Can We Change Processes in Our Cities? Reflections on the Role of Urban Mobility in Strengthening Sustainable Green Infrastructures

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Abstract—**Urban mobility, the transport of people and goods, is on one hand essential for economic and social well-being but is on the other also a growing concern. Urban development faces today the challenge of making mobility sustainable in terms of environment (i.e. control emission, air pollution, noise, land take) and of competitiveness (i.e. price, time lost at congestions and journey time). Moreover, sustainability in urban development has to cope with a steady concern: it is increasingly space-intensive. At the same time, space is a finite resource and its claim for urban uses, e.g. for housing, work places, recreation, infrastructure and transport networks, puts increasing pressure on landscape and ecosystems. Considering urban mobility as a social responsibility in this paper the issues of transport and cars use in urban areas will be discussed against the concept of green infrastructure. Transport networks also shape settlement patterns and transform the landscape. More and more, land take for transport affects the natural environment, both functionally and morphologically, with far reaching effects also on the built environment. In turn, the quality of the built environment depends very much on the nourishing quality of the natural environment. Although these two aspects are part of the same process, they are usually not discussed and treated with the same concern and consideration. As cars need lots of space for use and storage, the paper also addresses as a major problem the mono-use of urban spaces, and on the basis of investigated examples demonstrate the scope of problem and viable solutions towards a green mobility. Green mobility impose minimal disturbance to the environment, sparing landscape and especially calls for public education to shift individual travel behaviour.**

Index Terms—**sustainable mobility, paradigm change, green infrastructure, urban landscape, green spaces, sense of places.**

I. INTRODUCTION

This work aims at presenting arguments for policy change towards more liveable urban spaces. It aims to contribute to a reflection on the role of mobility for a healthier and more inclusive urban environment. This means to tackle with the same viewpoint the issues of mobility, the role of automobile, of pedestrians and cyclists and public open spaces, the places where people can meet and interact outdoors.

This paper is not intended to be comprehensive, but it does attempt to make sense of an enormous body of ideas and research that bear on the topics of urban ecology, sustainable development and the effects of mobility on them. Mobility is not only a basic need, but is also a pillar of the economy and a part of the contemporary urban lifestyle. The question is if our cities can still cope with having cars as symbol of mobility, modernity and independence. The unprecedented number of cars on roads, manly solo driving, is jeopardising the urban environment, the places where people live, work and relax.

The land-take for housing, industry, roads or recreation reaches each year more than 1 000 km ^{2} of territory[1], areas that are lost for natural processes, those relevant processes that could reverse the environmental condition in urban areas. Current global challenges as climate change, resource scarcity, increasing volume of transport and growing urbanisation, and the resulting environmental and social problems, urge, however, a fundamental discussion on mobility and policies to mitigate its consequences. Also mobility has to be sustainable; it should incorporate the concept of sustainable development and consider significant social, economical and environmental forces which are likely to alter this condition in the long term future. The fact that city planning and the production of urban spaces have been centred around motor vehicles is one of the greatest tragedies in our cities. The production of urban spaces did not focus enough on people and on creating supportive environments for their living, working and moving around, but often in accommodating an increasing numbers of cars.

The growth in car use and road traffic, besides the environmental problems, has also eroded people's possibilities of freely and safely roaming in urban spaces, in particular of children. This work is not intended to be a call against the car, but as a contribution to the debate and discussion on an increasingly explosive topic: the effects of mobility patters on urban spaces. The central idea is to

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[1] European Environment Agency, State of the Environment Report 2010. http://www.eea.europa.eu/soer. Accessed 12/09/2013

develop cities into quality streetscapes and turn back from monofunctional, fairly bleak and unattractive urban spaces. The pledge is to negotiate the use of cars in urban areas towards transforming the streetscape in attractive and multifunctional landscapes. In this work the prospect for a sustainable mobility is explored and discussed against the green infrastructure concept. The green infrastructure concept is based on the principle that protecting and enhancing nature and natural processes, and the many benefits human society gets from nature, are consciously integrated into spatial planning and territorial development, and therefore in mobility strategies. Green infrastructure promotes natural solutions and can offer an alternative, or be complementary, to standard solutions. To this end a better understanding of the multifunctional nature of urban landscapes could rise up in the local political urban agenda.

II. The Mono-Functionality of Urban Landscape

Urban Landscape describes the effect and subjective perception of the urban space by the totality of its cultural and natural features. The EEA[2] defines it as "the traits, patterns and structure of a city's specific geographic area, including its biological composition, its physical environment and its social patterns". The value of urban landscape lies in combining the biophysical, geophysical and social conditions and in interweaving the built with non-built environment. In its core are the green and open spaces as essential features, for their contribution to enhancing the city's qualities and mitigating the negative effects of the built environment.

The different open and green spaces can be translated into greater benefits to the environmental conditions of a city and quality of life it offers. Besides the environmental and social benefits the use of nature and open spaces in the composition and organisation of the urban fabric contribute to defining the urban structure and give form and content to it [1]. As an element of the urban landscape, green and open spaces enable the readability of the cities. They break the monotony of the built elements, making the landscape rich and diverse. This aesthetic function with the inclusion of different types of green and landscape elements contribute to the visual enhancement of the city and to its richness. They can become points of identification as well as gives character and image to a city.

Despite being an indispensable element in an urban context green and open spaces are very often merely used as "space filler", as buffers between different urban land use forms, solving conflicts, impacts and interferences.

III. Green Infrastructure, Urban Ecosystem & Green Spaces

The EC (2013) defines green infrastructure as a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. The underlying principle is that the same area of land can frequently offer multiple benefits if its ecosystems are in a healthy state [2].

Green infrastructure is becoming a widely accepted term since it puts nature and environmental issues forward as a basic facility and physical service needed for the well-functioning of a community or society, at the same level as all other infrastructure networks commonly seen in cities, as transportation, communication, sewage, water and electric systems. Green infrastructure implicates a broad understanding that the human society depends very much on the benefits generated by nature. As Berber [3] highlights the green infrastructure concept helps avoid relying on infrastructure that is expensive to build when nature can often provide cheaper, more durable solutions. Many of these solutions, according to him, create local and long-term job opportunities, an argument that is quite favourable for itself.

In an urban environment, the place where nowadays the most people live, e.g. 75% of Europeans live in cities, where 85% of the GDP is generated in[3], but also 80% of energy consumption can be accounted, nature can only occur, grow and freely unfold in the spaces we destine to it, mostly in green spaces and in some few remaining natural areas. In urban settings nature has also to cope with economic constraints besides these spatial and environmental conditions. A good green system is a key attribute of the cities' spatial structure and a guarantee for a better environment. Nevertheless as a whole, urban environment do not offer the best conditions for nature development. The process of building cities substantially alters the natural system, often with irreversible consequences, as among many others the changes in the air composition and the natural water cycle. Cities need soil sealed surfaces, for housing and transport of people and goods, and the increased use of materials that accumulate solar heat, such as concrete and asphalt, is provoking the so called urban hot islands. The result are cities that have increasingly less natural environment, and hence, have to invest more and more in structural changes towards sustainability.

If on one hand we create these adverse and bad conditions for green and nature evolvement, on the other we need and want to take the best benefits green and nature can provide. Instead of densification of urban quality, the land take for urban uses affects the natural environment, both functionally and morphologically, with far reaching effects also on the built environment, which quality depends very much on the nourishing quality of the natural environment. Although these two aspects are part of the same process, they are usually not discussed and treated with the same concern and consideration [4].

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[2] www.eionet.europa.eu. Accessed on 15/10/2013

[3] Worldwide, cities produce on average 60% of a country's GDP. 380 cities in developed-regions produced in 2007 alone half of global GDP, with more than 20% coming from 190 North American cities alone (Dobs et.al. 2013).

Very often urban growth results in landscape fragmentation and in a substantial loss of soil resources and degradation of open spaces. Open spaces, as components of the green infrastructure are often treated as "potentially developable" land within the urban fabric. Rural zones, forests and semi-natural and natural water bodies are disappearing in favour of a high percentage of sealed-off ground. Also biodiversity is affected by the land take since it provokes degradation of habitats and reduction of the living space of species, along with loss of landscape segments that support and connect the remaining habitats with each other [5]. The natural vegetation in cities are almost totally decimated and replaced by easily manageable or exotic plants, often with little ecological function. All these result in wasted economic resources and loss of opportunities for making use of alternatives for the sustainable development of cities.

Urban settlements are also ecosystems and include both natural and built environment, thereof human societies and their subsystems are part of it. Considering the natural environment these ecosystems incorporate also manmade and natural spaces, both to be met in a largely human-built context, and contain the community of living organisms and physical media that is being transformed by the result of our actions in it. Urban ecosystems together with the semi or peri-urban environments that fringe cities cover currently 4% of the earth's surface, which is four times more of the freshwater ecosystems [6].

Without having the intention of presenting an exhaustive list, but to illustrate their diversity, the urban ecosystem network in a city can potentially include: tree-lined streets, promenades and alleys, green squares, plazas, playgrounds, market places, gardens and urban parks, green spaces, greenways, green belts, community and allotment gardens, waterfronts, burial places, churchyards and cemeteries, urban woodlands and urban "wilderness. Also small paved city spaces with plants as courtyards, patios, roof gardens, balconies and school yards are part of the urban ecosystem. Each one of these spaces plays a vital role in the city, whether for mobility, for social life, for leisure and recreation, and/or on account of their scenic value and ecological, environmental merits for nature and landscape preservation.

IV. LANDSCAPE FRAGMENTATION CAUSED BY URBAN DEVELOPMENT

The use of landscape and nature resources results often in the fragmentation of landscape, in which the remaining, the "not used" spaces are separated by barriers such as roads, railroads, or urban areas. The result is not the fragmentation of landscape but also highly fragmented cities and metropolitan areas; where the urban fabric, and especially the urban fringe is typically made up of disconnected patches and swathes of vacant land. Fragmentation and landscape change have worldwide two major drivers: transportation infrastructure and urban development. The transportation infrastructure, like roads and railways act as barriers to movement for many animal species. In combination with growing urban areas and intensified agricultural land use, they increasingly narrow and separate the remaining wildlife habitats [7]. The anthropogenic penetration of landscapes effects to a greater or lesser extent almost of its values, from morphological to ecological, from historical to aesthetic and recreational qualities. It concern values as tranquillity, scenery and landscape character that are important components for gaining benefits for urban environment and better health conditions of the population. This last argument is ever more significant, because in the sedentary urban lifestyle the need for exercise becomes more and more apparent.

Besides this physical fragmentation the development of transportation infrastructure and urban areas enhances the dispersion of pollutants and acoustic emissions and affects local climatic conditions, soil and land cover, water balance, and land use [7]. As a result, it leads often to serious loss (and waste) of important potentials for a more sustainable urban development. Open and green spaces in a broader sense are essential starting point for sustainable development and quality of life in every city. It is very difficult (many times even impossible) and expensive to "re-establish" or "re-create" urban landscape and natural qualities relevant for the living and environmental qualities in the cities. Angel *et al.* [8] found out in their study that cities that constrain urban development are less fragmented. Such constrains have also to include measures to curb the loss of biodiversity and to minimise the negative impacts and enhance natural habitats.

In light of the foregoing, the claim here is to adopt and adapt an environmental perspective for our cities. This should be based on coordination and plans for safeguarding nature and landscape resources against adverse changes and their prevention of exploitation, destruction and neglect.

V. UNDERSTANDING THE PUBLICNESS OF URBAN OPEN SPACES & GREEN INFRASTRUCTURE

Important for this work are those spaces that have or could have value for enabling the share of experiences forming what we call public life, the city's publicness. Thus, publicness embodies the social function of public spaces; therefore we devote the attention in understanding the public qualities of these spaces and their implications.

The network of streets, green and open spaces of a city forms its public sphere. They are the social space where people can democratically meet outdoors and interact with others as well as with the urban fabric reality. The conceptualisation of these spaces as democratic spaces is associated with "public domain", the network of spaces that belongs to the community and is freely accessible for everyone. They are site of sociability, as they afford the common ground for communication and information exchange. As social gathering places such spaces enable the exchange between different social groups, independent of class, race and ethnicity, gender and background, etc. They are places to express cultural

diversity, for seeing and being seen or even be anonymous in a crowd [9]. Individually the social interactions are important for defining a sense of place, for contributing to our physical, cultural and spiritual well-being, for the personal development and social learning and for the development of tolerance [10].

Public spaces, as the stage of urban life, have the capacity of embodying multiple meanings, besides the above mentioned social function. In a political sense they offer a forum for political representation, display and action [11]. Public spaces are the most democratic places of cities [12], here known and unknown people meet, here all strata of society encounter each other, here the formal and informal relationships take place. Being "open-to-all [13]" they are neutral territories, which are inclusive and pluralist (accepting and accommodating differences). This concerns also their use for public purposes, such as to hold collective celebrations or to influence collective decision making [12]. This brings about to the symbolic character public spaces can embody as representative of the collective and of sociability (rather than individuality and privacy [9], [10], [13].

The quality of being an enabler of social interrelations confers the public spaces a positive connotation, but one has also to be objective. The urban society is heterogeneous and has distinguishing objectives and features in its social organisation. The modern urban environment, in its complexity, is considered one of the causes of the increasing social segregation; isolation and little involvement of people together [14]. For this reason, it is necessary also to demystify the relationship between public space and social interaction, a relationship often seen with certain romanticism. Although as Whyte [15] pointed out, what attracts people to public spaces are other people: Studies show that the majority of those who use public spaces for leisure activities do not want to be more than mere spectators, and are not interested in establishing interactions with strangers. A study conducted in Dresden (Germany) in 2006 revealed that the majority of users in the urban parks, while acknowledging as positive the possibility of social contacts, have no other interests beyond a simple conversation [16]. This means users want to spend leisure time in a pleasant manner without interference.

In a sense, each user or group of users "privatise" their space, creating what Hampton & Gupta [17] call a *cocoon*. For them the public space is not shared, but divided and shredded individually or collectively between different users. Although invisible and limited in time, these cocoons reduce the likelihood of serendipitous encounters, contradicting the common expectations for public behaviour.

Therefore, public spaces are arenas of multiple and sometimes competing interests, occupied by people unequal in gender and social and cultural class [9]. They can be locational and situational spaces of conflict among disputing interest groups and individuals.

VI. URBAN MOBILITY - A DILEMMA FOR URBAN PLANNING

Transportation, moving people and goods, is essential for our economic and social well-being. The choices people make in the way they travel affect not only urban development but also the economic well-being of citizens and companies and are potential sources of environmental stress. The massive use of individual transport and the attempt to accommodate huge amount of vehicles in the urban fabric, continue to produce serious problems. The mobility and the stress caused are not only limited to urban areas but also spread over peri-urban and rural areas under the influence of urban issues, bringing mobility into intra-urban relationships and making it a regional concern. Bertolini & Le Clerq [18] points out that the failure to tackle this problem is only possible at economic, social, and political costs that are becoming unacceptable in most societies.

The current patterns of mobility are of growing concern to cities and citizens. Urban development, as responsible for creating the right framework conditions for mobility, considering all uses and needs of the urban space, faces a great dilemma than the way our cities have been developed, allowing the private car an "*almost total and unfettered monopoly*" [19], is being increasingly recognised as a model that failed. Mobility is bound within a vicious cycle that once started is hard to break unless there is outside intervention, Fig. 1 illustrates this cycle. What we have witnessed as mobility response is twofold: first, the implementation of large streets, roads and highways and shopping malls out of town; and second, the increase of traffic congestion and daily commuting patterns. In fact both did not provide solutions but increased the environmental (noise and air pollution) and social (segregation, risks of accidents) problems besides created deep cuts in the urban layout.
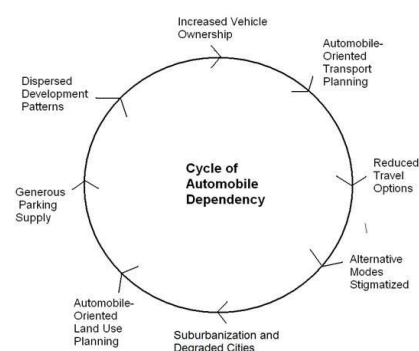

Figure 1. The cycle of automobile dependency. The dependency results from vicious cycle where a single step increase the others, as car-oriented land use patterns instigate the car ownership, which reduces travel options and so on. Source: VTPI [28].

Considering the public health the car centred world is causing also unprecedented levels of *health* problems, e.g. obesity, diabetes. Even if they are not directly caused by the use of cars they appear as side effect associated with the sedentary lifestyles.

Another concern: the noise pollution is widely regarded as a growing critical issue for urban stress, and

traffic noise is referred to for years as the dominant noise source. A study in 2010 in Germany shows an incredible number of over 80% of the population feeling bothered by traffic noise [20]. This number evidences that exposure to noise where people live and work is obvious. Taking the example of Lisbon, as Fig. 2 evidences, many parks and green spaces are exposed to noise. So we can assume that such green spaces are severely limited for quiet leisure and relaxing activities and therefore not really appropriate for alleviating mental fatigue and restoring the mind. Besides the environmental stress, traffic noise leads to decline of property value. In a list of effects that decrease the property value, the bad location appears at seventh place, with the conclusion that in particular, house along highways tend to have less value[4].
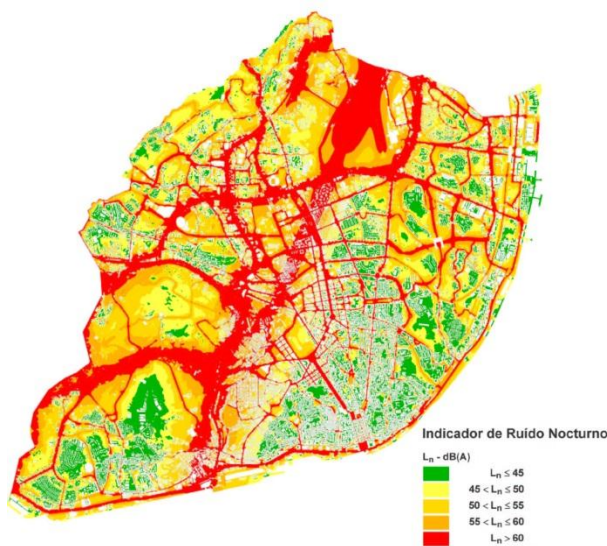

Figure 2. The noise map of lisbon demonstrates the effects of noise, mainly caused by road traffic on the city structure. Very few parts of the city are noise free; even the city's largest green space (Parque Florestal do Monsanto) is under constant high noise level, as the map shows for the night. Source: Câmara municipal de lisboa, divisão de controlo ambiental, 2010

Moreover, the use of car is the only travel mode that doesn't foster any other mode. Despite the development of low-energy, less polluting and quieter vehicles and introduction of concepts for responsible car use and traffic calming measures the traffic in urban areas remain for the most problem for residents and urban planners. Even city-friendly cars need lots of space (for driving and parking) and the transit still becomes inefficient and fosters an unsafe feeling for pedestrians and cyclists.

Despite the importance of the car in contemporary societies and taking the social responsibility in some cities some efforts towards avoiding total collapse have been made. They are mostly linked to the prohibition or restriction of accessibility, and so far, measures attempt to reduce the high levels of pollution through vehicle restrictions. In many cases these include controlling the flow of old cars. In Germany, for instance cities, are implementing the "low emission zones", as an action

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4 www.boston.com/realestate/gallery/10_features_that_reduce homevalue. Accessed 10/12/2013

against traffic-related air quality problems. These are areas where driving vehicles with particularly high emissions are prohibited to circulate. In fact, this prohibition did not bring the expected results [20], but the automotive industry could be pleased than cars have to be labelled and those that did not get it will for sure be replaced.

One example how people have to fight to get back "their environment" can be seen in Amsterdam in the 1970s. In the "De Pijp", a former working class quarter close to central Amsterdam, with its small houses and few amenities to be outdoor children had no choice but to play on the streets. But heavy car traffic and parking facilities had been preventing another use of streets. Several demonstrations with roadblocks and actions provoked the reaction of the municipality. The streets were subjected to a redesign; the drastically narrowed carriageway and reduced car parking facilities enabled widened sidewalks and pedestrian activities, planting trees and bicycle parking. The strong citizen activism of those years against a massive car domination of space paid off. The transformations turned the quarter into Amsterdam's "Latin Quarter", a trendy and liveable area, a neighbourhood where people want to live. Sadly this example did not set as a precedent and people have to continue the fight. Whereupon, one wonders if this is the model city that society as a whole aspire.

Another aspect to consider refers investments devoted to mobility. The case of Mexico could be considered paradigmatic, as cited by ITDP [21] 75% of the national budget for mobility is directed to car-oriented measures (e.g. to expand and maintain the road infrastructure) while 70% of the population don't use a car. This means the government is investing public money in a sector that is used by less one third of the population.

Considering that people automatically don't prefer cars, but they prefer what is convenient, cities have to tackle the problem from a different ways, and bring about environmentally more sustainable urban mobility patterns. Introducing concepts of responsible car use includes reducing the car accessibility, investing in increasing the efficiency and attractiveness of public transport and especially giving up the concept of mono-functionality of streets. In order to keep and transform cities in habitable places; car cannot continue "to reign" over them. A systemic change in all societal systems is a fundamental transformation to achieve all this.

VII. MANAGING CHANGES

It is clear by now that cities cannot cope with a steady growth of urban motorised traffic without compromising their environment and sustainability and thus drop standards of living conditions. This alone should be a good argument for a paradigm change. Technical solutions won't be enough to fight the problems of a car-centred mobility. At present the efforts are rather concentrated on developing "better, environmental-friendlier, green" cars, instead of inspiring a fundamental change of the attitude both to life (and lifestyle) in general and to nature in particular. The experiences

world-wide are vast, varied, and difficult to compare. However, a number of broad "soft" conditions for success and leading practices can be identified. These are grouped under the headings: Pressure to change, Compliance and Setting Policies, Proactive Leadership, Networking and Learning Process and the Role of Design, each of which is addressed below.

A. *Pressure to Change*

The current trends in mobility are not sustainable, this alone is a form of pressure to boost the transformation towards an ecological approach, and promote a coordinated urban development. The effects of globalization are another example of pressure to change. Globalization incites greater competition among the cities and workforce searching for urban qualities.

A successful agenda for a paradigm change does not wait for the perfect solution; it has to be experimental in nature, be open for different alternatives and accept new concepts. But as common sense these have to displace cars as the only owner of streets, dedicating them less space and devoting more for people, as pedestrian and cyclists.

B. *Compliance and Setting Policies*

We are living in an interdependent world and are relying on a situation I would call *laissez-faire* as a mean of coming to grips within a constantly changing environment. The production of cities is still driven concerning the mobility by technical knowledge from the 1970s, so the technical manuals for streets design. The need for change calls for setting policies that cope with current challenges, as shared leadership and cooperative relationships and as part of an overall response to developing climate adaptation and mitigation strategies.

The complexity calls for engaging with the community to make decisions on urban planning and space design that help to promote social cohesion. So the design and the production of cities and their public space, be it streets or green spaces, have to deliver spaces that help strengthen communities, are pleasant and attractive, are cost effective to construct and maintain, and are safe. Engaging with the community can empower and encourage leaders to act as drivers for change.

As a support and as guidance towards changes there is the need to translate the mobility change objectives into specific planning and design policies. Those have to consider and progressively move at different scales of urban development, ranging from metropolitan to urban centres, from towns to villages, and especially down to the level of the neighbourhoods.

C. *Proactive Leadership*

A part of managing changes is necessary to set up a strategic leadership. To its tasks belongs understanding when there is a need for change (and when it does not) and who can be the drivers. This implies in having the leadership as proactive, i.e. act in advance and anticipatory in providing solutions. This calls for identifying the key influencers (drivers) within the stakeholder group. To do so there is the need to "map the

political landscape" and recognise the key external and internal, formal and informal stakeholders who will be affected [22]. As Hunter (2007) highlights it is important to spend time up front identifying these key influencers, listening to their ideas and engaging their participation.

D. *Networking and Learning Process*

To benefit from all the changes it is explicitly necessary to work out a multi-disciplinary approach, which included planners, engineers, landscape architects, heritage officers, and ecologists. A comprehensive scope is a warrant in the delivery of cost-effective and long-term sustainable solutions and this throughout each phase of planning process, from goals settings to planning, design, construction and management. The structural change is a cumulative process involving all sectors of the urban development and the car industry.

E. *The Role of Design*

Good design is fundamental to achieving high-quality, attractive spaces and places that are socially, economically and environmentally sustainable. Only with investments in high quality design and equipments in the new gained places can bring people to accept the changes and become their compliance. In the design approach the new environment has to be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability. In the process of changing streets and their aesthetic qualities it is also relevant to increase the relationships between them and residents and to protect the built heritage.

As mentioned before urban green helps to soften the urban street-scene, creates visual and sensory interest, and improves the air quality and microclimate. It can also be used to limit forward visibility to help reduce vehicle speeds. Also in the design process it is important to ensure a high level of co-operation among the stakeholders and disciplines.

VIII. KEY PLANNING PRINCIPLES FOR PUBLIC SPACES IN FULFILLING TWO ROLES: A MOVEMENT ROLE AND A PLACE ROLE.

Once the "soft" conditions for a paradigm change are clarified the next step is to reflect on what to do with the space "gained" from reducing the car use in public spaces in order to enhance the urban green infrastructure. Streets, as they comprise the majority of the city's public realm, will be taken as representative of the kind of public open space. Streets have to fulfil a complex variety of functions in order to meet society's needs as places for living, working and moving around. This requires a careful and multi-disciplinary approach that balances potential conflicts between different objectives. Improving the environmental conditions demands to protect and enhance nature within the built environment and consciously integrate natural processes in the spatial planning and territorial development. Also here a change in the understanding is needed, than increasing the green infrastructure qualities is not a constraint on territorial

development but promotes natural solutions. It can offer an alternative, or be complementary, to standard solutions.

Figure 3. In S ão Paulo (Brazil) the elevated viaduct Costa e Silva built in the 1960s, twists between skyscrapers. Since the end of the 1980s the population reached its closing after 9PM and during the weekends. During the closing time the viaduct has been used as public recreation area, accommodating different activities. Due to the lack of outdoors opportunities for leisure in the city even such unfriendly environment is welcome. Photo: http://marcelagildesign.com/Minhocao (2012)

The consideration goes here to enhancing the urban fabric in different aspects. Improve the ecological values and environmental qualities are crucial to increase well-being and economic prospects of the cities. To enhance environment qualities offers good prospects to achieve different goals with few efforts. Through green infrastructure projects, working with nature and in harmony with the local landscape is the best way to deliver essential goods and services. As Berber [3] points out using a "place-based" approach is not only cost-effective but also preserves the physical features and identity of a locality. Green infrastructure and urban green provide not only ecological but also economic and social benefits through natural solutions. Natural solutions means increasing natural elements in built environment. These elements play important role in the quality of a public space. The presence of sun, shade, wind, water and vegetation influences how enjoyable a space is for people to spend time in or pass through. Sunshine or shadow is important qualities depending on the climate that make public spaces better or less favourable for a public use.

Considering the pressure for changes and the need to provide a good place for everyone, greening such new places has to be put forward. A study by the Universities of Birmingham and Lancaster [23] established that greening the streets in the UK could reduce pollution levels by an incredible 30%. Greening of streets means also protecting and enhancing biodiversity. A study on species adaptation to human habitats, especially in business parks, housing, roads and waterways, revealed that such types of constructions can even enhance biodiversity and encourage species to colonize urban areas by creating ecological corridors and networks to circumvent obstacles, thereby providing access to favourable habitats [24]. Furthermore, the author states that urbanisation does not preclude the development of teeming habitats; rather than being confined to remote

areas and wildlife parks, they can be found in densely populated areas.

The concept of walkability and the renascence of bikes offer another opportunity to build an infrastructure that will bring significant improvements in public health, besides huge economic benefits, as both also helps to reduce power consumption. Considering the renascence of bikes a project by Norman Foster for elevated bike routes in London unveiled in the beginning of 2014 made the news. The "SkyCycle" is a car-free network of 220km bike paths suspended about railway lines. As Foster says[5] the scheme is a lateral approach to finding space in a congested city. In fact, it does not provoke any change in the mobility patterns, as it does not tackle the car use but provides alternative routes for bikers over rooftops. Maybe the added value of such project is first of all the clearest indication yet that cycling is no longer reduced to a minority of fanatics, but a healthy, efficient and sustainable mode of transportation that urban planners should use in their arsenal. Lastly, the fact that a so called star architect also deals with alternative uses for the urban space.

The street and road networks can be places, rather than just corridors for traffic. Too often car use dominates the design and use of streets. The car industry plays a role in this process. Not too long ago the urban model was the "car-friendly city", today the car industry is selling us the idea of the "city-friendly car". This suggests the solution is replacing cars with the "city cars", a generation of cars more appropriate for the urban use and not with the way we use them. Even the city-friendly car will need the same space, also imposing significant economic, social and environmental costs; the society somehow has to pay.

If the aim is to better integrate streets with their surroundings and to promote their use as more of a "place", undertaking a radical redesign, is particularly crucial. Without this the measures remain only cosmetic nature. We need to recognise that our cities' streets network is more a result of negligence and lobby work than the construction and engineering failure. Although also the planning practice needs to be rethought, than the street's planning in almost all cities still use the technical models in which streets have to accommodate the number of cars the traffic engineers predict. All this leads to streets offering little reason for people to stay there. Maybe the most known urban renewal showcase for regaining space taken from roads and transforming it for the nature and people's use is the regeneration project of Cheonggyecheon Stream in Seoul (South Korea). The stream was canalised and covered in the 1950s and in 1976 a 16m wide elevated highway was built over it. This highway lasted until 2003 when it has been removed and the stream restored. This project, initially attracted much public criticism, has become popular among city residents and tourists after its opening in 2005 as a 8,4 km long public recreation space. This project is a motor

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[5] As published in The Guardian, 2 January, 2014. www.theguardian.com/artanddesign/architecture-design-blog/2014/jan/02/norman-foster-skycycle-elevated-bike-routes-london. Accessed 12/01/2014

for economic growth and a tourist attraction in Soul, what make possible the increase by 300 percent of property values to adjacent to the corridor. As air and water quality improved the number of species of fish, birds, and insects have increased in and around the stream, and being open to public access it enables again fishing and bathing the city. The urban heat island effect was diminished in Seoul, with temperatures in the vicinity of the river on average $3,6\,^{\circ}$C lower than in other similar parts of the city[6]. With less success people in S ão Paulo (Brazil) are still fighting against an elevated highway (Fig. 3).

Different and alternative approaches, the results of research have proven, in appropriate settings can bring benefits in terms of visual amenity, economic value and performance capacity of the streets. Also the perception and the real safety, personal and collective, after improvements in different situations have been increased. As Mayor & Coleman [25] found out in their study on the social and emotional benefits of good street design the users feel relaxed, comfortable and happy using the remodelled New Road in Brighton (UK), with many expressing willingness to donate money towards similar schemes. They go further in clarifying that the initial widespread scepticism among the businesses owners disappeared with the time and their vast majority eventually approved the scheme. The re-design improved the street as place, with possibilities to sit down and spend time there. Further, drivers and cyclists agreed that they were more conscious of the street environment and the need to slow down when using New Road. The lowering vehicle speeds and the shared space have had a significant impact upon how the environment is perceived by all users.

Well-designed shared space or traffic-calming zones schemes are proven to turn the streets safer, especial for children and elderly people, the more vulnerable as pedestrians and cyclists in the streetscapes. In Europe UK has one of the worst records on child pedestrian accidents, and even thou few are effectively made for reducing road accidents [26]. These also the user's groups who yet benefit the least from investment in infrastructure and the public realm. Some examples of physical measures to improve the liveability of urban spaces: narrowed streets, minimised demarcations between vehicles and pedestrians, different types of paving used to visually strengthen marked pedestrian crossings, elevated marked pedestrian crossings, and refuges islands.

Even the sideways in order to cause less obstruction to traffic or endanger drivers, are not really for pedestrians free use - usually here all street furniture and infrastructure are placed sharing the available space. The width of sideways should be provided according to the volume of traffic and speed limit. But often this is not the case than to accommodate the traffic sideways got as reduced to the desirable minimum or absolute minimum (as the Fig. 4 shows), losing in this way all the properties to become "places". Too often sidewalks are in bad conditions, discontinuous and unsafe.

⁶ www.restorerivers.eu/Portals/27/Cheonggyecheon casestudy.pdf, Accessed 05/12/2013

Figure 4. In order to accommodate a high volume of traffic the sidewalk has been narrowed to a minimum. The image shows a situation in Lisbon although this is a common situation and could be in many cities. Photo: Smaniotto 2011.

Providing parking facilities turned to become a key function of most streets. The greatest parking demand is usually for cars, but there is also a need for cycles and motorcycles. The amount and location of parking have a significant influence on the way people choose to travel; the availability of parking facilities is a major determinant in the choice of travel mode.

In all above mentioned cases changing the mobility patters require a distinct political will, a good communication strategy and a strong and effective concept of cooperative planning. Local decision makers have to target the measures towards citizens and their corresponding requirements.

A. Key General Findings and Road Map

In order for increase the liveability and the sense of places in urban areas, these spaces need basic characteristics:

- Over-exploitation of the natural resources is recognised as a threat to sustainable territorial development, urban development has to maintain the integrity of ecosystems and minimize the negative effects,
- Growth and prosperity of cities critically depend on the way their evolving challenges are tackled. No doubt that efficient transport is vital for economic growth of cities, but it has also limits, especially set by the environment and social costs it can provoke,
- Car dependency creates monofunctional spaces, what makes the creation of places impossible! Tackling car dependency opens the door to thrilling new design approaches like shared space that can help create safe and attractive places that people want to use and are proud of,
- The appropriation of public space should be a right to all citizens, increasing this exercise can be as step towards the renaissance in urban living,
- Places have to foster interaction. Good places for interaction are spaces that provide a reason for people from different areas and backgrounds want to be there, they have to go there,

- Creating living streets with wide sidewalks and green: Streets can be not only a way but also a destination where people go to, sit, eat, shop, watch or just walk through. In those space people have to feel safe and comfortable. Such spaces have to be welcoming and accessible to everyone,
- The design of streets should allow them to function as ecosystems, incorporating natural elements, ensuring more sustainability. Greening is however more than just an addition, it's a pathway to healthy people, and liveable cities,
- Investing in green Infrastructure can foster a more coherent approach to decision-making in relation to integrating ecological and sustainability concerns into spatial planning,
- Investing in green infrastructure is an important step towards protecting natural capital. This calls for an enabling framework that encourages and facilitates green infrastructure projects within existing legal, policy and financial instruments,
- As long as there is no political will to transform cities in more liveable places, we will continue to face significant environmental effects of mobility. These can be simplified, as discussed in the previous parts: energy and natural resource consumption, air pollution, noise, land use, separation efficiency, risk of accidents,
- Combine responsible car use and traffic calming measures with intermodality, public transport, cycling and walking opportunities,
- Qualitatively designed streets are also good for business, they are more visible and attractive, what also creates more value for the land owners,
- Mobility paradigm shift needs advice and supportive campaigns. It also needs drivers and policy makers who anticipate urban trends and a better prepare cities to respond to an increasing complexity.

IX. CONCLUSIONS: CHANGING THE RELATIONSHIP OF CARS AND PEOPLE IN PLACES

In view of the above arguments and the issue of whether such process changes in our cities is possible, it should be borne in mind that the evidences of automobile dependency and car culture are everywhere and this fact can't be ignored any further. In many cities highways, large streets or elevated roads were and are created in order to solve traffic congestion and clearly, this has never been achieved. So solutions have to be from other nature. The lesson should be clear: the more roads, the worse the traffic. As Stone [27] wrote, we are living a delusion in relation to individual transport: "Until now we could not realize the difficulties and avoid reacting on these. But the troubles are becoming so obvious we cannot just avoid them, especially the amount of cars in cities and the problems this cause, requires solutions". The solution, as widely discussed in the previous chapters, has to consider several aspects, from mobility to lifestyle, from space to environment. The examples used in this paper show that for their implementation besides searching for innovative solutions, there is no need for exacerbate financial support. With few, much can be reached; important in the process is to start and the sooner the better. Involving residents, stakeholders and policy makers in the whole process is crucial for achieving sustainability. People are becoming aware and perceive themselves within the context. Even the call for solutions is not by those that claim for less car-oriented urban areas but by drivers and car industries. Ironically, today's stressful and sedentary lifestyles call for healthy and attractive natural environments to relax in close to where people live. This demands to reflect contemporary mobility patters, to (re)think about means of transport, which do not pollute and are less invasive, also towards social changes. Putting these dimensions together rises the question what kind of mobility and city we all want.

This paper endorses the concept of green infrastructure, its benefits and especially our own needs of a health environment against the use of the spaces for mobility. The central idea is to develop supportive measures towards the creation of more sustainable mobility patterns, making of cities safe walking environments, with less dependency on individual transport. Urban environment challenges are inter-related: urban sprawl increases dependence upon private motorised transport, the lack of green space translates into decreased quality of life for citizens, and the rising consumption of primary resources.

Mostly the community evaluates physical improvement measures and features highly enhancements on environment. Streets have two important roles in our cities, although these two appear in different constellations and priorities. The first street system serves as a transportation route; here people and goods are transported. Secondly but it is also the gathering point for the residents with the community, it is place for interaction and news exchange. Public space can facilitate inclusion and social interaction on different scales. Therefore special attention should be given to the design of the traffic environment for children and elderly and for both safety and mobility. Making streets safer for them makes streets safer for everyone.

Good-cherished, well-designed, good managed and maintained public space can be one of a city's most valuable assets, and can provide long-term benefits. Improving the quality of the urban environment is an endless task. There is no sustainable city or growing economy, if there are no healthy and liveable urban spaces. This sentence sounds like a cliché, and in many cases it is indeed, but observing many of the cities, it is no longer obvious. In a sustainable city the adjective "public" should not be only an appendix, but a quality and a request to appreciate and recognise the public space as a place for individual and collective expression. So that the network of public spaces can provide a variety of benefits and opportunities for social interaction, it is up to the council to assess policies, with regard to quality, access, and design of these spaces. This calls not only for skilled professionals (i.e. urban designers, landscape architects, traffic planners) able to accept the challenge to

draw up convincing ideas and good spaces, but also politicians to prioritise the inclusion of quality public spaces in the urban agenda.

Moreover, continuous progress in research is needed to improve the understanding of the links between biodiversity and the condition of the ecosystem and their capacity to deliver ecosystem services, also to mitigate the negative effects of mobility. Under this light a paradigm shift in urban mobility should be not controversial, as it is at the moment.

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