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FUTURE OF TRANSPORT? – FUTURE OF CITIES!

ABSTRACT

The future of transport, whatever it will be, cannot be considered separately from that of cities. But what, where and when is the city today? The ability to provide opportunities for human interaction is the essential reason for cities to exist. In the pre-industrial past this required high-density, compact urban forms. Modern transport and communication techniques have however increasingly offered human beings ways of interacting at a distance. Physical proximity is no longer needed by many types of urban activities. As a result, cities have decentralised, as industry first, then residences and services have fled the diseconomies of high-density agglomerations. For the future, some even predict the advent of an entirely diffuse, 'virtual' city.

Actual evidence is at best mixed. Next to ongoing decentralisation, there are also signals that point in the opposite direction, as there are activities that show a tendency to physically concentrate, underscoring a persistent need for physical human interaction. These activities include business and financial services, the emerging sectors of culture, entertainment and the media, but also certain types of residences and of production. As a result, rather than decentralisation or concentration, contemporary cities show a complex combination of decentralisation and concentration.

How will these contrasting movements shape the cities of the future? Are telecommunication technologies going to radically alter current trends? Or will the quest for sustainability do this? And what will the role of transportation – as cause and effect – be? The diffuse urban-regional accessibility warranted by the car and the inter-metropolitan connections provided by the aeroplane have been essential conditions for the urbanisation patterns of the recent past. But will the car and the aeroplane also be the transportation means of the cities of the future?

KEY WORDS

future of transport, future of cities, urban diffusion

1. INTRODUCTION

In a journal issue dedicated to the future of transport, a paper on the future of cities might seem out of place. Wrongly so: the future of transport, whatever it will be, cannot be considered separately from that of cities. In the industrialised world, the majority of the population lives in urban areas, ranging from an urbanisation rate of 58% in Austria to one of 96% in Belgium. Only in Portugal are urban dwellers a minority, at 34% (all 1990 data, reported in Pucher and Lefevre, 1996, pp. 9-10). In the developing world, most people still live in the countryside, but the urban population is growing at a much higher rate than the rural (World Bank, 1995). According to United Nations estimates, in the mid- 1990s 43% of the world population lived in cities but the 50% mark will be passed by the year 2005, and by 2025 more than three-fifths of the world's inhabitants will be in cities (Badshah and Perlman, 1996). For a great deal, human beings are thus, and increasingly so, urban beings, and this is truer as the level of industrialisation of a country grows. Given this fact, there is no dare in assuming that the large majority of transport takes place either within, between, from or to urban areas, and that this urban dominance will grow in the future.

Shifting to a more qualitative point of view, the evolution of transport and that of cities are also closely related. On one side, transport technologies have always posed formidable constraints to changes in urban forms and functions. On the other side, ever evolving requirements of urban activities have continuously forced transport to adapt and innovate. Most contributions to this journal issue deal with the first half of this equation. This paper will concentrate on the second half, or on urban activities and their transport demand, on some current trends and some expectations for the future. Having demonstrated the relevance of a reflection on cities, the following questions will be addressed. What, where and when is the city today? And what we can expect from the future? What sort of demands does the evolution of cities pose to the development of transport infrastructures and services? Are perhaps telecommunication technologies going to alter radically the current relationship between physical transportation and urbanisation? Or will change be rather triggered by the quest for sustainability? Finally, what are the henceforth ensuing challenges confronting those researching, planning and designing the transport and urban system of the next millennium?

2. WHAT, WHERE AND WHEN IS THE CITY?

The ability to provide opportunities for human interaction is a – if not *the* – essential reason for cities to exist. According to Tarr et al. (1987, p. 38) "urban scholars agree that cities evolved in order to facilitate human communications". Webber (1964, p. 86) contends that "the history of city growth, in essence, is the history of man's eager search for ease of human interaction" (both cited in Graham and Marvin, 1996, p. 114). In the pre-industrial past this "eager search" translated into high-density, compact urban forms. Transport technologies (e.g. horse-back, sailboat) and communication technologies (e.g. ground mail) took then so much time to overcome any significant distance that virtually all non-occasional human interaction required location within walking range, resulting in the physical concentration of places of residence, work and exchange. The dense city "allowed time constraints to be overcome by minimising distance constraints" (Graham and Marvin, 1996, p. 114).

But then everything changed. Since the industrial revolution modern transport and communication technologies have increasingly offered human beings ways of interacting while at a distance, temporarily (thanks to fast transport) or permanently (thanks to real-time telecommunication).

Mass transit and especially the private automobile – together with the respective infrastructures – have increasingly allowed people and goods to shuttle between the corners of ever larger regions, much putting in perspective the need for physical concentration of activities. Real-time telecommunication technologies (the telephone, and now telematics) have gone a step further, by making physical concentration of human beings – at least in principle – wholly superfluous. Telecommunication technologies provide in fact, a radically alternative solution to the problem of overcoming space and time constraints to human interaction from that offered by the traditional city, as they 'help to overcome *distance* constraints by minimising *time* constraints' Graham and Marvin, 1996, p. 117, emphasis added).

Permanent physical proximity is indeed no longer required by many types of urban activities. Accordingly, cities have decentralised, as industry first, then homes and services have fled the diseconomies of high densities (congestion, high land prices, limited flexibility of accommodation, etc.). Ingram (1998, p. 1019) finds evidence of this trend in "a set of empirical findings with remarkably strong regularities across countries and cities". These findings include the following:

- population growth in large cities does not increase the population density of high-density areas, but promotes densification of less-developed areas and expansion at the urban fringe;
- metropolitan populations have become more decentralised due to the effects of increases in income and improvements in transportation performances;
- industry is attracted by motorways and special facilities as airports, but not by central locations;
- also, service employment shows a marked tendency to decentralise;
- development towards the periphery is driven by lower land prices and lower development costs, combined with the wide availability of motorised modes of transport.

The advent of telecommunication technologies have led some to foresee an even more radical shift in the evolution of urban form. After the concentrated and the decentralised city, a totally 'diffuse' if not 'virtual' city would be about to emerge. The rationale for this shift is provided by the substitution of physical transport by telecommunication through telebased initiatives as teleworking and teleshopping or the wide-scale application of the electronic cottage principle. According for instance to Pascal (1987, pp. 597-203, cited in Graham and Marvin, 1996, pp. 81-83) 'The newly emerging technologies will soon begin to provide excellent substitutes for face-to-face contacts, the chief remaining *raison d'etre* of the traditional city ... As the cost of disseminating knowledge and information declines and as specialised inputs are more easily assembled in remote locations, incubation too, can take place almost anywhere'.

But here is an intriguing paradox. Despite all the hype about diffusion and dematerialisation of the city, there are also signs that point in the opposite direction. For several types of human activities physical, 'face-to-face' communication appears to have an irreplaceable, and even a growing value. Ascher (1995, p. 74) calls this "the paradox of telecommunication, that adds value to all that is not telecommunicable". In the first place, the paradox applies to the economic domain. The fact that face-to-face, informal physical contacts play an important role in financial and business services has been demonstrated by several analysts (see among others Moss, 1987, Sassen, 1991, Mitchelson & Wheeler, 1994). But the same seems also to apply to the strongly growing sectors of culture, free-time and the media (Hall, 1996). Furthermore, the impact of new telecommunication technologies is all but one-sided. Telecommunication makes possible *both* spatial concentration *and* decentralisation, as the history of the spatial impacts of the telephone already poignantly shows (Graham and Marvin, 1996, pp. 313-317). Within economic organisations two divergent but coexisting movements appear on the way. Functions that need above all non-routine, non-telecommunicable information – as marketing, research

& development, management or finances – show a tendency to concentrate spatially. Functions that can suffice with more routine, telecommunicable information – as production and administration – can be and often are decentralised, in the periphery of urban regions or even – and increasingly – in developing countries (Ascher, 1995, pp. 61-62). Also as far as consumption is concerned, decentralisation (peripheral megastores, or leisure centres) coexists with the growth of activities thriving in densely built, multifunctional historic centres as urban tourism, culture, entertainment and connected (fun)shopping, hotel and catering activities.

The paradox of telecommunication can be also discerned in the social sphere. Here too, continuing spatial decentralisation and segregation trends (e.g., sub- and ex-urbanisation of households, persistence of old and forming of new sorts of housing gettos) are paralleled by the emergence of new forms of spatial concentration and integration. The continuing search for physical human contact can be observed, for instance, in the success of festivals, performances, and public events of all sorts, documenting the still great – and possibly growing – value accorded to all that can be experienced 'for real'. According to some (e.g. Hajer 1996) a society where groups and individuals increasingly spatially single themselves out, needs the counterbalance of situations as these, where people can peacefully learn to deal with different others, that is, opportunities for physical social interaction. These are what the French philosopher Foucault calls "heterotopias". Heterotosia is "a sphere where an accumulation of claims and different types of use mean that no single group can dominate that place" (Hajer, 1996, p. 5). Traditional examples of places where heterotopias (can) arise are urban squares, streets, parks, markets, etc. Today – in the era of the decentralised city – they are, according to Hajer (1996, pp. 8-9), especially the places where mobility flows come together: "stations, public transport interchanges, park & ride or carpool facilities."

The counter-trends outlined here are still selective and limited in magnitude. However, in the longer term they could be dramatically reinforced by the need to find a solution to the sustainability dilemma, or to the question of how to cope with exponentially growing claims on intrinsically scarce natural resources. Combining this last factor with the paradoxes discussed above, the economist Krugman concludes that within a hundred years we could witness nothing less than the "rebirth of the big city". Here is how, fictitiously looking back from the year 2096, he describes the evolution in the US from the present day, after having foreseen "soaring resource prices" as a consequence of the enormously grown demand of "limited supplies of minerals, fossil fuels, and even food" (Krugman 1996, pp. 3-4):

"During the second half of the 20th century, the traditional densely populated, high-rise city seemed to be in unstoppable decline. Modern telecommunications had eliminated much of the need for close physical proximity between routine office workers, leading more and more companies to shift their back-office operations from lower Manhattan and other central business districts to suburban office parks. It began to seem as if cities as we knew them would vanish, replaced with an endless low-rise sprawl punctuated by an occasional cluster of 10-story office towers.

But this proved to be a transitory phase. For one thing, high gasoline prices and the cost of environmental permits made a one-person, one-car commuting pattern impractical. Today the roads belong mainly to hordes of share-a-ride minivans, efficiently routed by a web of intercommunicating computers. However, although this semi-mass-transit system works better than 20th-century commuters could have imagined – and employs more than 4 million drivers – suburban door-to-door transportation still takes considerably longer than it did when ordinary commuters and shoppers could afford to drive their own cars. Moreover, the jobs that had temporarily flourished in the suburbs – mainly relatively routine office work – were precisely the jobs that were eliminated in vast numbers beginning in the mid-90s. Some white-collar jobs migrated to low-wage countries; others were taken over by computers. The jobs that could not be shipped abroad or handled by machines were those that required the human touch – that required face-to-face interaction, or close physical proximity between people working directly with physical materials. In short, they were jobs best done in the middle of dense urban areas, areas served by what is still the most effective mass-transit system yet devised: the elevator.

Here again, there were straws in the wind. At the beginning of the 1990s, there was much speculation about which region would become the center of the burgeoning multimedia industry. Would it be Silicon Valley? Los Angeles? By 1996 the answer was clear; the winner was ... Manhattan, whose urban density favored the kind of close, face-to-face interaction that turned out to be essential. Today, of course, Manhattan boasts almost as many 200-story buildings as St. Petersburg or Bangalore."

What can we conclude from this review of trends and counter-trends? Can we perhaps outline a 'most likely' evolution? The answer, I am afraid, has to be no. The future remains open, because of the unpredictability of the many factors involved, and also because, for a great deal it will be what we want to make of it. On the other hand, we can and must try to identify the *structuring forces* that shape the present and thatshaped the past, in order to understand some of

the premises and possible implications of our choices for the future. As far as cities are concerned, the starting point should be the notion that the facilitation of human interaction is their essential function. The question is then, which urban form will better perform this task in the future, given an evolving set of demands and constraints. To this question, the physically concentrated cities of the past have given a different answer from the decentralised cities of the second half of the last century. However, as far as emerging trends are concerned, the most important fact is that contemporary cities, rather than physical decentralisation *or* concentration, show a complex combination of decentralisation *and* concentration. Even in the general movement towards decentralisation identified by Ingram (1998) there are intriguing qualitative differences, and a continuously evolving rather than a static picture. The studies reviewed in his article document significantly differentiated patterns, that need to be understood and accounted for. For instance, employment appears typically more centralised than the population, manufacturing appears more decentralised than services. Furthermore, large manufacturing plants tend to be more decentralised than small plants, and areas close to the historic centre tend to specialise in the location of new, small enterprises in 'incubator areas'. The picture is an evolving one: as manufacturing jobs move out of the centre, they are replaced by service jobs; eventually, also retail activity disperses, and is replaced by employment in finance, law and other activities which are less oriented to households but require good communication and face-to-face contact...

Further disentangling of this complex dynamics and of the forces governing it is an urgent and a major research task. There are some promising beginnings. One example is the report "Ruimte voor Economische Dynamiek" ("Space for Economic Dynamics"), published by the Dutch Ministry for Economic Affairs and drawing from a series of in-depth studies on the spatial dynamics of firms in the Netherlands and north-west Europe (Ministerie van Economische Zaken, 1997). The picture emerging is one where "different sort of concentration and dispersion forces are active, which are not always easy to distinguish" (p. 50). It is one where "the measure of dispersion is ... highly dependent on the types of activities" (p. 55), and where each activity is seeking the right balance between different sets of agglomeration advantages and disadvantages. The result is, again, a variated one. In the instant-picture provided by the report, while industry shows a markedly diffused dispersion pattern, in the transport and distribution sector dispersion appears strongly oriented by the main transportation axis and rather follows a radial pattern. Business services have yet other trends, as they remain highly oriented towards urban areas, but increasingly also towards the big passenger transportation nodes, as station areas with a motorway connection and most notably the airport of Schiphol. More work along these lines, and possibly extended to the spatial impacts of a 'social dynamics' (where and why do which people live, work, consume?), is thus essential, but it will not be enough. Speculating on the future requires more than just charting current trends, inevitably dependent on a given context. Rather, it is also a matter of identifying the underlying structuring agents of change and permanence, and of reflecting on their possible evolutions and their implications.

It has been done in the past. In 1900 H.G. Wells contended in his "The Probable Diffusion of Great Cities" (published in Wells, 1924) that the then seemingly irreversible urban concentration trend would be reversed. The shift would be allowed by ever more complex railway networks, an envisaged system of 'private roads of a new sort', and by then emerging electricity and telephone networks. Especially these last would provide ubiquitous access to power and instant communication thus drastically reducing the advantages of a central location. As a result, in the year 2000 "the whole of Great Britain south of the Highlands seems destined to become ... an urban region, laced all together not only by the railway and the telegraph, but by novel roads ... and a dense network of telephones, parcel delivery tubes, and the like nervous and arterial connections" (cited in Hall 1988 p. 275). This anticipation is striking enough, but just as striking is what Wells envisaged of old city centres. These would not disappear, differently from what other future-writers (compare for instance with F.L. Wright's (1958) Broadacre City) would later contend. Rather, having lost their traditional economic base, historic centres would survive because of the inherent human attraction to crowds. These "post-urban" centres would be "essentially like a bazaar, a great gallery of shops and places of concourse and rendezvous, a pedestrian place, its pathways reinforced by lifts and moving platforms, and shielded from the weather, and altogether a very spacious, brilliant, and entertaining agglomeration" (cited in Fishman 1987, p. 187). There is everything here: the development and impact of new infrastructure networks, the decentralisation and geographical expansion of cities, but also the survival of the old centres thanks to specialisation in activities thriving on physical human contact!

3. CITIES AND TRANSPORT: SOME FOOD FOR THOUGHT

In-depth analysis of current trends and reflection on structuring forces are the essential ingredients of

an answer to the question of how decentralisation and concentration forces could shape the cities of the future. Addressing this question is essential when considering the role that physical transportation – as cause *and* effect – could play in the evolution. The diffuse urban-regional accessibility warranted by the car and the inter-metropolitan connections provided by the aeroplane have been essential conditions for the urbanisation patterns of the recent past. Conversely, the emergence of extended urban regions, and their interconnection into global networks have given a crucial boost to road and air transportation. But will the car and the aeroplane also be the transportation means of the cities of the future? The relationship between transport and cities is a tight one, and it goes in both directions. Technological developments in the transport domain are powerful determinants of permanence and change in the form and the use of cities. In this respect, other articles in this journal issue may provide precious food for thought to urban planners. On the other hand, demand for transport overwhelmingly originates from activities based in cities, and caught in the sort of complex decentralisation and concentration movements described in this paper. These dynamics should be a central object of attention for those involved in the planning and design of future transport systems. In this concluding section I will briefly discuss four points their reflection should address.

– The first point is that the differentiation in the proximity and accessibility requirements of urban activities outlined above suggests the need for an equally broad diversification in the supply of transport services. Mobility patterns are already complex and will, in all likelihood, become more so. Radial, suburb to centre commuting has been substituted by an intricate, multi-directional web of ever longer home to work trips. Trips for other than commuting reasons – in the industrialised world good for roughly three quarters of the total – follow each their own pattern. As a general implication, rather than one or few dominant transportation modes we should expect to see an increasing number of variations and combinations. There are already signs. Increasingly, our cities do not, for instance, just offer the choice between driving a privately owned car and riding mass public transport, but many more options in-between these two extremes. The in-betweens include car-sharing, car renting on a regular or an occasional basis, carpooling, individual taxis, group taxis, minibuses – possibly following demand-generated routes, etc. Next to these sorts of variations, additional differentiation is being provided by combinations of existing modes. Examples include the – more or less structured – coupling of private car, carpool or public transport (metro, tram, bus) at park & ride facilities; of aeroplane and second aeroplane, train, public transport, minivans, taxis, or rental cars at airports; of train and second train, public transport, taxis, cars or bicycles at railway stations, etc.

More of this diversification could emerge, both through the introduction of new technologies and the adaptation or combination of existing ones. Large, richly diversified urban markets are and will continue to be the ideal places for the introduction and the development of such innovation in *trans-*, *multi-* and *inter-modality*. On the other hand, a diverse and highly dynamic demand could make it increasingly difficult to justify large-scale investments with long amortisation times, as typical of many major infrastructure projects. Again, the way out could be to see also these primarily as elements of heterogeneous transportation systems and emphasise their network attributes, that is, the quality of their synergies with *other* systems (see, for a discussion of the Transrapid technology along these lines Bertolini, 1998).

– The second point, is that in our increasingly mobile urban societies, the time spent travelling is increasingly becoming an integral part of active urban life. The borders between supposedly passive 'nomadic' activities and active 'sedentary' ones are rapidly being blurred, as the time spent inside transportation means and centres is being used in increasingly rich ways. Cars are becoming sorts of second homes and workplaces, where people listen to music or the news, take language classes, call the office or are called by a loved-one, meet with colleagues, friends or family, and more. This trend is about to be reinforced by the imminent connection of cars into telematics networks of all kinds. The train, while offering less privacy, does not require any active involvement in riding, freeing up time for working, chatting or just relaxing, possibly while listening from a headphone. New sort of railway services are capitalising on this by offering specialised spaces for work meetings, refreshment, parents with children, etc. Independently from the modal choice, the mobile telephone allows us to do business or cultivate social relationships while travelling.

An even more striking evolution is taking place within transportation centres, and this is no wonder, if we think that passengers often spend more time there, than inside vehicles. Shopping, restoration, information and many other sorts of facilities are rapidly being developed in airports, railway stations or motorway rest-areas. The rationale is simple: the large flows of people passing through these places are an equally large (potential) market of captive consumers. But there is more behind this than a mere commercial calculation. The availability of complementary facilities appears an increasingly important criterion in people's choice for a transportation mode. There is a growing awareness that the choice among transport alternatives is not just based on the technical qualities

of the journey itself (speed, frequency, comfort, price, etc.), but on the whole 'travel experience', that is, on the whole succession of sub-trips and connections from origin to final destination, including the time spent waiting and the services available along the way. The message is clear: the transportation means and centres of the future must be seen not only as machines, but also and increasingly as *places of life* (see for additional inspiration on this subject Bellanger and Marzloff, 1996).

– The third point deals with the expected impacts of telecommunication. As we have seen, telecommunication increasingly allows human beings to interact at a distance, supposedly reducing the need for physical proximity and for physical movement. However, it has been also pointed out that this is, at best, an ambiguous trend, as proximity and movement remain required by many urban activities. There are as yet no signs that in the future a significant shift will take place from physical to virtual transportation. The available evidence is rather that of a combination of selective substitution, complementary or even reciprocal reinforcement between transport and telecommunication growth (Graham & Marvin, 1996, pp. 258-269). The net result of these developments combined might well be a continuation of the trend of the last 150 years, when telecommunication and physical transport have been growing together, and at roughly the same rate (Graham & Marvin, 1996, p. 262). Of course this does not mean that telecommunication will not have an impact on the distribution of urban activities and on the demand for transportation infrastructure and services. However, this is not likely to be a generalised shift from urban compaction to urban diffusion and from material to immaterial flows, but rather the complex mixture I have sketched in this paper. A good way to give a flavour of these complex relationships is considering some possible mobility impacts of teleworking (i.e. substituting physical presence by electronic connections). Teleworking is likely to concern a minority of the working population (not more than 14% in the most optimistic scenarios, according to Wetenschappelijk Raad voor het Regeringsbeleid 1998, p. 81) and for a limited portion of the working week. Next to the often commended reduction of home to work travel, teleworking could also have more contradictory effects (Graham & Marvin, 1996, pp. 265-269; Wetenschappelijk Raad voor het Regeringsbeleid 1998, pp. 81-82). Having to commute less often, people could choose to live further away, and have thus to travel longer (and/or a still regularly commuting partner would have to do so); such a more diffuse residential pattern could induce a further shift from public to private modes of transport; new non-work trips – such as shopping or bringing children around – previously combined with commuting, could be generated; the demand for the delivery of goods and services at home could also increase; any diminishing of congestion could be offset by the enticement of new trips (by other commuters, or for other than commuting purposes) on those same roads; etc. Rather than just as a factor in reducing mobility, teleworking (not differently from other telebased activities), could be more fruitfully seen as trigger of change and innovation in transportation and connected services. I have already mentioned some of the new transport demand it could generate; it could also re-evaluate slow forms of transport (walking, biking) within residential neighbourhoods; it could increase the demand for facilities for face-to-face meetings, possibly at highly accessible transportation interchanges; particularly in its less home-based versions, it could stimulate the development of new or improved accessory services 'along the way', inside vehicles and transportation centres, including telephone, fax, printing and reproduction facilities, PC outlets, connections to the Internet, etc.

– The fourth and last point concerns the sustainability issue. A less vague commitment to the sustainability goal than today is the case, could radically alter the context in which much of the present choices are made. Just think of the impact of the dramatic increase in (relative) transport costs that could result from a full internalisation of now mostly externalised environmental costs. These costs may be substantial. The Environment and Forecasting Institute of Heidelberg has, for instance, calculated in detail the social costs of road transport on the basis of the full life cycle of an automobile (The Guardian, 1993). These would amount to 6,000 DM per annum per car – including external costs of all forms of pollution, accidents and noise after income from all sources of vehicle and fuel taxation is deducted. A recent study of the European Conference of Ministers of Transport puts the cost imposed by a petrol powered car on society in Europe at about $ 0.12 per km travelled (The Economist 1998, p. 16). While numbers may differ, the same picture is confirmed by other studies (Ellwanger, 1990; Renner, 1988; Troin, 1995; World Resources Institute, 1992). However, it is difficult to predict if, when and in which measure the internalisation of the social costs of transport will actually take place. Apart from a (real or perceived) impending ecological cataclysm or - on the contrary – some (unlikely) technological wonder, we may assume that the sustainability issue will indeed acquire more weight, and that some progress towards the internalisation of costs will be made, but that – and certainly in the near future – sustainability will remain a factor among others.

What are the implications of this assumption for the discussion in this paper? Moving from the consideration that the essential function of cities is that of facilitating human interaction, the question is what sort

of constraints rising transport costs would pose, and how these constraints could be dealt with. Some bet on a substitution of physical by immaterial flows, or a "virtual city" inhabited by more or less immobile urbanites. However, we have seen that there is as yet no evidence that human societies could thrive without physical interaction and movement. Others, like the economist Krugman, see instead the solution in the "rebirth of the big city", that is, in a new massive concentration of urban activities and transportation flows. This, however, is against many current trends, leading a third group to expect little deviation from the actual course: because of technological breakthroughs, of reappraisal of the sustainability threat, or simply because no such radical change will be technically or politically feasible.

Uncertainties are such, that it is difficult to take party. On the other hand, if (relative) transport costs do rise, it can be expected that this will in the first instance translate in a stronger demand for efficiency of the present transport and land use systems. In the transport domain, this could boost and partly redirect the present emergence of multi-, inter- and trans- modalities, discussed under the first point. Higher efficiency would also mean better use of the time spent travelling, including the reconsideration of transport means and infrastructures as 'places of life', as contended under the second point. Finally, the complex of substitution, complementary and reinforcement relationships between telecommunication, transport and land use sketched under the third point will have to be evaluated in a new perspective. In sum, reflecting on the practical implications of the quest for sustainability on the future of cities and transport, requires considering all the four points discussed here together.

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