons, or activities elsewhere (Rooij, 2005). The network in its modern meaning is characterised by three principal criteria (based on Dupuy, 2008; Caso, 1999; Drewe, 2002):

- *the topological criterion*: here topology refers to the geometrical or physical configuration of a network; to the way in which the nodes of a network are physically connected. Networks are not abstract entities; they are related to the spatial dimension by connecting nodes via links, in space. The amount of links of a node - i.e. the degree of how networked a node actually is - is a measure of the quality of that specific node. Moreover, the connectedness of all network nodes is a qualitative characteristic of the network as a whole.

- *the kinetic criterion*: kinetic qualities refer to movement and communication between nodes. It is basically a relationship between space and time, which is translated in speed. The rapidity of the connections within a network is a measure of the quality of the network itself.

- *the adaptive criterion*: adaptability concerns the capacity of networks to evolve over time and space. On the one hand, a network should be able to modify its own structure of nodes and links. On the other hand, it should be able to 'guarantee' or adapt itself to the various and changing needs and desires of its users by offering them a range of choices to help them reach their goals. Both robustness and flexibility are measures of the quality of a network.

For this paper these criteria are relevant in two distinctive ways. The first is as a tool to evaluate the actual connectedness of TiB and whether they indeed belong to networked city-regions. The second is as a tool to promote interconnectedness in and between networked city-regions, and supposedly promote prosperity by increasing the accessibility of spatial opportunities for people. We assume that the network(ed) condition is desirable because it accelerates flows and exchanges, it allows faster adaptation to changes and improves resilience.

This is why we adopt an approach that highlights interconnectedness as a tool for both analysis and action: Dupuy's urbanism of networks approach. Dupuy presents three levels of network operators - and the relations between them: (i) the operators of the *technical networks*, such as the infrastructure managers and providers of cables, roads, pipes, streets, wires, sewerage et cetera, (ii) the *operators of the production / consumption networks*, such as service providers, like health care, retail, transport services et cetera, and different groups of consumers and (iii) the operators of the *individual urban household networks*, such as a family, or an individual. The levels have a reciprocal influence. Actual household behaviour manifests the need and demand for consumption and production services and technical infrastructures. Infrastructural developments condition and facilitate the possibilities for production and consumption services and daily household behaviour.

As a result of his studies in spatial planning using Dupuy's framework, Rocco (2008) introduced two additional features to Dupuy's network approach to be able to analyse and evaluate spatial planning and spatial policy-making. (Figure 2) First, Dupuy's three original network levels do not operate dissociated from their geographical setting or the 'first nature'. Dupuy's three levels together form the 'second nature', i.e. how people or 'operators' change, adapt and behave in space.

The first nature is the geographical concept that expresses the original or adapted geography of a place. This layer expresses (i) that there are geographical places with their own advantages and disadvantages, sometimes altered by human work in order to facilitate connections and flows and (ii) that these geographical places have a relational nature: they exist in spatial relation to each other and this relationship is generally immutable (e.g. the Netherlands occupies a corner of the great northern European plain. This geographic location, its proximities and distances to other geographical locations and features, is immutable). Geographical locations are the physical sites of cultures and civilizations and of modes of territorial management that transform them into cultured landscapes and political territories: the second nature.

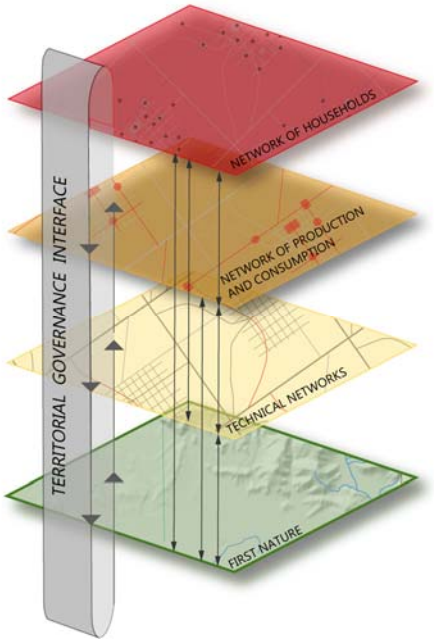

Figure 2: The levels of network operators, based on Dupuy (1991; 2008) and Rocco (2008), adapted by the authors.

Planners cannot intervene on the third level, that of households, where the individual urban household organises its 'own' networks by choosing and in some ways constructing its own circuits of action. But planners can influence all levels via the process of governance, another additional feature proposed by Rocco (2008). The interface 'governance' refers to 'the processes that create a positive tension between the public sector, the private sector and the civil society' (Rocco, 2008: 142), which ultimately result in territorial management processes. Those sectors apply tension on each other through their own specific demands and interests. The interplay between them result in specific territorial arrangements and specific conditions for the management of these arrangements. It is therefore crucial for spatial planners to understand how territories are managed by formal institutions and by "informal" power arrangements and negotiations between actors. In other words, the political interactions among stakeholders shape the way territories are conceived and managed and thus how the first nature is used and/or adapted and the first, second and third levels are developed and/or transformed. This is the field where spatial planners exercise their trade in an explicit way: by managing power relations and mediating spatial futures through the specific tools of the profession, like spatial strategies, designs and plans.

2.2. **Towards the strategic planning of the networked city-region**

The research group of the Chair Spatial Planning and Strategy at TU Delft took up the task to reintroduce and take forward the concept of networked territories into spatial planning theory, with the close assistance of Gabriel Dupuy and others. The accent at TU Delft is on the understanding of the region as the most relevant unit for analysis and planning actions because of the reasons explained above. The region is seen as a networked field of interactions facilitated by real and virtual networks. The emerging city-region, of which the Randstad-Holland is an example, is composed both by urban and rural environments and spaces in between, which are the focus of this paper. The city-region is understood as an open system, whose parts must be made to work coherently through

spatial interventions. By 'working coherently' we make reference to well-functioning expanded daily urban systems (Rooij, 2005) and to regional functional complementarity and harmony among the diverse spatial environments that compose it (Meijers, 2007).

With the growing importance of the regional scale, another issue arises: the landscape as an object of regional planning. The landscape and how the term is understood (i.e. what the term landscape means in different academic traditions and disciplines) has become a crucial matter for regional planning and design. Hokema (2009) states that there is a progression from a 'narrow' understanding of landscape to a 'wider' understanding of the meaning of the term landscape in planning theory and spatial policies. The narrow understanding used to refer to a natural landscape, or in other words a landscape that is cultivated by non-industrialised agricultural techniques. The ideal image is the pre-industrial rural countryside. Landscape in this sense is always positively connoted. On the other hand, the wider meaning of landscape refers to built as well as unbuilt spaces and includes also non-natural features. Advocates of the wider understanding claim that in this sense, the term landscape is free of normative and qualitative connotations (Hokema, 2009).

In the context of TiB, where the contrast of city and countryside dissolve into a diffuse agglomeration of built areas with different densities, which intermingle with a heterogenetic system of open spaces, the wider understanding of landscape offers better starting points for regional planning and design. Both New Urbanism and landscape urbanism use this wider perspective of landscape as a starting point for their interventions. Whereas in new urbanism elements of the traditional landscape are used to overcome the urban countryside divide to retrofit suburbia (Vall-Casas *et al*,. 2011), in landscape urbanism, the void in its various declinations '(…) becomes part of the design of the new habitat.' (Viganò, 2011: 12). In other words, landscape urbanism proposes a much more comprehensive understanding of the landscape as a cultured environment, where the distinction between urban and rural is truly secondary.

In this line, some authors speak of the 'totale Landschaft' or 'total landscape' (Sieferle, 1997) which means that 'a new type of landscape emerges, where the division of city and country side does not make any sense, because the opposition of city and countryside had only a constitutive meaning for an agrarian society' (Prominski, 2004: 36; translated by the authors). However, both Promski and Hokema emphasise that it is problematic to use concepts like the 'totale Landschaft' in planning practice as the difference to the common understanding of landscape is often confusing in a multi-actor environment. Therefore, different variations of a wider understanding of landscape are used here when talking about open spaces, overcoming the archetype of a pre-industrial landscape, but we still used to use the positive connotations that are commonly associated with the term landscape. In the next section, we will proceed to define open spaces in TiB.

2.3. **Open spaces in spatial planning and design and landscape planning**

Before developing a typology of open spaces in TiB, it is important to define our understanding of open spaces, as open space and green spaces are often used interchangeably in the literature (Swanwick et al., 2003) which leads to confusion and misunderstandings. Moreover, here we are only concerned about open spaces in TiB, which for us constitutes a specific typology. We understand open spaces in TiB as spaces not covered by buildings. Following Swanwick *et al.* (2003) we divide

them into 'green open spaces' and 'grey open spaces'. 'Grey [open] spaces is land that consist of predominantly sealed, impermeable "hard" surfaces' (James *et al.*, 2009: 66), like parking lots or streets. Green open spaces consist of 'predominantly unsealed, permeable "soft" surfaces'(James *et al.*, 2009: 66), like lawn or fields.

The general perception of open spaces in TiB in relation to the urban environment and the nature has often influenced the role open space has played in spatial planning and design concepts. Spatial planning has been traditionally focused on steering urbanisation processes. According to Koomen, Dekkers, & van Dijk, (2008) two different kinds of open spaces are the opposite of urbanised territories: natural and agricultural ones. Landscape planning has traditionally been concerned with the protection of nature, whereas rural development policies, often disconnected from spatial planning (compare Nadin & Wandl, 2010), have focused on the agricultural areas, which we consider to belong to the network level of production (the 2nd layer on Dupuy's original diagram).

Over the last two centuries, 'nature' (or natural environments) has been in retreat due to the expansion of both urbanised areas and agricultural areas. However, Koomen et al. (2008) conclude that, due to dedicated nature development policies in the last decade in Europe, natural protected areas have increased at the expense of agricultural areas. This might represent a shift in how we interact with natural environments and how we conceive urbanised environments, because natural and humanised environments seem to be able to coexist more harmonically than the old dichotomy suggested. In fact, a sharp opposition between urban or rural environments and natural environments seems to be fading, as the city-region seems capable of articulating natural and humanised environments more seamlessly.

Two major shifts in the perception of the relation between city and surrounding landscape took place over the last decades. The first is the sustainable development perspective (Potschin & Haines-Young, 2006) and the second is the change of a production-oriented understanding of open space to a consumption-based understanding of open spaces(Koomen *et al*., 2008).

The idea of sustainable development calls for a 'new' multidisciplinary understanding of the relations between built and unbuilt, as well as new planning solutions to allow and facilitate those relations. The ecological, social and economic benefits provided by open spaces in urbanised areas and at their edges are becoming a bigger concern of contemporary planning. Matsuoka & Kaplan (2008) for example, show that there is a wide international agreement on the benefits provided by nearby urban green spaces for the general wellbeing of people. They identify six categories of major human needs in relation with this concept: contact with nature, recreation and play, aesthetic preference, social interaction/privacy, citizen participation and sense of community. These factors are influenced by the accessibility and quality of green spaces. Sieverts & Bölling (2004), among others, emphasise the importance of qualitative open spaces for the (re)qualification of the Zwischenstadt, which means providing identity to otherwise identity-less places. 'From a landscape ecology point of view, urban and rural ecological networks are especially important because, in these fragmented cultural landscapes, they may provide the only opportunity for corridors, connectivity and wildlife movement' (Ignatieva *et al.*, 2010: 17). This is relevant to our argument because Ignatieva sees TiB as passive of being made more coherent or well-functioning by the use or enhancement of existing ecological networks, which exist in both urban and rural settings.

This discussion on sustainable development is relevant in the light of the environmental challenges of our times. Climate change will have an effect on the liveability and functioning of TiB, affecting quality of life and biodiversity but also prosperity. Integrated and linked open spaces can contribute to the ability of TiB to adapt to the adverse effects of climate change. It is necessary to acknowledge the positive effects of green spaces and corridors on the urban climate and therefore their direct bearing on health, the provision of migration corridors for specific species and the advantages for water management in a rapidly changing precipitation pattern. The concerns over quality of life, biodiversity and climate change identify urban green spaces as essential elements of urbanised areas that together form part of networks of interconnected systems and contribute to face future challenges. Concepts like multi-functionality, ecosystem services or green infrastructure are examples of planning praxis and theories that deal with the complex role open spaces play in city-regions, where the dichotomy of city and countryside does not seem to be relevant anymore, and where TiBs have a central role as articulating spaces.

Parallel to the concerns about sustainable development, the daily use of open spaces seems to have changed, especially in the periphery of cities embedded in complex regional settings. The retreat of agriculture thanks to modern techniques and the high concentration of population in urban areas seem to have had an impact on the services green open spaces adjacent to urbanised areas should provide. A change from an agricultural production landscape to a leisure-oriented consumption landscape is taking place in many places in Europe. Koomen *et al.* (2008: 366) describe that in the Netherlands, Germany and Britain, spatial policies adapted to this situation points towards a shift from a farmland preservation-oriented planning to a countryside-oriented planning, which should help 'safeguarded prolonged public support' (ibid.). They also argue that part of the success of the Dutch urban containment strategy is related to this shift.

Based on the previous considerations on strategic regional planning, the role of landscape and the nature of green en grey open spaces in TiB, we propose eight types of open spaces in TiB that have a strategic (regional planning) value:

1. Green areas being (informally) used as parks
2. Bodies of water
3. Small extensively used agricultural batches
4. Areas in-between infrastructures
5. Leisure and sports facilities
6. Derelict areas
7. Open spaces around nodes of transport infrastructure
8. Big parking spaces

In the next section, we will describe and illustrate these types more accurately and will also evaluate their strategic value for planning TiB according to the model of network urbanism proposed, in order to understand and prioritize the planning tasks that these open spaces face.

3. Inventory of open spaces in TiB and related planning tasks

The concepts explained above helped us conceive the framework of the typologies we present in this section. The two central aspects of this typology are the types of open spaces and their relation to the topological criterion of the networks (Table 1). The first aspect distinguishes whether the open space is a green one, a grey one or a hybrid one. The hybrid open space is an open space with features of both green and grey open spaces. The second aspect distinguishes between open spaces that are predominantly influenced by their vicinity to either nodes or links, or whether this influence is not distinguishable.

Table 1: Typology of open spaces in TiB, as defined by the authors

	Green open spaces	Hybrid open space	Grey open spaces
Predominantly related to links	Green areas being informally used as parks (1)	Areas in-between infrastructures (4)	
Predominantly related to nodes		Leisure and sports facilities (5)	Spaces around nodes of logistic facilities (7) Parking spaces (8)
Relation to nodes or links not distinguishable	Bodies of water (2) Small extensively used agricultural batches (3)	Derelict areas (6)	

While emphasising the role of regional planning and design in TiB, we then proceed to the description of the associated planning tasks for each of the types we distinguish. Examples from the European context are given. In order to keep the outcome manageable by users, we limit the planning tasks that are described for the different types of open spaces using three criteria:

(i) The relevance for the *regional scale*. Not all spaces are equally relevant for the regional performance. This relevance is defined, in our model, by the connectedness of the space to a larger network of spatial relationships. This means that a street in a housing area, although a grey open space, is not part of our typology. This is because a single small street is in general not of regional importance, unless its role is crucial in the larger network of streets. This is different than saying that local streets are not important. Our claim here is that the role of streets, avenues and roads in regional planning needs to be defined according to how crucial they are in regional networks. In this line, we acknowledge that a network of local streets, and specifically its layout and design connecting it to the larger regional network, is relevant for regional planning and design.

(ii) The relevance for *strategic planning*. This means that the definition of the planning task at hand should on the one hand focus on key issues and/or priorities and on the other involve the collaboration of a variety of actors at a variety of spatial levels: local, regional and/or metropolitan. In this way, a solution for the planning task is 'larger than itself', that means: solving the planning

problem brings synergetic effects that go beyond the borders of the planning task, both literally and figuratively speaking.

(iii) A specific relevance for *TiB*. This means that planning goals that have an equivalent importance for urban or rural areas are not included in our selection even if they are of very high importance.

3.1. **Green areas being (informally) used as parks**

Buffer zones and greenbelts are examples of this type of green open spaces.

The main spatial function of this type is to steer and limit urban development and to separate the urban environments from their rural surroundings. This type also works to reduce the negative environmental impacts of infrastructure, like noise or air pollution, on the population and ecologically valuable habitats. Due to their specific location, close to urban settlements, they are often (informally) used as parks and recreational areas. Local authorities can provide (formal) leisure infrastructure in these areas, as it has happened in regions like the Randstad, the Tyrol and others.

Figure 3 (left): A buffer zone in the Inntal (The Tyrol, Austria) and Figure 4 (right): A buffer zone between Delft and Rotterdam (South-Holland, The Netherlands). Both areas are used as parks with yet limited leisure infrastructure. Source: Alexander Wandl.

The planning task for the future transformation of this type is related to the increasing multi-functionality of these open spaces. We can summarise these tasks as (Figure 5):

a) *To facilitate* the additional space that is needed to limit future negative impacts of settlements and infrastructure in the light of stricter regulations and changing contexts like climate change. This planning task relates the network of infrastructure with the network of households as well as with the first nature (i.c. the humanised landscape).
b) *To create* a transition from a separating spatial entity to a connecting spatial entity (between urban and rural environments) but still keeping its steering function for the urbanisation process, that is: its function as barrier or border between the city and the surrounding rural environments.

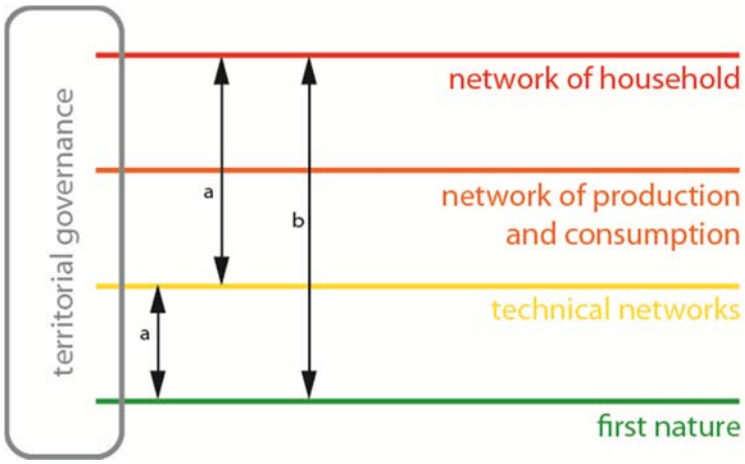

Figure 5: The relevant network operators and relations for the planning tasks in green areas being (informally) used as recreational areas.

3.2. **Bodies of water**

Lakes, ponds, rivers, creeks and similar bodies of water belong to this category of green open spaces. The type describes not only the body of water itself but also the shores and banks related to them.

Figure 6 (left): A waterway in South-Holland (The Netherlands) presents a combination of infrastructure and leisure areas. Figure 7 (right): Water used as a children's playground at the edge of Delft (The Netherlands). Source: Alexander Wandl

These types of open spaces are a part of different networks themselves. In the case of the examples offered above, they are parts of intricate networks of canals, dykes and pumps that keep large areas dry. By definition, they are part of the hydraulic network of TiB. They play an important role in the regional ecological network. In some TiB, waterways are important transport infrastructures and in most they play a major role in the irrigation or drainage of agricultural land. The planning task associated to bodies of water are (Figure 8):

a) *To integrate* them into flood management measures;
b) *To provide* spaces for leisure activities
c) *To use* these spaces for the aesthetic integration of infrastructure and settlements in the surrounding landscape.
d) *To use* these spaces for the production of electricity.

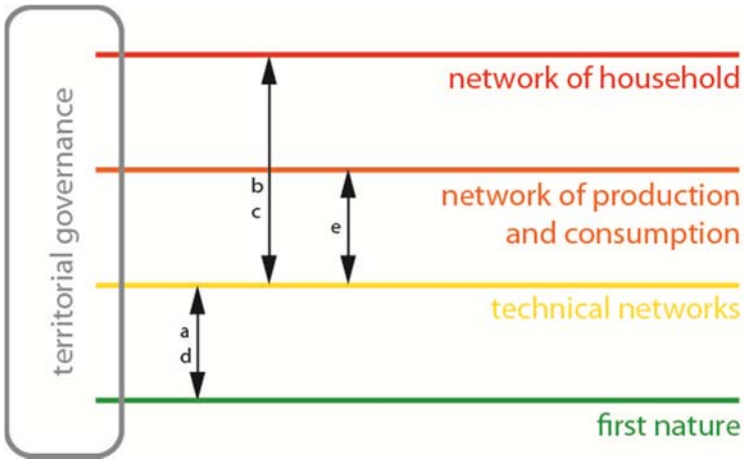

Figure 8: The relevant network of operators and relations for the planning tasks concerning bodies of water in TiB.

Examples of possible spatial conflicts in this type of TiB are the conflicts between flood protection structures and the improvement of ecological functions (see Figure 9). Hard measures of flood protection, like in the example below, may reduce or destroy the capacity of water bodies to act as ecological corridors.

Figure 9: An Example for the spatial conflict of flood protection and ecological functions of water bodies in a TiB in the Tyrol, Austria. Source: Alexander Wandl

3.3. **Small extensively used agricultural batches**

Examples of this green open space type are pastures, fruit gardens, and vegetable fields but also allotment gardens and similar spaces that are not characterized as rural land, but have functions associated to rural landscapes.

Figure 10 (left): Pasture and allotment gardens in the vicinity of Rotterdam, The Netherlands. Figure 11 (right): A cow pasture in Oerlikon (Switzerland) in the middle of a recent urban extension. Source: Alexander Wandl

These areas are often under pressure, as agriculture is often not profitable. These open spaces are frequently configured as islands within the urbanised land. Development policies that focus on densification within existing settlement borders often contribute to the pressure on these areas. The planning tasks associated to small extensively used agricultural batches are (Figure 12):

a) To *improve* their role as (ecological) connectors between the urban and the rural green space network.
b) To *secure* the provision of food at the local or regional levels, through urban farming and allotments.
c) To *provide* the possibility to experience 'nature', or to experience activities commonly associated with rural or natural environments.

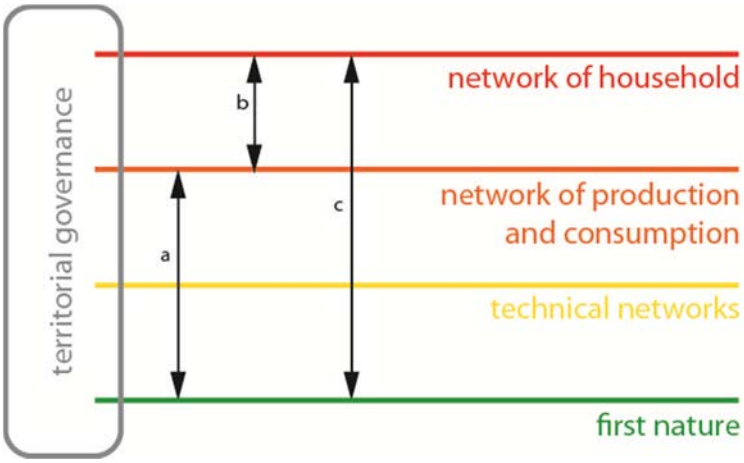

Figure 12: The relevant network operators and relations for the planning tasks in small agricultural batches in TiB.

Figure 13: Farmers protesting against plans of the government to develop the area, by explaining that their extensive form of agriculture is directly related to the ecological value of the area. The sign reads "No farmer, no nature, no field birds" and "Farmers out of sight, nature disrupted". South-Holland, The Netherlands. Source: Alexander Wandl

3.4. **Areas in-between infrastructures**

This type of open space contains 'leftover' space in-between links of infrastructure, such as voids between railways tracks and motorways.

Figure 14(left): Areas in-between a regional train line and the high-speed rail line in South-Holland, The Netherlands. Figure 15 (right): Leftover space along the national railway lines in the north of the Île-de-France, in France. Source: Alexander Wandl

These areas serve either as buffer spaces between infrastructures and other uses or as reserves for further expansion of the infrastructure. Because some of these areas are 'undisturbed' for longer periods of time, they often function as eco-corridors as well. The planning tasks associated to these areas are (Figure 16):

a) To *improve* their function as ecological corridors.
b) To *improve* the aesthetical integration of infrastructure with its surroundings.
c) To *provide* the possibility of temporal uses.
d) To *reduce* the segregating effects of regional infrastructure, in using these leftover spaces to facilitate (crossings) of local means of transport.

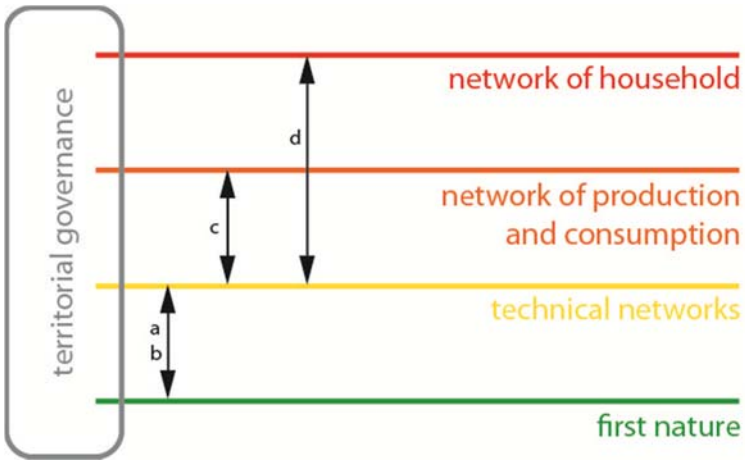

Figure 16: The relevant network operators and relations for the planning tasks concerning open space in-between links of infrastructures in TiB

3.5 Leisure and sports facilities

Golf courts, soccer and other sport fields, as well as horse riding facilities are examples of this type. They are often combined with parking lots and other support facilities and are, therefore, hybrid open spaces.

Figure 17 (left): A mini golf court under high voltage cables. Figure 18 (right): A golf course in front and a skiing slope in the background as example of large-scale sport and leisure facilities. (Both examples from the Tyrol, Austria). Source: Alexander Wandl

These types are a typical example of the increasing importance of the (leisure) consumption of the landscape in TiBs. The planning tasks associated to these areas are (Figure 19):

a) To *provide* cohesive accessibility to this type of open space.
b) To *minimise* unintended externalities produced by activities taking place adjacent to them, like noise, sanitation problems, water pollution.
c) To *facilitate* local economies based on the beauty of the landscape scenery.

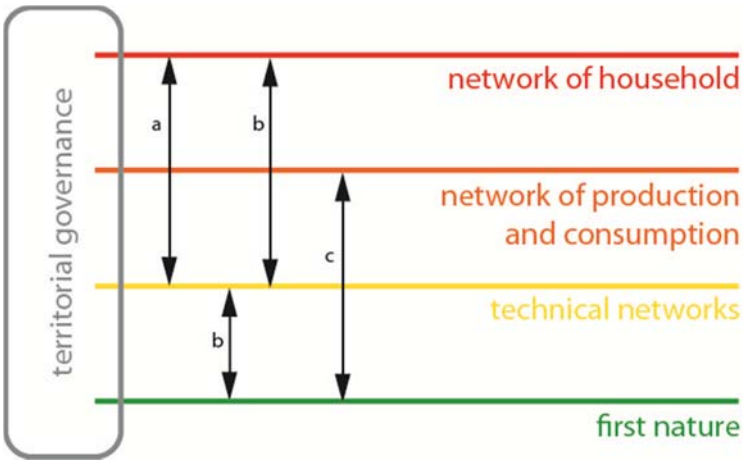

Figure 19: The relevant network operators and relations for the planning tasks concerning open space in-between links of infrastructures in TiB.

3.5. **Derelict areas**

This type describes grey and green open spaces not characterised by urbanity or rurality. They are left over spaces with an unclear use and/or development perspective. Old decaying industrial facilities or failed or unfinished infrastructure project are examples of this type.

Figure 20 (left): Unfinished motorway close to Schiedam (Netherlands). Source: Alexander Wandl. Figure 21 (right): Transformed derelict industrial site close to Duisburg (Germany). Source: Joris Wiers.

Conflicts can arise between the informally developed uses and new economic oriented uses in the transition phase from informally occupied territories towards formally planned environments. Planning task for the transformation of these areas are (see also Figure 22):

a) To *identify* possible uses and assist in producing identities of former non-places.
b) To *facilitate* economic possibilities based on the specific nature of these places.

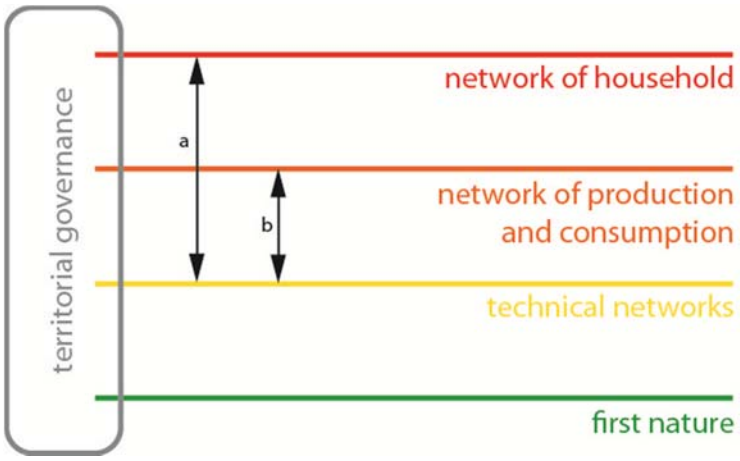

Figure 22: The relevant network operators and relations for the planning tasks concerning derelict open spaces in TiB.

3.6. Open spaces around nodes of transport infrastructure

In general these spaces serve production and consumption, which agglomerate at places with high accessibility by different means of transport, such as logistic centres, station environments, gasoline stations, or motorway exits.

Figure 23 (left): The lack of aesthetic and functional integration of a business park in the Austrian Tyrol. Figure 24 (right): The use of open space in a traffic node to facilitate bicycle traffic, close to Rotterdam (The Netherlands). Source; Alexander Wandl.

Transport infrastructure plays a crucial role in the functioning of today's network society. They connect both people and places. For several reasons – like noise, dust, emissions et cetera – there are open spaces around them. Planning tasks associated to the transformation of these areas are (Figure 25):

a) To *integrate* these areas aesthetically to their surroundings.
b) To *integrate* these are functionally with their surroundings to minimise segregating effects on the local scale.

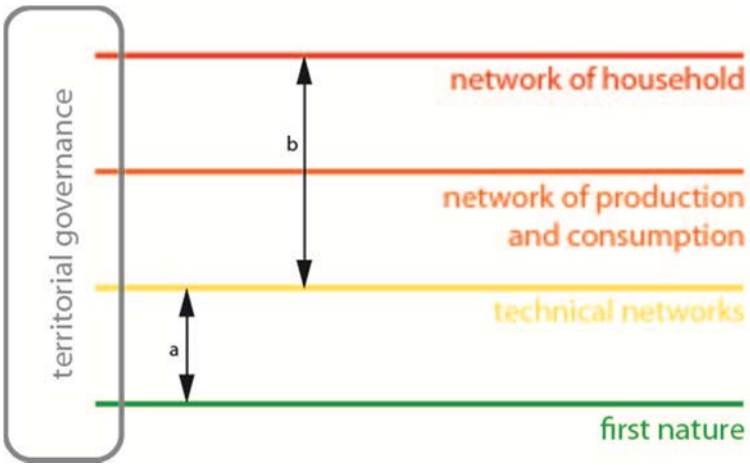

Figure 25: The relevant network operators and relations for the planning tasks concerning open spaces around nodes of transport infrastructure in TiB.

3.7. **Large parking spaces**

Large parking spaces can be found around shopping centres, train or bus stations, business parks, industrial facilities or event locations.

Figure 26 (left): A Parking lot around a light rail station in South-Holland, The Netherlands. Figure 27 (right): A parking lot along a motorway in Somerset (UK). Source: Alexander Wandl.

Although cars can bring us almost everywhere we want for work, leisure, shopping et cetera, they stand still most of the day. Parking lots around important destinations have become important entrance points to urban environments and thus important collectors and distributors of people. The car-dominated network city could not live without parking lots. Planning and design tasks associated to these areas are (Figure 28):

a) To *contribute* to the increasing of the multi-functionality of excessively large parking lots (with services to drivers, for instance).
b) To *integrate* these areas aesthetically into the surrounding landscape.
c) To *minimise* segregating effects on the local scale by the functional integration with their surroundings.

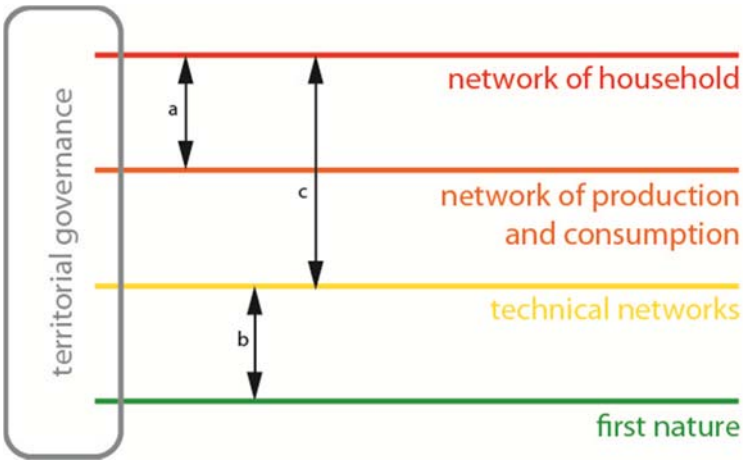

Figure 28: The relevant network operators and relations for the planning tasks concerning big parking spaces in TiB.

4. Conclusions

We have attempted to operationalize the network approach in urbanism by using the layer-analysis of network operators proposed by Dupuy and complemented by Rocco. In doing so, we have encountered plenty of evidence on the importance of the city-region as a relevant planning unit, the relevance of planning TiB in emerging city-regions, as well as the value of network-oriented thinking in defining spatial planning tasks. This new relevance of the region as a planning unit is related to metropolization processes occurring worldwide, as well as to the continuing extension of technical networks, consumption and production networks, and urban household networks, which facilitate the appearance of larger daily urban systems of a regional nature (rather than just urban).

In this sense, we have sought to conceive and operationalize new ways of looking at the planning of the city-region, by extending the network approach from urban environments to regional settings, which include urban and rural environments as well as territories in-between urban and rural environments. TiB are crucial constituent elements of emerging city-regions, and therefore we need to understand TiB and the planning tasks associated to them. Among these planning tasks, are the ones related to open spaces. We have therefore attempted to understand open spaces in TiB and their associated planning tasks, in order to inform planners and policy makers about the planning tasks associated to these territories and to raise their awareness to the need to better integrate those areas spatially and functionally to the emerging regional setting.

As a summary of our findings, Figure 29 displays a combination of all relevant relations between network operators of the planning tasks explained in the text. The thicker an arrow, the more often the relation between specific layers was mentioned in our study. The figure shows that all levels of network operator are involved in the transformation of open space in TiB. This indicates that there is a substantial amount of planning needed during this process. Figure 29 also illustrates the importance of technical infrastructures in TiB, as most relations expressed in the diagram involve technical network operators. The strong relations between the technical networks and the network of households on the one hand and the technical network operators and the first nature on the other, could be seen as further indication that the role of open spaces as consumption spaces is stronger than their role as production spaces.

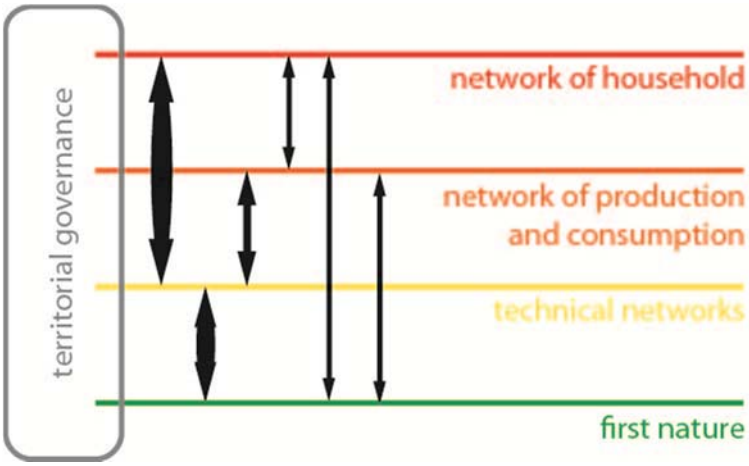

Figure 29: The thicker the arrow of the relations between network operator, the more often the relation was listed among the crucial spatial planning tasks for open spaces in TiB.

Additionally, we can observe that the topological, kinetic and adaptive criteria of networks are explicitly or implicitly addressed in the definition of the planning tasks made by us. In the diagram, we can simultaneously read the importance of geographical settings, of the flows of people between places and of the adaptations of existing facilities and networks.

Through the discussion of the concepts of open spaces in TiB, the definition of their planning tasks, and their relationship to the network approach, we gained a better understanding of the layers of analysis conceived by Dupuy and the relations between them. We used the layers as a tool for both the analysis and the planning of open spaces in TiB, i.e for a better understanding and for developing transformation proposals. Furthermore, we adjusted the Dupuy-Rocco visual representation of the layers into a scheme that - we think - even stronger communicates now the contents of and the relations between the layers of the first nature, the technical networks, the consumption and production networks, the urban household networks and the territorial governance interface.

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