Dietrich Henckel and Benjamin Herkommer

Spaces of Variable Speed

The temporal topography of cities as an indicator for competitiveness and quality of life

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Abstract

The speed of information production and the quality of access to information, the speed of industrial production, the speed of distribution of goods and services, as well as the speed of travelling become ever more vital for the competitiveness of enterprises and city regions. Connectivity is a prerequisite of participation in the globalisation of economies. But connectivity is very unevenly distributed over different spaces – between nations, regions and even within cities. Due to the changes in the connectivity of infrastructures the notion of proximity is changing from a more spatially related to a more spatio-temporal related meaning. Since the temporal aspects of urban functioning, the temporal topography of cities is not a very well established line of research in urban studies, the purpose of this paper is to show the importance of such reasoning. The article intends to demonstrate in what ways different speeds and different levels of spatio-temporal proximity influence not only the competitiveness of cities but also their quality of life. Dimensions of different speeds are among others access to transport, travel times, access to public services, time (delay) of the delivering of public services. Differences are due to technical reasons (speed and capacity of infrastructure networks), institutional arrangements (type of provision of infrastructure services (private vs. public, integrated vs. unbundled), spatial organisation (density) and the time sensibility of processes. The understanding of the temporal aspects of urban functioning will provide not only new insight, but will also contribute to a better organisation of cities.

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1. Introduction

A vital question for the development of global city regions and the diversity of their development is their respective collective efficiency. The following paper is going to deal with selective aspects of the collective efficiency of the city region. Taking “collective efficiency” seriously one has to look at a vast variety of aspects. To name just a few:

- The spatial organisation of the region,
- The division of labour and the organisation of the labour market,
- The education system and the access to education,
- The organisation of social security and the degree of social cohesion,
- Social stability and integration of diversity,
- The structure of the innovation system,
- The access to physical, social and institutional infrastructure,
- The governance of the city region.

Implicitly it becomes obvious that a wide definition of efficiency is used here. More than the mere economic aspects such an understanding of efficiency includes at least the usual dimensions of sustainability, i.e. the economic, social, environmental and cultural dimension. To build on such a definition of efficiency rests on the conviction that only a socially stable society is competitive in the long run (Henckel et al. 1998). This indicates that in the long run competitiveness and quality of life have a lot in common.

Most of the above mentioned aspects have a temporal content – at least implicitly. Since the temporal analysis of urban and regional development and functioning is not very well established, this paper will elaborate on selected temporal aspects of urban and regional efficiency and its relationships to the quality of life. We are convinced that a systematic introduction of “time” into urban and regional analysis and planning could provide not only new insights to the understanding of urban development, but also improvements for governance and planning.

Even in colloquial talking about cities, the description of our urban spaces contains notions of time. A global city, a harbour city, a production city, a service city, a summer resort: each type of city has a distinctive urban rhythm, largely dependent on its main (economic) function. A decisive factor lies in the different speeds of the respective types of cities. The urban rhythm is one dimension of the temporal topography of cities. Looking at this topography from a distance, we only identify one dominating main rhythm of a city or a region. Looking closer, it becomes evident that even within one city, urban rhythms and speeds differ between the distinct parts of a city. Thus, every

city region has its own differentiated temporal topography, which has an important influence on how we experience the “personality” of cities.

Temporal patterns of society are changing. Historic analyses show that with new technological paradigms, societal time patterns are changing as well (Rifkin 1988). Especially due to the IT-revolution, but also due to the introduction of new and faster transportation modes and institutional changes like deregulation, international integration, globalisation etc., we experience far reaching changes of time patterns. Analytically, they can be separated into four aspects with very distinctive social and spatial impacts (Eberling/Henckel 2002, Geißler 2004, Henckel 2007):

- Acceleration. Many authors have regarded the modern age as a time of general mobilisation (Sloterdijk 1989). Many sectors of the economy and of society are showing signs of acceleration (Gleick 1999). They range from shorter product life cycles and faster transport to accelerated telecommunications networking. This affects the spatial differentiation of the division of labour, the size of catchment areas, the useful life of locations, and the need for life-long learning. The effects are apparent in almost all facets of economic life, in the city, in (local) policy reactions, and in private, everyday life.
- Extension. The extension of working hours refers to the use of times previously largely excluded from economic activity. (Urban) activity advances into previously protected times, especially in the evening, at night, during the weekend, and on public holidays. However plausibly it may be argued that there have always been cycles of expansion and shrinkage in this domain, it must nevertheless be assumed that times once “conquered” will not be surrendered for good. In other words, there is a trend towards 24/7 continuousness even if our society is still far from completely implementing it. One important outcome is the linearisation of rhythms, at least a levelling off and smoothing of transitions and an increase in working times and employment beyond the normal working day. Here, too, there is a wide spectrum of effects. We witness an expanding demand for public transport services, increasing problems of compatibility of urban functions and growing risks arising from night work and overtiredness as economic activities and traffic continue far into the night.
- Flexibilisation. Flexibilisation entails the dissolution of the rigid, “mass” rhythms characteristic of industrialisation and the full-employment era. Not only are jobs being flexibilised. Working times are also being differentiated in terms of duration and scheduling. A key goal of flexibilisation is to adapt labour input to the demand for products. The logical consequence is the “breathing factory,” which breathes in or out in response to the state of the market. The extreme case is work on call. Temporal rhythms become individualised, dissociated from collective rhythms, and temporal coordination is left up to the individual. People have to “put together” their own working times as best they can.

- Temporal agglomeration, simultaneity. Temporal agglomeration or intensification refers to carrying out several activities at the same time. New information processing and telecommunications technologies have made this considerably easier. The general reachability afforded by the cell phone has increasingly integrated occupational activities into other spheres of life (leisure time, household chores, etc.); the possibilities offered by laptops and networking are changing travel time more and more into working time in the narrower sense of the word. Simultaneity is firstly a consequence of the differentiated division of labour, which now makes it necessary for actors from different companies to be present at the same time in the same place. Secondly, it is a result of time saving strategies which require activities traditionally carried out in sequence (e.g., development and marketing) to be performed simultaneously (simultaneous engineering), with corresponding consequences for factory or office organisation (Wendt 1995).

Speed and the adaptation to acceleration are seen as particularly important prerequisites for economic success and competitiveness. As the former CEO of ABB put it: “Not the big will eat the small, but the fast the slow.” A lot of organisational concepts in engineering and business organisation are tackling the problem of speed very intensely. Therefore we will concentrate on this aspect in the following pages.

2. The Speed of Cities

In physics, speed is defined as the rate of change of position, the distance travelled per unit of time. We use speed predominantly as a category to measure movement and movement is what makes us feel the interrelation of time and space. When we talk about speed and the city we immediately associate things that have to do with movement in space such as traffic and transportation and the respective infrastructures.

But there is more to the question of urban speed than that. The speed of a city is also a lived experience and thus a category of quality of life. Early studies in both the medical and the anthropological field have studied the pace of life in different big cities and the impacts on health and wellness. Within this body of research, the pace of life is defined as the "relative rapidity or density of experiences, meanings, perceptions and activities” (Altman/Oxley/Werner 1985, p. 14). To explore the question of variable speeds in and of cities we have to ask for the interrelations of these two concepts of urban speed: movement in space and the pace of life. In other words we have to look at both: what drives a city to make it move fast or slow and what makes us experience life in a city as either fast or slow.

In this section we try to shed some light on a particularly scarcely researched aspect of the temporal dimensions of urban space: on differences in the speed of cities and parts of cities. We present the analytical dimensions of urban speed and an example of empirical research on the subject, followed by the analysis of the driving factors of

differences in cities' speeds to finally look at the implications this has for the question of the temporal efficiency of cities.

2.1 Dimensions of Variable Urban Speeds

There are multiple dimensions in which we can experience and analyse the speed of cities. The most important among them are:

- The speed of pedestrians
- The character of breaks, rests and off-time
- The extent of incessant activities and incessant spaces
- Access to and bandwidth of transport (long/short distance, physical/virtual)
- The visibility of nature and natural rhythms; light and noise
- The urban fabric and its changes (demolition of obsolete and addition of new physical structures)

2.2 Differences in Urban Speed

In urban planning and traffic engineering questions of speed play a considerable role when it comes to the design of public spaces and street layouts and diameters etc. Private developers of shopping malls take special interest in techniques of modelling walking speeds and pedestrian behaviour to assess the effects of design alternatives on potential clients (Harney 2002, Al-Azaawi/Raeside 2007, Space Syntax 2008).

But the speeds of cities are only very rarely a matter of comparative empirical research. Robert Levine's "A geography of time" (1997) is perhaps the best-known example of such research. Levine and his teams conducted experiments in the capitals and/or economic centres of 31 countries around the world to produce a ranking of fast to slow cities. They measured not only the walking speed of pedestrians but also the exactness of clocks in public spaces as well as the time it took post office clerks to hand out a standard stamp and return the change. The resulting ranking of the 34 cities examined put Zurich and Bern on top, with Dublin, Frankfurt, Tokyo, Rome and London following. Hong Kong as 10th, Paris as 11th and New York as 16th ranked surprisingly low, as did - maybe less surprisingly - Rio de Janeiro, Djakarta and Mexico City as 29th to 31st (Levine 1997, p. 180).

Admittedly, these results and the methods applied are quite debatable. Since the economies of cities like Paris and New York are dominated by advanced producer services, enterprise headquarters, stock exchange and financial services and not so much by the b-to-c branches of postal services, it seems problematic to ignore these very accelerated branches of the global economy and their impact on the urban pace of life. Similarly, the walking speed of pedestrians doesn't seem to be a very convincing indi-

cator as well. When Levine tested 36 American cities with the same methodology, Los Angeles ranked last. But how representative is walking speed in L.A.? Joan Didion once said the only form of secular community in the City of Angels was to drive down the highway (quoted in Levine 1997, p. 203) and truly, people in L.A. only walk when inside a mall or on the beach etc., thus in situations where you rarely tend to hustle. On the other hand, when it comes to driving speeds on highways, the Greater Los Angeles Area and the State of California as a whole are investing a lot of money and engineering creativity to speed up traffic. During the 1990s, additional highways-lanes where added but reserved for vehicles with more than one person riding. By the end of 2004, these so called “high occupancy vehicle (HOV) lanes” or “carpool lanes” covered 1,236 lane miles in California, 832 of which are situated in the metropolitan area of Los Angeles (Los Angeles and 4 neighbouring counties). They save commuters an average one minute per mile, which amounts to 40 minutes per day, considering 40 miles as the average commuting distance in the L.A. region (California Department of Transportation District 7 2004, Southern California Association of Governments 2001, L.A.C.M.T.A. 2006). In addition to HOV-Lanes, California’s transportation authority invested in the implementation of a new program, the so called High Occupancy Toll Lanes (HOT-Lanes) (American City & County 2001). Access to these express-lanes is generally charged a varying fee, depending on the amount of traffic, but busses and vehicles with more than one person riding can use these lanes for free or receive price reductions.

These examples illustrate four arguments:

- Time in California seems to be more precious than Robert Levine’s studies would suggest, pointing out that the walking speed of pedestrians is probably not a very reliable indicator since traffic and transportation systems in cities are very different from each other.
- A second important aspect is to acknowledge that differences in speed not only occur from city to city but *within* city regions. With fast moving traffic on express lanes just alongside congested normal lanes, it becomes obvious how thin the line between fast and slow places can be. Considering that there are numerous other examples of spaces with slow and high speeds very close to each other or even competing with each other (for space), we might describe this type of space as a *temporal hybrid* (Herkommer 2007).
- Thirdly, the case of California is a clear example for the spatially and financially uneven distribution of urban speed regimes. *Spatially*, merely 53% of all commuters within the region have access to carpool lanes as they have been added only to certain sections of highways. In terms of infrastructure access, those neighbourhoods of the Los Angeles area unable to use carpool lanes will have to be considered slow, as commuters are more likely to experience traffic congestion. *Financially*, where there are HOT-Lanes, only those commuters will have access to accelerated travel times that are able and willing to pay for a shorter commute.

- Finally, the example of California sheds light on the role of urban and regional planning in the question of the speed of cities: The spatially selective implementation of access restricted express lanes on urban highways is altering the geography of slow and fast cities in the region. Urban speed thus becomes a political issue.

2.3 Driving Forces of Urban Speed

If we let aside the methodological problems of Levine's experiments, his work has to be acknowledged at least for being a pioneer step to an empirical approach to the question of the speed of cities. And more than that, his study reveals a number of interesting questions, the most important one of which is: *why* are there differences in the speed of cities or, respectively, why do we *experience* different places as fast or slow?

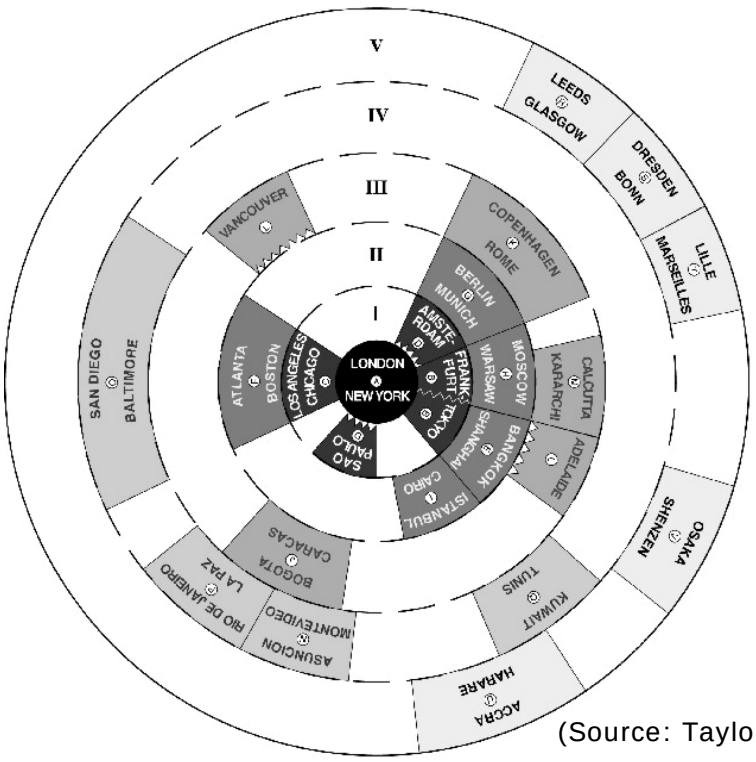
2.3.1. Economic Factors

Obviously, the economies of cities play a very important role here. In the spatial dimension, it is the distribution of the different economic functions of a city that to a large extent defines the urban space as fast or slow. An industrial zone of the fordist type will seem considerably slower as a postmodern central business district that hosts time pressed employees with extended working hours as well as retail, entertainment and sometimes even residential functions.
On a very general scale, Levine assumed places with a well performing economy to be faster than those in economic difficulties (Levine 1997, pp. 38-45). Where the economy is doing well, wages are relatively high and thus time is a scarce and precious resource that is not to be wasted. Consequently, there will be a tendency not only to move fast (goods, people and information) but also to extend working and opening hours with incessant and fast moving urban areas as the phenomenological dimension of fast urban space.

Apart from these general assumptions, it makes sense to highlight the geography of the globalised information economy to get a hold of the role of economics for urban speed. In her already classic books on the Global City, Saskia Sassen describes firms of the advanced producer services sector as the decisive local agents of globalisation. Indeed, producer services sector firms represent at the same time the global in urban economies as well as the local in *the* global economy. The reason why this is so important for the question of the speed of cities is because globalisation has brought with it and, respectively, was enabled by an all-encompassing new wave of acceleration. Apart from material as well as virtual transportation acceleration is most pronounced in the information economy, i.e. the producer services sector ranging from R&D over advertising to consultancy and, most importantly, the financial sector.

Looking for the geography of urban speed we can start with the geography of the accelerated global economy. In his brilliant "World City Network", P.J. Taylor (2004) presents the first convincing analysis of the geography of the globalised service economy. Instead of presenting the global yet urban service economy as a hierarchy of cities, he emphasizes the fact that global service firms function as networks and that this has to be reflected in the attempt to draw up globalisation's geography. For Taylor it is not the mere number of headquarters of banks or multinational enterprises in cities that could provide for a hierarchy of more or less globalised cities. Instead, he ranks cities depending on how strongly they are integrated in the global economic network considering not only global headquarters but investigating the role of regional headquarters and simple subsidiaries as well. The role cities play as nodes of global economic circuits can be represented as a network topography with highly integrated cities in the core and less integrated cities in the outer arenas of globalisation.

Figure 1: Arenas of Globalisation



(Source: Taylor 2004, p. 168)

The topography of the global economic network can give us hints for the geography of urban speed. As a hypothesis one could argue that since the general trend of acceleration is most pronounced in information economies, it is the cities in the core of the networked global economy that witness a strong impact of acceleration as well. In the informational economy the time in which information is modified by knowledge and subsequently exchanged and codified into information again is crucial. In addition to that, being spread over different time zones prompts firms to not only operate during regular working hours of a particular local time zone but to extend operating hours

and thus be able to watch global markets and communicate with affiliates and partners around the globe. Locations of global enterprises are nests of incessancy because the network never sleeps. Their highly skilled employees earn high wages and are short on time. This makes the places where these people work especially fast. Vice versa, this creates demand for the city to provide the spatial and infrastructural means this fast crowd needs. Clusters of firms and the supplemental infrastructure of communication spaces such as cafés, restaurants and public spaces work as “creative milieus” (Camagni 2000) that have the important capacity of quickly mobilising the exchange of information, ideas and knowledge (Herkommer 2005, pp. 358-359). The working environment of this “creative class” (Florida 2002) is a special breed of fast space.

Surely, a city’s economy will never be entirely global. But although the effects of acceleration and incessancy of the global economy predominantly impact Central Business Districts and other comparable urban agglomerations of increasingly global firms, they are not limited to theses types of spaces. Rather, acceleration and incessancy emanate from these “global city spaces” into otherwise slower parts of a city region by cascade effects of the demand for goods and services (Herkommer 2002, Henckel/Herkommer 2004). Most obviously, the nodes of local, regional and global transport are in particular subject to these side effects of the increasing importance of time in globalised economies (see below).

A look at the downside of globalisation further strengthens the argument of a relation between the speed of a city and its position in the global economic network. If cities integrated into the global economy are accelerating, places whose economic performance is poor, where factories, offices and infrastructures have become obsolete, are slowing down. A lack of economic importance tends to impose a slow pace on the areas concerned. Where there is little integration in economic circuits and a shattered labour market, there is no great need to hurry. We experience declining areas as slow, however rapid the process of devalorisation might be. Simply the amount of superfluous time of the remaining inhabitants and the amount of superfluous space of defunct buildings and streets that carry a fraction of the traffic they were designed for give us an impression of standstill.

In 2004, the “shrinking cities” project presented vivid images of abandoned, decaying urban areas around the world. They are involuntarily slow cities, disconnected from global economic development and increasingly spatially and mentally disconnected. In spatially and temporally fragmented cities, slow “ghettos of unemployment” can be situated in close juxtaposition to fast, gentrified areas with incessant activity. But of course “slow” cities have positive connotations, too. Some of the wealthiest urban areas might be just as slow as decaying areas. It is simply that slow pace has not been imposed on these areas. Here, slow time is quality time because it gives balance to an otherwise active life. This distinction points to how strongly the spatial distribution of different social groups and temporal lifestyles influences the temporal map of a city.

2.3.2. Infrastructure Networks

In similar ways as the integration in the global economic network the integration in infrastructure networks influences the speed of cities. Here too we can analyse spaces of variable speed as a topography of network integration. High-speed networks of virtual and material transport are spatially highly selective and there are growing disparities between well connected and disconnected regions. The decisive criterion for the speed of a city, here, is connectivity, which can be defined as the quality of access to and the bandwidth of the accessible infrastructure. Table 1 illustrates these aspects of connectivity in terms of infrastructure:

Table 1: Connectivity characteristics of different areas in city regions

	high accessibility	**low accessibility**
high bandwidth	FAST: city centres, areas around infrastructure nodes	INTERMEDIATE A: suburban areas in between the access points of high speed infrastructure
low bandwidth	INTERMEDIATE B: low density areas within the urban core where infrastructure networks do reach but have low speeds, low service frequencies and reduced night or holiday service	SLOW: areas without direct access to transport infrastructure / closer to an access-point with low bandwidth than to high speed networks

Source: Herkommer 2007

Urban speed in terms of infrastructure is spatially and financially highly selective. High connectivity costs a lot of money and access to high speed infrastructures tends to uneven distribution in space featuring an inversely proportional relation of the number of access points on the one hand and the bandwidth of the infrastructure on the other hand. With each step of infrastructural acceleration, access becomes spatially more and more uneven.

- A well known example is given by high-speed networks of long distance trains and how they alter geographies in redefining the relation of spatial proximity and temporal proximity. In temporal terms the well connected metropolises are getting closer because train speeds have been strongly increasing. The downside of high-speed rail is the tendency to reduce stops in between the big cities. This has a peculiar impact on space: even very distant urban centres grow closer together but the disconnected spaces in between, where the high-speed trains don't stop, are in temporal terms further away than their geographic location would suggest. In other words: 900 kilometres can be "closer" than 400 kilometres.
- On the local level too, access to infrastructure and its bandwidth influence the speed of urban areas. And there is similar spatial and financial selectivity, as well. An inner-city metro line, for instance, typically carries by far more people per hour than a small bus circulating in the outskirts. In terms of cost-effectiveness public transport networks generally tend to privilege city centres, reducing the speed of

the outskirts. Night services, in particular, are spatially selective, and tend to be very limited service outside the inner city.

- The access-restricted fast lanes on highways in dense urban and suburban areas discussed above are an example of financial selectivity in local infrastructure. People with limited time budgets have to pay more to move faster within their region whereas people with limited monetary budgets are more likely to lose time in congested traffic corridors. Another striking example for this trade-off between time and money spent on journeys through urban agglomerations is provided by taxi services that use motorbikes. In Europe, Motorcycle-Taxis can only be found in London and Paris, perhaps the continent's most time sensitive cities, where businessmen, politicians, celebrities and other time-pressed people pay relatively high fares to bypass congested roads or service interruptions in public transport.
- The use of differing speed regimes as a regulatory and/or commercial strategy in traffic is not limited to individual transport only. One example is the difference in price for the journey from Heathrow Airport to the City by non-stop express line, which takes approximately 15 minutes, and by standard metro or bus lines, which take 45 minutes and more. Calculability risks also play a role. The "Stansted Express" train linking Stansted Airport with Liverpool Street Station in the City was running advertising campaigns emphasizing the risk of delays on London's streets and motorways. The argument is that while customers pay about five times less on the bus they can never be sure to be on time for their flight in Stansted or their appointment in the City. The increasing replacement of old infrastructural monopolies by fractured and fragmented commercial solutions – a phenomenon that Stephen Graham and Simon Marvin so appealingly termed "splintering urbanism" – has its temporal dimension in the differential speed of the infrastructures (Graham/Marvin 2001).

2.3.3. Cultural Factors, Climate and Natural Rhythms

Differences in regional cultures articulate themselves, among other phenomena, in time structures and temporal cultures. Temporal traditions and temporal institutions that can be of more or less binding character have important consequences for the speed of cities. Within Europe alone there are important differences in temporal cultures. A striking example is the "Siesta" in many Mediterranean countries that survived not only industrialisation and its rigid mass rhythms of labour but also the invention of air conditioning. Public life stops completely for an hour or two, and such places become incredibly slow. In the evenings people work longer hours and shops stay open late. In many regions where the siesta is still practiced, religion and religious rituals continue to play a dominant role. This also affects local speed, since urban activity is rare on a Sunday. These cultural particularities are under pressure to adapt to standardisation. Modernisation and globalisation primarily affect parts of cities integrated into national and global economic circuits. Outside these areas, local traditions

and rituals have a moderating and balancing function in between global and local time patterns.

Similarly, climate and natural rhythms influence how we experience the speed of cities. Extreme temperatures tend to slow life down and sound and vision play an important role too. In uncivilised nature, there is a clear cut difference in rather noisy and bright daytime on the one hand and quiet and dark night-time on the other hand. In cities such as London and Paris, nights tend to be almost as bright as days and constant urban white noise gives us an impression of incessancy and restlessness and thus rather high speed too.

2.4 Implications of Variable Speed

As indicated, urban speed differs between nations, regions, cities and within cities. It is not only selective in spatial but also in social terms. Very often, speed and acceleration are associated with efficiency and effectiveness. Cities regarded as fast are deemed efficient. But is this really the case? Do not cities with a fast economy in effect need a lot of slow spaces to provide for time and space efficient means of recreation that help to support the fast pace of the rest of the city? And do not successful fast cities due to their attractiveness for businesses and employees reach a size that forcefully reduces their efficiency at least in certain aspects? The question is which indicators of speed play the decisive role for efficiency. Therefore we have to look closer to the different aspects of temporal efficiency of cities. Time efficiency as an analytical concept may shed light on aspects of urban competitiveness, which are not taken into account systematically, but which could provide tools for improving the competitiveness, quality of life and social cohesion of cities. What do urban politics and planning need to learn about variable speeds of cities? This question has a couple of important implications for economic development.

3. Time Efficiency of Cities

The temporal efficiency of cities is a specific aspect of the question of urban speeds that cannot be explored by simple categories such as fast or slow and needs further elaboration.

Especially due to the general acceleration of our economies and societies, time gets an ever scarcer good (Rinderspacher 1985, Franck 2002). Its efficient use is seen as vital in economic respects. Temporal efficiency is therefore an important dimension of collective efficiency. As mentioned earlier in this paper, it has clear economic but also wider meanings. Using the notion of temporal efficiency and trying to evaluate it could be deemed as yet another attempt to economise every aspect of life. But despite the fact that temporal efficiency is a criterion for competitiveness, it could also be used as a criterion for the quality of life of a city region.

The concept of a time efficient city or city region is not yet clearly developed let alone established. Therefore, we try to unfold the concept here, giving some – more or less eclectic and anecdotal – evidence and clues for further research efforts. Quite a few different aspects of temporal efficiency are relevant here.

In the following paragraphs we elaborate a bit on two dimensions:

- The business related temporal aspects of urban organisation, i.e. the time efficiency in the narrower economic sense with special emphasis on competitiveness,
- The quality of life related aspects, which make a city region (or parts thereof) attractive and liveable for the population – and indirectly, via the attractiveness, also foster competitiveness.

3.1 Business Related Aspects of Temporal Efficiency

Time to market for goods and services of the regional economy is an important factor of the competitiveness of enterprises especially in R&D- and knowledge intensive sectors. Here, especially hardly codified and tacit knowledge as well as what could be called “perishable knowledge”, typical of many turbulent markets like finance, play a major role. This type of perishable knowledge loses its competitive edge immediately after it is codified. It is therefore particularly dependent on face-to-face communication, on its quick exchange between the actors and its quick use, before others can get hold of it.

For the temporal competitiveness of regions the infrastructural and institutional framework of the region is vital. It can be more or less favourable. One of the most important favourable conditions is in the first place made of physical access to the city region and the access to information and knowledge. On the one hand this has a lot to do with the technical transport infrastructure and the infrastructure for information transport, i.e. the IT-technology, its bandwidth and access, but also with the localisation and urbanisation effects, the urban milieu etc. and especially with the resonance effects that the local labour force and milieu gives to “incoming” stimuli.

3.1.1. Access and Connectivity – Traffic

Temporal access has to be analysed on different levels, i.e.

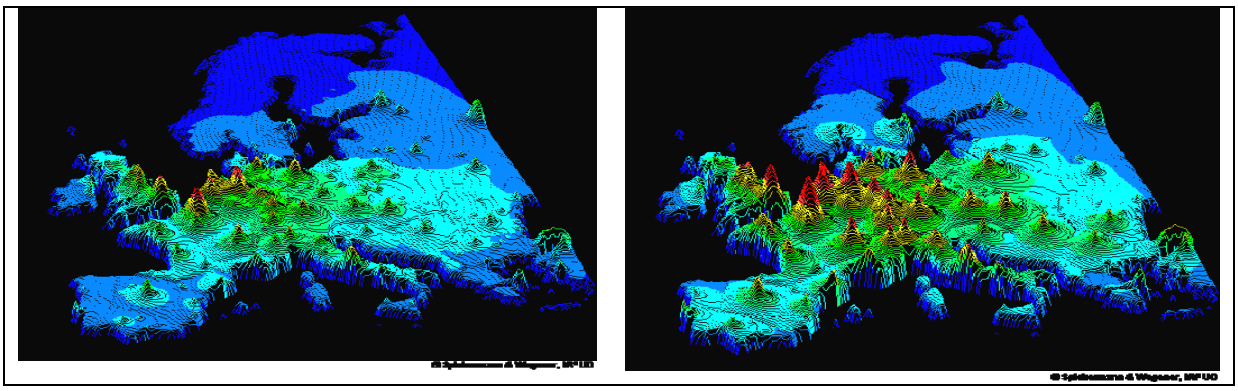
- internationally,
- interregionally,
- intraregionally.

For such analysis, space time mapping meanwhile provides a good basis of information for the German and the European context. As was already mentioned above, the new high-speed transportation links not only produce a space time compression but

also a torsion of space as quite distant locations come close together in temporal terms and locations that geographically are rather close become distant in temporal terms (Dicken 2003: 93).

Regarding its position within the different transportation networks in Europe, Germany is well integrated. Several analyses demonstrate the favourable position of most parts of Germany within the air traffic network, the high speed train network and the road network (Espon 2006, pp. 34-38). Especially the air traffic links and the high speed railway links favour urban agglomerations: the accessibility of the nodes is growing. Figure 2 illustrates how the Trans European Network (TEN) of high speed railways has led to the extension of catchment areas and increased the number of people accessible within a range of five hours (Spiekermann/Wegener 2002).

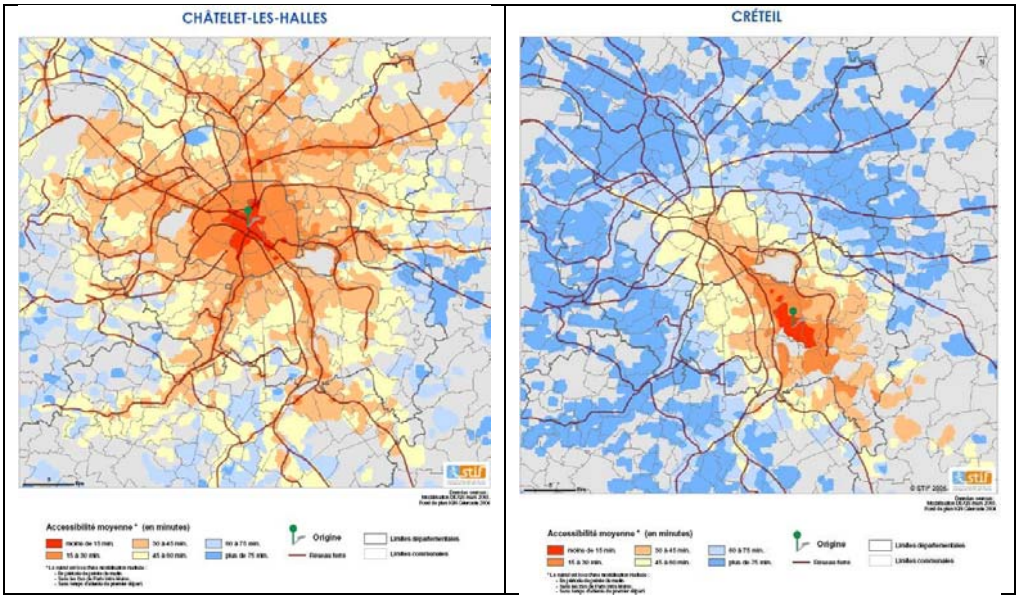
Figure 2: Population accessible within 5 hours (1995, 2020)



Source: Spiekermann/Wegener

A particularly interesting example of the problematic temporal effects of the construction of a public transport system within an urban region is the transport system of Paris. The transport agency provides isochronic maps of the temporal accessibility of a number of stations. As the examples in Figure 3 show, temporal access is unevenly distributed over the region. Especially connections within non central locations are very distant in temporal terms, because nearly all connections are constructed in a way that one has to cross the centre; there are hardly any tangential links. This raises quite some doubt on the temporal efficiency of the public transport system. (As far as we know, no comparable analysis on the level of the city region is provided for Germany.)

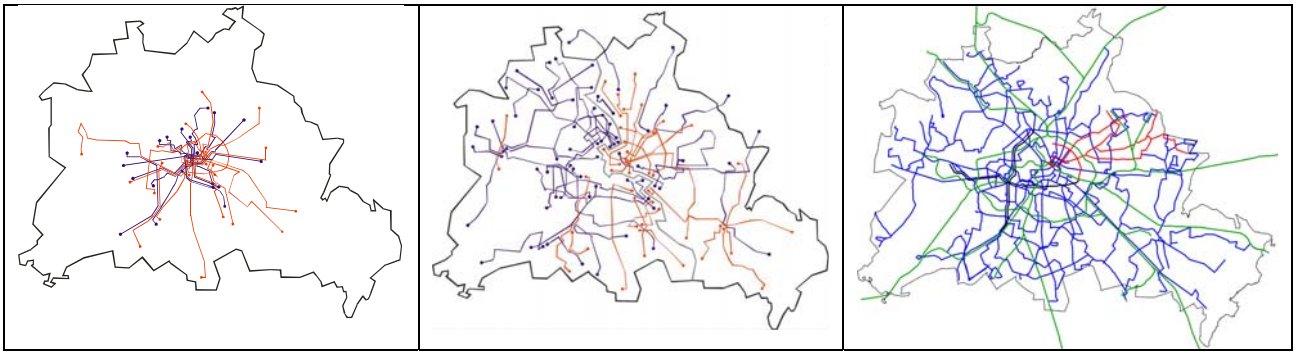
Figure 3: Isochrones of public transport in Paris



Source: Stif 2006

Another example for changes in connectivity in public transport – especially during night time –is the historic development of night-time public transport in Berlin. As shown in Figure 4, the night-time network was spatially extended and has become denser; the services' frequency has been increased too. Since several authors see the possibilities of an extension of economic activities towards 24/7 is as a competitive edge (for instance Moore-Ede 1993), the extension of the night time public transport network can be seen as an improvement to tap on a bigger regional labour force for an extension of working hours and obviously has relevance for night time leisure activities. The extension of the night time transportation links thus demonstrates the general tendency to extend urban activity towards a 24/7 city region. Therefore, public transport has to extend its services to bring employees to work and back home and likewise the night time leisure population. The maps shown in Figure 4 indicate the changes (and improvements) over time, even if there is empirical evidence that in some public services (e.g. the police) work-shifts are still organised in a suboptimal way due to a prevailing lack of night time public transport provision (Eberling/Henckel 2002).

Figure 4: Night-Time Public Transport in Berlin 1929 – 1965 – 2001



Source: Eberling/Henckel 2002

Ways to enhance time efficiency in the city region is to provide temporal privileges for certain users, which are introduced in many cities. There are quite different examples with very specific distributive effects:

- Bus and taxi lanes to fasten public or quasi public transport. These measures are taken to give an incentive to use public transport due to time savings. Usually, these bus lanes are also open for bike riders too to give them a temporal competitive edge (Berlin, London, Paris and many others).
- Congestion charges for inner cities to allocate road space according to the willingness to pay and to fasten the payers and public transport (London as a recent and rather successful example). (Often major arguments for congestion policies are the environmental costs of congestion but at least as important are the temporal implications of congestion policies).
- Road pricing to allocate road space according to the willingness to pay in a more general way. Road access has to be paid according to the time of day, degree of congestion and number of people in the car (California and Singapore as examples). This could also be interpreted as one example for what Graham and Marvin (2001) call prime network spaces, which give special access to a privileged group of persons.
- Providing a new type of information. An example here is the indication of distances on roads not in physical distances but in temporal distances depending on the amount of traffic and the traffic flow. The Boulevard Périphérique in Paris is the prime example here.
- Time indications at traffic lights. In some cities (e.g. Shanghai) many traffic lights indicate the running time of the red (or the green) signal, thus improving the awareness of the drivers and the pedestrians.

Another way to overcome the temporal inefficiencies of intraregional traffic is the substitution of the car altogether. This is relevant especially for a part of delivery services. Many courier services in cities, which used to be provided by car, are more and more substituted by deliveries by motorcycles and bicycles. For the same reasons, the motorcycle-taxi made its way to the streets of Europe: as already mentioned above, the notoriously congested streets of London and Paris witness a growing number of motorcycle-taxis that can help in situations where citizens have extremely limited time budgets and are willing and able to pay for the privilege to bypass traffic jams.

Berlin and London provide a very illustrative example for the temporal (in)efficiency of access: „the traffic flow in Berlin is much better than in comparable cities: Cars have an average speed of about 26 km/h in the inner city of Berlin, whereas in London the average travel speed by car is about 15 km/h, despite the congestion charge; busses and trams reach an average speed of 19 km/h in Berlin, more than double the speed of busses in London. The reduction of car traffic within the inner city of Berlin also improves traffic conditions" (Senator Junge-Reyer 2008).

The negative side of the process – leading to the endeavours to improve time efficiency – is largely determined by the times lost due to traffic jams. As early as 1983, Illich (1983) demonstrated that a lot of time is lost in cities due to congestion, which reduces the average speed quite considerably.

Connectivity thus defines the temporal dimensions of access and at least part of the speed of different parts of the city and the region. Implicitly, the temporal proximity between different locations is also defined. Connectivity is dependent on commuting times and times spent in traffic.

3.1.2. Access and Connectivity – Telecommunication

In the information society, access to information and telecommunication networks is of crucial importance. For Germany it can be said, that more than 95 per cent of the population have the possibility to get access to a broadband internet connection. No possible access exists on the other hand (only) for nearly 6 per cent of the territory where no possible broadband internet connection is available. Obviously these are rural and peripheral regions. But that does not mean that there are no differences within city regions. Several aspects have to be kept in mind:

- The time to get a new telephone line has declined sharply over the years, but changes in the provider can lead to considerable time losses.
- Time on the internet is dependent on bandwidth, and even within cities there are remarkable differences depending on the type of broadband access (Magdowski 2008). Increasing the quality of internet access by investing in more bandwidth can take a lot of time.

- In telecommunications, the above-mentioned prime network spaces (Graham/Marvin 2001) play a major role. Many firms in London's financial district for example have invested in a broadband network of superior quality, which is independent of the city's general publicly accessible infrastructure. This exclusive private network features particularly high stability and security and, of course, a very high bandwidth. A second example is given by call-centres and telecommunicative customer care services that rank incoming calls depending on an existing (e.g. caller spends little/a lot of money for goods and services of the respective company) or assumed (e.g. caller lives in a poor/rich neighbourhood) customer profile. Callers with a "good" profile will have by far less time to waste in the waiting loop than callers with a "bad" profile.

Due to fast development of mobile telecommunication services, the supply of access is much easier and faster provided than it used to be. Mobile communication is extending its bandwidth very fast and substituting cable based communication, implicating a remarkable reduction of the digital divide (Wittmann 2006). The spatial differences in telecommunicative connectivity are much easier to overcome than in material traffic, therefore leading to less pronounced differences in access and speed of spatial entities – at least within city regions.

3.1.3. Service Provision

For his empirical research, Levine (1997) used as one indicator to measuring urban speed the time for the provision of a standard public service, i.e. selling a stamp for a standard letter at the post office. It is questionable whether this indicator is really appropriate for measuring the time efficiency of business services. But as a first approach it shows quite significant differences between cities. The problem is that empirical results are hardly available for indicators that would seem more appropriate to measure the temporal transaction costs in a wider variety of more important public and business services.

To give a somewhat broader perspective: The first important aspect is the time to get access to the provider of a service and the second aspect is the time it takes to get the service done. It depends not only on the opening and service hours of a respective provider, but also on the institutional framework, the paperwork that has to be done in advance to apply for the service, on waiting times at the office, the availability of remote access etc. A wide range of services could be compared – business services as well as services for private use – between countries, regions, cities, to test their temporal efficiency. Examples for standard business services could be:

- The application and permit for the establishment of a new business. Business organisations in Germany often argue that things are much easier and quicker in other countries than in Germany. The scarce empirical evidence shows that there

are quite a few differences not only between countries but also between regions within one country and even within the city of Berlin (Eberling/Henckel 2002).

- Supply of a building permit. Another example is the time to get a building permission. Germany is said to be very ineffective in this respect, which seems especially problematic in cases where the building permit is a key factor in the time to market. Managers of Siemens (now Infineon) reported that one of the strategic factors for the location decision of the semiconductor factory in Dresden at the time was the city's guarantee for an extremely quick building permit (and above all quicker than in competing regions). This is one of a range of other anecdotal examples how temporally efficient the provision of permits can be, if the interest of public institutions is high enough. In these cases, the structure of the permission procedure is reorganised from a sequel of statements by the involved actors to a simultaneous procedure where all relevant actors take part in the debate and decision making at the same time. The structure of the permission procedure is reorganised. But in sum the standard situations are more relevant. Regarding the majority of cases, little systematic evidence is available. Business organisations in Germany often claim that things are much easier and quicker in other countries than in Germany. But the problem is often that only parts of the hole procedure are compared, leading to the conclusion that e.g. the time span for the provision of a building permit is quicker in France than in Germany but neglecting the fact that the control procedure of the erected building takes more time in France, with the result that the duration of the complete procedure is not that different. Other examples of relevant public procedures could be the permission for a new production process, an environmental impact assessment etc.
- Financial transactions. In line with Levine's reasoning for the speed of a standard service but with more relevance to the core of business performance would be the analysis of the time necessary to get – standard and more complicated – financial transactions done. The scarce available evidence indicates that despite deregulation and standardisation of procedures, the time needed obviously differs quite a lot between different countries. Even standard transactions – so we were told – cannot be made online between Shanghai and other Chinese cities and necessitate time consuming endeavours to go to a banking office.

Obviously the time to get these different services delivered differs quite substantially between different locations. As indicated, there is very little empirical evidence on the differences of the delivery time of services and the evaluation of these often inefficient times. But it seems at least plausible that more efficiently delivered services (which does not necessarily mean less regulated, less controlled) give the economic actors a competitive edge with respect to other locations.

Beyond these more formal and quite evident aspects of temporal (in)efficiency there are less obvious – but nonetheless very time relevant – aspects of institutional and cultural differences. Formally, the questions of corruption, reliability of and equal ac-

cess to the legal system or the need for integration into inner circles and the existence of cultural barriers play a major role. Bribery in particular is not only risky but it takes a lot of time and the outcome is not enforceable. Here, temporal efficiency probably has a clear negative correlation with the degree of corruption or a positive one with transparency. This means that in a broader sense, the legal framework and the access to legal services, to courts and the time to get a case settled is vital also in temporal terms. An indicator for the relevance of the time to get a case settled is the number of private settlement arrangements when the public juridical system is taking too long. Empirically, a lot of German enterprises which relocated part of their production to low cost countries returned, because the higher transactions costs – which are to a high degree temporal costs – outgrew the lower labour costs.

To overcome these barriers is not only costly but also time consuming. Transaction costs in terms of time are hardly ever explicitly mentioned or even analysed, but we are convinced, that especially the temporal costs, the retardation of processes in an accelerating environment is a major source of competitive disadvantage, which has to be calculated in the balance of enterprises and city regions.

3.2 Temporal Aspects of the Quality of Life

Temporal efficiency in its different dimensions is also a question of the quality of life. As happiness research shows, commuters find their commuting time a burden and report systematically lower degrees of subjective wellbeing despite their personal decision to live in suburban settings (Stutzer/Frey 2004). Research from Hamburg shows that the mobility costs in the majority of the cases analysed outgrow the lower housing costs; in particular the time burden for commuting from the suburban areas to Hamburg is higher (literally by weeks) than at inner city locations (Grundeigentümer-Verband 2006). Since the tax framework in Germany is changing (less tax deductions for investments in single family houses and for commuting costs) the financial incentive for suburban living is reducing, and – maybe even more important – the time sensibility is rising (ibid.), making locations in less suburbanised settings more attractive.

Research for Zurich's transport agency shows that for commuters, the cost elasticity is lower than the time elasticity: the degree of reaction to a change in travel time is higher than the reaction to a change in prices (Winkelmann/Bachmann 2004). This indicates that the time sensibility might be rising.

On the other hand there are cultural and individual differences in the perception, valuation and the use of time in commuting and traffic jams. The majority obviously sees traffic times as a burden, but qualitative research shows, that quite some people regard the time alone in their cars (even or especially in traffic jams) as their own time – not disturbed by colleagues, partners, children – a time to calm down, to reflect, to enjoy the media equipment of the car. Automobiles increasingly are equipped

like extended living rooms with high quality media provision. In the 1990ies a French motor car company published ads with the notion “enfin seul” (finally alone). This sheds light on the ambivalence in the valuation of time loss vs. given individual time. Even if the high valuation of these times is true for a lot of people, it can be no argument for society to accept the production of these times.

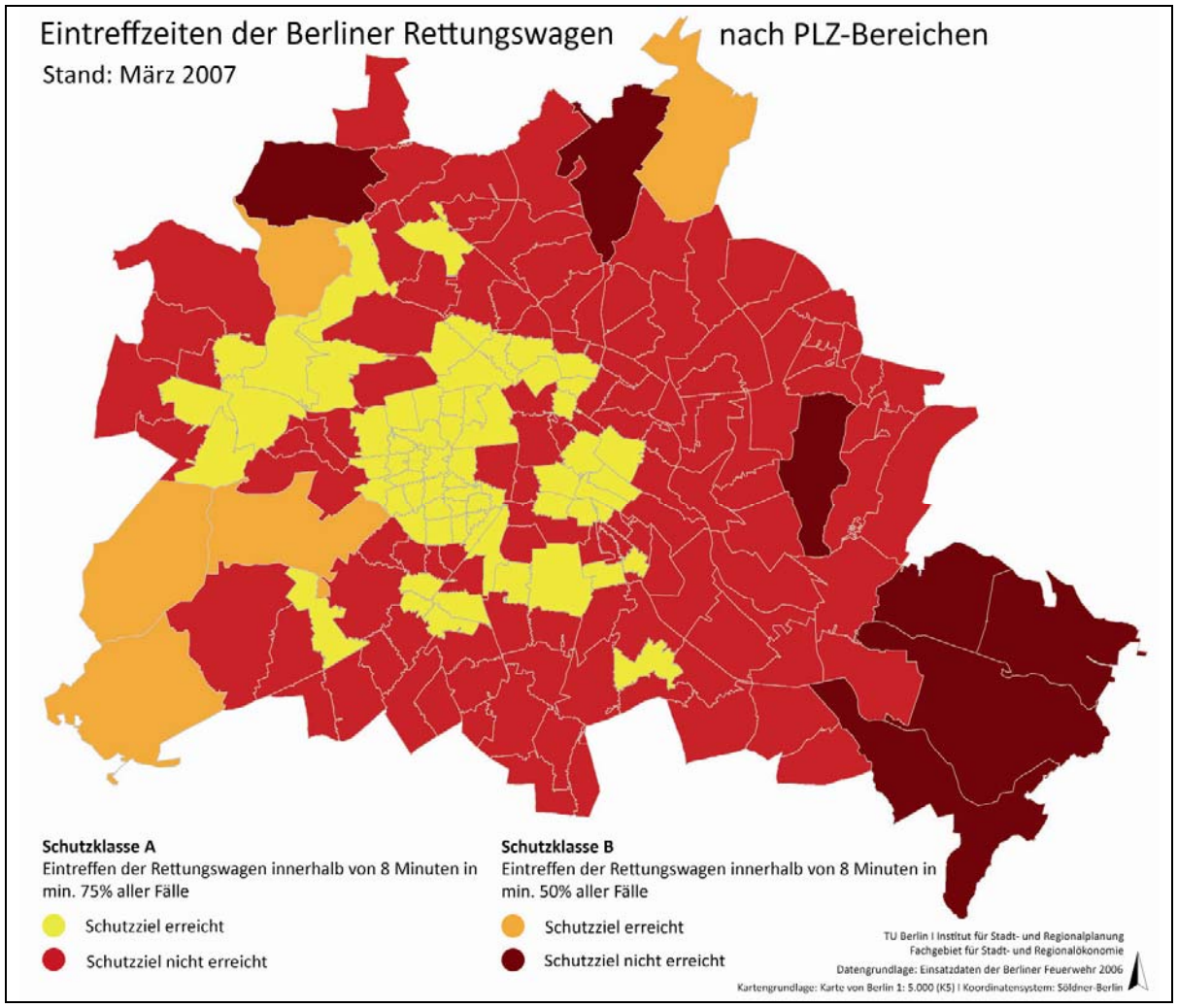
Due to the privatisation of public transport the net gets thinner for some urban areas. The reduction of access on the one hand and the improvement by prime networks on the other hand produces a social and spatial redistribution of access times within the city region – in absolute and/or relative terms. This is one of the aspects described by Graham/Marvin (2002) as splintering urbanism. The result is that things are accelerated for some groups of people at the expense of others – a redistribution effect not taken into account. Similar processes take place with respect to public services – the changing of service hours, the change of location or the redefinition of catchment areas.

The (problematic) provision of public and private services – especially for women – was one of the main driving forces for the Italian movement for local time politics (Bonfiglioli 1997, Mareggi 2000). The women’s movement “women are changing the times” finally lead to a legislation which gives the mayors of Italian cities the right to coordinate local times. In essence this has – let aside all scepticism concerning the Italian concept and its realisation – increased time efficiency in the provision of public services. The movement spread into other European countries. Some experiments were also conducted in Germany (Mückenberger 2000, Eberling/Henckel 2000b, Heitkötter 2005), with results in the coordination of public transport in Bremen and the extension in the provision of health services and services for children in Hamburg (Eberling/Henckel 2000b). The temporal extension of these kinds of services has manifold impacts: It improves the access to the services, it facilitates the coordination of work and family duties (work life balance) and improves possibilities for the businesses to tap on the labour force and the quality of life for the employees who use these services. The extension of service availability is of course much less favourable for the employees who have to provide the services and therefore work at unsocial hours.

The time efficiency of personal services depends on an institutional framework (e.g. the organisation and efficiency of the public sector services, the type of health insurance and provision of health care services, the culture of organising waiting times, queuing cultures and the organisation of supermarket check-out counters). Little systematic empirical evidence is available for typical waiting times for personal services. Notorious are the queuing problems in the English National Health Service. Experiences from London show that the personal chores are extremely time consuming there. Recent studies in Germany indicate a socially uneven distribution of waiting times dependent on the type of health insurance of the customer.

A very important aspect – with literally potential impact on one's life – is the time the police or any other emergency service needs to get to the required location. A survey from Berlin shows that there are relevant differences between different neighbourhoods in Berlin (and we would assume that Berlin is comparatively efficient). Because of budget problems within the emergency services the situation is worsening at the moment.

Figure 5: Time to Location – Ambulance (Emergency Calls)



Source : Data of the Berlin Fire Brigade, own Graph

According to the "Most Livable Cities" report by Mercer (2007) based on 39 key quality-of-life issues, which include political stability, currency-exchange regulations, political and media censorship, school quality, housing, the environment and public safety 7 of the top ten ranked cities were European and of the top 50 cities 25 were European, only 5 were Asian and none were African cities (Business Week 2007). It would be worthwhile to analyse the data with a specific emphasis on the time relevant indicators. Our hypothesis is that especially regarding the time indicators the Euro-

pean cities would stay at the upper positions in the ranking (since this study is done by a commercial consultant to provide information for extra payment for international personnel in transnational companies the data are sold and very costly).

3.3 The relevance of the concept of temporal efficiency

On the basis of an admittedly swampy ground and scarce systematic empirical evidence we tried to show that the concept of temporal efficiency is worthwhile to elaborate. Especially if the concept is not used in the mere economic sense but also in the sense of "zeitgerecht", a term we could translate as "time-equitable", associating meanings of a well-adapted and just city, suitable for all.

A whole variety of relevant questions arises from this:

- Should and how could time efficiency be fostered?
- What could the different notions "adapted" "just" and "equitable" mean?
- How would a normative concept of a time efficient and equitable city look like, which reflects
    - "adapted" with regard to the acceptance of different and variable speeds – spatially and socially
    - "just" with regard to the social valuation of time and to the effects on temporal distribution of public policies
    - "equitable" with regard to the right to one's own time (Mückenberger 2007)
- How could these concepts be made relevant for public policies?
- If the individual time sensibility is rising, does that mean that the social valuation of time is also changing and how? What will be the social and spatial effects?
- What are the specific relationships between time structures, temporal efficiency and quality of life?

There seem to be cultural differences in the acceptance of time losses, of waiting times (queuing or pushing behaviour) and barriers to access as well as in driving behaviour. But with increasing internationalisation the pressure on specific local barriers rises and a tendency to harmonise temporal standards arises. This aspect was already illustrated above with the example of the mediterranean Siesta. Another example could be the changes of the regulation of shop closing hours in Germany.

4. Spatio-temporal proximity and spatio-temporal division of labour

Yet another perspective of temporal efficiency is the question of spatio-temporal proximity. The question is whether physical proximity is a prerequisite of temporal prox-

imity or whether physical proximity could be substituted by virtual proximity on the basis of IT-technologies or by time efficient transport systems which provide for face-to-face contact within a reasonable time span despite long physical distances. An especially important aspect is the relative time distance between face-to-face contact partners within the city or city region and locations of longer distances. This aspect is of rising importance, since despite many authors pushed the notion of the "end of geography" or "the death of distance" (Cairncross 1997) face-to-face contacts are getting particularly important in many professions in line with the emergence of the knowledge society.

The need for spatio-temporal proximity and face-to face contacts could be seen as a function of i.a.:

- The difference between information and knowledge: knowledge is "bulky information" and as such not very apt to telecommunication because it needs interpretation and non directed communication. This leads to the conclusion that with the increasing knowledge intensity of our economies the demand for face-to-face-contacts is rising. Evidence can be i.a. seen in the prevailing spatial concentration of the advanced producer services sector in city-centres, the rising number of business travels, meetings, congresses, conferences and the increasing space for meeting rooms in office buildings.
- Since knowledge always has a relevant part of tacit knowledge which is transferable at best in the process of direct communication or cooperation, the need for knowledge transfer fosters the demand for spatio-temporal proximity.
- Moreover, there are types of information which are very volatile and/or perishable. A typical example for this is the financial services sector, which could in theory ("death of distance") be spatially distributed deliberately due to the high deregulation, internationalisation and penetration with IT-technology. But in fact the spatial concentration is more pronounced than in most other sectors. This is due to the volatile and perishable types of information, which probably make a relevant part of the information handled, i.e. information which loses its value (or at least part of it) as soon as it is available in the net (e.g. information on the performance of a specific company).
- Specific types of work organisation – projects, virtual enterprises etc – are much easier to handle if spatio-temporal proximity is provided.
- Especially creative and innovative parts of the economy have an extended demand for information, stimulation and challenges independent of the specific sector, which can only be provided by the agglomeration of a great variety of different services, qualification and milieu. Here, the notion of the city as an extended milieu (Camagni 2000) is the relevant point of reference.

Due to the IT-technologies and the acceleration of material transport the conditions of space time proximity have changed. Table 2 shows a classification of relationships be-

tween spatial and temporal proximity on the one hand and material and virtual proximity on the other hand (for the following see Henckel 2007).

Table 2: Relationship between material and virtual space-time proximity

	Proximity in space materially	**Proximity in space virtually**
Proximity in time materially	Same location, walking distance, "appropriate" (?) transport distance, (transport mode specific isochrones)	Coordination of telecommunication in time (e.g. telephone call over time zones, telephone conference, video conference)
Proximity in time virtually	Inaccessible location in close vicinity (e.g. social barriers, no go areas, divided cities)	Disjointed telecommunication in time (e.g. answering machine, email, letter)

Source: Author's compilation.

The two top quadrants are the most important for the present issue. The top right-hand quadrant shows the possibilities of personal co-presence with the (limited) means of telecommunications and thus the potential for substituting proximity by telecommunication – or, to put it more precisely, for renouncing spatial proximity while maintaining temporal proximity – and thus for the dissolution of the city.

The top left-hand quadrant is of particular interest because it deals with the urban and regional – or at least locally bound – variant of spatio-temporal proximity. However, this variant is also not clearly defined, because temporal distance is variable and spatio-temporal boundaries are generally indefinite. We are therefore dealing with a variable calculation of spatio-temporal distance in conjunction with other variables such as costs. Spatio-temporal distance could be measured in transport mode-specific isochrones whose overlap identifies the places with greatest space-time proximity. Crucially important is how the "demand" for this variant develops. An important aspect is also the redundancy of the transport system. During the recent strike of parts of the public transport in Berlin there were relatively little effects visible in term of time delays and reduction of access, partly due to the independent S-Bahn railway-network covering a great part of the city.

An extremely important analysis would be to compare the isochrones of long and short distant transportation modes, because such an analysis would show when/where a physical proximity could be substituted by a temporal proximity on the basis of high speed interregional transportation links in comparison to low speed local transportation. Probably there are also country- or culture-specific differences in the acceptance of temporal distances. Maybe crossing the border of the own urban region mentally has such an impact that even short travel times to a nearby but different city region are not as accepted as possibly even longer travel times in slower local transport within the region. Therefore, the perception of speed and temporal distance in comparison to the "objective" situation has to be studied For a comparison of public transport and individual transport within cities showed that the public transport has to be one and a half times faster than individual transport to be perceived as equally fast. It

might well be that the European, especially German time sensibility and time elasticity is higher than those of other countries.

With regard to the representation of the catchment areas in Europe in Figure 2 the German city system could be described as an example for a high degree of temporal proximity between the nodes with long interregional distances. This facilitates a joint realisation of quality of life and temporal proximity within a decentralised urban system. In this contribution we cannot reason on the causes for such a structure (Läpple 2006) and its comparability to other spatial, historical, cultural and institutional settings, but the implications for the German city system could be interpreted in a rather far reaching way: Despite the fact that Germany is still the world's champion in exports and is well integrated into the globalisation process, Germany has no global city. In contrast the German city system, cooperative, based on the division of labour between cities and a very high connectivity, could be described as a virtual global city (Läpple 2006, Henckel 2007).

The generally rising importance of face-to-face contacts makes proximity a key factor. Decisive is, in which instances and for which industries and functions physical spatio-temporal proximity is needed and where physical proximity could be substituted by temporal proximity alone. Rather little seems to be known about this trade off between spatial and temporal proximity and the (acceptable) boundaries of proximity.

5. Conclusions

Temporal and spatio-temporal research is not well established in urban studies. The purpose of the paper was to give – on the basis of eclectic evidence and theoretical reasoning – an overview of relevant aspects to be dealt with when looking at the collective efficiency of city regions. We are convinced that this line of research has much to provide for the understanding of the state, the development and the improvement of collective efficiency.

In times of globalisation speed and acceleration play a major role, especially with respect to competition. Therefore we concentrated in the implications for

- the temporal topography of cities and city regions
- the different dimensions of temporal efficiency of city regions and
- the demand for proximity in the knowledge society.

Time is becoming or perceived as an ever "scarcer" resource within the production system and society alike. Therefore, the time sensibility is increasing, leading to time centred concepts in the production of goods and services and private life. This should put pressure on the social re-evaluation of time. Whether this is really the case is an open question so far. We showed that the hidden implications of different policies on time patterns and the "distribution of time" so far did not lead to an open debate on

temporal policies. If the notion of collective efficiency is taken seriously, the temporal aspects – with respect to the economy and the quality of life – have to be taken into account, not only to understand what is happening but also for policies of improvement. If time sensibility is rising and the external effects of time patterns and their change is no longer neglected then a new era of social policy becomes necessary (Mückenberger 2007).

This leads to the conclusion that there is need for a chrono-urbanist perspective (temporal urban studies), which reflects:

- The temporal implications of spatial planning
- The spatial impacts of temporal changes
- The interdependencies of time structures
- The ambivalence of temporal efficiency and quality of life
- The cultural differences in the perception of speed, temporal efficiency and time losses and their acceptance
- The time elasticity of different (economic) activities
- The dynamics of the demand for space time proximity
- The potential for substitution effects between spatial and temporal proximity, for example the substitution of spatial proximity by high speed transport or, vice versa, the obsoleting of costly transport infrastructures by clustering functions locally.
- The implications for the structure of city regions and even city systems

We are well aware that this is an extremely ambitious agenda, which is going to take a lot of time and effort to advance. In this – and many other respects – there are lot of similarities between time research and policies and environmental research and policies.

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