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Governance of urban networks and transport corridors

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Abstract

In recent publications the expectation is formulated and underpinned that the dominant urban pattern of the future in Europe will be the polynuclear urban region. In that pattern urban areas and infrastructure networks are strongly interrelated. A consistent development of city networks is needed on different geographical scales to guarantee an excellent accessibility of urban areas.
One of the possible negative agglomeration effects in urban areas is an increasing congestion, in combination with a decreasing environmental quality. Positive agglomeration effects are promoted by an improved physical and digital accessibility of urban areas, strengthening the economic productivity of cities.
This paper demonstrates how urban networks and transport corridors can be governed to promote the synergy between urban networks and transport corridors.

Keywords: urban network, transport corridor, polynuclear urban region, agglomeration effects, accessibility

Europe as a Network of Urban Networks[1]

Europe's urban fabric became the object of intense and fundamental policy debates at the end of the twentieth century. It all started in the 1980s. Since the second half of the 1980s, spatial planning has been discussed in the EU, between the member states and the European Commission (see in particular: Fit & Kragt, 1994; Williams, 1996; Faludi & Waterhout, 2002). The regular meetings between EC/EU ministers responsible for spatial planning that have taken place since 1989 have played a crucial part in the coming about of a new, informal policy domain in the EU, referred to as European spatial development policy. During the first couple of years it appeared that most member states were thinking about the structure of the European territory in terms of a centre and a periphery, with the centre located in north-west Europe. Many saw this as a form of spatial injustice: a greedy core set against an impoverished periphery. There appeared to be a great deal of support for the concept of a 'balanced urban network'.

One of the first discussion reports produced along the way which ultimately led to the European Spatial Development Perspective (ESDP) (European Union, 1999) included the following statement: "European cities should be organized into an effective network which allows the balanced and effective distribution of strategic functions" (Presidenza Consiglio dei Ministri,1990: 4). The Dutch, using a multitude of spatial concepts in their own national planning system, proposed a novel concept, namely urban networks (Minister van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 1991). The way in which the Dutch presented the urban network within Europe cartographically made it seem that the European territory was already highly integrated in this regard—something quite different from the previously prevailing assumption that the European territory was becoming increasingly fragmented. This is a striking example of framing with images and metaphors (Zonneveld, 2000).

This concept of the European urban network led almost directly to the ultimate ESDP concept of polycentricity. However, proper understanding of the concept is hindered by the variety of meanings attributed to the term polycentricity in the ESDP. The concept refers in an analytical sense to the spatial structure to be found in polynuclear urban regions such as the Randstad, the Flemish Diamond, RheinRuhr, the British Midlands and, later, Central Scotland. In policy terms, the concept refers to the relationships between urban and rural areas where, through a polycentric system of urban centres, economic development ought to spread from the cities to the countryside. And finally, there is the pan-European notion of polycentricity, which is set even more firmly in terms of a desired spatial structure, as something to aim for. The present urban-

[1] This section draws heavily on Priemus and Zonneveld (2004).

economic pattern in Europe is characterized by the dominance of a core area, an urban pentagon defined by the metropolises of London, Paris, Milan, Munich and Hamburg (CEC, 1999: 20). Polycentricity entails the promotion of several of such zones, not through classic policies aiming at dispersing employment from economic core areas for example, but rather through the utilization of endogenous potentials. Given the growing importance attached to the notion of territorial cohesion at the European level, there was expectation of a real possibility that the polycentricity concept would be taken up in the Structural Fund discussions.

It is evident that the polycentricity concept relies on a few basic assumptions (Davoudi, 2003). The first of these is that urban areas can indeed act as nodes in a polycentric development of Europe. The second is that these nodes are distributed across the European territory in a reasonably balanced way. The first assumption is no longer contested, while the second is surrounded by uncertainties, since urban hierarchies remain remarkably stable.

Here, another important basic assumption of the ESDP brings some relief, namely that individual cities can win economic strength through cooperation at regional level—cooperation oriented, for example, towards the development of common development strategies. A regional concept of polycentric development then appears within the pan-European concept of polycentricity. Regions characterized by a dense pattern of some medium-sized and a few larger cities are the obvious candidates to take up this challenge of cooperation. Some of the prime examples of these polynuclear urban regions (PURs) happen to be located in the European core par excellence: the Pentagon, namely the Randstad, RheinRuhr, and the Flemish Diamond.

Towards a Network Approach[2]

In the European Union a shift can be observed from a city to a network approach. Four types of networks can be distinguished: green and blue networks, which could be seen as a kind of substratum; traffic networks; the novel layer of energy and ICT networks; and finally, the urban networks, including occupation patterns (land use). For the purposes of further discussion we identify some crucial policy issues to be taken up with respect to these different networks.

Path dependency almost always plays a prominent part in the explanation of spatial processes, spatial and future spatial developments. Bringing the current situation into the picture requires the acquisition of knowledge of the various networks, also over a much wider area, often across borders. An appreciation of the development opportunities of a particular area, for example a

[2] This section draws heavily on Priemus and Zonneveld (2004).

region including a number of cities, requires the existing networks in a much greater area to be brought into the frame: the green structures, the water networks, the traffic networks, the energy and communication networks, and finally the occupation patterns in the form of urban networks. If these networks and their mutual relationships are known, their logic understood, if any possible communication breakdowns and missing links are identified, and observations made of how these networks function now and with estimations calculated for how in a similar spatial layout, these networks will function in the future (in 10, or 20 years), points of departure for a spatial plan that fits the location or area well may be found.

Green networks ought to be analysed in a chosen area of generous proportions, taking into consideration the ecological significance of these networks (biodiversity), the landscape value, and the opportunities for forms of agriculture adapted to the vulnerability of the countryside as well as leisure pursuits (Tjallingii, 1996). The ecological significance only comes into its own when the networks have a certain spatial coherence that suits the habitat demands of wildlife. A careful consideration of the properties and qualities of green networks is necessary, because the concern here is for an economically weak function that gets the worst of it if the criterion applied is the function of being capable of generating the highest land price. There is thus every reason for proactive governance, in part on a transnational and even European level.

In general terms, there is every reason to strengthen the green networks, that is, to secure ecological potentials and to raise scenic qualities. Any damage to the green networks in the urbanized areas of north-west Europe ought to be avoided, or repaired, wherever possible.

Blue networks are particularly relevant with respect to catchment areas. Rivers have their sources in the hills and mountains, are fed by meltwater, springs and rainwater, and flow into lakes or the sea. Rivers may branch out, or merge. In the past, humankind has influenced the blue networks through constructing dikes and dams, managing water meadows, digging canals, pumping water away, changing the groundwater level, and extracting drinking water. Over the centuries, the absorption capacity of wide areas alongside rivers and streams has been reduced, so that the risks of flooding have increased markedly. Climate changes have probably played a significant part here. On the basis of risk analyses, the blue networks can be adapted by identifying retention areas where surplus water could be buffered and by strengthening and raising local dikes. What happens downstream depends to a large extent on the measures taken in upstream areas. Appreciation of this perspective facilitates multiple space use, such as new residential forms on water, or the combination of landscape and water.

Traffic networks consist of roads, cycle paths, pavements, rail infrastructure, inland waterways, seaways and aviation routes. The unimodal and multimodal junctions, such as parking garages,

transfer points, railway stations, inland harbours, seaports, terminals and airports, are all important. The interconnectivity of networks is particularly relevant, both for passenger and freight transport, so that chains of mobility and multimodality are facilitated. Some networks, such as international aviation connections (through international airports), harbour connections (through seaports) and high-speed networks (through HST stations) are internationally orientated. Some junctions fulfil a mainport or hub function, because their traffic flows are clustered and fed via the mainport or hub. Congestion indicates local capacity shortages in particular periods. Through setting a price on mobility and dynamic traffic management, the chance of congestion can be reduced. If utilization measures are not capable of resolving the bottlenecks, physical adaptations will be necessary.

In the vicinity of railway stations, motorway exits, harbours and airports we encounter sites with good to outstanding accessibility. There, real estate prices rise as a result of this enhanced accessibility. These places are the logical locations for logistic business activity, commercial services, production and supplies.

Communication and energy networks are not laid by the government—as is the case with most of the classic traffic infrastructure—but by private companies. Their lack of involvement in the realization of these networks no doubt helps to explain how it is that government authorities and planners show so little interest in the location of these infrastructures. The inability to recognize adequately the territorial implications of these networks probably also plays a part. Lambooy *et al.* (2000) and Louter (2001) assert that ICT use and ICT infrastructure probably strengthen the urban economy. They associate themselves here with the analyses of Townsend (2001) and Warf (2001), who arrive at similar findings. Although the spatial effects of ICT infrastructure are not fully understood, the access to an ICT backbone with high capacity is an important location factor for knowledge intensive companies.

Urban networks, including existing occupation patterns of housing, employment, shopping and recreation locations and other services, ought to be brought into the frame. Concentrations of dwellings, business activity and amenities determine the urban economy, together with traffic, energy and communication relationships in general and commuter relationships in particular.

The spatial planning task for the future is located within the patterns of these green, blue, traffic, energy, ICT and urban networks. This planning task consists to an increasing extent of transformation—the restructuring of, for instance, agricultural, residential, or industrial areas—and to a decreasing extent of greenfield development (agricultural areas into residential estates, business parks, and infrastructure). Opportunities for multiple space use should be investigated with more vigour, including underground construction and the superimposition of functions.

Increasingly, spatial planning will take place in a network of networks. The urban core has become too small a unit of consideration. To an increasing extent, housing markets, labour markets and mobility markets cross municipal borders. An approach at the level of the network, situated in the networks listed at an above regional, partly international scale level, is indicated for the next few decades (Batten, 1995; Drewe, 1998; Capello, 2000). The compact city is having to make way for the network city.

Whenever we consider the question of how spatial planning in polynuclear city regions could take place, the thought which immediately comes to mind is to consider regional border crossing and even national border crossing networks and first of all to try to maintain and where necessary to strengthen the cohesion and the logic per network. These networks are laying down the conditions for spatial development at the regional scale in particular in terms of occupation patterns within polynuclear urban regions (Rijksplanologische Dienst, 1996; Tjallingii, 1995, 1996). Policies for concrete part areas can then be worked out within this regional framework. This regional level forms the link between national and transnational spatial planning on the one hand and the spatial layout of small-scale areas on the other hand.

Spatial governance and transport corridors[3]

Corridor development and new directions in government policy are both underpinned by fundamental socio-economic and spatial changes. These changes are discussed using different names, such as globalisation (Kearns and Paddison, 2000), the emergence of a network society (Castells, 1996) or post-fordism (Scott, 1998). A characteristic of these changes is that traditional spatial and institutional categories no longer adequately describe and solve problems faced by societies (Hajer and Reindorp, 2001; Kearns and Paddison, 2000; Graham and Marvin, 2001). Spatial categories such as 'cities' and 'regions' often show a lack of awareness of the multi-scalar dimension of current social problems. Similarly, the traditional dichotomy of state versus market often ignores the complex interplay between various actors—public as well as private—involved in social problem solving.

An important reason to speak of governance instead of policy or planning regards the scope of activity (Healey, 1997). Traditionally, policy and planning have been equated with what governments do. This has been generally understood as an organisational hierarchic mode of coordination, and often described as a command- and-control type of planning (Kearns and Paddison, 2000). In practice, and recently much more than before, governance is the result of a

[3] This section draws heavily on De Vries and Priemus (2003).

complex interplay of government agencies, non-governmental organisations and private companies. Public–private partnerships and the provision of services in the public interest by private companies are already well known in the field of infrastructure and transport. "Internationally, all the major urban infrastructure networks—water, waste, energy, telecommunications and much of the transport infrastructure— are gradually being 'opened up' to private sector participation in the management and provision of services" (Graham and Marvin, 2001: 13). In addition to changes in the relationship between governmental and non-governmental stakeholders, the role of the European Union is also becoming more and more important for spatial governance. The European Union has added an extra layer of government to the institutional fabric of many policy fields such as infrastructure, environmental and agriculture policy (Williams, 1996; Faludi and Waterhout, 2002).

Another reason for the increase in complexity is a growing differentiation in the spatial scope of social relationships and practices (Scott, 1998). Because of this great differentiation, it is now useless to try to fit government, territory and planning together for every spatial problem signalled (such as those associated with corridor development). Addressing the problems associated with corridor development cannot be done on the basis of command-and-control planning because the areas in which these developments take place are too spatially and too institutionally complex (Zonneveld and Trip, 2003). Besides crossing national borders they also cross numerous local and regional administrative borders. All these borders correspond with responsibilities that are relevant for the developments that take place. National governments are often the most important players when it comes to the building and maintenance of the kind of infrastructure that forms the backbone of a mega corridor. It should be noted however that private or quasi-private organisations have or are gaining a larger stake in infrastructure development.

It is important to enhance the ability of existing governments and non-governmental organisations to deal with corridor developments. This requires institutional capacity building (Healey, 1997; Hassink and Lagendijk, 2001; Cars *et al.*, 2002). "The concept of institutional capacity refers to the overall quality of the collection of relational networks in a place" (Healey, 1997: 61). This second-order activity provides a context for the first-order activity of concrete decision-making to take place (Faludi, 1987). This refers to the task of creating institutional conditions for collective action. These conditions can be hard, such as legal procedures, but also soft, such as mutual trust or a common vocabulary among stakeholders. It is the social capital that enables stakeholders to interact in a constructive way. The whole set of structures, procedures, attitudes and perceptions that are shared by stakeholders can be described as "a

public good of a second order" (Gualini, 2002: 38). Because the (transnational) areas in which mega corridors are located often lack these kinds of second-order public goods, they have great difficulty in creating public goods in the traditional meaning of the word (e.g. cross-border natural reserves or cross-border infrastructure).

Taken together, all the developments described above—increasing spatial complexity and growing importance of hierarchic modes of coordination—point to a conclusion that one should not be overconfident about the potential for planning of corridors.

Long-term urban images, according to the Strategic Research Framework Urban Europe (2011)

In view of the strategic orientation of the Urban Europe research calendar, four long-term urban images are identified (European Commission, 2011). These interlinked future appearances of urban environments (in the year 2050) offers stylized pictures of urban agglomerations, with the aim to distillate relevant and operational research issues for the Urban Europe's Strategic Research Framework (SRF). These four urban images and their main orientation are:

- *Entrepreneurial City 2050*: economic vitality and innovation
- *Connected City 2050*: smart logistics & sustainable mobility
- *Pioneer City 2050*: social participation & social capital
- *Liveable City 2050*: ecological sustainability.

These images may be used as strategic vehicles to identify important research challenges and foundations for an Urban Europe Strategic Research Framework (SRF). These interconnected urban images are described as follows (in: European Commission, 2011).

Entrepreneurial City 2050

This image assumes that in the current and future global and local competition, Europe can only survive, if it is to maximize its innovative and creative potential in order to gain access to emerging markets outside Europe; cities are then spearheads of Europe's globalization policy.

Connected City 2050

The image of a connected city refers to the fact that in an interlinked (from local to global) world, cities can no longer be economic islands in themselves ('no fortresses'), but have to seek their

development opportunities in the development of advanced transportation infrastructures, smart logistic systems and accessible communication systems through which cities become nodes or hubs in polycentric networks (including knowledge and innovation networks).

Pioneer City 2050

This image refers to cities as attractors for creators and makers as pioneers, offering the general conditions for cutting-edge innovations and developments beyond conventional approaches, and providing innovative environments for the assessment and implementation of new (technological) solutions, through which Europe can become a global pioneer.

Liveable City 2050

The final image addresses the view that cities have to consider all relevant aspects such as health, security and safety in order to provide an attractive environment to live and work for all citizens, and that smart environmental and energy initiatives (including recycling and waste recuperation) shall act as engines for ecologically-benign strategies, so that cities may become climate-neutral agents in a future space-economy. Although the authors do not mention this, we may consider urban housing markets and housing environments as an important component of the Liveable City 2050.

These four images highlight the strategic dimensions of urban futures in Europe. The future city will always be a combination of the four urban images. These images lend themselves for systemic approaches to Urban Europe, they all need operational geo-science information and behavioural data to map out or understand uncertain urban futures, and they also reflect the need for strategic thinking on the governance of urban agglomerations in Europe. These four ideal-typical representations of European agglomerations in the year 2050 are not to be seen in isolation, but they are interconnected.

A wealth of innovative research ideas has been extracted from a creative envisioning process regarding these four interlinked urban images, on the basis of stakeholder consultation and interactive workshops with experts and policy-makers. To create a systematic and operational research agenda, a process of focusing and filtering has been carried out. This led to the identification of three major research issues to be addressed in the Joint Programming Initiative (JPI) Urban Europe. These can be presented as follows:

A. Urban Megatrends

What are the prominent demographic, economic and technological megatrends that are decisive for a promising future of urban systems?

B. *Urban Networks and Connectivity*

What are new mobility, logistic and land use developments and policies that are needed to create vital and attractive cities – and networks of cities – in the decades to come?

C. *Socio-Ecological Sustainability of City Systems*

Which ecological and social constellations have to be met and implemented in order to shape sustainable and balanced long-run urban development patterns (including energy systems) in Europe?

What the European Commission (2011) doesnot mention explicitly is the need for adequate, and timely political decisions, in a context of multi-level governance, public-private partnerships, an active civil society and a flourishing democracy. This has to be included in the research agenda without doubt.

Agglomeration economies and economic productivity

Urban areas will flourish and expand as long as agglomerations externalities are positive. But there are not only positive externalities, there are also negative externalities of agglomeration (Ciccone, 2002; Fujita and Thisse, 2002).

Negative externalities of agglomeration are:

- *Congestion*: When infrastructure capacity is hindered by bottlenecks, more agglomeration may increase congestion;
- Negative *emissions* of traffic, worsening *air quality*, which may threaten the health of people living and working in urban areas.

By making transport of persons and goods greener (less emission of greenhouse gases, the modal split in favour of high-quality public transport, adopting congestion charges and forms of mobility pricing, and by synchronizing infrastructure networks and urban patterns, the negative externalities can be reduced considerably.

Emissions of greenhouse gases from traffic and real estate can be reduced by an energy transition from fossil to renewable sources (sun, wind, geothermic, water power).

Positive externalities are:

- *Input externalities*: proximity enables producers to save on transportation costs and share specific services;
- *Labour market externalities*: proximity and short commuting times enable knowledge workers to select the best jobs in the region. In particular for two-earner households this is crucial. Employers can improve the recruitment of talents as a result of proximity. A better matching between employers and employees can be realised;
- *Knowledge externalities*: proximity facilitates the exchange of information and knowledge, including tacit knowledge, by face-to-face contacts. It fosters a climate of entrepreneurship and innovation (Audretsch & Lehmann, 2006) and makes the city a pioneer and entrepreneurial city.

Proximity stimulates functional specialisation and strengthens a high specialisation in knowledge-intensive business services (Duranton & Puga, 2005).

The positive externalities reduce the production costs and increase the value of outputs. This means that well-functioning urban networks with mainly positive agglomeration economies increase their economic productivity and strengthen their international competitiveness. In order to realise this attractive urban future a *sine qua non* is an improved synergy between transport infrastructure and city networks.

Transport corridor challenges[4]

When we observe the development of traffic infrastructure and the dynamics of mega corridors between urban areas, we are confronted with a number of specific challenges.

(1) How should long distance and short distance traffic be regulated? More and more, the solution to this question is being sought in disentangling the infrastructure of these two traffic types. For example, one can levy fees for long-distance traffic (e.g. toll roads, road pricing), and for short-distance traffic during parts of the day with high congestion.

(2) How should the interconnectivity and interoperationability of networks be promoted? This issue requires a logical and hierarchical design of networks and infrastructure with multimodal nodes for both freight (terminals) and passenger transport (stations, transfer stations).

[4] This section draws heavily on Priemus & Zonneveld (2003).

(3) How can synergy between urban patterns and traffic infrastructure networks be increased? This question is related to the accessibility of housing areas and business parks, the multimodality of nodes and the relationship between urban areas and green and water structures.

(4) How can one prevent corridor development from taking place at the expense of existing urban centres? How can one prevent infrastructure networks from fragmenting the open countryside and damaging natural areas? How can the spatial quality of landscapes and the biodiversity and ecological significance of natural areas be guaranteed with the development of corridors? These issues will require gaining further insight into the location and logic of green–blue networks, and prioritising these as much as possible over traffic network routes. Where conflicts arise, underground infrastructure or stacking (e.g. eco-flyovers) may offer a way out.

(5) Corridors situated between polynuclear urban regions usually cross municipal borders, regional borders and even national borders. This necessitates the coproduction of policy between municipalities, regional authorities and national governments, and also between different sectors: spatial planning, housing, economic affairs, agriculture, environment and transportation. Particularly differences in regulation and policy practices between nations must be overcome. Successful examples of multi-level governance, policy coproduction and multi-actor systems can offer guidance.

Towards better integration of transport infrastructure and city networks

In discussions among urban planners and urban researchers the city network paradigm is becoming more and more popular (Camagni, 1993; Camagni & Capello, 2000; Capello, 2000; Parr, 2004; Meijers, 2005). As we mentioned earlier, the European Union (1999) presented the polycentric approach as the appropriate urban pattern in the *European Spatial Development Perspective*. Polycentrism is defined as an urban pattern with related cities of more or less similar sizes and connected with each other.

The transformation of the mononuclear city into the polynuclear urban region in Europe (Batten, 1995; Kloosterman and Lambregts, 2001; Meijers, 2007) by definition means the development of more urban centres, more nodes connecting urban centres and infrastructure networks. Not only is housing suburbanising, so is employment, with secondary urban centres (edge cities)

developing (Garreau, 1991). This American phenomenon fits very well into the European tradition of polynuclear urban regions. This tradition will be influenced more and more by global developments. Polynuclear urban regions can develop into global city regions (Scott, 2001) and can support an increasing synergy between infrastructure networks and urban areas.

The high-speed rail network has recently been developed in Europe as part of the Trans-European Network (TEN), partly as an alternative to continental flights over relatively short distances. So far the high-speed rail network has many missing links. It is important for high-speed trains to stop in the centre of cities and at the major airports so as to ensure interconnectivity between continental and intercontinental air routes and rail routes (Givoni and Banister, 2007) and to improve the integration between cities and infrastructure networks. Whether this will result in substantial substitution of air travel by rail travel (as was intended from the very start) is doubtful, as the low fares charged by price-cutters such as Easyjet and Ryanair have upset the original substitution calculations. For the accessibility of businesses and homes in urban areas the development of the European HST network is crucial.

The idea of the polynuclear urban region is a promising perspective when it comes to answering the question: How can the synergy between urban pattern and infrastructure networks be enhanced? In many cases the system has to be redesigned at the regional level, creating or improving transfer points (Priemus, 2011):

- between air and car or train;
- between car (on trunk roads outside urban built-up areas) and rail/metro/tram/light rail;
- between rail and metro/tram/light rail.

Once this redesign has been carried out, the nodes such as railway stations and airports, need to be highlighted and classified. It is also important to plot the metro/tram/light rail stops and to zoom in on the nodes where passengers and/or freight can transfer from one mode to another. Special attention is being paid to the areas around railway stations where the high-speed train will stop (Pol, 2002): here major urban impacts are expected, as has previously been the case in Japan (Amano *et al.*, 1991) and France (Newman and Thornley, 1995).

Apart from the transport function, the function mix in and around each node is significant, including housing, offices, ateliers, hotels, restaurants, bars, educational and cultural facilities. When analysing the functioning of and prospects for HST station areas, Bertolini (1996; 1999) distinguishes between *node value* (transport value) and *place value* (functional value) (see also:

Bertolini and Spit, 1998). In this approach it is essential that the transport function and function mix of each node be 'in balance' with each other. As a rule of thumb, the more passengers per day transfer and get on and off at a node, the more reasons there are to provide a rich function mix. It is important that urban nodes be considered as interfaces between public infrastructure networks and urban functions, each with their own specific characteristics.

The development of networked infrastructures in urban areas is not without problems. Graham and Marvin (2001: 382) use the umbrella term 'splintering urbanism' to describe the dialectical and diverse sets of processes surrounding the parallel unbundling of infrastructure networks and the fragmentation of urban space.
Graham and Marvin (2001: 382): "(I)n these times of 'globalisation', those users demanding intense local and global connectivity are starting, along with the internationalising infrastructure operators, real estate developers and urban development agencies that struggle to meet their need, to pay considerably attention to how the whole of their networked urban infrastructures are configured, managed and developed. At the same time, in search of absolute security, privacy and control, local connections with the wider metropolis are being increasingly filtered through a widening array of walls, ramparts, security practices and access control technologies. In the process the relative infrastructural connections of less powerful users, and the spaces in which they live, seem to become more and more fragile and problematic". Privatisation and liberalisation lead to a transition from broadly similar services at relatively equal user charges over cities and regions towards hegemonic forms of infrastructure monopolies with unequal access. For the future of urban areas the quality and accessibility of public space, including public infrastructure, is an important academic and political issue.

Transport networks and attractive places in urban regions[5]

Light rail surface and underground networks can be an important component contributing to the sustainable accessibility of urban regions. Light rail is a rail-associated transport system that can in general be positioned between train and tram. The vehicles have ample pick up and set down points, rapid acceleration, short stopping times and adequate top speed.

[5] This section draws heavily on Priemus (2011).

Cities like New York City, Tokyo, London and Paris could not function without its elaborate underground rail network. Recently the authorities in Beijing, Shanghai and other Chinese metropolis, did a similar discovery.

Partly as a result of its exemplary public transport, the number of visitors to the central city in Strasbourg has increased (Priemus and Konings, 2000; 2001). A synergy between urban (re)vitalisation and the improvement of public transport in Strasbourg has brought about a cost recovery level for the tram of more than 100%. Public transport has priority here. Park-and-ride areas have been laid out at some of the larger tram stops with bus stations. Both the liveability and economic attraction of the city centre have been strengthened. This experience makes clear that the connected city and the liveable city can very well go together.

In Japan the public transport operators are the owners of the rail infrastructure and the stations. This situation came about together with a strong diversification of these companies. They are very active in the development of real estate along the lines of public transport and at stations as well as in the operation of transport services (train and feeder bus services). The companies develop new residential areas, apartment complexes, department stores, shopping centres and office locations.
Public transport in Japan has a market share in the total number of passenger kilometres 2.5-3 times as great as in the Netherlands. Japanese public transport proves well able to recover most of its costs, including the cost of the infrastructure. The railway companies benefit from the increases in value of land around the railways (Cervero, 1998).

In many cities a process has been underway for years in which the city centre becomes car shy and car traffic is concentrated on the ring roads. This attitude enhances the attraction of central cities for cyclists, pedestrians and public transport. The more car use in the city is regulated, partly through physical measures and partly with the help of the price mechanism (congestion fee, paid parking), the more important it becomes for the central city to be readily accessible via public transport (Mackett and Edwards, 1998).

The endeavour to facilitate chain mobility implies a strategic location and an adequate capacity of transferia (places where passengers change mode), terminals (places where freight changes mode) parking garages and bus stations and a redesign of public space. In this manner tourist and

cultural facilities can be strengthened, and justice can be done to protected cityscapes and monuments.
In the central city, the customer must be able to choose and combine not only public transport, but also private transport (both with a price tag) and combinations of public and private transport in mobility chains. For city logistics new concepts are needed which take the demand of urban customers into account.

In addition, there are ample opportunities for multi-modal travel information systems (navigation systems in cars, public transport information systems, tracking and tracing) to contribute to the smooth running of urban transport systems.

Cities are ideal locations for developing attractive places geared to strengthening the economy. National and international companies prefer to run their operations from a city base. Many businesses communicate with their suppliers and customers via physical and virtual global networks. Attractive places will emerge if businesses in the cities can be easily accessed thanks to the proximity of airports, rail networks, motorways and ICT connections.

Socio-cultural, medical and educational services will be concentrated in the urban centres. Transport nodes will make it possible to switch modes: there will be railway stations (with car parking and bicycle storage) and transfer sites where people can park their cars and continue their journey by bus, metro or taxi. Ideally, these sites should be located at strategic places along city bypasses to serve drivers from outside the region. The city centre can then be reached by metro, light rail, bus and/or bicycle. More facilities will be added to these park-and-ride stations, e.g. filling stations, car washes, car repair facilities, florists, gift shops, cafes, and meeting rooms. In the London city centre the congestion charge has been introduced. The centre remains easily accessible, thanks partly to the underground system. Each urban agglomeration must have a high-quality, high-capacity, safe and secure public transport system and a high-quality system of motor roads which are ready to facilitate electric cars. Parking will be expensive in central areas and a congestion charge could be introduced. Mobility and parking in inner-city areas will be priced to promote an optimal use of the available transport infrastructure.

Attractive places also have an ecological dimension: cities are not only integrated in transport and ICT networks but also in water and green networks, which give citizens the opportunity for open air recreation close to their homes, playgrounds for children, urban agriculture, and which

stimulate biodiversity in urban areas. The increase of energy costs and the reduction of energy use in housing can, in addition, lead to a more compact way of living.

Finally, attractive places have also an important social dimension: they promote and facilitate social interaction and social cohesion. Housing preferences and housing environment preferences differ. On the one hand households in urban areas prefer all kinds of central locations, close to theatres, museums, restaurants and bars, but also close to a public garden and schools. At these locations they will often accept apartments. For other households, in particular with children or where children are expected, the ideal home is mostly a one family house with private garden, with a quiet green, suburban environment not too far from schools, shops and city centres. Polynuclear urban areas can offer housing opportunities for both categories of households. A large variety of housing units and housing environments can be offered.

In particular for two-earner households the accessibility, departing from their homes, of jobs in a differentiated labour market is essential. Visser and Van Dam (2006) argue that the number of jobs that can be reached within half an hour travelling, is the variable which has the highest impact on house prices. Improvement of the urban traffic infrastructure for commuting will, *ceteris paribus*, increase the value of residential properties. Here is a direct link between the quality of urban housing and the quality of urban infrastructure. For housing a dedicated parking place for one or two cars will remain popular, including charging points for electric cars in the future. But it will be expensive and not every-one will give this the highest priority. Also a bike storage and a short distance to a stopping place of public transport are crucial. Traffic infrastructure must guarantee accessibility of high quality without deteriorating the quality of the housing environment by emissions of greenhouse gases, particulate matter or noise. By strengthening agglomeration economies in the connected liveable city also the entrepreneurial city and the pioneer city can be promoted.

Closing remarks

There are many factors which may explain the future of cities. The synergy between transport infrastructures and city networks is only one of these factors. This paper only elaborates this aspect which is presented as a *sine qua non* for a positive urban development. There is no standard solution for all European cities, let alone for all cities in the world. The current situations are different and these situations will designed and redesigned in different ways. For city dwellers,

visitors, entrepreneurs and tourists it is crucial that every city is unique and has its own economic and social profile and its cultural unique selling points.

Not only societies and markets may change, but also policies. Competition between urban regions may lead to a change in ambitions: every urban region will discover - sooner or later – its strong and weak points and will try to increase its productivity by strengthening its competitive edge and to enter into promising alliances. In all those cases improving the synergy between transport infrastructures (and also energy and communication infrastructures) and city networks is a no-regret policy. In a world of many uncertainties and risks this may be an important observation.

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