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Reshaping metropolitan transportation cultures. A comparative study of bicycle friendly cities in Europe and the case of the Metropolitan City of Milano

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Reshaping metropolitan transportation cultures. A comparative study of bicycle friendly cities in Europe and the case of the Metropolitan City of Milano

“Il y a un lien secret entre la lenteur et la mémoire, entre la vitesse et l’oubli » Milan Kundera (La Lenteur)

Ario de Marco

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Abstract

The urban fabric determines the city social and economic organization. Western city form has been shaped by a long century of car symbolism that imposed the choice of building infrastructures for a life style based on the exclusive automotive option. In the case of Milano, it meant the amputation of its historical development as an aquatic city by transforming the channel network of Navigli in a grid of roads. Then, the city knew the common fate of sprawling communities plagued by social segregation, long commuting time, pollution due to excessive traffic, loss of identity in dispersed and constantly growing peripheries. Active transport modes have been considered episodically to mitigate the Milano traffic drawbacks but no attempt has been dared to use the transport policy to re-shape the city and make it sustainable, attractive, efficient, and fit for the future challenges.

Now, the knowledge that the transport policy deals not solely with the traffic issue but influences aspects as different as integration, access to job market, recreation and educational opportunities, safety, local economy and cohesion, health costs has been exploited by several other municipalities to revolutionize the structure of their cities starting from the reconversion of the infrastructures. Active modes, and cycling in particular, became the lever to invert the car-based development trend and to transform the lame metropolis populated by isolated individuals into a dynamic entity with brilliant community life.

Milano could profit as well from a similar vision of alternative transport policy. A network of effective bicycle routes would not only alleviate vehicular traffic and pollution, but would offer physical connectivity to the dispersed outskirts and join their citizens to the down-town work and recreational opportunities. Utility cycling would populate the streets, revitalize deserted districts, and contribute to recover the access to the remaining urban water surfaces that represent the city historical identity. The presence of the Navigli would simplify the launch of a viability reconversion project by which Milano could on the one hand reconcile with its territory and its history, and on the other gain in appealing to succeed in the competition among large post-industrial cities.

Zusammenfassung

Das städtische Gefüge bestimmt die soziale und wirtschaftliche Organisation der Stadt. Die westliche Stadtform wurde von einem langen Jahrhundert der Autosymbolik geprägt und bei der Entwicklung der baulichen Infrastrukturen ausschließlich auf die automobile Option beruhende Lebensstile gesetzt. Im Fall von Milano bedeutete dies die Abtrennung von der historischen Entwicklung als Wasserstadt, indem das Kanalnetz der Navigli in ein Straßenraster umgewandelt wurde. Doch dann lernte die Stadt das Schicksal jener ausufernder Kommunen kennen, die von sozialer Segregation, langen Pendelzeiten, Umweltverschmutzung durch übermäßigen Verkehr und Identitätsverlust in dispergierenden und ständig wachsenden Peripherien geplagt waren. ‚Aktive', d. h. hier mit Muskelkraft betriebene Verkehrsformen wurden zwar immer wieder einmal in Betracht gezogen, um die Nachteile des Verkehrs in Mailand mindern, aber es wurde nicht gewagt, die Verkehrspolitik gezielt einzusetzen, um die Stadt neu zu gestalten und sie nachhaltig, attraktiv, effizient und fit für die zukünftigen Herausforderungen zu machen.

Heute bestimmt das Wissen, dass die Verkehrspolitik über das Verkehrsproblem hinaus Einflüsse auf so unterschiedliche Aspekte wie Integration, Zugang zum Arbeitsmarkt, Freizeit und Bildungsmöglichkeiten, Sicherheit, Gesundheitskosten, lokale Wirtschaft und sozialer Zusammenhalt nimmt, das Handeln vieler Kommunen. Die revolutionäre Wende beginnt mit der Umstellung der Infrastrukturen. Alternative Verkehrsmittel - und vor allem das Radfahren - werden der Hebel, um die Auto-basierten Entwicklungstrends umzukehren und die gelähmten Metropolen, von isolierten Individuen bevölkert, in dynamische Wesen mit hochentwickeltem Gemeinschaftsleben zu verwandeln.

Milano könnte von einer ähnlichen Vision einer alternativen Verkehrspolitik profitieren. Ein Netz von leistungsfähigen Radwegen würde nicht nur den Fahrzeugverkehr und die Umweltverschmutzung verringern, sondern eine physische Verbindung zu den verstreuten Stadträndern herstellen und deren Bürgern die innerstädtischen Arbeits- und Freizeitmöglichkeiten neu erschließen. Alltagsradverkehr würde die Straßen bevölkern, verlassene Bezirke beleben und dazu beitragen, den Zugang zu den verbliebenen städtischen Wasserflächen zu eröffnen, die der Stadt historische Identität sind. Die Präsenz der Navigli könnte den Anstoß für ein Projekt zur Wiederherstellung der Lebensfähigkeit geben, das Milano einerseits in Einklang mit seinem Territorium und seiner Geschichte bringen, die Stadt andererseits erfolgreich im internationalen Attraktivitäts-Wettbewerb der großen post-industriellen Städten positionieren würde.

1. Preface

There are different and successive reasons that motivated me in developing this work as it appears now. The first were personal: I moved to Milano region and I did not like the city but I found difficult to rationalize what was disagreeable, what were the causes of my perceived poor life quality and whether any solution was available to improve the situation. In the previous years I lived in several European cities and the comparison could be a starting point but I was aware of two risks, namely a too subjective interpretation and the fact that no sound analysis can be performed in the absence of a robust theoretical background. Urban design and the influences that the urban structures and organization have on the daily life have been thoroughly studied before my interest for the argument. Consequently, it was necessary to follow the historical development of the discipline for approaching the present with motivated arguments. Only at this point it would have become possible to explore the implications of the historical experiences and to sketch a critical framework for evaluating the proposed solutions and to identify the ones that could fit to Milano. These were the rational and operative motivations for undertaking the commitment of writing a thesis.

I lived for some years in a village located 30 Km far away from my working-place in Milano and commuted by bicycle taking advantage of the path along the historical channel Naviglio Pavese. This channel connects the center of Milano with the city of Pavia and the lower course of Ticino river located at South. In the countryside, the service road along the channel has been transformed in a bicycle pathway and during the years several technical improvements have been integrated for making it safer. The channel was part of a large network of historical water ways serving Milano, most of which have been paved in the course of the 20th century. At the present, the other main remaining channel is the Naviglio Grande that takes its water from the upper course of Ticino river, close to Lago Maggiore and terminates in the Darsena, the ancient port of Milano which is a large basin kept dry and dirty for many years and is the origin of the Naviglio Pavese. Although the bicycle pathway is well equipped in the countryside, it stops

with no alternatives at the Milano periphery, making extremely dangerous the final part of the trip (or, in the opposite direction, reaching the dedicated bicycle pathway). I was solicited by some observations: I liked commuting by bicycle, no matter what was the weather, because it allowed me seeing the colors of sky and fields, the forms of the bushes, the animals attracted by the water, I could smell the air, the water was a changing spectacle for itself and kept me fresh even when I came home under the summer sun. Bikers are relatively slow and exposed to the environment, two critical conditions to sense the surrounding context. Surprisingly, it was possible to enjoy also the extremely boring flat countryside southern of Milano, made of repetitive rice fields, very few trees and almost no other crops to introduce polychromatic views and perspectives. I had a shower in the building where I worked and a protected area to park my bike, two absolutely out-of-common resources in Milano. Moreover, I observed that my speed was competitive when compared with commuters using cars or train for the door-to-door trip. I also observed that few Km by bicycle in the city were a source of stress and objective danger, an argument that almost equilibrated the pleasure I could have from the whole remaining part of the trip. In the traffic I could not look at landscape or water and, generally speaking, cyclers and pedestrians had no chance to approach the channel because of the road design.

Altogether, these observations forced me to think that they should be organized, compared and inserted in a systemic context to form solid arguments to answer to the common attitude of people: the situation is extremely bad, but no alternative is possible. My hypothesis was that, perhaps, Milano simply missed the cultural wave other European cities undertook to improve their appeal and sustainability and did not look for a developmental alternative that could improve both mobility and city appreciation at different scales (inner city, connection among urban areas, exchanges with the other communities of the metropolitan structure).

This work should therefore become the occasion to evaluate the solutions proposed in other contexts to deal with urban development problems and to identify what are the requisites for their effective implementation. For instance, is it real-

izable the hypothesis to favor the slow-speed, active mobility resources (walking and cycling) as suitable means for reshaping the metropolitan transportation culture? Is it meaningful to link this transportation opportunity to the recovery and valorization of urban water and waterfronts? Could this solution restore Milano's peculiar past of "aquatic-city" and offer specific architectural identity to this diffuse and blurred agglomerate? Is it feasible, useful, and fair to propose a urban development for Milano for which the channels cease to be a hinder to pass over for becoming an attractive place to walk and live along? How to motivate people to use the paths along the channels for walking, cycling and experiencing the pleasure of the water in its vicinity, substituting this mobility and life approach to the one based on cars? What are the brave political decisions about mobility infrastructures that can support people in their transportation choice? Surprisingly, during the work I discovered another and completely different issue that emerged during my analysis. It has ethical relevance and anticipates all the questions related to urbanism, namely is it fair to impose an urban structure and the life conditions that the first favors? And if yes, what planning and by what means? I tried to argument my answer according to the documents that describe the historical development of the discipline and that contributed to bring me to the positive confidence that, yes, we need –as a society- planning and that we would benefit from a more participative one.

The main bibliographic reference I used for the historical analysis of city planning is the book "Cities of Tomorrow" [Hall, 2002] which efficiently correlates the approaches of the key stakeholders with the cultural and political conditions of their age. I reported also some secondary citations -always explicitly indicated for what they are- as part of my personal contribution in the sense that I selected Hall's passages to make them my personal interpretation of his view. Sir Peter Hall, author of more than 150 publications and professor of City and Regional Planning [http://en.wikipedia.org/wiki/Peter_Hall_urbanist, 2013], is considered "the foremost geographer and planner of his generation" [The Guardian, 2007] and a convinced supporter of the idea that urban planning is more than simple design or administrative implementation of schematic rules, but rather the art of

providing a city with the necessary theoretical frame to develop a long-term sustainable transport, social, and economic integrated policy. This approach is in strong opposition to the anti-planning policies (either ideologically supported, as in the case of UK and USA, or just the consequence of a passive laissez-fair mentality which prevented the adoption of long-sighted land use and urban planning, as in Italy) and urged me to analyse the social and environmental consequences of the different approaches applied to city development. More generally, I was influenced by Hall's view and methodology according to which Urbanism is a highly multidisciplinary field. Indeed, any absolutely specialized background might be dangerous for reliable urbanism because, if the implementation is technical, the strategic view must remain driven by cultural perspectives. As he explicitly stated: "it is not necessary to be an architect to become an urbanist" [Paquot, 2000], and I'm not. Consequently, my intention has been that of developing the work theses by using a methodology that considered Hall's lessons mixing subjects which do not belong to classical urban development background but whose relevance emerged by the planning praxis of many local administrations.

Finally, the collected material confirmed the initial intuition that bicycle can play a critical role in the present "urban revolution" and, hopefully, will help in understanding why and how bicycle will be able to influence the city structural and functional reshaping.

2. Introduction

Milano is located in Lombardy (northern Italy) and is the capital of the largest metropolitan area in Italy with more than 3 million of citizens. It represents the third-largest economy among European cities and knows problems similar to those of several other large cities worldwide: traffic congestion and consequent pollution due to the prevalence of a transport mode based on private automobile, loss of environmental resources and urban identity due to sprawling at regional level, social segregation and unequal access to resources for the population. The "Great Milano" is paradigmatic of a kind of urban development in which the original dense structure of the city was progressively diluted during its transition into a metropolitan area. The original compact form was denaturalized when the city growth was dictated to second the motorized transport mode, starting with the covering of the channels [Franchi and Chiumeo, 1972]. The present result is an extended low density suburb region. On the one hand, proposals suitable for solving Milano problems would result meaningful to other urban contexts as well, such as historically evolved European cities which need to adapt to a post-industrial condition. On the other hand, the specificity of Milano in the European context is being a metropole of a country in which there is no spread culture of public participation into decisional processes and a planning prospective which considers active transport mode as a crucial player in the mobility policy is –apart from very few exceptions- neglected [Benevolo, 2012; Urbanpromo Green, 2017]. At national level, there are no real transport and urban public space use policies with the ambition of dictate future models and aims [Benevolo, 2012]. Consequently, also public awareness for the implications that urban development choices, or lack of them, will imply for the development of Italian cities is rather limited. The interconnection between city form, transport policy, and sustainability is overflown and Urban and Region planning are neither part of the political agenda nor of public cultural debate in Italy [Morello, 2002, p. 9; Benevolo, 2012, Pasqui, 2017]. In agreement with the analyses of the above authors, personally I never met in Italy interlocutors who thought over or were keen to know about theory and practice of city development and its implications for daily concerns

such as commuting time and costs, pollution, social cohesion. In the case of Milano, there are recurrent emergencies that are related to city structure, such as air pollution, missing shelters for refugees, recurrent water flooding, marginalization of specific communities [Milanotoday, 2015; Leggo, 2015; De Vito, 2016; Vice News, 2016], followed by extemporary actions. What is missing is a systematic approach for removing the structural causes eliciting the emergencies and a general discussion about the long-term objectives. In this perspective, it becomes apparent that any proposal for reshaping such an urban context cannot be limited to technical aspects but must deal with cultural factors as well because these guide the society perception of the reality, as it is and as it could be.

2.1 Aims and Methodology

To approach the problem, I considered that a **comparative analysis** of what other cities already experimented would have helped in identifying both the social-economic-cultural context and the technical factors, including the pre-existing urban form, that enabled to update their city fabric. By such a comparison between successful projects and others which failed, I expected to overcome the simple description of the present reality and to identify heuristic alternatives based on validated experiences. For instance, other cities recognized earlier the necessity to modify their growth model and that a pivotal role would be played by a new concept for transport policy. They first defined and then tried to solve the problem of building sustainable urban structures and attributed increasing importance to **active mobility** ("the form of transport of people and sometimes goods that only uses the physical activity of the human being for the locomotion", according to Wikipedia definition: https://en.wikipedia.org/wiki/Active_mobility: contact 26/10/2017) and to cycling in particular.

In this work, therefore, I collected the available information, with special attention accorded to the reasons of success or failure of their attempts to retrofit their urban space, from car-centered to active mode-based. Administration documents and theoretical argumentations proposed in different assays were critically evaluated and integrated with the experimental data published in scientific journals,

analyses published by international organizations and other associations, and even some comments reported on blogs. This process enabled to underline the different efforts placed in elaborating strategies, to understand when theoretical concepts have been effectively implemented in the praxis and why other potentially good ideas did not. The different administrations not only designed different policies, but also dissemination and communication strategies which were highly diverging. As the consequence of the heterogeneous available material, in the practice the analysis methodology was not merely comparative since the case studies resulted often **complementary** rather than overlapping. One central hypothetical element of the analysis is the role (or, as it will emerge during the surveys, the roles) attributed to bicycle as the factor around which a new city equilibrium can be built. A similar interest for studying the relation between urban space repartition and cycling mobility, and the consequence of this equation for social inclusiveness, was specific of another dissertation that appeared recently [Koglin, 2013]. In this case, the information from official documents has been integrated with interviews with persons who have been in charge of implementing urban policies as well as with citizen opinions. Nevertheless, this work limited its comparison to only the two cities of Copenhagen and Stockholm [Koglin, 2013], whereas my effort was directed to overcome a mere sectorial assay limited to the description of the characteristics of bicycle and active transport and to underline what are the multiple consequences offered by the urban reshaping addressed to favor cycling-based transport. To obtain this overview, I enlarged the data collection to several -and more differing- realities such as Amsterdam, Paris, London, Orlando, Freiburg, Oulu, Australian cities, and the emerging metropoles of the “Global South” that look for their own growth way [Keil, 2013]. Cities -as complex systems- require comprehensive answers to their interconnected problems and this implies the necessity of holistic analyses able to span the different levels which contribute to urbanity and city development. These problems and the factors relevant for their characterization emerged in the analysis of the case studies (section 3). Consequently, the Introduction has been organized as the section in which the theoretical background relative to the problems and factors (the “Key-

words") identified in section 3 is presented. Therefore, Keywords will guide the Introduction development and then will be critically reviewed in the conclusions of the Case Studies to show their mutual influence. The relationship between Introduction subjects and Case studies has been reinforced by short paragraphs (at the beginning of Introduction chapters and at the end of single city descriptions). The analysis of the problem-characterizing factors will contribute to the understanding of how an existing city, not an ideal city to build from scratch, can evolve into updated versions with the capacity to cope with constantly new challenges. In other words, the question is whether it is possible to envisage a rational approach for designing a **sustainable city growth and renewal,** what is the nature of the challenges, and what factors must be optimized for achieving such an aim:

- **Environmental and management challenges**: They refer to the growth limits of cities as complex systems with increasing monetary (direct and indirect) and ecological costs that challenge their sustainability.
- **Social and Cultural challenges**: They represent either opportunities or causes of contrast for the urban community. Aspects as different as education and employment opportunities, integration and discrimination, cultural and religious differences, social commitment, community spirit, participative democracy, develop differently under different urban contexts.
- **Aesthetic challenges**: A city must be also a pleasant place, with its peculiarities, resources, history, social milieu, capacity to display different functions and to serve as a symbolic reference, to offer space legibility and orientation.

These challenges will be introduced thematically, although already the short explanations provided above suggest that the border among categories is fuzzy. For instance, urban space organization is symbolic (it shapes the model of social interactions, designs identity patterns, is used to state a variety of ideological messages [Smith, 2007]) as well as functional (promotes or contrasts aspects such as segregation, access to jobs and education, a mobility mode with respect to others).

In an attempt of rationalizing the logic relation of the different topics, the relevant aspects have been grouped and the meaning of keywords that emerged in the

case studies (extracted from administration documents, association white papers, bloggers commenting the mobility policies, press articles,…) was explained and contextualized:

- Urban planning, decision processes, and community resources. *Keywords*: top-down & bottom-up planning approaches, market-oriented city development, segregation, discrimination, citizen participation to decisional processes, transparency, gentrification. *Challenges*: Urbanity is the result of living together, discussing, sharing, participation in common activities and decisions. Citizens' commitment in the process of urban development is highly inhomogeneous in different countries. This fact implies consequences for the process of decision, the idea implementation, and finally the life quality of the citizens. City development can either favor or reduce structure cohesion and separation between living and working areas. Physical segregation determines the failure of cultural integration and inclusiveness programs, services and opportunities are concentrated and not equally accessible
- City form. *Keywords*: city functions, attractiveness, zoning versus mixed activities, neighborhoods, dense city, sprawling, Marchetti's law, typicality, local economy, symbolic features, space legibility and orientation, health. *Challenges*: in a city there is the necessity to link form and functions, but also that of blending social and aesthetic features to make the space appealing, conferring to it the characters of urbanity and specific identity. Social integration and equal opportunities, good neighborhood and frequented streets increase the sense of safety. City aesthetic is also a statement, promotes behaviors, suggests cultural choices. Car-based economy tends to conform spaces and attitudes, decreases personal interaction, wastes public space converting it to parking slots and promotes the migration of economic activities on the outskirts where there is still space to build. This trend kills local activities, denies urbanity, and favors sedentary attitudes that are major health risk
- Mobility policy. *Keywords*: active transport modes and intermodality, bicycle track design, filtered permeability, commuting. *Challenges*: How to distribute the urban space (devoted to different transport modes, to parking, to social-

ize, to buy), to balance infrastructure depreciation, maintenance and running costs, to tune the transport volumes, to enable access to services/jobs/leisure, to facilitate individual mobility of different social groups

- Environmental issues. *Keywords*: pollution, CO_2 emission goals, ecological footprint and loss of irreplaceable resources, soil impermeabilization, costs for flooding and erosion, natural resources (green areas, water, and waterfronts) and their psychological functions. *Challenges*: Environmental burdens and development models which neglect sustainability reduce life quality and increase long-term material and immaterial costs for communities and individuals. Natural resources compensate intimate needs and help in connecting to the history of the specific place. In the case of Milano, its ancient richness was built on its water ways and their use to boost trading, industry, agriculture but also leisure

2.2 Urban planning, decision processes, and community resources

Keywords: top-down & bottom-up approaches, market-oriented city development, segregation, gentrification, transparency, community welfare, public participation, decisional processes

The idea that urban development is a discipline which needs planning for answering to its complex and interconnected technical and social problems is not universally accepted. The arguments that have been proposed for justifying the different, and often contrasting, approaches to urban development should be briefly discussed because they have practical implications and not only theoretical interest. As the examples described in this work will show, the successful implementation of innovative policies which led to a paradigmatic change of city mobility organization depended on their coordinated realization. The successful retrofitting of a city built according to the private car-based model into a city which exploits active modes integrated with public transit to improve its sustainability was the combined result of comprehensive design capacity to build *ad hoc* infrastructures plus communication activities aimed at convincing the citizens to accept a different use of the public space, to modify their behaviors, but also to

participate actively to improve the concept. According to this vision, **sustainability** is the symbolic pivot around which to conceive a new development plan. In other contexts, market-driven development is considered the gold-standard and both planning and public feed-backs are seen as mere hindrances. Planning can be also criticized for other reasons, such being dirigiste and prone to ideologies, but indeed there are many declinations which is worthy to analyze. The Case Study analysis shows that most of the cities were perfectly aware of the fact that the management of the refurbishing process was at least as important as the vision to implement by means of technical solutions. However, the tools they developed and the actual power they provided to the different actors during the decisional process was highly dissimilar. It was, therefore, necessary to recapitulate how the urban planning theory and practice evolved historically to understand why the different administrations chose some strategies or others (and why some of them were more successful than others). Furthermore, at least some cities were so foresighted and ambitious to anticipate that the redefinition of their mobility could affect not only their physical structure, but also contribute to alleviate some social problems.

2.2.1 Historical background of urban planning

Modern urban planning arose as an answer for solving the problems which large industrial cities faced after the often messy urban growth of the 19th century. The idealistic origins and the reasons of being of the planning theory aimed at identifying solutions for the improvement of the horrible life conditions of the overcrowded city slums. The social order and health problems caused by the inhabitants of London (and other large cities in Europe and North America) slums in the second part of the 19th century became a “threat to the stability of the State” and forced trying housing options that should represent a moral alternative to that situation [Neville Chamberlain, quoted in Johnson, 1968 p. 370]. New suburbs were therefore conceived to improve the overall welfare of people.

Using the countryside for solving the social danger represented by urban slums was already in the intentions of the paternalistic and authoritarian plans con-

ceived for establishing labor colonies outside inner-cities [Booth, 1892 in Hall 2002 p. 91]. An interesting, idealistic alternative to spontaneous suburb development and settlements built by people compulsory work was represented by the concept of garden cities that were intended not to be merely agreeable environments, but places in which to reconstitute a communitarian feeling among residents [Hall, 2002 pp. 93-97]. In England, the systematic elaboration of the garden city concept as a self-contained entity which uses railway to connect to the neighbor communities was achieved by Ebenezer Howard and its success was mainly due to the accurate planning of Raymond Unwin and Barry Parker who developed a peculiar informal, neo-vernacular architecture inspired from the German Middle-Age towns according to the suggestions of Camillo Sitte [Sitte, 1909 in Hall, 2002 pp. 100-110]. At least three basic aspects were very clear to Unwin: i) high density was necessary to reduce the building costs and prevent land spoiling, but good planning should also result in easy access to recreation area. As he stated in his “Nothing Gained by Overcrowding!” pamphlet [Unwin, 1912], “a proper planning scheme could give everyone much more space, without using more land”; ii) suitable design should favor optimal social relationships and, possibly, exchange between members of different classes. The realization of common rooms for social events was instrumental to reach this aim as well as the presence of protected open spaces (reminding the inner place of a farm or a narrow square among buildings) for improving the neighbor casual interactions; iii) beauty and reposefulness should be the first feelings inspired by the garden town. Unwin layout anticipated all the key-concepts of settlement design. Housings were built following a great variety of types around irregular curving streets to form playgrounds and cul-de-sacs designed to segregate the pass-through traffic, to provide safe space for children, and a meeting place for adults. It meant attention to the natural features of the space (use of hills and creeks for maximizing specificity and diversification) and avoiding boring formal standardization of housing. His design solutions enabled to reduce the amount of land needed for roads from 40%, as usual in by-law schemes, to 17% whereas gardens and open spaces raised from 17% to 55% [Unwin, 1912 in Hall p. 108]. In my opinion, the

comprehension of the relationship existing among city form, traffic, social conditions and life quality is the most crucial contributions of garden suburb planners. They first theorized and then designed solutions to discourage through traffic and to separate motor traffic from routes necessary for pedestrian/bicycle displacement, a concept later elaborated under the name of Radburn layout and the reference for countless attempts of designing ideal communities in several world countries [Garden City Movement, 2017]. In at least some of these implementation attempts, the project concept was elaborated by multi-disciplinary teams aware that the successful development of a settlement is more complex than building houses [Tuomi and Patero, 2003].

Garden cities should possess also further characteristics, namely should be self-contained, relatively small (max 30.000 people each), possibly circular and dense, separated by green belts, and capable to attract enough jobs for rendering each city independent. The underlying concept for their success was that the distances separating private, social and working places had to be kept extremely short for limiting traffic, commuting time, and for reducing the space allocated to transport infrastructures. Nevertheless, in the reality job availability was always insufficient, a reason for which it became more acceptable building garden satellites, namely settlements depending on the main town, although conceived as green oasis that should confer pleasure of living and, at least in their German declination, a sense of collective spirit. This aspect was critical for the architects who developed the neo-vernacular “Siedlungen” of Hellerau near Dresden and Margarethenhöhe, funded by Krupp in Essen with the aim of improving the industrial labor relationships [Hall, 2002 pp. 122-127], and the Trabantstädte designed using the parameters of modern architecture, such as the May’s settlements of Praunheim and Römerstadt in Frankfurt and the Berlin’s garden suburbs of Siemenstadt, Britz, and Onkel-Toms-Hütte. If a criticism can be raised to these successful experiments is that the accent to the collective spirit kept aside the opportunity to build a place shared by members of different social classes. This point was better addressed by Hilberseimer’s Mischbebaung concept in which buildings of different typologies are accommodated in the same settlement for an-

swering to the variable economic and practical needs of large families, singles, elders, rich professional and manual workers [Hilberseimer, 1963].

2.2.2 The impact of theory on reality

Personalities such as Le Corbusier succeeded in interpreting the Zeitgeist and their theoretical contributions influenced generations of architects or, as sharply summarized by Sir Peter Hall, “the evil that Le Corbusier did lives after him” [Hall, 2002 p. 219]. The orthodox Le Corbusier Modernism theorized the design of self-sufficient and specialized modules that pretended being universally suitable and adapted to any condition (for instance, the Le Corbusier’s Plan Voisin, 1925, and Ville Radieuse, 1930) without any consideration for the historical, social and even the morphological background. The efficient and mass-produced homogeneous House-machines formed by minimal Cells should simply substitute the “idea of old home of local architecture” [Le Corbusier, 1929 p. 215]. He introduced the idea of zoning by proposing a strict segregation of work-adapted blocks and areas for social activities. The spontaneous criticism to his concept is that did not consider the high transportation volumes generated by the “compulsory commuting”, the consequent higher energetic costs, the space misuse of buildings bound to remain empty for most of the time, the need of doubling the parking slots, the costs for maintaining the infrastructures, and the environmental problems caused by the traffic. This approach which systematically underestimated the transport costs plagues now most of the modern cities that, like Milano, favored a *de facto* zoning development with peripheral residential areas and office buildings concentrated downtown or in new service districts.

Lecorbusien Modernism can be identified for its claims such as the substitution of the building density specific of cities originated from Middle-Age settlements with an expanded texture in which open spaces and function-specialized aggregation areas alternate on the surface. The resulting specialized urban structure should assure to each zone the optimal conditions to perform the different economic and social activities, avoiding unhealthy overcrowding and making the traffic more fluid. At the present we know that these solutions do not work but the incapacity

of Le Corbusier to realize most of his large-scale projects was due to the lack of other planning qualities: his technocratic and anti-dialectic view impaired him to accept any criticism, to have any empathy for the social costs and he did not recognize that without dialogue it is difficult to impose radical choices.

Le Corbusier proposals were an answer to the real necessity of shaping cities capable to cope with the challenges imposed by the rapid structural changes dictated by industrialization. As it has been underlined, they represent the application of the Fordist paradigm into the planning practice [Natrasony and Alexander, 2005] in the sense that they pretended to offer a unique standardized answer to the (variable) contemporary problems related to urban development. Clearly, this objective could be pursued only assuming as acceptable the placelessness and the timelessness ("We must build on a clear site", Le Corbusier, 1929 p. 178) of the architectural discourse. Symmetry and repetition should guide the development of building units in the space with no mercy for the human factor, personal expectations, relationships between elements, and he explicitly stated the refusal of finding a historical contextualization for the proposed urban modifications. This rejection is masterfully conceptualized in the following text: La comparaison entre le chemin des ânes et le chemin des hommes est finement établie. "*L'homme marche droit parce qu'il a un but; il sait où il va. Il a décidé d'aller quelque part et il y marche droit. L'âne zigzague, l'homme régit son sentiment par la raison. L'âne ne pense à rien. L'âne a tracé toutes les villes du Continent: La rue courbe est le chemin des ânes, la rue droite, le chemin des hommes*» [Conrardy, 1924]. The models are merely abstract and are considered suitable for any "nation and climate", with an obsession for (magic and irrational) ratios among proportions, an irritating mystic approach for a method that claimed being rational. Only in his late years Le Corbusier recognized at least the necessity to consider some elements relative to the topography and the orientation as crucial for effective planning. Otherwise, as pointed out by Ley [1989], modernist planners aimed at "building spaces, not places" with the consequences that "the casual suburban visitor would have a hard time deciphering wherever he was" [Moe and Wilkie,

1997] because he landed in an “everywhere community” [Calthorpe and Fulton, 2001]. It is astonishing that such a radical view could gain hegemony considering the existence of alternative thoughts that –in the same period- went in a completely opposite direction. In his reference work, Hall dedicates large space to the Regional Planning movement inspired by Patrick Geddes that explicitly underlined the relevance of the historical and geographical background for a meaningful planning. The Survey before Plan approach claims that “planning must start with a survey of the resources of such a natural region, of the human responses to it, and of the resulting complexities of the cultural landscape” because each region is an “active, experienced environment” that elaborated its own practical and social solutions to the local resources [in Hall, 2002 pp. 146-150]. Geddes’ legacy was openly acknowledged by London planner Patrick Abercrombie who noticed in 1927 how the intellectual complexity of planning made evident by Geddes was too challenging for a discipline that was sliding into an administrative machine: “Shake-up in a bottle the German town-extension plan, the Parisian Boulevard, the English Garden Village to produce a mechanical mixture which might be applied indiscriminately and beneficently to every town in this country: thus it would be “town-planned” according to the most up-to-date notions” [quoted in Meller, 1990 p. 157]. Being justified in skipping the painful confrontation with the territorial specificities could be one of the reasons for which lazy administrators and impatient businessmen followed enthusiastically Le Corbusier’s flute.

This mystic for abstract formulae, rigid geometry (“The city of today is dying because it is not constructed geometrically” [Le Corbusier, 1929 p. 178]), uniformity, symmetry, repetition (a typical necrophiliac profile, according to Erich Fromm socio-psychological classification), the systematic social segregation introduced in his planning, and the autocratic conception of being part of an absolute elite who must impose its projects to the mass because it is the exclusive owner of the unique knowledge has been a constant of Le Corbusier and tells more about his leaning towards Nazi ideology than his explicit politic supportive comments for

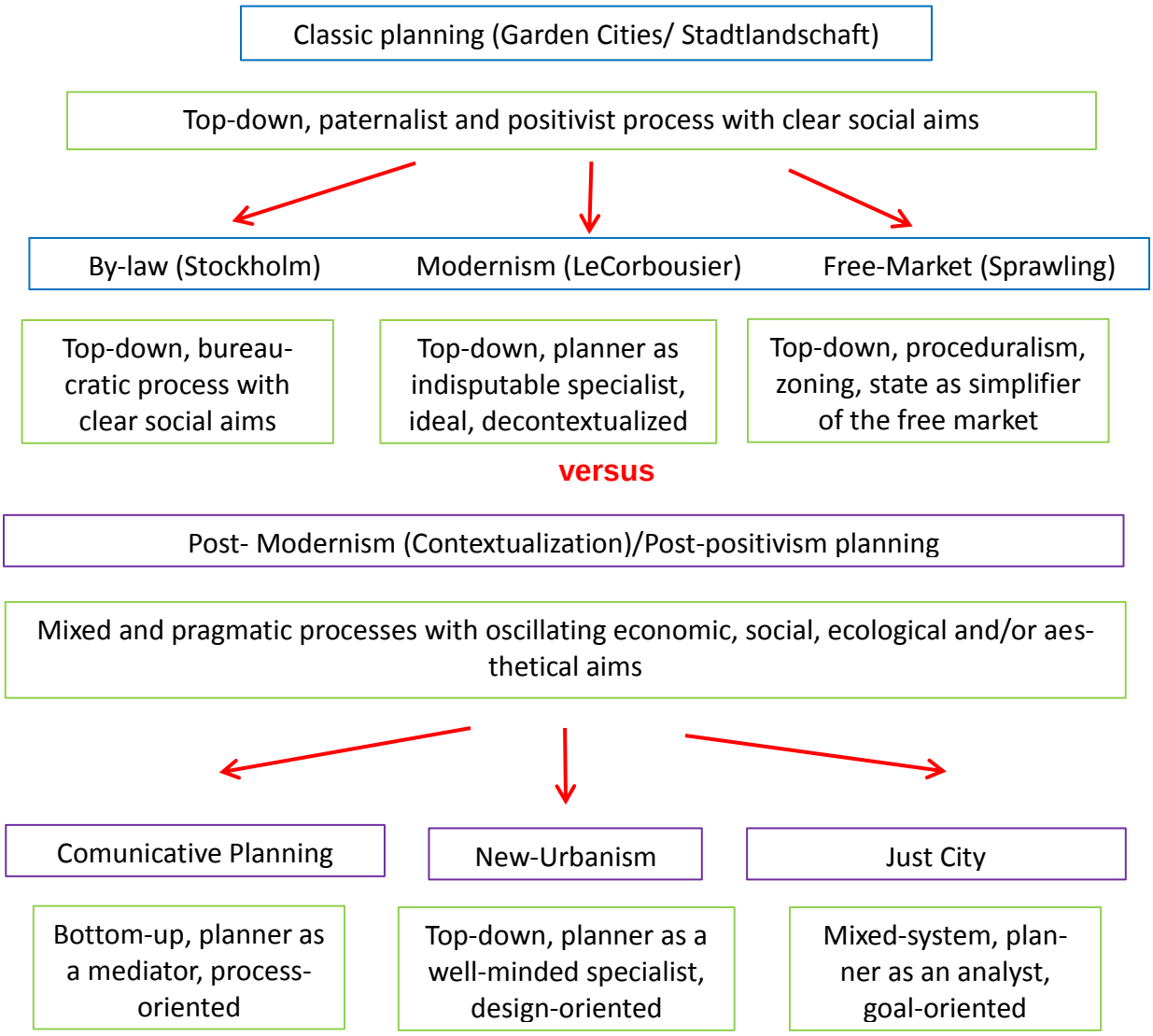
autocratic solutions [Le Point, 2005]. It is surprising to observe how this elitist anti-democratic approach has hegemonically shaped the urban planning praxis in Western (Democratic) Countries, a detail that questions the relationship between citizens' and economic groups' effective power balance in these societies. The strategy used to subtract the supervision of the public space from the public opinion to confer it to profit-oriented groups has been astonishingly simple: the urban fabric is declared a mere matter of applied science and not a political issue. With the argument that planning is a technical problem and that only professional specialists possess the specific competences and the objectivity necessary to interpret it ("The design of cities is too important to be left to the citizens" and "once plans are formulated by experts"…"who understand the science of urbanism"…"they must be implemented without opposition", Le Corbusier, quoted in Hall, 2002 pp. 222 and 225), the citizens have been set aside from the decisional process. In parallel, the city ceased to be considered an organism with its relationships with the territory and in which different activities grew together and interconnected for becoming an abiotic entity suffering of a list of limiting technical factors. These were dealt with separately, denying the need of any holistic approach. Whereas work, home, marketplace and social life were separated into exclusive zones, planning was presented as a neutral and exclusive event instead of a process in which opinions should be compared. The trivialized development of Lecorbusian modernism is an urbanism in which planners follow codes and restrict their interest to a technical process of land-use planning that is presented as apolitical. This sort of mechanistic planning was suggested being fair, neutral, and obviously objective (the result of the specialist analysis), and urban development ceased to be "as an always unfinished social project" asking for constant efforts for "organizing hope, negotiating fears and mediating memories" [Sondercock, 1998], namely a place in which humans need more than synchronized traffic lights. There were strong economic reasons for delegating planning to few specialists with the excuse that they are better suited for performing some calculations rather than promoting a participative activity. The consequences of this ideological choice in favor to technocracy can be exemplified by the analysis

of the transport policy of the city of Surrey (Canada). “Since each department works independently trying to solve its problems without correlating them with a general plan, engineers just looked at projected traffic trends and designed infrastructures in an attempt to accommodate them considering highways and cars only, while ignoring community design and public transit” [Nastrasony and Alexander, 2005]. The lack of an overall urban design conceived before starting the infrastructure building made necessary successive “rescue actions”. Traffic congestion and parking problems in the inner city prompted constructing further infrastructure and the transfer of commercial and administrative activities on the outskirts. In turn, this solution created other shortcomings, such as the dependence on cars for shopping and the death of the inner city economy and social life because of the growth of large malls in the suburbs. “Streets became conduits for cars and not for people” [Nastrasony and Alexander, 2005]. All this happened without any process addressed to asking the citizens’ preferences, a procedure often experienced worldwide by other citizens, as the ones of Milano. Are there possible alternative approaches?

2.2.3 Top-down and bottom-up approaches: conjugating planning and democracy

As we have seen, the initial idea of modern urban planning was daughter of the Positivism and has some characters of well-meaning Paternalism. Nevertheless, it was acknowledged for its social relevance, a character that was progressively lost to become an ethically neutral, technical-oriented toolbox.

Figure 1. Scheme of different planning approaches



Planning (Fig. 1) performed observing by-law prescriptions was no spectacular, sometime misconducted, but guaranteed minimal living standards to lower incomes. Hall recalls that "down to the mid-1960th, the prevailing ethos –shared by planner and planned alike- was that comprehensive development of large areas was a thoroughly good thing: it swept away old and outmoded buildings, it aided circulation and could be used to separate pedestrian from traffic" [Hall, 2002 p. 286]. This global planning "improved the city, providing new facilities, open space, new housing" but "almost overnight this became a bad thing" [Christensen, 1979 p. 287]. For a long part of the past century, decisions were mostly **top-**

down, namely decided by specialists and imposed to the community rather than the result of a bargain between different social entities. It was the period in which the practice shifted from the theory OF planning (understanding the very nature of a discipline that must translate expectations into housing) to the theory IN planning (practical techniques and methodologies of a degenerated regulatory machine) [Hall, 2002] and the admission that urban planning was a mere matter of technological savoir-faire rather than a political and cultural issue. Only in few but remarkable cases, effective lobbying performed by organized citizens succeeded in obtaining substantial ameliorations of initial plans, as for the initiative headed by Jane Jacobs against Moses' development plans in West Greenwich Village during the '50s [Gopnik, 2016]. However, their success should not obscure that, in the absence of an intellectual leadership, low-income dwellers in the norm could nothing to stop their replacement. Once freed from its social responsibilities, planning evolved into an instrument useful to implement group interests rather than the **community welfare**. As a general rule, better educated and economic stronger groups can understand the situation and defend their interests better than poor and ignorant communities. This participative power is ambivalent, since it is a tool which can be used for ''purposes both progressive and reactionary'' [Coit, 1984]. Organized groups can impose their own interests over the general advantage. English-speaking people use the term NIMBY: Not In My BackYard to define groups that support initiatives that wish to be applied only to somebody else to preserve their own advantages (the last arrived in a new development opposes to new developments [Mitchell, 2001]) instead of been conjugated to the concept of social equity. In the States, zoning was used to promote exclusion by giving localities the power to endorse laws that were "surrogate for physical walls" [Haar, 1996 in Hall 2002 p. 423]. The New Jersey Supreme Court decision of 1983 [Haar, 1996 in Hall, 2002 p. 423] that stopped exclusionary zoning was a statalist act against local rights, but preserved the right of local minorities against the abuse of the economic majority. At the present many modern democracies experience a growing alienation between society and political decision-makers. Citizens have developed a deep distrust for poli-

tic and economic elites as well as expert knowledge and see large-scale projects, such urban reshaping, as the accomplishment of the interests of few privileged people rather than objectives to reach for the common good. One form of reaction is the rejection of choices that pass –or are perceived as passing- above their heads and demand more **transparency** and co-determination with planning measures. The danger of a paralysis of any innovative urban reshaping is real, as pointed out by the assay “Participation: The New Tyranny?” [Cooke and Kothari, 2001] but removing the reasons of hostile public acceptance to large projects is not trivial. Urban projects may be delayed for years due to objections of concerned citizens and protest movements such as the one against the rail station-project Stuttgart21. These facts illustrate the failure of top-down planning models which require only a formal **public participation** but prevent its real possibility to influence the final decision by presenting projects only at a very late stage of their development. Informal procedures of participative governance [Sandercock, 1998] (**bottom-up participatory planning**) have been postulated as necessary to overcome the distrust towards institutions and implement shared decisions. Friesecke [2011] underlines that “public participation means the opening of political processes for a public contribution” of citizens and institutionalized organizations such as unions, associations, and possibly including disadvantaged groups for collectively identifying a solution or rather implementing it cooperatively. This “culture of cooperation and dialogue” can be promoted by a range of procedure variants [reviewed in Friesecke, 2011], despite the fact that every single situation has its specific conditions. As illustrated by case analyses [Davies et al., 2012], the expected public contribution can be extremely different in terms of content and forms to express it. Nevertheless, successful processes should respect some rules. First of all, public participation should be anticipated early enough to influence as many basic conditions as possible and it should be clearly established how the results will be incorporated into the executive plan. The public process output must be disseminated accurately to maximize transparency and consensus measures immediately implemented. Legitimization of urban projects is therefore feasible by means of alternative governance ap-

proaches in which the citizen requests, rights, but also duties and responsibilities are considered from the beginning of the procedure. As stated in the UN document SD21, “there is no one top-down solution to urban sustainability but a wealth of bottom-up approaches instead” [Taipale, 2012]. The example of the Stuttgart21 project exemplifies the complexity of this dialectic. Decision makers tried to sell a crucial town remodeling as a mere administrative issue and their initial refusal to open communication raised the suspicions about meaning and means of the action. Citizens often used ethical arguments but their fight was ambiguous because part of them aimed at preserving privileges and had a conservative attitude towards any form of urban development. Nevertheless, the largely followed open debate organized to identify shared decisions remains an important example of how a democratic process regarding the space design should be undertaken.

This modality is historically very recent in most of the countries. In Italy there has been no attempt to build a public legitimation of **decisional processes** to create a consensus on major infrastructure projects, such as the high-velocity train connection Torino-Lyon or the environmental recovery of Taranto’s ILVA steelworks. Similarly, the top-down tradition and the cultural inadequacy to participative governance could strongly condition also the implementation of any project designed to transform the mobility model of large cities from automotive to active mode-based. Therefore, comparing communicative experiences from different cities is instrumental for understanding why some solutions were rejected whereas others succeeded, and in conceiving new publically accountable urban upgrading.

A key role in the paradigmatic change from top-down to bottom-up perspective in urban planning was played by the Community Architecture movement. According to Rod Hackney, one of the most representative inspirer of this movement, “Community Architecture means attempting to understand the needs of a small group of residents and then working with them and under their instructions and guidance, in order to articulate their case and present it to the various organizations that hold either the purse strings or the approval/rejection powers” [Wates, 1982 in Hall 2002 p.291]. The accent was on the anarchist, self-organized collec-

tive spirit and the practice is preferentially oriented to rehabilitation rather than demolition and replacement. The reasons for this radical approach were the technocratic top-down attitude of Modernism that ignored the social and political questions related to urban planning [Fainstein, 2000] on the one hand and the neoliberalism practice on the other. The **market-oriented urban rehabilitation** mostly resulted in a dramatic change of the estate value and indirectly promoted the silent exchange of inhabitants known as **gentrification** with its high toll of social costs. Gentrification is defined as the process by which a renewal program of deteriorated neighborhoods results in a resident substitution, with more affluent people taking the place of the former low-income inhabitants instead of improving the living conditions of the original community. As a result, poor people concentrated in always more isolated and neglected areas because they could afford neither renovated brownstone downtown buildings nor middle-class subdivisions in the suburbs [Mitchell, 2001; Hall, 2002 p. 394]. In the US, the Urban Renewal program started as a project for the requalification of blight areas and the creation of public housing, but political and economic interests turned it out rapidly in a means for commercial redevelopment displacing low-income, principally black and Hispanic families and replacing them with middle-class housing or offices. Gentrification seems the logic result of urban valorization programs in which the public sector prefers limiting its activity to the exclusive facilitatory role for market-driven speculative initiatives instead of leading the transformation. It represents the failure of the policy made for the collective interests, led to **segregation** and to the exclusive advantage for few groups of interest. “A working-class shop or housing block could be destroyed by other things as a bulldozer….The local baker’s becomes a professional studio, the cheap café a chic restaurant, the dartboard is removed from the pub and gradually many more gins and tonics are sold” as has been resumed after the Covent Garden requalification [Anson, 1981 in Hall 2002 p. 287]. Notably, in the UK speculative requalification projects were supported by right-wing governments in a campaign against normative planning that was depicted as a socialist bureaucratic routine producing boring and problematic settlements. In this context, advocacy planners re-

questing bottom-up forms of design became more and more mediators between different social and economic interests, had to prevent conflicts, be focused on communication and assumed political attributes rather than technical with the risk, once again, to appear manipulators [Hall, 2002 p. 285]. Furthermore, planner intrusions extended so much and thinly over a wide spectrum of competences that the professional meaning of planning was openly questioned: “If planning is everything, maybe it is nothing” [Wildavsky, 1973]. The radical theoretical view arrived to consider the complete abrogation of state-oriented collective solutions to problems and claimed direct democracy based on localism, voluntarism and informal communication means intended to overcome the rational discursive argumentation that was perceived as discriminatory [Sandercock, 1998; Young, 2001]. This solution showed to be not implementable and was strongly criticized as essentially post-positivist and ignoring scientific justifications [Fainstein, 2000], but significantly contributed to discredit the idea of centralized planning coordination. As a result, it objectively jointed the forces with right-wing anti-statist elements promoting the so-called New Proceduralism and whose efforts aimed at reducing planning to a codified and bureaucratized activity simply instrumental to support a development led by the free market forces [Hall, 2002 pp. 240-245]. The public rejection for institutions we experience nowadays may therefore explain the fortune of New Urbanism, an approach in which “the substance of plans is more relevant than the method of achieving them” and “is perhaps more ideology than theory” promoted “primarily by architects and journalists...with no fear to play the role of persuasive salespersons for a particular point of view”, namely that of “an unrealistic environmental determinism” [Fainstein, 2000] in which “spatial forms are privileged over social processes” [Harvey, 1997]. The weakest point of New Urbanism is associated with its distrust towards institutional planning. Consequently, it relies on the private developers for the realization of its projects and consequently these present segregation and homogeneity features similar to those of merely speculative investments. The Just City alternative, in contrast, identifies the necessity of the public intervention to support the development of really socially mixed settlements by subsidizing house price [Fainstein,

2000]. The role of the citizens is to influence public institutions by analyzing, controlling, and criticizing their activities. It should be a form of "democratically controlled" top-down approach in which the citizens assess the process by evaluating the results. Summarizing, urban planning possesses at the same time the immaterial capacity of delivering cultural information and the material power of influencing the group interactions by modifying the urban structure. Groups of different social origin can be separated more strictly or induced to share spaces, as conceptualized in the Hilberseimer's Mischbebauung projects and discussed by Sachs-Pfeifer who indicated in the complexity of mixed (dense) cities the opportunity to satisfy different needs in the same places [Sachs-Pfeifer, 1988]. Therefore, (Just) planning can also be a political means to give an opportunity to whom, in a pure market context, has too low income to choose how and where to live [Clawson, 1971 Hall, 2002 p. 330]. Of course it can also become the authoritarian instrument to kick him out, once and forever.

On the opposite site, planning is matter of interests hidden behind ideology. "It is not about nature or scientific ecology; it is about environmentalism, about one – recently born – **dirigiste** and collectivistic ideology, which goes against freedom and free markets" (from the blog of Fred, "a conservative Canadian", http://www.climatedepot.com/ contact 11/7/2014). The statement is not about planning, but mirrors a general ideological perspective which has implications also for planning. It clearly shows a political perspective that pervades any aspects of daily life: there is absolutely no need for regulation. Or, even worse, regulation is unmoral because it limits personal freedom. A pretty simplified ideology ("less government, more freedom", "no taxes", "controls impairs economy") that does not even consider the old liberal principle that somebody freedom finishes when it prevents somebody else. This spread position matters for planning as well, because planning has to do with regulation and the prejudices that regulation raises in ultra-liberalist societies. "Our criticism is directed (towards)….planning against competition – the planning that is to be substituted for competition" [von Hayek, 1944, in Hall 2002 p. 378, but it could be our blogger Fred]. This background leads to perceive (any) planning as the evil and the ene-

my of the healthy market forces. Consequently, governments sharing that ideology, such those led by Ms. Thatcher, systematically cancelled planning institutions and favored the closure of planning schools declaring that there was no longer the need for strategic planning [McCann and Ward, 2011]. Land use should be treated just as any other production factor of the capitalistic society and, indeed, a speculative item that can produce huge revenues: the aim was encouraging growth at almost any cost. In this optic, planning must be deprived of social-political contents and reduced to mere administrative land-use affair. The public hand should remain aside, favor private developing by providing infrastructures, avoid claiming for clear requital, just hope in leverage, namely the generation of larger private investments with respect to public expenses.

Historically, planning was the "socially-necessary response to the self-disorganizing tendencies of privatized capitalist social and property relations as these appeared in urban space. In particular, it seeks to guarantee collective provision of necessary infrastructure and certain basic urban services" although "it solves one problem by creating another" [Dear and Scott, 1981] because it alone "cannot remove the contradiction between private accumulation and collective action" [Scott and Roweis, 1977] in the absence of a clear political reinterpretation of the space and of the production modes. However and although critical planning theory "cannot hope to divert the course of capitalist evolution by more than a millimeter or a millisecond" [Hall, 2002 p. 371], its contribution can result meaningful at both practical and ethical levels. It is "pragmatic with vision – to reveal true alternatives, to correct false expectations, to counter cynicism, to foster inquiry, to spread political responsibility, engagement, action. Critical planning practice, technically skilled and politically sensitive, is an organizing and democratizing practice" [Forester, 1980].

2.3 City Form and Mobility

Keywords: city functions, attractiveness, zoning versus mixed activity, neighborhoods and safety feeling, dense city, sprawling, Marchetti's constant, urban intensity, typicality, inclusiveness, social discrimination, cultural integration, access

to resources, local economy, symbolic features, space legibility and orientation, health, active transport modes, intermodality, pollution, CO_2 emissions, ecological footprint and loss of irreplaceable resources, impermeabilized/impervious soil, runoff, flooding and erosion, environment and its psychological functions

Anthropological studies, historical political decisions, analysis of philosophers and religious leaders belonging to different cultures witness the widespread awareness that the city form shapes the forms of the urban life. When some European pioneer cities started in the ‘70ies of the last century to think to their long-term future, they realized that their physical growth could not be infinite. Alternative visions concerning space use and mobility were necessary to maintain the city economically fit, socially cohesive, appealing and safe. The plans to reconvert automotive-based cities into communities in which active transport and intermodality could improve life quality needed technical solutions (bicycle path design, filtered permeability), theoretical background (comparative analysis of dense and sprawling cities, Marchetti’s constant), and clear objectives (preservation of space specificities and legibility, Vision Zero). However, they needed also the support of “soft competences” which helped to understand cultural (the symbolism of both architectural elements and objects, the ideology of cycler tribes) social (the relevance of religion, sex, age, education for mobility choice and accessibility) and health aspects. City structure and development can impact dramatically both quantitative and qualitative parameters of the territory. While some of these parameters can be easily measured, the attempt to assess in a quantifiable manner the contribution of goods such as urban parks, forests and meadows to hydrological stability, ecological sustainability and leisure opportunities [Dumanski and Pieri, 2000; Lambin et al., 2000; Jansen, 2001] is difficult because landscapes possess qualitative values difficult to be assessed objectively. For instance, aesthetic and emotional impacts depend on the perceptive faculties of the beholder [Mainig, 1976; Ulrich, 1979; Orians, 1980; Zube and Pitt, 1981; Nohl, 1988; Lothian, 1999; Daniel, 2001] namely his cultural and psychologic specificities which differ significantly in the overall population [Bell, 1999; Masuda

et al., 2008; Tveit, 2009; Ode et al., 2009; Sklenicka and Molnarova, 2010]. These values mutate during history [Dinnebier, 2000] and new requirements substitute the previous ones. Here it will be reported a list of significant factors that exert an impact on the urban environment. A brief explanation of their relevance will help to remind that transport mode has an impact on the environment and this is the summation of many variables which is worthy to know. Urban planning reacted relatively late and slowly to environmental issues and the current news such as the threat of blocking the access of city centers to motorized vehicles evidence how shortsighted policy operated specially at national level. However, some local administrations were able to recognize and anticipate the problem, limiting its impact although local initiatives are often insufficient to cope with regional issues. The major environmental factors relevant for urban sustainability needed at least a brief description to allow understanding the reasons for some city choices in terms of public space distribution. This chapter will discuss the theoretical background of the factors that cities explicitly or implicitly exploited to formulate their plans for urban upgrading with the aim to influence positively the activities and life quality of their citizens.

2.3.1 Factors which control city growth

Historically, the development of settlements into larger urban centers was the result of the specific topographical, social and economic mix which drove their evolution. The constrains of a physical space are modified progressively during the historical development of a city till that they are not anymore recognizable, sacrificed to the functional development, as analyzed by Voggenhuber in the case of Salzburg [1988]. The original landscape finishes for being transformed in a human-featured cultural entity [Rossi, 1998]. Milano waterways have the characteristics of built elements that become permanent elements of the urban landscape. This growth process is usually regulated by successive plans aiming at optimizing the space use for military and civil goals, providing better access to commodities, and inserting **symbolic features** (such as religious and civil monumental buildings, but also space distribution and accessibility to resources) as

visible elements of the ideology on which that society was based [Smith, 2007]. The inner urban organization automatically established social relationships.

The automatic and unlimited growth guided by the “invisible hand” of the market, as it is the case in many contemporary cities [Unitas Consultancy, 2015], was largely unknown. One major technical reason explaining the preference for dense cities instead of uncontrolled growth has been analyzed by Marchetti who demonstrated the existence of a constant which establishes the maximal dimension of a settlement. The **Marchetti’s constant** corresponds to the “travel time and cost budget” that people accept to allocate for daily commuting trips necessary to reach their work places [Marchetti, 1994; Ausubel et al., 1998]. The Marchetti’s constant has been conceived considering the previous studies performed by Zahavi [1976; 1981] and was confirmed later by Schafer and Victor [1997] who identified that the average travel time (1 hour) stays approximately constant under any historical and economic condition. Clearly, the technology development of the transport means enabled to enlarge progressively the limits of towns because longer distances were compensated by faster transport modes. Moving from walking to car mobility means the possibility to pass from a town of 2.5 Km of radius (20 Km^2) to a city of 20 Km of radius (1200 Km^2). Of course, these values are theoretical and do not consider bottlenecks such as traffic congestion. Therefore, extremely large cities built according to a model based on the automotive transport mode tend to be extremely vulnerable –and expensive to maintain- because they can assure the Marchetti’s mobility budget only under conditions that are more and more challenged by progressive sprawling, lack of transport alternatives, and shrinking of useful space [Lipman, 2006]. “One-hour cities” depending on cars for person mobility finish, therefore, imposing an actual higher contribution in terms of time and cost budget to their citizens because of structural inefficiencies [Newman, 2004]. These conclusions seem to be supported by the fate of historical examples of low-density agrarian cities, sort of edgeless cities corresponding to the modern megalopolis, from lowland Mesoamerica, Sri Lanka, and South East Asia, with the Great Angkor measuring 1000 Km^2 (as a reference, the imperial Rome and Constantinople had a surface of 20 Km^2) [Ev-

ans et al., 2007]. Angkor had at the time of its maximal expansion (XV century CE) a population density estimated at 10 p/ha, namely almost 10 times lower than the largest European towns of the same age that had a surface of 10-15 Km^2 [Fletcher, 2009] but the same density of the present Greater New York. All these agrarian-based low-density large settlements share the characteristic of having been vulnerable to some combinations of social and ecological factors and knew a process of sudden collapse –independent on external factors- that brought to the demise of their core areas [Fletcher, 2009]. Low-density urban development seems to reach a limit for which the costs for maintaining the complex and widespread infrastructures necessary to the life of the agglomerate result unsustainable. Although not thoroughly investigated, it seems that low-density settlement becomes "increasingly transient and fragile the larger [it] becomes" [Fletcher, 2009]. This analysis confirms the importance of Marchetti's constant and represents another argument against contemporary sprawling.

Marchetti's constant should be therefore considered to design any transport strategy. In the case of a model integrating active modes in the global transport policy, it means providing infrastructures with characteristics compatible for achieving the planned speeds, the removal of bottlenecks, and conceiving reliable solutions for **intermodality**. Intermodality (also called intermodal passenger transport or mixed-mode commuting) is a transport modality which involves using two or more modes of transportation in a journey [https://en.wikipedia.org/wiki/Intermodal_passenger_transport]. As underlined in the Wikipedia description, the aim of mixed-mode commuting is "to reduce dependence on the automobile as the major mode of ground transportation and increase use of public transport". By combining the strengths of various transportation options, such as the train for long-distance displacements and active modes for first and last Kilometers, it has the possibility of making cycling attractive, namely time-efficient, also for peripheral areas.

Marchetti's constant seems being related to further quantitative parameters useful for rational urban design such as the **urban intensity**, namely the sum of residents plus jobs in a given area [Newman and Kenworthy, 2006]. When this value

is above 35/ha, both the use of private automobile and the energetic costs for transportation start decreasing significantly. Data from North American and European cities appear very homogeneous, not biased by cultural or economic backgrounds, but strictly dependent on the most suitable mobility alternative offered to the citizens [Naess, 1993; Holtzclaw et al., 2002]. Effective planning would be obtained, therefore, by a design capable of maintaining sufficient amenities (services, recreation areas, shopping) in an area dense in terms of job opportunities and inhabitants. In other words, when as many as possible **city functions** are present in the same area, its **attractiveness** increases and transport issues diminish. A condition typical of a **dense city** stimulates **active transport modes** (walking and cycling) and keeps rentable public transit because the reduced distances discourage car use. “You need density to support public transit” [Newman and Kenworthy, 2006] as well as density is necessary to support **local economy**, a condition rarely reached in dilute suburban sprawling. In such an urban structural situation, policies that further favor active transport and transit accessibility and discourage car use can be implemented more easily because the physical conditions for this alternative already exist. The empirically determined urban intensity of 35/ha is compatible with the development of a polycentric urban region constituted of several satellite, largely self-sufficient towns with a defined center built around a transit station and direct connection with the main city center, a model strongly reminding the Stockholm historical concept and recently proposed for Sidney [Newman and Kenworthy, 2006]. Crossing these data with those summarizing the absolute preference among urban inhabitants for bicycle to travel distances shorter than 8 Km [Bakker et al., 2011], we arrive to the indication that keeping moderately dense cities of 10-15 Km of diameter would be a rational and feasible alternative to low-density sprawling for implementing a transport scheme in which active modes are integrated by public transit. This dimension would respect the Marchetti Constant [Marchetti, 1994] better than car-based urban agglomerates with a diameter of 50 to 60 Km which constantly suffers from sub-optimal viability conditions with consequent increasing commuting time. This increases until it is perceived as inacceptable and transport

becomes a political issue [Newman and Kenworthy, 2006]. In the praxis, although our modes of transport sped up leading to the acceleration of time and the contraction of space by a ratio of 1 to 60 since the 18th century [Rosa, 2010], the structural bottlenecks did not allow to expand functional city surfaces more than 10 times. This observation indicates that there is a limit to the expansion and suggests that public space used for transport should be reconverted for favoring more efficient modes. The investment in infrastructure for cars did not save travel time but it rather induced in travelling longer distances [Metz, 2008], namely to expand the city dimensions according to the "theoretical" Marchetti's constant. Finally, this policy resulted in even more congestion since the increased rate of private transport finishes for damaging also the public transit (Downs-Thomson paradox in the "Iron Law of Congestion"). This experimentally proved result has been explained by considering that the increased road availability promotes more traffic according to the principle of induced demand [Duranton and Turner, 2011] with the consequence that congestion is only shifted to other junctions: *traffic expands to meet the available road space* (**Lewis–Mogridge position:** Mogridge, 1990). As a consequence, accessibility is reduced by increased private automotive transport instead of being facilitated. To overcome this limitation, alternatives have been searched both at the level of transport modes (actions to favor active modes which save public space) and city design conceived for obtaining "denser catchment areas of trips rather than by increasing the size of the catchment areas" [Crozet, 2012]. Apart from infrastructure capacity, it has been suggested that car-induced traffic congestion has to do also with driver psychology since the summation of a large number of flaws in driving behavior has a major impact on congestion [Vanderbilt, 2008]. The trend towards the use of automated vehicles has been presented as a solution to render more fluid the traffic by eliminating human mistakes. In opposite, their availability could also multiply the overall traffic volume –and consequent congestion- by boosting individual car-dependent mobility at the expense of public transit and active mobility [Markus Friedrich, quoted in Der Spiegel, 2017b]. These scenarios remain speculative, whereas examples from European cities (see next section) illustrate

that bicycle results already now more effective than motorized transport as a **utility mode** in urban context despite its minor maximal speed. A redistribution of urban space for the advantage of bicycle would further contribute to decrease pollution and to improve users' **health** because of the physical exercise. The recent development of e-bikes has the potential to widen the dimensions of cities that can be served by bicycles and to favor **inclusiveness** of weaker subjects such as elders.

There are historical reasons for which car participated to and somehow "gave shape" to the cities of the 20th century, imprinting its symbology in their form and in people mentality. Car contributed to plan life styles participating in the first "wave of acceleration" [Rosa, 2010] and Regional Planners such as Lewis Mumford and Clarence Stein considered it as one of the new technologies (together with electricity, radio, and telephone) that could alleviate the amorphous growth of overcrowded centers by allowing for long-distance dispersal of people and jobs throughout the territory in the form of an utopian regional city "in which a great variety of urban communities would be sited upon a continuous green backcloth of farms, parks, and wilderness areas" [in Hall, 2002 p. 158]. In this context "towns could cease to spread like expanding ink-stains" but could grow as independent self-contained garden cities organized in a regional plan [Geddes, 1915 in Hall, 2002 p. 154], as an alternative to inefficient "Dinosaur cities" declining to physical collapse [Stein, 1925 in Hall, 2002 p. 160]. The automobile-dependent movement freedom of the early 20th century represented the hope to "disperse population rather than to concentrate it" [as Mumford said in "The fourth migration", 1925, in Hall, 2002 p. 159] in a nation (the USA) in which the land still appeared being infinite, The same author, however, recognized few years later in "The culture of cities" [1938 in Hall, 2002 p. 322] that private internal combustion engines were the strongest allies of urban sprawling and not of ideal small communities homogeneously dispersed over the territory. Perry anticipated in the 1920s the drawback of planning cities in which the transport depended on private motorized mobility and spoke of "automobile menace" [1929 in Hall 2002 p.166]. More recently, the "old" concept of regional plan, namely a

global coordinated development for large and complex areas, has been re-proposed as the antidote to amorphous car-dependent sprawling [Calthorpe and Fulton, 2001]. According to the authors, the main reasons for more planning and consequent diversification of transport modes are not ecological or esthetical, but economic, because controlled growth enables more functional and productive use of the resources.

If the axial development was typical of the period in which urban grew along rail public transit, the increasing availability of personal cars made available a development in any direction. Benton MacKaye envisaged “townless highways” that, remaining segregated from existing urban centers and their local traffic, could connect new self-contained cities “compactly planned and limited in size” built “at definite and favorable points off the main road” [MacKaye, 1930 in Hall 2002 pp.163-164], a car-based linear alternative to the Stockholm model of semi-independent satellite towns encircling the center and served by a transit network. A highly idealized version of low density, decentralized, “townless” development aggregated around places of shared activities was also proposed by the Soviet deurbanists to improve the social quality of the personal interactions, to remove the discriminating structures typical of cities developed to serve the elites, and for promoting the development of an evenly populated country [Gentile, 2000]. This expectation seemed to be shared by those who have seen in the “extensive rather than intensive city” the possibility to prevent urban congestion: “the city of the future ought to be a harmoniously developed community of local centers and garden cities in which the need for rapid transportation over long distances will be reduced to a minimum” [Dykstra, 1926 in Hall, 2002, p. 306]. In the praxis and in contrast to this idealistic vision, horizontal cities based on car commuting grew in the absence of regulative policies. Instead of decentralization, suburbanization in the hand of private developers led to wasteful use of resources and large-scale **commuting** progressively dependent on car ownership, given the impossibility to maintain economically independent public transportation in low-density communities. Motorways became, consequently, corridors designed for giving “rapid access from the congested central city to new suburbs”, so “allowing the ordinary

worker to live further from his work" [Hall, 2002 pp. 297 and 317]. Since "a million automobiles move in different directions and conflict at a million of intersections, a million times a day", it became necessary to develop "a network of motor-ways…for the exclusive use of motor vehicles over which there shall be no crossing at grade" [East, 1941 p.97]. The parkways consciously developed by Robert Moses for New York were a system for car commuters that could "reach their office in Manhattan from distances up to 20-30 miles, namely four times the effective radius of the subway system" [Hall, 2002 p.298]. This policy based on "car culture" had a strong influence on the middle-class emigration from down-town [Chatelain, 2013] and the door to sprawling –as the result of private speculative development- was open according to Ford's aphorism: "the city problems will be solved by leaving the city" [Brodsly, 1981 p. 79] and the consequences, remarked in Los Angeles before any other town in the world, were the breakdown of the inner city economy and the transfer of the activities from central areas to suburbs [Hall, 2002 pp. 303-308].

One century later, a regional planning organizing independent community regains charm. These should be the condensed and small centers in which active modes impose themselves because of the pragmatic advantage they offer. The model of regionally interconnected small communities appears easier to implement in the reality of a world in which the population concentrates increasingly in urban centers. Both grass-root and top-down initiatives in US have recently pioneered the possibility to revitalize the Stockholm model based on satellite cities connected by transit, with defined boundaries, **mixed activities** and income population, and possibly the attributes of **typicality**. This concept implies a variable offer in terms of lodgment quality and prices, and the acceptance of a more equitable principle of social mixity [Terrin, 2011], an argument refused by those who believe that cheap housing and consequent integration of disfavored population groups will depress estate values [Mitchell, 2001]. Lately Australia proposed some innovative solutions [Plan for the Sydney Region, in Newman and Kenworthy, 2006], probably stimulated by the active academic debate concerning the quantitative parameters necessary to design efficient modern cities.

2.3.2. Models of city growth

The social and economic problems generated by uncontrolled city growth (sprawling) were underestimated by those who claimed that there is no “universal spatial or physical aesthetic of urban forms” [Webber, 1963 p. 52]. Burckhardt [1994] and Dinnebier [2000] proposed similar theses for the landscape. According to this view, the environment is not only the product of human transformations, but it exists only as a human (cultural) concept. Since the esthetical assessments are shaped according to the cultural conditions and these change over the time, there is no ideal environment worthy to be preserved or to be modified pretending to reach a “better”, definitive solution. We should simply be able to catch what is interesting and stimulating for being able to like it. So, no effort is meaningful to change or preserve something since other people will not appreciate such engagement. The shortcut logical loop should sound like this: if reality is rational, there is no reason to ask for modifying it (and the decisional structures governing the present). Such view that finally denies the opportunity to choose among options, offers a theoretical base to anti-planning ideology and, applied to urban development, looks for support in the recurrent myth that the new technologies (the electricity, the automobile, the communication technology: any age had its break-through innovation) would overcome distances and that the urban place will be replaced by the non-place urban realm [Webber, 1964 p.52]. It is just one of the declinations of the theory known as “end of the history” [Fukuyama, 1992] which considers the present model based on private automobile as the final point rather than a historical step. Consequently, the “present” environment should be rather oriented to satisfy the driver and it will be not worse, but simply different with respect to alternatives since “one use form is superior to another only as it better serves to accommodate ongoing spatial processes” [Webber, 1963 p. 52]. Logically, if private cars are the reference, the fittest solution is the “Architecture for Speed-Reading”, namely forms conveyed for passing motorists [Liebs, 1985 in Hall, 2002 p. 325]. It is somehow ironic that the most acute pro-

blem that this ideology of the perennial movement never managed to solve, no matter how much hypertrophic the road network grew, is accommodating sufficient parking spaces for satisfying the resting drivers. Similarly, it is curious that the absolute relativism for which everything constantly mutes results in the conclusion that no action is worthy and, finally, in the magnification of immobility: recognizing the dynamic of the landscape leads to the conclusion that the history is finished and we should be happy to stuck in the present model. The implications of this ideology are dangerous. Implicitly, it suggests that we must accept the reality as it is and avoid identifying alternatives for the future. This position can also be understood as an absolution for any responsibility concerning the (non)planning policy: there is no ugly or beautiful landscape or urban form, only a transient human judgment about what surrounds us. Of course, this position also implicitly opposites the conclusions of the European Landscape Convention which states that « the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as everyday areas » [Council of Europe, 2000].

In contrast to this stationary view, there is the empirical observation that cities need a constant renovation. The necessity to remodel cities offers an investment opportunity to developers as well as a chance to policy to remove structural problems and to alleviate inequality. The relative decisional influence of the different lobbying groups will determine the quality of the final product. In the absence of a comprehensive regional design, suburbs develop according to the infrastructure availability (railway, public transit, or motorways) connecting to downtown and job opportunities remaining dormitory settlements built with no attention to promote the development of a structure with the attributes of a urban community. This spontaneous, market-driven development is known as sprawling, where “**urban sprawl** or **suburban sprawl** describes the expansion of human populations away from central urban areas into low-density, monofunctional and usually car-dependent communities, in a process called suburbanization” (Wikipedia,

https://en.wikipedia.org/wiki/Urban_sprawl). Acute analyses addressing some of the drawbacks of this model were presented as early as in the Thirties of the last century. It was observed that the territory was bound to become a “hermaphrodite beastliness”, “never town nor country, but only a single dispersed suburb” and “the process of low-density sprawl” would be exacerbated by “the growth of car ownership” [Sharp, 1932; Pick, 1936; Joad, 1938; in Hall, 2002 pp. 83-84]. Workers become commuters, suburbs were appendices of the metropolitan center and their expansion limit was imposed only by the time necessary to reach employment opportunities. Consequently, housing prices became a function of the vicinity to transportation facilities and this caused a selective migration to differently served areas according to the original income of the inhabitants. No mechanism for obtaining a mix of different social classes in the same territory was foreseen in the model based on private development and the consequence was the sprawl of linear and stochastic settlements along public transit axes with the poorest people living in the most marginal areas. Attempts to organize linear but self-contained cities –as suggested by Arturo Soria y Mata and Le Corbusier- never succeeded or remained commuter suburbs developed as a commercial speculation [Hall, 2002 p.117]. In the worst cases, zoning was instrumentally introduced to creating social segregation, especially in the States. Here, **zoning** was an administrative act envisaged to produce stable property values and resulted in an effective means for segregation “by excluding undesirable land use and neighbors” [Marcuse, 1980 in Hall, 2002 p. 317] until the sentence of the New Jersey Supreme Court of 1983 which declared inadmissible “exclusionary zoning” [Haar, 1996 in Hall, 2002 p. 423]. Sentences can remove formal interdictions, but cannot compensate for discrimination based on the income. Proposing only expensive housing was sufficient to keep lower incomes out of suburb developments built according to zoning land use [Mitchell, 2001] and, despite the Court decision, the physical segregation of social groups according to their incomes still persists [Jargowski, 1996; Reardon and Bischoff, 2011].

Government-guaranteed fixed interest mortgages together with road network development and zoning have constituted the motor of urban sprawling. This kind of

development has been said that represents “the American dream” and suites to a country that had plenty of space [Mitchell, 2001]. Ever similar peripheries lead to what has been defined as cites where no memory was anymore identifiable [Sandercock, 1998]. The lack of urban coherent structure and space orientation references leads to the loss of physical and emotional identity in sprawling agglomerates [Ganser, 1991; Moe and Wilkie, 1997]. The specific features of town and countryside are diluted until becoming unidentifiable in urban agglomerates composed by anonymous outskirts instead of **neighborhoods**, namely places with social identity, **safety feeling**, and community interactions. Natrasony and Alexander speak of “Decline of Place” [2005] and identify the reason in the lack of strategic planning, substituted by bureaucratic planning, a mere matter of “codes, plot ratios, setbacks, percentages of open space, standardized road patterns” [Newman and Kenworthy, 1999]. This administrative approach is presented as neutral and anti-ideological since it simply preserves the existing power relationships without questioning the driving forces behind the decisions. Anyway, it failed to solve the complex problem of shaping cities and optimizing land misuse by considering city development as the addition of separate technical specificities instead of a holistic discipline. The result is “larger homes in larger lots” and decreasing density, with 2 million acres a year claimed by sprawl in US, 2 hours in the driver’s seat each day and a bill due to traffic delay (wasted fuel and productivity) estimated to 72 billion a year in the States at the end of the last century [Mitchell, 2001].

2.3.3 Costs of sprawling and remediation opportunities

In the optic of transforming a urban fabric into a sustainable city adapted to future challenges and shrinking budgets, it becomes essential to eliminate inefficient land use. The anti-sprawling philosophy of the Berlin Masterplan is based on the assumption that there are both quantitative and qualitative reasons for such a choice. Avoiding land waste, decreasing commute time, limiting service costs, and saving parkland go together with the concept that “a modern city, no less than a medieval town…must have a defined size, form, boundary” and is “not a

mere sprawling of houses along an indeterminate avenue" [Mumford, 1938 p. 397]. The lack of form for the whole sprawling model is mirrored by the fact that "each building is treated in isolation, nothing binds it to the next one" [Nairn, 1965 in Hall 2002 p. 322], but if "sprawl is bad aesthetics, it is also bad economics. Five acres are being made to do the work of one, and do it very poorly" [Whyte, 1958 in Hall p. 322]. Sprawling wastes non-renewable resources such as land, ground water, and requests strong investments for setting and maintaining infrastructures and for running public services. It imposes elevated transport costs and contributes to noise, air pollution, energy consumption, congestion, social segregation [INRETS, 1995; Camagni et al., 2002; EEA, 2006]. Sprawl increases the public and private costs of infrastructure per residence, drains fiscal capability at the expense of the traditional city centers, and militates against adequate public transport service supply [World Bank, 2002]. Distances become a high toll for residents who must spend more and more time commuting by private cars but they also exacerbate the differences between rich and poor citizens in terms of access to mobility and occupation opportunities. In transport terms, it increases trip lengths and car dependence, fosters a spatial mismatch between the places of work and residence of the poor and hence reduces accessibility to employment and to urban facilities for the poor and very poor [World Bank, 2002]. For instance, in the States it can become difficult hiring people for low-salary but necessary service jobs in suburbs because they are too distant from cheap inner-city areas in which potential workers live [Mitchell, 2001]. For them, the costs related to transportation can do those jobs not rentable or simply they cannot reach them due to their limited access to mobility. Sprawl not justified by population growth has become a widespread development pattern around the world. In many cases, the middle-class supported by increasing incomes and consequent relative low private transport costs moved out from inner cities. The towns of nations that adopted planned growth schemes in the past –such as the Eastern Europe countries- are moving fast from dense to scattered structures [Ott, 2001]. The European Environment Agency identifies urban sprawl as the pivotal challenge for Europe sustainable development. At the same time, recognizes that

policy makers still ignore or underestimate it, although sprawl can be coped only with an integrated policy between different administrative levels and sectors [EEA, 2006] in which transport and land use policies should be coherent and co-ordinated.

Sprawling means 20-40% inflated capital, operation, and maintenance costs with respect to inner-city and this for any service (water and sewage, police, fire department, schools), but the main bill comes from road building and maintenance [Burchell et al., 2005]. At European level, the road network occupies significantly more space in scattered than in dense cities and together with commercial areas can cover till 50% of all the built-up land [EEA, 2006]. In South Caroline, the costs for road infrastructures at 2015 were estimated: 2.5 fold the expenses for education infrastructures, 3 fold those for health infrastructures, 10 fold those for administration and justice infrastructures, 15 fold those for environmental protection and 20 times those destined for culture and recreational infrastructures [Burchell et al., 2005]. An Australian survey sampled data from North America and Oceania cities. It showed that the building costs of the car-dependent sprawl model of city are almost three times higher than those requested for urban reorganization aimed at obtaining compact structures compatible with active mobility [Trubka et al., 2010]. Transport costs remains half as expensive in the case of the compact city model. Sprawling, considered as the ideological decision of avoiding political choices in urban planning, is destroying the resources necessary to keep good living standards in the communities. In several contexts of the Global North, it can be also very unfair since the oversized infrastructures and higher operational costs necessary to serve the low-density affluent peripheries are over-proportionally paid by low-income tax-payers of crowded centers and suburb dormitories [Monstadt and Schramm, 2013]. Recently, its unsustainability has been clearly detailed in a survey having as the objective the African megalopolis in which infrastructure costs and commuting time have exploded as the consequence of diffused growth of the urban agglomeration [UNOHabitat, 2014]. Despite the amount of data supporting the necessity of limiting city sprawling to

prevent their economic collapse due to raising costs, there is always the liberal argument that this claim is an outrage to personal freedom.

The attempt of developing mathematical algorithms to identify the maximal city size has been very deceiving since based on too many assumptions and few reliable empirical data [reviewed in Camagni et al., 2013]. Models often accept the idea of scale economies of infrastructures and that technological and intellectual expertise agglomerate in large centers. However, the parameter “size” can correspond to entities as different as citizen number and surface, whereas cities of the same size can be dense, mixed, or zoned developments. As a consequence, artificial simplifications imposed by the necessity to limit the number of variables did not enable to obtain modelling results suitable to explain the reality. For instance, correlating the “productivity factor” of Paris and Lyon on the base of the mere population [Rousseaux and Proud’homme, 1992] to state the advantage of “large cities” is clearly arbitrary because a capital enjoys several assets due to its status (representative offices, decisional centers, political influence, very high-income minorities,…) that are not related to a generic parameter such as “total population”. Regional distribution of expertise among networks of small centers (for instance, the Flemish, the Danish, or the Dutch models) can work even better than megalopolis because it is easier to provide effective services on the whole territory and life quality to attract qualified personnel. The awareness of the methodological issues in all the modelling assessments has been the motor of recent and accurate analyses promoted by the European Environment Agency that defined more appropriate “Urban Morphological Zones” for comparing different realities [EEA, 2011]. Such instrument is now used to monitor urban sprawling in EU and to infer its relationship to both local and continental policies with the aim to identify solutions able to confine its terrific progress: discontinuous peri-urban areas grow 4 times faster than continuous urban areas and often 10 times more than population [EEA, 2010]. The question related to affordable city size, therefore, is qualitative (how to grow?) rather than quantitative (how much?).

One of the ideal opposite to sprawling is a town with features similar to those of the dense middle-age town fenced by a wall separating it from the countryside and in which the function mixity is maximized. Such model should also be ecologically and energetically optimal because reduces the distances and preserves the space around the settlement. This provocative picture has been questioned not only because unachievable but also dangerous since moves the debate in a mythological field instead of in the region of suitable and implementable proposals [Sieverts, 2000]. The actual production and commercialization model with its consequent social and cultural conditions is not compatible with a middle-age urban structure and the present widely acquired necessity of spending time on open space would induce the inhabitants of modern dense cities to travel regularly outwards for enjoying green areas, an attitude that would strongly invert the ecological balance that dense cities should assure. Therefore, the attention must be driven to the real possibilities to improve the space use. For instance, Jacobs was very critical towards considering urban green areas as a positive factor *per se* [Jacobs, 1961; Putnam and Quinn, 2006]. Her (theoretical) argument was that too often open (green) spaces were “lost spaces” the function of which was not defined and that consequently become marginalized, useless, and possibly dangerous [Jacobs, 1961; Capn Transit, 2015]. However, she did not notice that green areas should not respond only to direct fruition but also to indirect functions such as for instance heat and acoustic screening or natural sink for rain water. Recent experimental works evidence the correlation between the presence of urban parks and human health as well [Takano et al., 2002; Maas et al., 2006]. For Sieverts the practical solution is to accept the diffuse structure of metropolitan areas (Zwischenstadt) and to act on the process to shape it in the most suitable form. It means the creation of a multi-central system with specialized areas in terms of activities and services [Sieverts, 2000]. The system should be kept together by an effective network of physical and electronic connections, whereas a permanent urban structure refurbishing should enable to solve the successive structural issues each time they become critical. In this sense, Sievert’s concept that infrastructures could be updated by progressively reconverting

the urban space has been realized, for instance in the case of Paris reconversion of Seine banks (see page 126). The present rate of space re-qualification (2-3% of the overall urban surface each year) can be used to constantly act on the urban fabric for its (re)-development towards updated structural forms. What for Jacobs was considered as vacuum (abandoned areas, regions close to water surfaces, “trapped” countryside) become elements which possess the plasticity necessary to accommodate the physical modifications necessary to update the infrastructures and to forge a new federating cultural awareness of a large metropolitan region. Furthermore, the opportunity of planning together the complementary elements represented by countryside and urban areas is an opportunity for a harmonic global development to transform amorphous sprawling into a coherent environment with the features necessary to be readable and understandable for the users.

The possibility of rescuing orientation will represent the requisite necessary to appreciate the novel urban complexity of large metropolitan areas. Their peculiar qualifying feature will be the availability of a highly interconnected and differentiated structure able to offer a wide variety in terms of working, social and recreational activities. The same principle should be applied also to new small satellite settlements which will contribute to the development. Koolhaas conceived a structure in which void and built spaces with different characteristics are alternated [Koolhaas, 1990]. The function of void spaces is of hosting areas for relaxation and mobility infrastructures –the presence of which is necessary- and to act like pauses in the rhythm of urban landscape. They separate the built islands with peaceful areas and underline their characteristics as in the music a pause can underline a note. In this perspective, the vacuum defines the limits of what is built and, keeping the built islands separated, allows for their differing developments and characteristics, an element that should avoid monotony. At the same time, this sort of functional vacuum must be designed as connecting link between the built islands. Indeed, the idea of segregating arterial roads into green belts was already proposed in 1932 by Parker for his garden city of Wythenshawe Estate to prevent ribbon development along them. As he indicated: “Such arterial

roads will lie in strips of parkland and they will not be development roads" [Parker, 1932 in Hall 2002 p.115].

This intelligently-designed diffuse city looks like a compromise between "stone cities and green cities" [Graham, 1999], in the sense that green areas and infrastructures are planned together with the dense centers in order to minimize the impact of the empty space on the overall system. It could represent a model for *ex-novo* urban development as well as a solution to alleviate the problems of already existing sprawled cities that need progressive refurbishing to remove their negative attributes.

2.3.4 The symbolic in urban space

Theories can have a strong impact on reality because they are often perceived as ideological entities to either accept or refuse globally rather than one of the instruments for explaining the reality. For this reason, Rowe and Koetter [1997] warned against the totalitarian draft that concepts can have when used as the absolute reference to organize any and every detail according to its rigid logic. Indeed, theories should remain toolboxes that offer means to read and organize different realities, possibly correlating that information to other rational sequences of events, a condition that can help in understanding what parameters can be tuned to modify a situation into a more suitable one. In this perspective, the approach of Lefebvre to the study of urbanism is a good example of pragmatic exploitation of theoretical instruments belonging to the large system of the Marxian Weltanschauung. At the same time, its work remains a crucial construction for the interpretation of urban structure.

He applies to the material space the Marxist intuition that the production means determine the cultural over-structures, stating that "the social space is a social product" [Lefebvre, 1974 p. 26] in which the physical original space is more and more difficult to recognize because of the transformations imposed by the activities performed by successive human societies. The natural space is sized down to a mere background progressively modeled by the different social structures that used that space and modified it according to their variable production needs:

every society shapes its own space [Lefebvre, 1974]. It means that the space becomes the result of the economical organization of the contemporary society. In this context, city organization cannot really exist or being evaluated without its corresponding economic structure. Following Lefebvre, previous production models may have let traces, but each space progressively mutes to represent the contemporary relationships. At the same time, its shape establishes the production relationships and dictates the place of the actors in the hierarchy by assigning to each of them its physical space that is also a symbolic representation of their positions in the society. For explaining the logic concatenation of such a process, Lefebvre introduced three concepts describing the space and its representation [Lefebvre, 1974].

Pratique spatiale. It is the functional level at which the daily activities take place and that forges the space dedicated to production. It is a logic structure with high internal coherence and corresponds to the perceived space available for the common life.

Representation de l'espace. It is the attempt to rationalize ex-post the pratique spatiale by introducing references for its development according to specific social guidelines. It is a designed space and aims at justifying the reality in moral terms, stressing symbols that have direct implications on the social acceptance of the power relationships inside the society. It assigns the single positions in the global texture and implements the conditions that will preserve the established order.

Espace de representation. It is the level of the symbolic that represents the ideal social construction and promotes suggestions by referring to acknowledged values. Because of its artificiality, it possesses a freedom that escapes to rules and may represent the abstract design place for the creation of intertextual allusions for reinforcing messages (cultural reproduction), but also for suggesting alternatives.

The symbolic level is the most genuine product of the cultural reflections and it fills in the urban landscape with elements selected for moving common spiritual resources. According to Lefebvre, the space representations are conceived for being coherent and functional to the system, but rely on abstract elements that

can be object of discussion and modifications. It appears evident that, whereas the pratique spatiale is for itself the mechanical consequence of the productive relationships, the two other levels can be manipulated, their alteration can modify the productive relationships and, finally, also the pratique spatiale.

The awareness that urban forms contribute to engrave symbols in our daily world and that these manipulate our judgment and support politic decisions, usually re-enforcing the dominant ideology, is not a recent discovery. In the first book of his History of the Peloponnesian War, Thucydides remarks the effort of Athens in building its symbolic urban form in a way in which it could witness its wealth and power and this in contrast to the modesty of Sparta, which reproduced its social austere costumes in its architecture (Thucydides, 1989). The reasons of the difference are in the ideological perspective of the two cities. Sparta was a traditional economy based on agriculture which perceived itself as a local entity with no expansionist goals. Athens was a capitalist empire with hegemonic aims on the whole Hellenic world, totally leaning forward and with the necessity to inculcate fear and admiration in the junior partners.

All the levels identified by Lefebvre contribute, starting from the production relationship, to the space distribution and its representation, namely the urban form that is the reference for the social order. It is a realized “signifying system through which…a social order is communicated, experienced, and explored” [Williams, 1982 p. 13]. It is by means of a structured arrangement of signs that it becomes a “central element in a cultural system, for as an ordered assemblage of objects, a text, it acts as a signifying system through which a social system is communicated, reproduced, experienced, and explored” [Duncan, 1990 p.17]. The message incorporated in the landscape, what Duncan [Duncan, 1990 pp. 17-19] calls the signification of the structured and structuring quality of landscape, is easily deciphered inside a society for which the deep relationship between signs is evident, but remains mute for people with different cultural background: “What is “seen” is not a given, objective, reality open to an innocent eye, but an epistemological field constructed as much linguistically as visually” [Mitchell, 1986 p. 38]. We must be aware that “the visible order….is only a superficial

glitter above an abyss" [Focault, 1970 p. 251] and that "we need to fill in much that is invisible – to read subtexts that lie beyond the visible text" [Duncan, 1990 p. 14]. The message inscribed in the urban organization and its meaning are available only for those who are used to its symbolic. There are several experimental reports that compare the appreciation of space elements and that evidence how this exercise is culturally biased by experience, technical knowledge, gender, age, and profession (Meinig, 1976; Bourassa, 1990; Bell, 1999; Dramstadt et al., 2006; Masuda et al., 2008; Tveit, 2009; Ode et al., 2009; Sklenicka and Molnarova, 2010). For a community sharing a common culture, the landscape/city form remains a powerful symbol which propagates truth. Its effectiveness relays on the fact that, unconsciously, space representation, that indeed simply mirrors the actual social relationships, is perceived as a natural product, a pre-existing reality and not the result of human activities. Therefore, carving the natural space for introducing favorable symbolisms is a powerful expedient for inducing the idea that they are natural, even divinely ordained and unchallengeable. Contextually, this expedient will improve the authority of the system related to that symbolism and its acceptance as a consequence of the natural order. Observing a hierarchical model represented in the surrounding space, the observer accepts it as immutable and when the landscape will reproduce elements of signification relative to social and political practices, he will see confirmed "in the rock" elements present in other media of the cultural system [Duncan, 1990 pp. 19-22]. Furthermore, he will finish for considering unique and fair the ideological model proposed subliminally by the symbolism and not to see it as an external variable that has been introduced to lead his "free choice". It must be noticed that this process can be done in agreement or against the material structure of the pratique spatiale. However, a symbolic level coherent with the pratique spatiale represents a stable condition, whereas the attempt of imposing metastructures that are not in agreement to the pratique spatiale will be constantly challenged by the perceived contradiction between conflicting symbolic structures.

The power of symbolic elements dropped in the landscape/city form is that their code remains hidden, the exposed message is not perceived as something intro-

duced externally, whereas its permanent visibility constantly exerts its action suggesting to the observer a partisan ideology and to accept the represented social relationships and behaviors. It is an approach that aims at exerting a behavioral conditioning by using a sophisticated rhetoric, whereas all the communication constructs remain unconscious. Duncan analyzed the use of allegoric visual vehicles, such as those shaped for obtaining gradual inculcation of concepts related to authority legitimation, in his study concerning the landscape symbolism of the Kandyan kingdom [Duncan, 1990]. There are some analogies between symbolic structures that influence our perception of the real space despite the fact that we cannot perceive them and the material elements that false our appreciation of virtual realities. In internet, tens of uncontrollable and undetected "cookies" find their place in our computers, contributing to define and transmit a detailed picture of our interests. This information is used for forcing our web surfing to links selected by programs that use the cookie information. We are not aware of it and think that we arrive to a specific page by chance or because we were clever, but finally we shall choose a product or will be reinforced in our beliefs because we have been carried on them by an algorithm. In an urban landscape context, rebuilding a middle-age quarter substituting the network of small and curved lanes with a regular order of large blocks and broad avenues will force finding natural driving fast through it by car instead of walking slowly and talking with the neighbors. In both cases, we are forced to make choices without recognizing the logic and the interests that led us to that specific decision.

In this perspective, urban development is always ideological, no matter whether it is formulated and implemented with socially-concerned, demagogic or merely speculative intents. Since planning is choice, it is never neutral and consequently it remains an instrument by which the prevalent ideology can forge the framework in which life will organize its routine. It can use the symbolic plasticity to preserve stable relationships or for introducing new elements, even revolutionary, in the urban form and, consequently, accelerating modifications. Rossi [1998] recalls to the historical fact that the Russian architects of the post-Revolution period had the clear awareness that there was the necessity to create an urban space mir-

roring the new social ideals because they recognized the interaction among space design, function, and social relationships. The Revolution had to shape its own space out of the previous imperial forms for becoming real praxis, its symbols had to be introduced in the daily life to make its message and its society organization immediately understandable. It was clearly perceived that there was the historical necessity to shape an ideal and symbolic new space and to free the urban landscape from its past formed by the successive accumulation of layers of autocratic power representations. Soviet deurbanism in the 1920s considered new city design as instrumental to promoting a new citizen and a new society because urban layout can influence, suggest, and even lead the citizen behavior [Gentile, 2000]. More generally, the space distribution and the symbols to introduce in the urban fabric will depend on the leading ideology. Market-driven speculative growth represents the space transformation with the lowest rational mediation between production relationship and symbolic level: the physical separation between rich and poor, powerful and powerless is matter of differential estate value. In contrast, the implementation of coherent system of ideas into urban structures needs planning and coordination, and historically it was facilitated under authoritarian conditions. Hall quotes one of the British-ruled New Delhi planner who stated that, if accomplishing the project would be “possible only under a despotism…Hurrah for despotism!” [Baker, 1944 in Hall 2002 p. 198]. Le Corbusier affirmed that only *grandes seigneurs* without remorse could save Paris imposing their spirit able to dominate the mob: “Homage to a great town planner – This despot conceived immense projects and realized them” [Le Corbusier, 1929 p. 293].

Probably it is not a case if large and prestigious urban developments, in any historical period, have been often conceived for being symbolic rather than functional. The City Beautiful –as it is suggestively called by Hall- is the expression of the dominant power. The contemporary re-proposal of City Beautiful planning corresponds to “planning for display, architecture as theatre, design intended to impress”, “concentration on the monumental and on the superficial, on architecture as symbol of power”, ”expressive, representational, oratorical” with “almost

complete lack of interest in the wider social purposes of planning" and it "builds new facades that hide a mass of ancient slums" [Hall, 2002 pp. 198-217]. Urban symbolism is suitable to serve different scopes such as expressing imperial dominance, innate authority, and racial exclusiveness (the British Indian New Delhi), visions of glory, political, military, and economic power (Nazi Berlin and Italian fascist new "cities of parade and spectacles", [Schorske, 1963 in Hall 2002 p. 212]), nationalism (the independent Indian Chandigarh) or simply the tangible exteriority of boosting business (the Chicago at the beginning of the last century). Therefore, City Beautiful planning can be the "handmaiden of finance capitalism, the agent of imperialism, and the instrument of personal totalitarism" [Hall, 2002 p. 216]. In this context, any effort for preserving and integrating in planning the built memory of the past is something to avoid, if past symbolic conflicts with contemporary ideology [Delafons, 1997]. The dismantling of the past is not the consequence of ignorance, but the fruit of the deliberate choice of removing it.

It does not matter if the new urban forms are utopia or dystopia, new societies need to start from new city organization. There have been examples of towns designed according to ideal plans following which the urban form should finally contribute to create social equity instead of oppression. Philosophes such as Tommaso Campanella (La citta' del sole) or Thomas More (Utopia) identified a clear relationship between the form of their ideal towns and the possibility to build a society based on the justice. Similarly, the disparity introduced by the socially biased structure of towns was recognized by extreme equalitarian reformist movements, such as the Taborite Hussites who predicted the impossibility to build an equal society inside contemporary towns because of the symbolic inscribed in their space distribution and the social consequences that this structure had. They recognized that immaterial relationships could indeed create actual discrimination and that the form of the city shaped the structure of the society. In a very consequent way, the Hussite towns were the first to plan boroughs designed according to an ideal model for which all the individuals should profit of the same chances and no hierarchy should be evident [Libal, 1970, pp 34-36]. What has been built, it has been built according to the view of the dominating

groups, for preserving their interests or stating their claims [Rossi, 1998]. Paris is an emblematic example of this top-down urban reshaping. Its structure was successively transformed for allowing a more effective control of its turbulent population: broad avenues were built to enable the fast displacement of troops, narrow streets dismantled for avoiding easy-to-defend resorts, but the major attack was addressed to squares. The usually small middle-age squares in which many public activities took place and served as the meeting point where people exchanged goods as well as ideas were substituted by large areas that remained empty of people for most of the time but were functional for transportation and offered the optimal scenery for military parades, namely for serving as the symbolic place of the power [Sennett, 1983]. The life has been excluded from these monumental spaces that seem to reside in a vacuum, probably the reification of one of the attributes of authority that must be perceived as a not accessible entity. Habermas [Habermas, 1981] proposed a diametrically opposite view: in a democratic society the urban space determination should be a dialectic process to which all the actors should participate and that should reach the maximal beneficial result for the community as a whole. But what are the elements that should be present in a urban democratic symbolism? The first paragraph of the Berlin city master plan - Planwerk Innenstadt from 1997 explicitly refers to the symbolic aspects of urban design but they are less related to social aspects such equitability, rather to feelings of community cohesion and identity. The plan recalls that the symbolic level must be introduced as forms able to overcome the physical and perceived fracture between City Ost and City West as well as to introduce the signs necessary for conferring to Berlin the status of capital. Only after underlined these priorities the document recognizes that the master plan has the power of implementing functions by defining the urban forms and consequently the sociological structure and the modalities of interaction among the actors that will populate that shared urban space [Berlin Planwerk Innenstadt, 1997].

In conclusion, symbolism graved in urban environment is highly effective. It contributes to shape a cultural background, suggests what is normal and what is strange. Most of the present cities have been built according to a car-centered

view of mobility and this primacy is supported by redundant signs such as the number and width of roads for cars, the general urban space distribution with a disproportional rate devoted to car parking places, the priority (legal and perceived) that cars claim on shared streets, the distribution of investment mass. To move to a different mobility, it is necessary to operate for changing cultural and symbolic features. If it is true that the forms establish the functions rather than the opposite [Rossi, 1998], implementing a bicycle infrastructure into an automotive city may represent a cultural shock able to shake the people perception of the material symbols of the power.

2.3.5 Emotional value of urban landscapes

We have seen that a critical element for city fitness is their capacity to preserve or recover multifunctionality. Now, usually the term is used to indicate a complexity in terms of economic and social activities, but also of emotional values [Lynch, 1960]. According to Sachs-Pfeifer [1988], there are also qualitative needs that contribute to the quality a city can offer. For instance, “place attachment and place meaning are the person-to-place bonds that evolve through emotional connection, meaning, and understandings of a specific place and/or features of a place” [Shumaker and Taylor, 1983]. These values are particularly relevant for community-building [Wolf et al., 2014], are individually specific, and cannot be fulfilled by quantitative elements. Therefore, city must have the capacity of offering multiple opportunities in terms of qualitative urban space. Although the large-scale economy tends to produce homogenized products, the request is for multivalent spaces in which different activities and aggregation modalities can be achieved. The capacity to provide urban space which satisfies all the needs can be crucial for obtaining a long term acceptance of the whole community. Cities should offer aggregation nuclei to an atomized society made of individuals that wish to approach the others in an environment in which they have the possibility to represent themselves without feeling constricted by the excessive vicinity [Bahrdt, 1961]. Psychological studies indicate that a multiform offer would be necessary also for the esthetical factors, such as the urban landscape spanning

from inner cities to green areas surrounding the towns. The term dense landscape has been used in several acceptations that shared the idea that many different elements are condensed in a limited space. In this context, the term “dense landscape” would define a place in which there is a large variety of sensorial patterns to fulfill different emotional needs, the dimensions described by Grahn and Stigsdotter [2010]. Therefore, planning should consider quality rather than quantity of available green (and blue) areas and expertise to diversify the landscape to fulfil the multiple psychological exigencies. Since observer velocity can influence the landscape appreciation, this factor should be evaluated during landscape design in analogy with the scenic assessment of roadsides [Hull et al., 1987].

Adults as well as children elaborate environmental strategies of self-regulation for emotion and cognitive restoration. They identify “favorite places” in which to go and spend some time for regaining emotional stability. Favorite places are often natural settings and has been determined that both social and individual frequentations are critical for restoration. For children it seems important to be able to reach them alone and being there without adults around [Korpela et al., 2002]. It would be useful to conjugate urban structure with environmental solutions able to offer a variety of “safe niches” for any individual looking for his/her “natural place”. The insistence of Amsterdam administration for training children to cycle independently around the city and its suburbs means also the possibility for the young citizens to build their own space and environmental references (See page 115).

2.3.6 Towards sustainable cities

The analytical work performed in the last century has largely confirmed that it is possible to influence the social relationships acting on urban structural elements. Indeed, if the production relationships adapt a physical space to their needs and consequently this “spatial practice” arrives to forge a social structure, we can imagine that offering alternative spatial practices could contribute, if not to reorganize the social relationships, at least to influence the present habits and, upwards,

to induce a reorganization of the production conditions. Although habits seem belonging to private sphere rather than public, their modification induced by alternative structural conditions can strongly impact the collective psychological attitude towards, and the acceptance of, new behaviors. A striking example of structural modifications that generated new social praxis has been the systematic introduction of secured bicycle roads and the consequent increase of cycling for commuting and leisure in Central and Northern Europe in the last thirty years. Land-use policy, high fuel taxes, road pricing, parking charges, and the introduction of physical curbs on streets have been very effective supporting factors and now the presence of an established and committed community of cyclers represents a significant critical mass for introducing further structural urban modifications to boost walking, cycling and transit rather than the transport mode based on private automobile. The documents cities used for justifying their reconversion form automotive structures to sustainable communities (see Section 3) often refer to the theoretical considerations formulated by Jacobs in “The Death and Life of Great American Cities” [Jacobs, 1961], a book which knew an unexpected medial success [Ward, 2006]. Both market-driven urban development and Lecorbusier Modernism were objects of Jacobs’ criticisms, whose crucial contribution was to list bluntly the sins of the urban policy of her age and to move them in the middle of the debate in a moment in which no other voice opposed the main thought. She made popular concepts that were originally pointed out by Unwin at the beginning of the 20th century, such as the value of **dense cities** with mixed building typologies, multiple functions and differentiated population, with spaces to exploit intensively for different social activities. Planning should be therefore aimed at maintaining and promote mixed activities able to contrast specializations (the urban zoning) that cause urban fragmentation in areas that are used only during a short part of the day time. She pointed out the necessity to maximize the use of the space because it is a limiting and limited factor. It means planning for the **multifunctionality** of the same space that can be used for prolonged time and should host an array of different activities as well as for building dense cities opposed to sprawling towns.

This contrast between densely built, functionally mixed, highly lived and long-time exploited areas and zones that have become marginalized was conceptualized by Jacobs by introducing the concepts of edges and vacuum. Edges are physical borders that impair the communication and the difficulty to overcome them determines that the areas flanking them are deserted. As a consequence, they create not only a physical fracture in the urbane structure, but a psychological perception of loneness, the establishment of a vacuum area that has a decreasing gradient from the hedge towards the vital core of the settlement. The concept of vacuum is associated as well to psychological feelings of abandon, danger, permanent separation and, in return, becomes a factor that promotes the perceived marginality of the border areas, a process that contributes to the progressive marginalization of hedge regions. Railways, high-speed roads, large parking lots but also empty spaces such as green and water surfaces can be –or become- physical “edges” in Jacobs’ view. The same applies to blocks of buildings with monofunctional use and that, for this reason, are deserted for long hours. Although urban partition into areas with peculiar specificities can be attractive because of the possibility of underlining some of their positive and exclusive characteristics, the aim of a planner should, therefore, focus on creating an effective urban continuum by acting on the urban texture. Interestingly, the mobility options serving a specific area play a pivotal role in its fruition. Edges can be overcome by designing safe passages whereas slowing down the traffic speed incentives the eye-contact and the possibility of observing and using the landscape details for orienting our interactions with the environment and the other people. The psychological differences that the same individual can experience according to the transport modality he uses have been analyzed by other researchers as well. Whereas the driver is isolated in his car and high-speed roads alongside the settlement edges separate the drivers from the community, active transport modes allow meeting people and watching at the shops: persons have higher chances to be exposed to serendipity [Lynch, 1960]. In the perspective of sustainable cities, it means neighborhood feeling, impulse for local economy, reduced pollution, more space and occasions for socializing. It results therefore

evident that transport infrastructures play a crucial role in shaping urban forms and consequently behaviors because a town built for motorists ejects the pedestrians out of its streets and empties its center, whereas the opposite attitude can be supported implementing a layout favoring pedestrian, cycling and public transit [Terrin, 2011]. Surprisingly, one of the most important contribution about functional mixity and transport optimization came, more than 30 years earlier, from the lines of Modernists. Hilberseimer was always extremely aware of the systemic and socio-psychological factors that must be included in planning and how city form and function are interconnected. He noticed soon that the mobility issue could not be solved independently from the building distribution in the space and understood that creating satellite dormitories –as proposed by Le Corbusier- for decongesting the traffic in the center would have the opposite effect because of the increased commuting movement. Therefore, he proposed holistic city models such as his Hochhausstadt project (1924) in which the activities were separated vertically in different layers, each one specialized but functionally and physically interconnected [Pommer et al., 1988 p. 33]. By such a way, business and vehicular traffic were kept to a lower layer whereas pedestrian movement and residential buildings were at the surface. The traffic at the two levels moves at different speed and both are optimally set for their function, the nervous work activities not interfering with the calm of social life at the surface. Furthermore, being the business activities located directly under the residential structures, this planning allowed minimizing the movement for the residents and the overall system needed less surface and energy. The idea of multifunctional buildings (business underground and residential above the soil level) was an attempt of conceiving shared spaces for different activities, in opposition to the zone separation supported by Le Corbusier. Despite the value of his proposals, they influenced only those Northern European countries in which the cultural background was more shaped by egalitarian ideologies. In his late days Hilberseimer articulated a fundamental critic to the same spirit of Modernism. The symmetry, so precious for Le Corbusier, appeared monotony to Hilberseimer who admitted that the result “was more a necropolis than a metropolis, a sterile landscape of asphalt and cement, inhu-

man in every aspect" [Hilberseimer, 1963 p. 22]. To avoid "the repetition of the blocks that resulted in too much uniformity" [Hilberseimer, 1963 p. 22], he introduced the idea of Mischbebauung, namely the design of areas in which different building typologies and activities were present at the same time and where the offer should be optimized according to the different human topologies, being for examples the needs of young singles different from those of families with small children. It was an implicit recognition that urban planning is not an abstract activity for standardized "living-machines" far away from real human, from home, from pleasure, but a cultural act that has to do with real people.

There is, therefore, a line of urbanism that starting from Unwin always perceived the discipline as a sociological field which needs technical tools to be implemented and avoid design mistakes that can compromise the quality of life in the community. In some cases, the professional expertise enables even to convert limits into opportunities. The danger that -according to Jacobs- represented edges for social aggregation served for identifying solutions to overcome these fractures in the urban context. The idea of building bridging structures (dolphins) that physically bypass edges and are at the same time spaces for social interaction has been developed by Koolhaas [1990] and collaborators for building a connection between Antwerpen center and its outskirts, two entities separated by the highway infrastructures. The relevance of the mental perception of the city form and of its **legibility** has been also the subject of another seminal work appeared in 1960 [Lynch, 1960]. In his The Image of the City, Kevin Lynch suggested that we need to recognize specific elements in a city to build the mental maps which provide the necessary orientation and the solution to organize our urban mobility. He shared with Jacobs the concept of "edges" as boundaries which impair harmonic continuity and introduced further elements such "paths" (the selected route to move throughout the city), "nodes" (junctions of the path network), "landmarks" (external recognition sites), and "districts" (urban areas with specific typicality). These elements should be enough recognizable to allow building personal experiential mental maps. We could comment that a city should offer the keys for its legibility and for avoiding to remain "inaccessible" for the people which it hosts.

Jacobs' work has been largely recalled also in the Berlin city master plan [Berlin Planwerk Innenstadt, 1997]. A key-concept of the Berlin Masterplan is that it recognizes the necessity to design an urban structure suitable not solely for the immediate future, but economically affordable and sustainable in the long term. There are studies [Newman and Kenworthy 1989; 1999] who demonstrated that the energetic needs of a city are directly related to its design and that compact structures are more effective in reducing energy consumption because the distances and the costs for infrastructure construction and maintenance are decreased. Consequently, the Masterplan underlines the necessity to modify the present transport model strongly dependent of motorized means since it is unaffordable in terms of pollution, energy consumption, and space waste. A city growth favoring short commuting distances will favor walking and cycling in opposite to the car use. The expected result is that moving out from a car-oriented structure will give back public space in the inner city, whereas avoiding the development of low-density settlements will save space in the surrounding countryside. In the case of Berlin, it means also to recover the typicality of its historical dense structure avoiding the overcrowding typical of the compact city of the beginning of the 20th century [Abercrombie, 1914 in Hall 2002 p. 34].

The Berlin Masterplan proposes actions at different levels. The conservation of old building is considered useful for preserving "urban seeds" inside the newly built areas that will maintain diversity and should avoid the citizen transmigration typical of the speculative revitalization projects performed in the Anglo-Saxon countries. The past represents also the reference for building the new. A further section promotes private citizen ownership and a mixed system for the construction development with the aim of avoiding strong economical concentrations able to condition the future of large areas. The control and coordination must, therefore, remain in public hands to avoid developments contrasting to the plan sense and to promote a global coherence. This should result in a strongly connected urban structure in which reference points will orient the texture level of the town, the dimension in which the daily life finds its way [Lefebvre, 1974]. It is noteworthy that the necessity of having a clear public power able to coordinate the stra-

tegic lines of urban development has been recently recalled by Koolhaas as an antidote to the proliferation of ‘generic’ towns without peculiar articulation [Koolhaas, 2012]. This is because speculation has short-term perspective and this approach is not compatible with the responsibility of designing global frameworks that must be both sustainable and suitable to incorporate the future modifications that will be necessary to upgrade cities to the changing necessities. The city development model needs long-term perspectives and, consequently, must remain public.

The perspective of building a sustainable Berlin is considered also a symbolic achievement leading to economic opportunities. By representing a successful story of innovative development, a city might aspire to become an internationally acknowledged reference for the future. Smart and innovative solutions possess an image appeal that goes behind the fact of being suited for answering to specific needs such as efficient mobility or pollution control. The competition among large cities is mainly a race for attracting qualified work craft that should guarantee economic growth in post-industrial societies. Values that possess both immaterial (degree of innovation capacity, cultural and leisure capital, participative processes to decisions) and material (technical development, environmental quality) aspects may represent a crucial argument to convince qualified professionals to choose a destination and guarantee its long-term development and cities that dare innovative solutions for a sustainable future have the chance to gain the competition [PWC, 2005; Michelangeli, 2015].

2.3.7 Co-benefits of active transport

Most of the effort devoted to study urban mobility concerns technical (how to manage the fluxes due mostly to automotive hypermobility), ecological (what is the pollutant impact of automotive traffic), or economic (how much does it cost building infrastructures and allowing good and person circulations) issues. The social aspects related to the denied right to mobility and consequent **social discrimination** based on reduced **access to resources** are more neglected. Nevertheless, the right to mobility corresponds to the fundamental right to access to

jobs and social opportunities. Since the different transport modes have variable direct (paid by the user) and indirect (subsidized by the public hand) costs, a policy aimed at improving the infrastructures necessary to support the active transport –less expensive for the user- might redistribute more equally the chances among the citizens because it will contribute to a more equal access to mobility and, consequently, to opportunities. The modifications of the production structure in Western countries that occurred in the last 50 years have radically changed the relevance of public transit as a factor to access to the job market. Whereas the industrial city of the XIX and XX centuries knew the associated segregation of jobs and living places for workers, a condition for which the distance to the workplace was limited to few Kilometers, the job offer in the contemporary service society is disproportionally located either in correspondence of the communication axes at the city fringes or in the wealthy inner urban areas. In contrast, the offer of cheaper rents is localized in the dispersed far periphery. The result is that the progressive separation between housing and working places does not affect all the employees equally. In US, the **commuting time and costs** for low-income workers are increasing faster than for middle-class employees [Kneebone and Holmes, 2015]. Similarly, in the case of Paris, people with well paid jobs can pay higher rents in favorably placed and accessible areas, whereas unqualified, low-income workers must travel in average more than 10 Km to reach their workplace [Orfeuil, 2006]. Since the lodgments in peripheral areas are less efficiently served by public transportations, the consequence is a stronger dependence on private car and increasing rates of multi-motorization for low-income families. The commuting costs in the Paris area can account for as much as 25% of the total income for these workers [Orfeuil, 2005] despite an increasing recourse to second-hand cars. Summarizing, badly paid jobs need more expensive trips to be reached and furthermore they require also longer commuting time. Low-income families allocate almost 60% of their budget for transportation and rent costs. The poorest households in very large cities worldwide spend more than 25 percent of their budget for transport and need over-proportional long travel time (one-way commute times of more than one hour) [World Bank,

2002]. Ironically, transport expenses are not assessed to evaluate the solvency at the moment of signing rent contracts [Orfeuil, 2005]. In the case of the States, in which sprawling is more expanded than in Europe, transportation costs for low-income families are now more elevated than housing costs [Lipman, 2006]. The necessity to travel to distant job centers dramatically increases the commute times and the road congestion [Lipman, 2006]. As a consequence, the disparity due to the social sieve that confines low incomes in marginal areas and forces them to spend more for travelling longer to their workplaces by car is not only a picture of the inequality, but becomes an "integral part of its reproduction" [Orfeuil, 2006]. Surprisingly, the actions undertaken so far to cope with this problem are symptomatic, such as indirect subventions to automotive mobility (warranty for car loan, reduced gasoline price). Although some planning centers pleaded for regional policies in which housing, job location, and transportations issues should be considered together [Lipman, 2006], in most of the cases public administrations do not envisage a urban restructuration conceived to reduce on the one hand social discrimination and on the other car-dependency. The social segregation is then usually accompanied by environmental inequality due to the reduced access to amenities in the degraded periphery [Gueymard, 2009]. In these conditions, **cultural integration** has scarce opportunity to succeed, with consequent social problems [Phillips, 2010].

Uncertainty is a growing feeling in our post-industrial societies in which fixed jobs disappear and, with them, the possibility to plan the own life on solid backgrounds. Such loss of certitude has been invoked as one of the main reason of metropolitan area growth since these agglomerates offer more chances to both individuals (larger job market, wide educational options) and enterprises (recruitment opportunities, synergies). Nevertheless, opportunities have no sense in the absence of means to join them. Autonomous mobility becomes necessary to travel the long distances that separate the critical points (housing, job, schools,…) in a metropolis. Consequently, private car can result the most reliable means to react to the opportunities since simplifies the primary need represented by transportation in a diffuse urban structure. How it has been summarized, "the

utility of a car resides in both the possibility to use it and actually using it" [Proud'homme and Frybourg, 1983; quoted in Orfeuil, 2000]. In a city designed according to the private automotive transport necessities, namely sprawled and zoned, the access to private cars appears as the only possibility to solve both the psychological incertitude and the material need to remain physically connected to the social vital centers. At the same time, among the reasons of inquietude expressed by city citizens, traffic congestion seems a constantly growing issue ("la ville impracticable" [Orfeuil, 2000]). So far, the way of approaching the problem in most of the countries has been building more and more infrastructures devoted to individual motorized transports to counterbalance the increased traffic volume and to maintain the daily travel time stable despite the growing distances, according to the Marchetti law. This choice has contributed to significant space consumption and to the re-localization of the economic activities along the motorway axes. Furthermore, although not effective in the middle term [Metz, 2008; Duranton and Turner, 2011], it still represents a solution easier to implement in urban situations (US, Canada, Australia cities) that historically grew together with cars than in European cities with dense old downtowns. In both cases, in the presence of a building policy that favors the settlement of peripheral new residential rings and an offer of always larger, heavier and faster cars, it requires constant new investments. Otherwise, in a condition for which the traffic increases faster than circulation space, traffic-jam and parking lot paucity are programmed. Such diffuse urban systems, however, need large and underused infrastructures that are more and more expensive to maintain and –even when they succeed in keeping fixed the transportation times- impose higher transport costs for individuals as well as for the administrations [Orfeuil, 2000]. It means decreasing real incomes for low-income workers beside the social costs of segregation and social atomization. Finally, the analyses of the statistics concerning the use of infrastructure for motorized transportation indicate that the average values are not always informative. In the case of the Paris region, the majority of the citizens use no or rarely the infrastructures for motorized vehicles, whereas a minority uses it very intensely [Orfeuil, 2000]. The consequence is that the taxes of many

pay for a service that is used by few. Infrastructure costs should be more equally redistributed, instead of selling investments for new motorways as a necessity for the whole community. Shifting the resources from car-infrastructures towards to facilities suitable for active modes would redistribute them more equally because these are potentially accessible to a larger number of citizens. Furthermore, the lower costs of maintenance would decrease the public expenses, whereas the possibility to use the bicycle or a combination of bicycle and public services instead of the car to reach the job would strongly alleviate the travel costs for low income workers. Of course, the travelling time must be competitive and the experiences of many cities have shown that it is possible for most of the urban trips in the presence of a well-designed network of dedicated paths.

Apart from being an opportunity to alleviate discriminations based on the census and improving equable accessibility to city offers, an increasing number of studies published in the last years dealt with other co-benefits for the community generated by the shift from a transport model based on private car to systems relying on active transport modes [Xia et al., 2013]. The environmental benefits are intuitive because of the reduced emission of pollutants that would follow to a decrease in motorized transport. Consequently, the costs for air pollution control are reduced. Furthermore, several models [Woodcock et al., 2009; Lindsay et al., 2011; Rojas-Rueda et al., 2012; Grabow et al., 2012; Maizlish et al., 2013] have been developed to quantify how the variations in transport behavior can influence the direct and indirect costs (time loss due traffic congestion, fossil oil consumption, cleaning, diseases caused by pollution, diseases prevented by physical activity, shrunk car space requirements, improved passive surveillance of public space, increased neighborhood cohesion) disbursed at the present by the society. The advantages of cycling instead of driving a car are, in terms of **health benefits,** 20 times superior to the risk of accident [EECS, 2009]**.** The results of meta-analyses [Mueller et al., 2015; Cepeda et al., 2017] indicated that active commuters –due to their proximity to traffic- may be exposed to higher amounts of pollutants than motorized commuters, but that the benefit from physical activity is larger than the risk from an increased inhaled dose of fine particles. The net ben-

efit for cyclers is, on average, of one extra year of life expectance and only extreme conditions (more than 5 hours/day of urban physical activity) render negative this accomplishment [Tainio et al., 2016]. The positive effect could be significantly increased by design, being commuters using segregated bicycle paths by far less exposed to traffic pollutants than cyclers who share the road with motorized traffic [MacNaughton et al., 2014; Hankey and Marshall, 2015]. Also a numerically significant migration of commuters from motorized to active modes would strongly impact the overall population health condition and consequently increase its global life expectance. The calculations for Stockholm quantify as more than double the effect of the introduction of the local congestion charge in terms of reduced mortality [Johansson et al., 2017]. Cycling produces a positive effect on emotional health with consequent improved levels of self-confidence, tolerance to stress, and reduced perceived tiredness [Boyd et al., 1998] and the higher physical activity decreases cancer risk calculated as disability-adjusted life-years –DALYs [Espina et al., 2015]. Utility cycling brings the major contribution [Andersen et al., 2000; Wen and Rissel, 2008; Oja et al., 2011; Veisten et al., 2011; Heesch and Sahlqvist, 2013] to these advantages and for this reason is meaningful to support it with finalized active transport policies such as investments into infrastructures for active mobility. Their availability will impact not only the present transport behaviors but also facilitate the implementation of future sustainable models [Filion, 2013] able to reduce sedentary which is a major risk factor for all the most common diseases of developed countries [Biswas, 2015].

2.3.8 Public space allocation, active transport modes and intermodality

As we have seen above, urban planning can be performed applying different approaches, but whatever is the procedure of goal definition and description, the implementation of ideas into reality is a mix of political and technical skills. The mobility policy of a city can be realized only once quantitative parameters are known and both constrains and the resources must be identified. What makes this procedure “politic” are the specific objectives, priorities, and temporal schedule to achieve the agenda results. The most limiting factor in urban context is

space and its allocation is a political choice. As we'll see when the different city policies will be analyzed, the reconversion of cities which had developed according to the constant growth of motorized private traffic into communities in which active transport is supported must pass through the redistribution of the urban space. Public administrations have evaluated the "light" infrastructure network necessary for cycling in terms of cost/benefit assessment and compared the results with the data relative to the "heavy" infrastructures necessary for the automotive transport. As reported in Danish and Dutch analyses [Copenhagen cycle policy, 2011; Dutch Ministry of Transports, 2009, City of Amsterdam, 2012], investments in active transport are more rentable than those devoted to motorized vehicles and the impact on traffic congestion more significant (for a detailed review, see the chapters Copenhagen and Amsterdam in the next section). Both direct costs (building and maintenance) and indirect benefits (reduced congestion, reduced pollution, health benefit, improved service accessibility, inclusion for different social classes, more active local economy, safer and more lively neighborhood) are favorable to active modes. Of course, the result of these analyses must be also confronted with citizen satisfaction which represents the final control for political choices. Surveys are generally positive towards politics which seriously supported active transport modes because, so far, these politics succeeded in (progressively) answering to the community needs by improving city life quality by means of a more effective urban mobility.

Mobility is often associated to private and public transit powered by a fuel-consuming engine. However, people can walk or cycle to move and, since in this case no fuel is used, these are named **active transport modes**. Active transport modes can significantly contribute to private mobility and the "useful distance" that they can optimally cover is in agreement with Marchetti's law, namely till 3 Km for walking and 5-15 Km for cycling, a distance that can be further extended by the employment of e-bikes. Statistically, most of the inner urban displacements [EESC, 2017] are therefore compatible with active mode transport. However, a relevant contribution to the overall traffic is due to commuting from the larger city region which implies distances till 50 Km. In these cases, local active

transport needs to be integrated by public transit (train, light-train, metro, busses) to maintain the total commuting time still affordable. This concept of integrated transport (**intermodality**) needs a dedicated design to fulfil its task of being a valid utility mode alternative to private car mobility. Examples of opportune solutions that boost the different intermodal configurations (bike&ride, ride&bike, bike&ride&bike) include (Figure 2) secure parking places at the public transport stations, access ramps, wagons built for bicycle transport, bike-sharing services, and a network of secured roads [Taylor and Mahmassani, 1996; Hegger, 2007].

Figure 2. Bike&Ride must be supported by suitable facilities

The combination of different services and infrastructures results in higher rate of cycling and intermodal commuting. As examples, air pumping spots along cycling roads (Hamburg), repair workshops at the working place (Hamburg), dedicated roads (Amsterdam), covered and controlled shelters for parking (Münster)

2.3.9 Sociological aspects of active mobility: Utilitarian cycling, cycler awareness, and bike "hipsters"

The idea of cycling recalls to relaxed behavior and to persons with greater attention towards the others, traffic players inclusive. This idea of cycling is the one promoted by the administrations of European continental cities with cycling tradition and fairness is the principle on which they base a traffic policy intended to involve as many citizens as possible, independently of their skills and age. Cycling becomes useful for the community when people of all ages use it for commuting (utility cycling), shopping, meeting friends, and reaching cultural and administrative centers. The fruition of protected bicycle tracks should be not threatened by any factor. In the reality, aggressive bikers, but also bulky cargobikes and fast e-bikes, can become a danger for weak subjects such as children and elders. While the shortcomings caused by cargobikes and e-bike can be overcome with technical solutions (increased path width, automatic speed regulators), some dangerous individual behaviors are more difficult to fence. It emerges from several surveys that a portion of cyclers –mostly in US and UK- considers cycling a political statement (***biketivism* - bike activism**) and/or the opportunity to declare a hipster behavioral identity rather than only a transport mode. Hipsters, defined as "persons who follows the latest trends and fashions, especially those regarded as being outside the cultural mainstream" (Google Dictionary), identified (aggressive) cycling as an unconventional social statement. In his dissertation thesis, Furness describes the attitudes of "groups of people who believe that bicycles are not merely forms of transportation, rather, they are instruments of communication, sources of identity, vehicles for pleasure, and tools for technological, cultural, and political critique. This 'counterculture' is comprised of feminists, socialists, punks, anti-globalization activists, writers, environmentalists, and others who have created and developed a politics of cycling through a dialectic of communication and action" [Furness, 2006]. Part of these cycler tribes intend as a part of their civic role to make themselves visible as cyclists and propose theories to explain that "there are different dynamics at work when one considers the relationships between the technology and narratives of the bicycle, the act of cy-

cling, and the cultural context in which bicycles are produced, popularized, politicized, and ultimately ridden" [Furness, 2006]. In this galaxy, the absolute reference is **Critical Mass**, a movement that had originated in San Francisco and had grown in size and popularity due to the fact that cyclists felt marginalized by the unwritten rule of 20th century transportation, namely that streets are meant for cars, and for cars only [Furness, 2006, Blickstein, 2008]. Cyclers started claiming: "We are not blocking traffic, we *are* traffic!" and the steric hindrance represented by their volume –the critical mass- on the streets became a means to gain the public attention on cycler rights. Other cyclers are not pushed by community politic awareness but simply find cool to misbehave and do not respect traffic and social rules. They experience their misconduct as the consequence of precise individual (ethical or fashionable) believes and their acts of self-representation are not limited to the simple boldness expression of a teen-ager challenge desire. Apart from our personal opinions, their attitudes must be considered for their (often large) medial influential effect rather than for their (low) statistical relevance because their presence may affect the efficacy of active modes.

The very influential book "Effective Cycling" [Forester, 1976] boosted an even more radical idea of cycling: cyclists must act and be treated as drivers of vehicles. They must share the space with motorized traffic and pretend respect as any other driver instead of asking for segregated cycling lanes and traffic calming solutions. Implicitly, **vehicular cycling** relies on intrepid cyclers who cycle to defy the other drivers and show up their vigor, brave, and strength. Their relative proportion is higher in countries in which cycling is not the norm and in which the simple act of cycling is a sort of statement rather than a utilitarian activity. The most popular catch-phrase of vehicular cycling is "claiming the lane", namely to occupy totally a lane by driving in the middle and to preclude the passage to other vehicles. The conflicts generated by such an attitude are evident. Motorized drivers meet increasing collision risks and less strong and skilled cyclers must renounce to cycle in dangerous conditions. Advocates of cycler rights –as for instance even several members of the Critical Mass movement- warn from the vehicular cycling ideology because it is counterproductive and does not analyze

the complex urban design reasons that slow down transport policies based on active transport [Mapes, 2009]. Somehow, all these expressions correspond to the effort of a minority to reach visibility and acceptance but in one case (Critical Mass) there is expectation for a democratic, fair global solution (safe infrastructures), whereas others (vehicular cyclers) seem to prefer the individualistic challenge because of its heroic flavor. In the praxis, the borders are not sharp between the two tendencies since boldness is a popular attribute among the members of these movements and it is not by chance that they grew in Anglo-Saxon countries in which utilitarian cycling is statistically irrelevant and individuality is prized over community achievements.

In this atmosphere, cycling can assume voyeuristic aspects. Riding a bike can become a subculture that drifts to extreme (and dangerous) trends to stress its identity. The most popular and recent fashion relative to "**hipster cycling**" is represented by the **fixie communities**, now spread in most large cities worldwide. "Fixie" is for fixed-gear (no freewheel mechanism) bicycle and originally this bike format has been used by post messengers of private shipment companies because of its simplicity and low maintenance (gear and breaks are not installed). The main characteristics of fixies are that the pedals turn when the rear wheel turns and that they can stop only by skidding, due to the absence of conventional breaks. The method is not reliable and renders driving these bicycles dangerous. Exactly this fact makes fixies exclusive and gave them a cult status. Logically, they are considered illegal in many countries but this condition contributed even more to increase their status rather than discourage their use. As a consequence, they have been proposed as an indicator of hipsterness [Gelman, 2012] and are the preferred/exclusive bikes for (often illegal) alleycat races in urban context. What at the beginning was considered as an act of rebellion, "a style statement and a direct insult to conformity and functionality" [Rosenfield, 2013] or "a suicidal response to urban conditioning" [Bezdek, 2012] has finished being a "borderline-nonfunctional cliché…because when a subversive act becomes a trend, against what, exactly, is it rebelling?" [Rosenfield, 2013]. As bloggers underline, "in terms of responsible driving, Fixie without brake is not the answer"

and “the problem for people who ride Fixies is not their riding ability, but potholes, cars, etc, that can cause a major problem if you are unable to stop quickly enough” [Bezdek, 2012]. However, for the Fixie subculture, “in true hipster fashion, you refuse to have brakes on your bike” because “it would greatly decrease hipster cred”: “Fixies with hand breaks….it is cheating!”. Is it a case that “Fixies are so dense in central London?” [Gelman, 2012].

In any case, these attitudes are perceived as dangerous by several bicycle users and need to be monitored to avoid that the irresponsibility of few becomes a factor of risk that can discourage many cyclers to share the lane with bold vehicular bikers [The Blog, http://www.copenhagenize.com/2010/07/ vehicular-cyclists-secret-sect.html].

2.3.10 Environmental parameters affected by transport infrastructures

Infrastructures represent a large portion of the built surface of modern settlements and consequently the choice of transport modes critically impact land use. As much as 20-30% of urban land, and 40-60% of commercial center land is devoted to roads and parking for cars [Litman, 2017] with an increasing use of fertile lowland in the case of low-density urban expansion [Ferrara et al., 2014]. However, the **ecological footprint** and the **loss of irreplaceable resource** due to infrastructure impact can be limited. For instance, automobile dependent cities have 3 to 5 times as much land devoted to roads and parking as cities which chose multi-modal transport and a denser structure because these solutions induce the use of alternative transport modes which requires lighter infrastructures, require less car driving and discourage vehicle property [Litman, 2017]. Put differently, 66% to 80% of the land devoted to roads and parking facilities in modern cities results from the greater space requirements of automobile transport and consequently this toll can be cut by using active transport mode since a bicycle requires less than 1/10 of the infrastructure space claimed by a car. The expansion of urban areas has resulted in marked alterations of natural processes and environmental quality. The large surfaces of **impermeabilized soil** (urban impervious surface coverage) influences infiltration and evapotranspiration, drastically

increase the temperature [Xu, 2010] and exacerbate the portion of water lost via **runoff** which, in return, worsens **flooding and erosion** [McGray, 2016]. Urban runoff is also a major source of **pollution** for surface and ground water to the point that impervious surface coverage has been proposed as a key indicator for environmental risk [Arnold and Gibbons, 1996]. To reduce the costs (energy for cooling, damages due to flooding and erosion, loss of usable water), the shift towards the lighter infrastructures necessary for active mobility, that are more compatible with vegetal covers and have lower impact on natural resources, would be highly convenient [Gill, 2007]. Finally, also single cities are now committed to respect the global environmental goals concerning energy use and pollutant emissions. Specifically, **CO_2 emission** limits have been defined and administrations are designing development policies to respect them. Urban traffic is one of the pillars that need optimization and this primarily means incentives for active modes and disincentives for private car mobility [CopenhagenClimatePlan, 2009].

2.4 Cycling spaces and Urban Waterfronts

Keywords: bicycle path design, filtered permeability, commuting time and costs, utility cycling, Vision Zero program, water and waterfronts

Theoretical deepening is crucial also when technical aspects are considered, otherwise sociological or economic smart conclusions could be not implemented into effective practical solutions. Specifically, there are two fields related to the subject of this work for which it is important to know how the international community developed concepts and designed optimized layouts. The Case Studies indicate that the success of any plan to reorganize the city mobility and to recover waterfronts finally depends on the user satisfaction with respect to the proposed offer. Consequently, just simple details which can influence the perceived or actual safety, the accessibility, or the trivial availability of a parking place can challenge the success of a project otherwise optimally conceived for what con-

cerns the guidelines. More specifically, a good realization makes usable the target resource for the widest public.

2.4.1 Technical characteristics of cycling paths

Any project for city infrastructure development and transport strategy must take in consideration also some technical aspects. Good design is absolutely necessary to guarantee safety and transport efficiency and in the absence of excellent building standards for the bicycle network any mobility plan is drastically challenged. The reason for which qualitative parameters are particularly important in the case of cycling infrastructures is that the bikers are more physically exposed than car drivers and several sensitive stakeholders such as children and seniors share the space with potentially bolder bikers. Furthermore, bicycle and automotive traffic cannot be totally segregated and the dangers must be minimized at the intersections. Consequently, many countries developed catalogues of optimized **design solutions for safe bicycle paths**, protected street intersections, or traffic-light space organization that increases cycler visibility. The proposed approaches are often different and the catalogues of the considered practical cases more or less exhaustive; the main characteristics of the German “Guidelines for Urban Road Design”, (Richtlinien für die Anlage von Stadtstraßen, RASt [FGSV, 2006]) and the Dutch “Design Manual for Bicycle Traffic” [CROW, 2007] models are briefly illustrated here as an example.

Figure 3. Bicycle-friendly solutions at street stops

Two examples of design used to offer protected space to cyclers waiting to cross a road. In one case, a large buffer zone outdistances the stop limit for bicycles (in front) and for cars and enables the cyclers to move along the waiting cars and anticipating them when crossing the cross-road. In the second case, cyclers who need to turn across the traffic flow find a dedicated waiting spot

The German Automobile Association VCD (VerkehrsClub Deutschland) recalls that the design solutions collected in RASt 06 are recommendations to local administrations, not compulsory rules to apply (Figure 3) [Sluka, 2014]. The "Recommendations for Bike Traffic Installations (Empfehlungen für Radverkehrsanlagen - ERA) in RASt 06 are indications that focus on the respect of "safety measures" (for instance, minimal width compatible with a specific speed, number of users, or with mixed walking/cycling solutions; warning concerning specific intersection conditions) rather than "*ad hoc* design" (for instance, optimal entry angle and corresponding protections or by-pass solutions at a street intersection) [Gwiasda, 2009; Sluka, 2014]. The CROW approach is more flexible, starting from the idea that "traffic engineering is not an exact science in the sense that there is always a single solution to every problem. There are often a number of good solutions to the situation in question" [CROW, 2007 p. 109]. The bicycle mobility is discussed both systematically (cohesion of the road network, relevance of services like parking slots, different cycler typology) and in details (design of curves and visibility, inclines, bicycle dimensions, paving type and maintenance, typology of intersections). The idea is that any single aspect can work only in a correctly organized system and that weak points must be improved otherwise the overall structure is challenged. In this context, also bicycle tracks are classified according to their use -from local access paths to long-distance bicycle highways- and the corresponding standards are those necessary to sustain that use. Copenhagen has elaborated its own guidelines for the design of bicycle roads according to its empirical experience [Cycling Embassy of Denmark, 2013].

The attention to the road design is also at the base of the **Vision Zero program** [Vision Zero, 2016] which was conceived in Sweden in 1997, has been largely adopted in the other Scandinavian countries and now has become popular also in some US cities [Evers, 2015, CAD, 2015]. The goal of the initiative is to eliminate death accidents on the roads and the philosophy is that to achieve this result the responsibility must shift from the personal skills and psychological health of the drivers to the infrastructure safety. Their design is the key to prevent that human mistakes become an accident risk. This concept has been progressively (and successfully) implemented to protect any category of drivers and resulted particularly useful to avoid casualties among cyclers and pedestrians [Vision Zero, 2016].

A particular aspect of bicycle infrastructure design is represented by **filtered permeability**. According to the Department of Communities and Local Government of UK [TCPA and CLG, 2008], "filtered permeability means separating the sustainable modes from private motor traffic in order to give them an advantage in terms of speed, distance and convenience" and its application is a key element in the transport planning strategies of several continental Europe cities. The advantage of using differential transport permeability was already clear to Unwin who largely adopted this concept in his urban plans so to become the reference for the Radburn layout [Wikipedia, 2017]. By according specific rights to each different transportation mode and designing passages open exclusively to active transport, it is possible to improve the effectiveness of walking and cycling in residential areas and exclude or reduce the motorized traffic in the same areas [Melia, 2012]. The strategy is based on a mix of administrative and design conditions that filter selectively the through traffic, improve the connectivity of the allowed transportation modes, and recover public space for the community. This approach re-equilibrates the public space use that is otherwise disproportionally biased towards motorized transport. For instance in the case of Paris, private car accounts for 33% of the total trips, but consumes 94% of the road space [Servant, 1996]. Effective traffic permeability policies use incentives (better infrastructure offer) as well as disincentives (gas taxes, limitation of car parking places,

parking payment, physical measures to slow down the traffic speed) to make car driving less appealing [Pucher et al., 1999; Rietveld and Daniel, 2004; Krizek et al., 2009; City of Freiburg, 2012].

2.4.2 Waterfronts - The recovery of water surfaces as an enriching element inside the urban landscape

Natural resources are powerful elements to exploit in the perspective of improving city environmental equilibrium and, at the same time, increasing the urban aesthetic appeal. **Water** is a particular element among the others because it is associated to concepts such as purity, (re)-generation, life. Its cultural relevance is witnessed by its main role in any mythology and religion as well as by the widespread feeling that it can calm with its flowing, its colors and its clatter (type "calming effect of water" in Google to appreciate how people perceive their relationship with water in all its forms). There is also a functional aspect relating human beings and water since its availability has always been critical for choosing a settlement. Such resource has meant drinking water for people and cattle, irrigation water for the agriculture, rivers and ponds for fishing, and water surfaces for moving goods. Natural water availability has been increasingly organized by artificial systems aimed at optimizing its use by means of channels, locks, embankments, and bridges, the riverbanks have been modified for hosting mills, blacksmith forges, paper workshops, harbors and later on factories, water clearing sites, and energy power stations. In a post-industrial landscape, urban water surfaces and **waterfronts** are more and more appreciated as recreation areas and as a decorative element contributing to the quality-of-life of the site.

Revitalization of inner-city industrial sites has been probably one of the major accomplishments of the urban planning of the last quarter of the 20th century. In several cases the interested areas included water surfaces [DIFU, 2004] because many urban deserted areas were old deposits and infrastructures in industrial harbors. The interest for this specific development combination is witnessed by dedicated publications such as the "Waterfront Review" (journal dedicated to "regeneration, retrofitting, and development" and distributed by the Future City

Forum [http://futurecityforum.com]), the special issues of different journals ("Ware Wasser" in Stadt Bauwelt, "Stadt im Fluß" in Stadtforum, "Cities and Waterfront Infrastructures" hosted by Sustainability [Stadt Bauwelt 1991; Stadtforum, 1998; www.mdpi.com/journal/sustainability/special_issues/cities-waterfront infrastructure], books [Haass, 2010], the number of "waterfront revitalization projects" published on urban plan websites [www.competitiononline.de], monographs [LAE, 2009], and by tens of city webpages.

Several of these programs were/are merely speculative, such as the East London requalification project. "Lost space" was revitalized but the interest for improved social access to the urban spaces was often neglected. The lack of critical thinking in the periods of easy credit led to waterfront regeneration projects planned without any assessment for their potential social benefits [Harper, 2009]. These projects operated as gentrification actions, created glamour and superficial beauty instead of equilibrated, mixed, and sustainable environments for a heterogeneous population. In other lucky cases these concepts have been set at the center of the planning idea and urban water surfaces and their embankments become more and more pivotal in the social life of the cities. Paris-Plage, Isarlust and Kulturstrand in Munich, the renovation of the Rôhne in Lyon, the new Rhein park in Strasbourg/Kehl, the Zurich Flussbad and leisure area at Limmatt, the channels in Gent are just some examples of the renovated centrality of water in small towns as well as in large cities. Towns that grew up along rivers and that exploited them for their trading and industrial activities progressively turned the back to them. The post-industrial society seems to have rediscovered the patrimony represented by waterfronts as a leisure resource to improve the urban quality life. In this context, the intrinsic esthetic and psychological value of water was used to make of the recovered waterfronts new centers of urban aggregation by creating open places which allow alternative fruition possibilities.

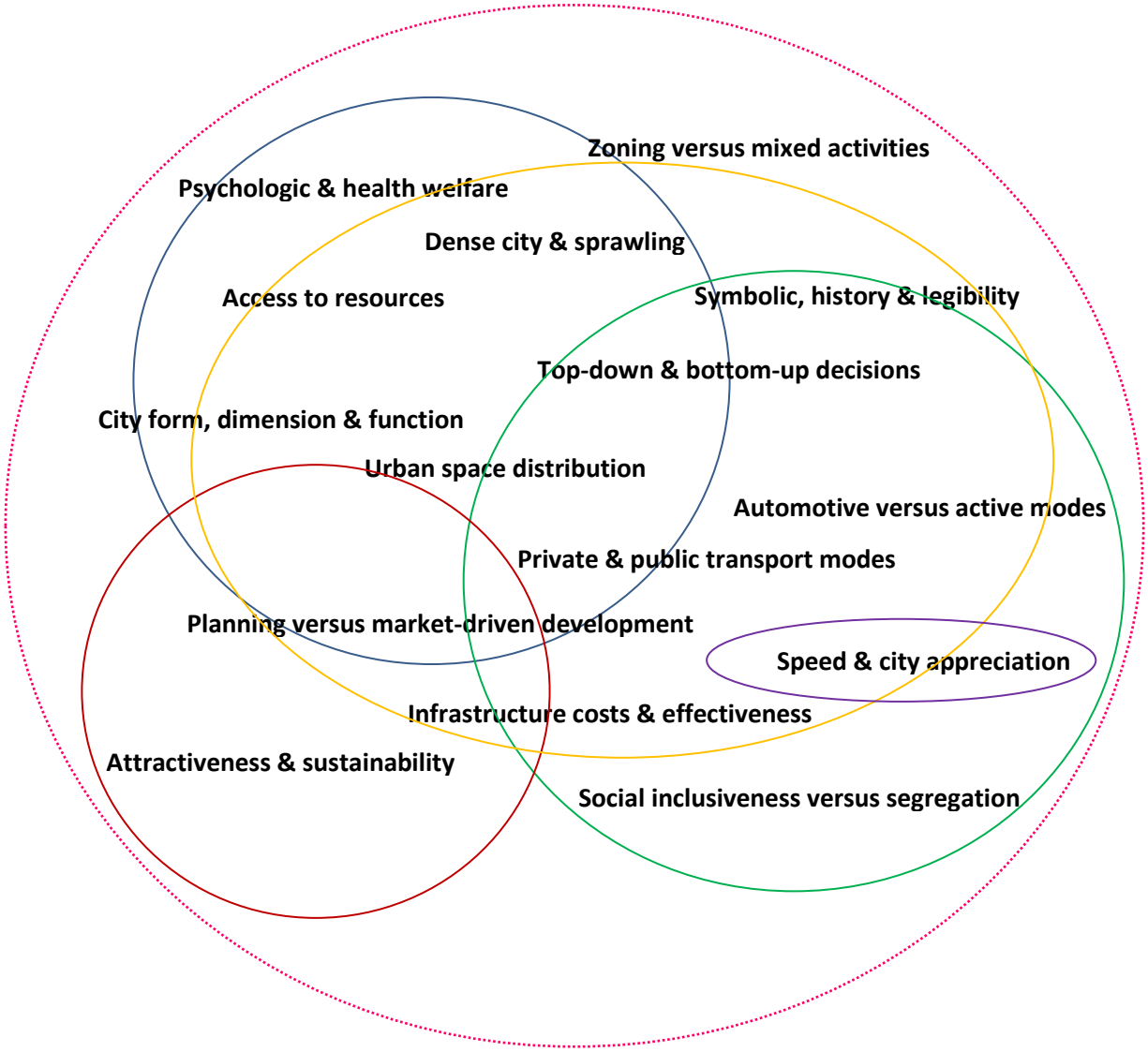
2.5 Remarks

The meaning of this thesis section was to introduce those factors (theories, concepts, experimental results, analysis tools) which needed to be described and

better framed theoretically because they emerged, directly or indirectly, in the documents regarding the transport policies of the cities examined in the next section. Of course, previous urban planning theories have significantly influenced the design of contemporary urban development and upgrading plans, although the relative weight of the single factors changed along the successive historical periods. For example, environmental issues and energetic sustainability are issues which emerged in relatively recent years. The contribution of different personalities to specific themes has always been heterogeneous. Figure 4 will express the complexity of the subject and the many opportunities that exist to approach it creating always new combinations and idea associations. Similarly, city administrations operated by adopting analogue procedures when they conceived their programs for urban reshuffling: they listed the major categories with which they had to deal with and tried to design a plan offering suitable answers to the critical questions. Some plans aimed at being exhaustive, others were by far less ambitious. Since my work is based on the comparison of the single strategies, collecting the different contributions I arrived to a pool of issues larger than those provided by the single experiences, a condition that –ironically- I defined as “the holistic view” of urban development.

Figure 4. Theoretical issues related to urban planning and their grouping

The different aspects related to city organization and development can be studied very sectorally or comprising different combinations. Various sets and subsets of factors can be analyzed and therefore practitioners have proposed considerations which dedicate variable interest to the different topics and deal with only partially overlapping subjects. In the picture, different possible combinations of elements are grouped. However, a larger set (holistic view) able to incorporate all the elements is always theoretically possible



The classical urbanists (Unwin, but with him Howard, Parker, Geddes and Abercrombie) already considered planning as a means to deal with a large array of city problems. Apart from granted subjects such as the relationship between city form and its functions, they were aware of the interconnections between planning choices and issues such as mobility and "welfare", understood as both social and psychological appeasement. They considered top-down planning as "natural", reason for which they were accused of paternalism by J. Jacobs. This author, apart from proposing a bottom-up, participative contribution to planning, recognized the strong relationship between city form and practical and psychological

functions proposed by the classical school. The most social aspects of planning (modalities of planning practice, effects on social inclusiveness) became particularly relevant in more recent years (Fainstein). Maybe a bit surprising, Modernism offered the most contrasting personalities. On the one hand, the totally self-confident abstract design of Le Corbusier, on the other, Hilberseimer's deep concerns to conceive a urban structure socially fair and environmentally sustainable. And then, beyond all the theories, the pragmatism of whom believes that the invisible hand of the free market will regulate automatically the development. All these tendencies, in different proportions and combinations, form the substrate on which the administrations responsible for the cities analyzed in the next section built their development plans and because of this they were analyzed in the Introduction. Myself, I was interested in understanding how cities reasoned on transport policy when planned urban growth and structural reorganization. It was somehow surprising to notice that active transport modes, and particularly bicycle, got a critical share in the projects that are now considered clear development successes. It was also unexpected that such success was strictly related to the technical quality of bicycle viability and this reason explains why, in an Introduction mostly dealing with theoretical aspects, I dedicated the due space to building details that otherwise might appear incongruous.

3. Development – Case studies

Cities have their own dynamics and constantly need to retrieve investments and human capitals for coping with their development. Good planning means also consider all the aspects that play a role in the global competition among cities for acquiring material and immaterial resources. The information technology revolution was predicted to lead to the “Death of Distance” [Cairncross, 1995] and to a production model independent on face-to-face communication. In opposite, what happened is that the decisional centers have recently become even more concentrated than the manufacture production was in the past. Consequently, gaining the favors of the economic actors -no matter the reason of the appeal- can decide the chances of any city to maintain or improve its life standards. City upgrading is often driven by speculative forces and consequently it presents all the dangers of a rapid and cyclic succession of highs and depression periods. On the other hand, other cities undertook a urban development model that wishes to be sustainable in the long term and able to face to future challenges. In this section it will be exposed how different cities conceived their strategy for the future starting from their transport policy. This implied choices in terms of space redistribution, repartition of resources for infrastructures, accompaniment policies necessary for successful implementation. In particular, it will be analyzed why different cities converged towards similar choices and often attributed to active transport mode –and mostly utility cycling- a key role for answering to their growth issues. There is a bunch of questions that need an answer to understand how to achieve the transformation and the reasons which simplified or delayed its implementation:

- What are the reasons which led to a paradigmatic change of the transport policy?
- Why active mobility became a pivotal actor of transport policy?
- What are the short- and long-term goals of local administrations and the degree of coherence among original idea, implementation policies, and final results?

- What have been the effects and how have been evaluated?
- Do the policies consider the interconnection between city design, access opportunities to resources, and urban reshaping as an occasion for re-equilibrating social equity?
- What are the priorities among planned infrastructures?
- Are there safety and building standards for such infrastructures?
- Is intermodality integrated in the plan?
- Is citizen contribution requested during the decisional process?
- What measures have been designed for assuring inclusiveness, for instance of elders, children, women, in the new transport concept?
- Are there holistic concepts which address the urban texture and form, its density, mixture, etc.?

The question list is not exhaustive but will help in orienting the research and in undertaking a systemic and possibly comparative survey involving cities that adopted different strategies to approach their problems starting from the redefinition of the transport policy. As it will be clearly appear, both policies and the interest for their dissemination are extremely inhomogeneous. The background theoretical documents, the implementation strategies, the feed-back evaluation, the investment amounts, the priorities differ among individual administrations. As a consequence, the analysis of the available material will underline more often complementarities than similarities among city aims and instruments to implement and evaluate them.

3.1 The European framework

EU establishes the framework legislation for all the member states and, therefore, its policy matters. The praxis in the single States may appear substantially different, but at least at the level of principles there is a clearly formulated engagement that should bind all the European nations to support non-motorized transport means such as walking and, primarily, cycling because they are “clean, sustainable mode of transport and essential part of an inter-modal plan for urban travel” (ECMT, 2004). The first document dedicated to bicycle as a crucial player

in urban transport policy was published in 1999 [EC-DGE, 1999], followed by the "Key Message to Governments on Implementing Sustainable Urban Travel Policies" approved in Lisbon (2001) and articulated in detailed form at the 2004 council in Ljubljana. In this last document ("Implementing sustainable urban travel policies: moving ahead – National policies to promote cycling") the European Conference of Ministers of Transport (ECMT: including effective as well as associate members such as Japan and USA) claims the necessity: i) to increase the bicycle use; ii) to collect the available data, the good practice, and the critical points for the implementation of bicycle-based transport policy; iii) to recall that "national-level commitment is important in setting the right legal, regulatory and financial framework" for the "successful implementation of cycling initiatives" [ECMT, 2004]. In the attached Ministerial Declaration, the Ministers resume the following points: i) the measures to promote cycling are an integral part of urban transport policy; ii) co-ordinate national policies must indicate clear goals and actions, propose legislation, provide financial resources, improve the (cycling) safety, support research and implementation of properly designed infrastructures; iii) improve communication because it is crucial to change the skewed image of cycling as an activity merely confined to childhood and leisure, or corresponding to low social status typical of many countries. Although the EMCT document is the most significant from a political point of view since it engages directly the Transport Ministries, the factual data and their analysis totally refer to the EC-DGE work [EC-DGE, 1999] promoted by the former commissioner with responsibility for the environment, Ritt Bjerregaard. Indeed, this data body will remain the reference for all the successive "surveys" published by EU departments, although their conceptualization will become more and more conventional and superficial. The development prompts to ask whether EU, as an institution, has any real interest in a cycling-inclusive transport policy or –beside the rhetoric- the only clear and informative statement it produced was due to the personal commitment of a single politician, being Ritt Bjerregaard a Danish social-democratic woman who ruled Copenhagen as a Major. Similarly, the EMCT document was prepared during the service of Margot Wallström (Swedish, social-democratic and woman,

another identity compatible with social sensibility). Of course, if personal attitudes are more important than collective and long-term visions, the fact that later the same responsibility was taken for a long mandate by a Greek conservative man did not help the cause and explains the disappearance of bicycle from the EU political agenda. This example demonstrates, how policy can promote changes or preserve the existing power construction built on old social and cultural believes and economic links. In the case of Copenhagen, the head of the bicycle planning program recalls how Klaus Bondam built his 2005 campaign on cycling. "It was the first time a mainstream politician went into the election with a bicycle program and won the election with specific bicycle projects. And now even conservative and liberal politicians take up bicycle projects in elections. Independent of party membership, they take bicycle politics and bicycle planning seriously. There is a decision that sees the bicycle not as a goal, but as a means to create a more effective transport system, and that is backed up by all parties in Copenhagen" [Koglin, 2013].

The attitudinal differences of the above personalities are illustrative of an issue – often underestimated- that in the EU documents is reported as the "real and perceived barriers to bicycle use". Cultural hindrances are quoted even more frequently than technical factors such as the lack of infrastructures, the unfavorable topology of some situations, the presence of critical impediments such as land use policies that led to urban sprawl and the consequent substantially increased travel distances specific of some countries [ECMT, 2004]. Communication should be, consequently, one of the major tasks of national level stakeholders. In many countries and social groups bicycle is associated with modest means or regarded as a mode of travel for children or leisure, not for utility activities performed by adults. A sensitization campaign should foresee coordinating cycling policies inside common strategies "addressing land use, environment, physical health and finance" [ECMT, 2004]. This approach needs in return the horizontal cooperation among national decisional entities and the vertical integration with regional and local administrations, non-governmental organizations and cycling associations. National cycling policies would have the final responsibility to move cycling from

a marginal position in transport discussions into the focus of the political agenda. To reach these objectives, they must be long-term and sufficiently funded initiatives that fix legal and regulatory instruments, provide clear objectives, and foresee reliable methods for evaluating policy implementation and benefits [ECMT, 2004].

The ECMT document acknowledges that bicycle use could significantly decrease transport congestion, but does not catch the overall advantage in terms of "recovered space" that massive cycling means for cities. There is no reflection about the meaning of freeing urban areas that are now occupied by roadways and parked cars and that could be gained back for the social dimension in towns in which people mostly travel by bicycle. Only a technical note addresses the subject pointing out that cycling facilities are smaller –and therefore cheaper- than investment for car infrastructures. Anyhow, there is an effort to underline also the indirect advantages of cycling in a global cost/benefit analysis. For instance, regular cycling offers the opportunity to make physical activity and contributes to reduce pollutant emission, as reported by the WHO document [WHO, 2002] to which ECMT makes reference. These conditions represent a real benefit for the citizens' health but they contain the costs for public health care as well. A recent report of the European Code against Cancer indicates that limiting the use of private cars and using bicycle would significantly impact the environmental cancer risk by cumulating the positive effects of reduced pollution and improved physical fitness [Espina et al., 2015]. Cycling is also the quickest transport means for distances shorter than 5 Km that represent more than the 50% of the trips in Europe [EC-DGE, 1999]. Given these conditions, the question clearly is why cycling is not a more popular transport mode than actually is. As discussed above, cultural reasons seem more critical than expected, as confirmed by experimental surveys that evidenced why it is difficult to push some citizens to modify their habits [Rietveld and Daniel, 2004]. Interesting, cyclists and non-cyclists have a completely different perception of the barriers and advantages of cycling, as precisely reported in the WALCYNG report [Hyden et al., 1998]. The most anecdotal is the influence of weather on the possibility to use the bicycle. The experience of

Oulu (a 120.000 inhabitant town close to the Arctic Circle with a superb cycling infrastructure) clearly shows that –in opposite to what perceived by car drivers- weather does not matter, since cycling represents almost 25% of the average modal share in the town. Again, 75% of the Copenhageners cycle throughout the year [Copenhagen Bicycle Account, 2012]. The policy objective should be, therefore, to make attractive the shift from car to bicycle by acting on psychological elements using a smart communication strategy and, at the same time, by optimizing the conditions that can improve the real and perceived safety of the cyclists. Policies designed to restrict excessive car use as well as modifications of the traffic code in favor of cyclists have been introduced in several Northern European countries and seem to be very effective because change the power relationships among traffic actors and give a more appealing status to cycling [Hyden et al., 1998]. Also the coordinated development of intermodal transport networks is beneficial because it integrates the advantage of cycling on short distances with the long-range mobility offered by train. At the European level, useful synergies might arise from experience and technology transfer: using the resources for building conceptually wrong infrastructures is a real danger in countries without a specific tradition in bicycle infrastructures (and limited financial resources).

The two main EU documents had different targets: whereas the ECMT document was addressed to national level institutions with the aim of stimulating framework supporting actions, the EC-DGE paper represents an explicit call to the local administrators to be brave and creative. It is at the same time a pamphlet and a handbook that offers arguments, references, practical solutions, and asks for civic courage rather than laissez-faire justified by budget restrictions and practical shortcomings. “Daring to redistribute space and means” is the eloquent title of a chapter dedicated to the vision of an urban space in which motorized transport does not correspond to mobility, but represents just one means among others which deserve their own space for guaranteeing overall mobility and life quality. The reasons for the change are not theoretical and ideological, but pragmatic and rational and the force of the work is in its being factual and well documented. It quotes cost-benefit analyses, flux diagrams, health studies, statistical tables,

sociological surveys, preferential polls, climatic data, and technical parameters. It also reports success stories built starting from different cultural, topological, and environmental conditions to suggest that the will to accomplish a change is more critical than the available means and that communication strategies and accurate design are more effective than incoherent large investments. Local limited actions can be more effective than comprehensive and ambitious plans conceived without understanding of the reality, as shown by the failure of the British National Cycling Strategy [NCS, 1996].

The ECMT remains generic and the section dedicated to the national efforts does not allow the direct correlation between official announcements and results. Consequently, there is no articulate case-by-case analysis concerning what are the keys for plan successful implementation and what are the reasons that prevented the initial declarations to become reality. The general reasons (financial constraints, institutional barriers, technical limitations, insufficient public awareness) seem to be used for justifying the failures rather than to understand them. Therefore, also the final conclusions remain unproved and the comment that reliable data on cycling use are not sufficient adds another reason of doubt to the document solidity. EMCT was later integrated into the International Transport Forum that did not produce further documents concerning cycling (just a recent one on walking [ITF, 2012]).

In the recent years EU does not seem to dedicate to the cycling policy the same interest of the past and lately produced only very deceiving documents. When I read the EC-DGI paper [2010], I had the impression of a naïve and confused compilation of extemporary, not updated results (as an example: Copenhagen releases a complete statistic document every 2 years, but the document published in 2010 refers to data of 2000), without any attempt of critical analysis and in which no novelty can be found. Another document is a generic summary of already well-established concepts in which cycling and walking have a marginal role in comparison with individual “clean” (electrical and gas fuel) car mobility [Gaggi et al., 2013]. Indicative of this trend is the absence of a bicycle concept for urban mobility at the website of the EU directorate for Mobility and Transport.

Available documents are usually inaccurate summaries of old works. The Velo.Info initiative was funded for the period 2002-2004 and is still officially active to "make the expertise available to professionals all over the Europe" and to offer "specific and detailed information on cycling" [Velo.Info, 2013]. Astonishing, the Velo.Info portal provides almost no information concerning cycling, although it is very well documented regard to any other transportation issue. No single document dedicated to mobility and urban planning thematic mentions bicycle transportation [Delle Site and Salucci, 2009; Stantchev and Whiteing, 2009]. The impression is that –at the level of the EU Commission as well as at the level of local implementation of the communitarian policies [Interreg, 2016]- the bicycle has no place, with the exception of rhetoric statements to its crucial contribution for solving all the problems of urban traffic. There are some recent facts which indicate that the present situation is the logic consequence of a perverse interaction between politicians and the car producer lobbies. Car companies could produce for many years cars that did not respect the legal limits of noxious emissions under real conditions because of tolerated control procedures that embellished the results [The Guardian, 2015]. When finally the Volkswagen software scandal [Ewing and Bowley, 2015] raised public attention on this problem (and manipulations was demonstrated also for cars produced by other companies, indicating that it was a general behavior of car industry), the pro-car industry countries conditioned the EU parliament which voted a norm enabling the carmakers to build for other several years cars emitting illegal amounts of noxious gases [The Guardian, 2016]. Apart from this notorious scandal, recent experimental data confirmed that even Euro-6 cars emit amounts of harmful pollutants significantly higher than indicated in the corresponding norms. According to the EU-environment commissioner the present system that delegates the control to national states is totally inadequate because national states do not take actions that could dislike to the companies producing cars [Dlf24, 2017]. Recently, scientists claimed that CDU-SPD German government deliberately manipulated the audit results that should clarify the danger represented by diesel engine combustion products with the aim of denying correlations between exhaust fume pollution

and citizen mortality [Der Spiegel, 2017a]. At the present, diesel remains subsidized, car industry lobby can still obtain much more than bicycle lobby and even more than private citizens should pretend from their governments for their right to health [Der Spiegel, 2017b; Transport&Environment, 2017]. Only in 2018 the EU and German authorities seem to increase their pressure on car companies to force them to a more serious (self)-commitment towards the implementation of the already prescribed norms [Eisenring et al., 2018]. All this to say that mobility policies of single cities can have objective difficulties to evolve into more sustainable approaches if the national and EU framework remains substantially anchored to the defense of some industrial privileges.

It should be finally added that a common EU legislation concerning bicycler rights and traffic rules would be beneficial to avoid misconducts and potentially elevated risks for cyclers. This is particularly true due to the more and more frequent EU inner tourism, education, and work mobility. However, no apparent effort has been done in this direction and, despite the Vienna Convention, local laws and policies are admitted that are openly detrimental to cycling [Meggs et al., 2012]. In these conditions, some local entities proved being very resistant to any change [Meggs et al., 2012].

Altogether, EU policy concerning sustainable mobility seems a weak compromise in which declarations of principle are not followed by effective implementation instruments and targeted actions. When cycling is mentioned in regional development schemes, it is usually considered as recreational/tourism resource whereas utility cycling finds no place in the axes dealing with transport-produced pollutant reduction.

3.2 Copenhagen

Initially were the citizens who asked for a U-turn of the transport policy that by the end of the 1950es favored the automotive choice. Later, the implementation of a master plan that considered cycling as equal to other modes of transport was pursued consequently by the administration and the necessary resources were transferred from funds previously dedicated to automotive infrastructures

[Greenfield, 2012]. Nowadays the cycling culture in Denmark has been widely accepted and is directly supported at national level by both the Ministry of Transport [Cycling Fund, 2014] and influential generators of innovative solutions for sustainable future such as the public-private partnerships State of Green [2016] and the Cycling Embassy of Denmark [2017] which capitalize the generated know-how and export “bicycle planning expertise”. Nevertheless, Copenhagen opened the track and its success-story is based on some principles: i) the cycling strategy must be an integral part of traffic planning; ii) a new cycling policy has to be started with a major impact in terms of infrastructures to assure the network continuity and safety standards necessary to make the cycling alternative affordable; iii) the financial plan must be secured for the long term (maintenance and improvements); iv) a regional traffic scheme should integrate the overall mobility structure by improving its interconnections. These considerations implicitly imply an overall planning policy aimed at preserving a compact urban form because destination proximity encourages the use of active transport [Copenhagen Bicycle Account, 2015]. Cost-benefit analyses became further convincing arguments to adopt an active mode-based mobility programme, given the fact that investments in infrastructures devoted to cycling and walking score constantly better than car-centered investments [Netherlands Ministry of Transport, 1999; Sælensminde, 2002; Copenhagen Bicycle Account, 2013]. As an example, the monetary value of the citizen time saved by the short-cut offered by the new Bicycle Serpentine bridge will pay the investment in only 7 years [Copenhagen Bicycle Account, 2015].

3.2.1 Long-term aims, flexible praxis

Copenhagen established a long term urban development based on the alternation of built and recreational areas along five major axes (the „finger plan“). The initial city transport system was conceived contextually inside such regional plan. The saturation of the available areas prompted to look for planning alternatives and a mobility concept based on cycling was considered for achieving the objectives. The city began monitoring regularly the opinion of its cyclers in 1995 and

inscribed a specific section entitled „Subplan for the Improvement of Cycling Conditions“ in its „Traffic Improvement Plan of 2000“ in which quantitative goals and funds were defined. Bicycle-based transportation became a main player of the mobility policy and was indicated as the means that had to cover the highest rate of people transfer in the successive 10-year period (objective 2012: 40%, objective 2015: 50%, from 34% in 2000). Two further integrative projects, the „Proposal for Green Cycle Routes“ and the „Cycle Track Priority Plan“, were approved in 2000 and 2001, respectively, and the plan implementation was monitored by the „Bicycle Accounts“, reports that analyze the actual conditions every two years. In 2002, Copenhagen published the first exhaustive document totally dedicated to the reasons and the aims of its efforts for improving the bicycle use in the city and for crowning this transport mode as the central actor of the city traffic for the period 2002 - 2012, updated for 2012 - 2025 [City of Copenhagen - Cycle Policy 2002; ibid. 2011]. The strategic project defined objectives, available means, assessment instruments, and its goals were not limited to answer to transport needs. Cycling was expected to contribute significantly to the overall city life quality and to its attractiveness at the international level. Copenhagen established from soon that catching a leading role as bicycle-friendly town was a priority because of the economic feed-backs that this leadership could mean in terms of image: being perceived as an innovative and livable city able to develop competitive alternatives to static and anti-economic ways of managing a city. Cycling became an instrument to build the “brand Copenhagen as a livable, innovative, sustainable and democratic city with a political will to lead the way in the battle for an improved quality of life for the citizens” [City of Copenhagen - Cycle Policy 2011]. The new transport policy was expected to influence social behaviors and modify life perception as well as social opportunities. “By aiming to be the best in the world we can show the way for other cities around the world and raise the bar for what is possible in the area of urban cycling” [City of Copenhagen - Cycle Policy 2011]. There are pride and idealism in these official words, but also the awareness that urbanity values can be experienced only in a city built for being fair with its citizens and that only this daily experience makes a society re-

ally democratic. This awareness and the necessity to witness the successes led to the organization of a powerful documentation center that from the beginning published its text in English to reach a larger international public and to exert marketing activity [City of Copenhagen - Cycle Policy 2002]. A second strategic plan was published in 2011 and fixed the objectives and the cycling city policy for the period 2011-2025 [City of Copenhagen - Cycle Policy 2011]. Related legislative decisions detailed in the “Municipal Plan 2011” enforced the goals, such as the requirements for bicycle parking places in new buildings, including cargo bike parking slots. Nevertheless, this desire to reach an outstanding position does not restrains Copenhagen from referring openly to Amsterdam successful bicycle solutions to identify the weakness in its own bicycle planning and to adapt actions that could improve its cycle policy [Copenhagen Bicycle Account, 2012]. Quantitative objectives were foreseen from the beginning, such as the increment of 10% of the average speed and the 40% reduction of serious cyclist causalities in the period 2001-2012, regardless to the expected bicycle increased traffic volume [City of Copenhagen - Cycle Policy 2002]. Copenhagen management realized also that the choice of cycling is psychological as much as rational and, consequently, regularly monitors the perceived sense of security (that does not always correlate with the objective data concerning accidents and safety [Copenhagen Bicycle Account 2007]), improved the comfort and the quality of the intermodal infrastructures. The opportunity to combine cycling with public transport or to use dedicated green panoramic routes were designed to make cycling a realistic alternative to private cars not only for short distances (till 10 Km it was already the most frequently transport means used in Copenhagen in 2010 [City of Copenhagen - Cycle Policy 2011]), but for greater distances as well. Coherently, Copenhagen conceived an intermodality plan by stipulating agreements with the railway and metro administrations to facilitate the bicycle transport (development of new dedicated wagons) and ameliorating the parking facilities at terminals that were integrated with repair services [City of Copenhagen - Cycle Policy 2002]. The data relative to the years 2012 and 2014 (37% and then 45% of the commuting trips for work and education, 52% and successively 63% if

considering only the City of Copenhagen residents, respectively) showed a trend towards the initial target despite the fact that in the 2000-2012 period the global traffic volume increased more than 20% [Copenhagen Bicycle Account, 2013 and 2015]. The municipality position was somehow surprising. Instead of celebrating, it considered that the adopted strategy had just picked up the low hanging-fruits and that more ambitious policy and investments were necessary to convince cycling more people, also foreseeing a substantial population increment in the coming years. This led to an investment plan of 260 million euro in 10 years to improve the existing facilities. Two years later, the Bicycle Account reported both quantitative indicators and goals for 2025 [Copenhagen Bicycle Account, 2017]. Commuting trips by bike remained below expectations (41% of the total, with a goal of 50%) but the share of shopping turnover performed using the bicycle matched that of cars and for the first time in the recent history, in the city traffic the number of bicycles exceeded that of cars. Almost all the usually analyzed indicators showed a positive trend, a condition that renders realistic the other ambitious aims fixed for 2025: reducing cyclists' average travel time by 15%; increasing the number of cyclists who feel safe in traffic to 90% (2016: 76%); decreasing the number of seriously injured cyclists by 70%; increasing the share of cyclists who find cycle tracks well maintained to 80% (2016: 71%); increasing the share of citizens who think that bicycle culture affects the city's atmosphere positively to 80% (2016: 71%); increase citizens satisfaction with bicycle parking to 70% (2016: 37%) [Copenhagen Bicycle Account, 2017]. Indeed, it seems that Copenhagen managed to solve the infrastructure problems related to bicycle mobility (track number, width, interconnection, safety), but still needs to improve the interfaces between cycling and other activities. Parking is still the indicator with the lowest score whereas the only indicator with a negative trend concerns intermodality, namely the possibility to combine cycling with public transport modes.

Since both the most recent reports [Copenhagen Bicycle Account, 2015, 2017] identify bike parking as the weakest infrastructure, the local administration is evaluating a specific plan to address this issue in the frame of a more ambitious

reshuffling plan for urban mobility. It considers reducing overall car use in the city by introducing further road pricing, narrower lanes, and further speed limitations. Specific actions foresee transforming car parking lots in bicycle parking facilities but also designing the public street space as a flexible factor to be used according to needs. Bicycles and cars would share the same space but have access to it at different hours, according to their more frequent use of that space. About intermodality, long-distance utility cyclers are the most sensitive to its efficiency. Historically, they are open to acknowledge improvements, as in 2006 [Copenhagen Bicycle Account 2007] when observed the positive effects of the agreement with the railway society aimed at facilitating the bicycle transport in the trains and of the introduction of norms for the compulsory building of bicycle parking facilities in the new constructions. However, the higher number of users has rapidly saturated the supplementary offer and it will be interesting to see how the municipality will address these bottlenecks that will be even aggravated by the increasing absolute number of bikers and cargo bikes. Another issue concerns the administration aim to make cycling appealing and affordable for more and more social groups. Inclusiveness and affordability are concepts that require increasing safety and comfort standards for being implemented. Copenhagen decided for bicycle traffic on segregated spaces: dedicated tracks along the main roads, bicycle-friendly traffic-light systems, covered and locked bicycle stands, panoramic and less noisy routes for utility users, optimized interconnection with green cycle routes –isolated from motorized traffic- offering long distance commuting opportunities in quiet environment. The new strategic plan considers innovative Bicycle Superhighways for long-distance commuters [Copenhagen Bicycle Account 2010; 2012; Cycle Policy, 2011].

Beside a large array of bicycle supporting initiatives, the town adopted also dissuasive policies against car use and through traffic introducing road pricing, increased parking fees, and reduced accessibility in resident areas. The width for car-accessible streets was diminished and parking spaces for cars were discontinued to recover bicycle parking slots. Modifying the spatial distribution between cars and cyclers improves cyclist safety (objective as well as perceived) and

comfort. As it has been noticed, just one intersection perceived as unsafe is enough for the elderly to leave the bicycle at home, whereas stretches without cycle tracks prevent parents to allow their children cycling to school [City of Copenhagen - Cycle Policy 2011]. Therefore, construction details such as the design of the intersections and the positioning of cyclers at the traffic light have been constantly improved to ameliorate their visibility and reduce the possibility of conflicts with other transport means. At the same time, great attention was given to the constructions of safer cycle tracks (separated from motorized roads and that were progressively enlarged for accommodating the increasing traffic volume) and to the completion of the sections linking-up the existing network [City of Copenhagen - Cycle Policy, 2002; Copenhagen Bicycle Account, 2013 and 2015]. As a consequence of these improvements, more (and heterogeneous group of) people were encouraged to cycle.

The situation evolves and the problems change rather than disappearing because solving a bottleneck will move the pressure to another section. The accurate constant monitoring has been conceived to identify and remove as soon as possible such weaknesses by upgrading the infrastructures.

3.2.2 Firing to a mobile target: reacting to ever new challenges

One of the major skills requested to the administrators was the capacity to react timely to the changing conditions. The 2006 bicycle account [Copenhagen Bicycle Account 2007] showed how the number of cyclists constantly grew in the previous ten years as a consequence of a longer and better connected track infrastructure. The bicycle policy success led to higher cyclist density and made more difficult for them to find parking place. The congestion of some tracks increased the cyclist sense of insecurity, although the statistic showed a significant drop of serious accidents, and it was necessary to cope with this negative perception with interventions such as the building of wider cycle tracks and the constructions of new infrastructures aimed at prioritizing bicycle transport [City of Copenhagen - Cycle Policy, 2011]. Anyway, the system is based on dynamic equilibrium. According to the city calculations, “a reduction of 10% in travel times for bicycles

gives 1-2% more bicycle trips. Wider cycle tracks on all streets with more than 10,000 daily cyclists and/or alternative routes separated from motorized traffic are estimated to lead to a rise of 3-5% in the modal share of bicycles" [City of Copenhagen - Cycle Policy, 2011]. Similarly, the implementation of any new separate track contributes to increase the bicycle traffic of 15-20% on that portion [Copenhagen Bicycle Account, 2017]. Therefore, it is constantly necessary to improve the overall quality of bike infrastructures. Ambitious short cuts are now provided by means of dedicated tunnels and bridges over sea arms, railways and large roads [City of Copenhagen - Cycle Policy, 2011] such as the Åbuen bridge, the Bryggebroen – the bicycle and pedestrian bridge over the harbor- the Cirkelbroen bridge over the Christianshavns Kanal, and the bicycle and pedestrian bridge over Lyngbyvej, and the Nordhavnsvej.

Recording quantitative parameters (average speed, number of cyclists/hour, parking place availability,…) and constantly monitoring users' satisfaction by means of regular polls enabled to recalibrate the infrastructure offer during the time and following how new *ad hoc* actions concerning safety, parking facilities, track width, and their maintenance affected the cycling praxis. Indeed, the goals were not always reached at the foreseen time. For instance, traffic congestion did not decrease between 2006 and 2008 but the bad scores were the occasion for an open acknowledgment of the failure of the undertaken initiatives and to implement more focused actions [Copenhagen Bicycle Account 2009]. The successive reports [Copenhagen Bicycle Account 2011; 2013, 2015, 2017] showed that the effort was appreciated by the users. The accurate monitoring of the actual cycling conditions enabled to improve them even in the presence of a contemporary overall traffic increase. As a consequence, the number of cyclists and cycled Km increased, the users felt safer and the number of accidents decreased even though the track network was extended. Comparing the reports published in the period 2000-2017, it becomes apparent that also the introduction of new quantitative parameters used by the traffic administration enabled to better evaluate the implemented actions and to anticipate the future needs. One example is given by the determination of the travelling speed on specific roads that allowed synchro-

nizing the traffic lights to the cyclist average pace and coordinating it with the fluxes of pedestrians and bus passengers to avoid physical interference. Another illustrative example well describes the attitude of the city bicycle specialists. It concerns the development of a specific device, the “comfort meter”, conceived for measuring the track surface quality. For itself, the implementation of such an instrument would be negligible, but it shows the attention for collecting objective quantitative data even related to minor aspects of cycling because of the firm conviction that the transport preference is the result of additive details. Their global optimization represents, therefore, a primary goal for achieving the transport objectives. In the 2010 report, beside the introduction of some actions designed to improve the cycling permeability (dynamic street repartition according to the traffic mode, contraflow cycling on one-way streets) there is the presentation of a list of innovative applications and services proposed by the city (pump points, fountains, bike repair shops, on-line applications for signaling shortcomings, footrests, oriented rubbish bins,…) that might be judged just funny, but that the users seemed to appreciate [Copenhagen Bicycle account, 2011; City of Copenhagen - Cycle Policy, 2011]. The 2011 strategic plan explicitly acknowledged overall comfort as a crucial parameter to make cycling appealing and affordable to more people and diverse social groups. “Conversation Cycling” is a paradigmatic initiative the goal of which is to build 3 lanes in each direction on 80% of the network (4 lanes in total on stretches where the cycle tracks are bi-directional) to enable cyclers to drive side by side without preventing faster cyclers to overcome [City of Copenhagen - Cycle Policy, 2011]. Parents and children will be able cycling alongside and friends to chat. The infrastructure makes possible to ride at the speed that suits the individual best and in such conditions both young and senior should feel safe. Another smart idea of bicycle-oriented urban design is the introduction of “bicycle-beds”. These are bike parking areas lowered 20-30 cm below street level: the shrewdness enables a better overview and a simpler identification of the own bike [Copenhagen Bicycle account, 2015].

3.2.3 Cycling for a fit economy

Financial reasons represent the major motivation for cycling only for a tiny minority, whereas most of the citizens acknowledge that they prefer it because it is fast, easy, and helps in getting physical exercise [Copenhagen Bicycle Account, 2017]. These advantages are sufficient to keep cycling 75% of the citizens even in winter [Copenhagen Bicycle Account, 2015]. Their effort was encouraged by many firms which recognized that supporting cycling employees by providing covered parking, bathing facilities („Just one missing shower will discourage long-distance commuters from cycling to work") and company bikes was both a direct economic advantage (fit and motivated employees) and part of their corporate communication effort [City of Copenhagen - Cycle Policy, 2002; Copenhagen Bicycle account, 2015]. Similarly, companies are more and more supportive in providing facilities for customers who shop by bicycles and cargo bikes. If single citizens choose cycling mostly for their pleasure, it represents an interesting economic alternative to other transport means for the public actors, as shown by the cost/benefit analyses. Commuting by cycling is a physical exercise that was considered positive for health but this advantage –in terms of overall community- was not initially quantifiable [City of Copenhagen - Cycle Policy, 2002]. The application of official parameters allowed recovering precise data to describe how the specific infrastructure improvements in favor of further bicycle use may reduce the socio-economic costs for the community [Copenhagen Bicycle Account 2009; 2011; 2013]. The cycling-dependent health benefit for the sole city of Copenhagen corresponds to 230 million of euro and 34,000 sick days per year [Copenhagen Bicycle Account, 2013]. "Fortunately, it pays off to invest in urban cycling. Increased cycling levels give society less congestion, fewer sick days, longer life expectancy, less wear and tear on the roads and less pollution. Cycling infrastructures are also inexpensive compared with other transport investments" [City of Copenhagen - Cycle Policy, 2011]. The internal rate of return of investment for bicycle infrastructures is equivalent to 19%, largely superior to the average obtained for investments in other infrastructures [Copenhagen Bicycle Account, 2013]. Furthermore, the bicycle leadership stimulated the development of an array of companies dealing with technologies related to bicycle construction

and cycling transport [Copenhagen Bicycle Account, 2011]. Last but not least, cycling is considered a major pillar to achieve the environmental/economic goals concerning energy consumption, air pollutants, and CO_2 emissions [Copenhagen Climate Plan, 2009; Copenhagen Bicycle Account, 2015].

3.2.4 Cycler profile(s), social behavior, and sense of community

Detailed planning, secure funding, and clear objectives are all necessary ingredients, but Copenhagen could rely on positive cultural factors as well to convince its citizens to cycle. In contrast to other cities, cycling was always socially acceptable and cyclists are evenly distributed over all income brackets [City of Copenhagen - Cycle Policy, 2002]. High-income earners choose to cycle at least as frequently as the rest of the population [Copenhagen Bicycle Account 2001; 2007], families with two children make large use of cargos and trailers instead of using a car. When half of the population prefers the bicycle for transport, it means that it responds to the needs of several and differentiated user groups and ideological reasons are not statistical relevant for bicycle choice. For the city it was always clear that mass alone was not a criterion, but that all the different population groups should participate in the cycling success, namely that everybody should feel having her/his place. For the same reason one of the most annoying factors for standard cyclers as well as for users of different transports are “intrepid” cyclists who have an aggressive conduct [Copenhagen Bicycle Account 2007, 2015]. The local administration has therefore devoted attention to campaigns focusing on correct behavior and courtesy. The cultural relevance of cycling in this city can explain also the outcome of some unsuccessful initiatives. Copenhagen launched a bike-sharing project (the second attempt after Amsterdam trial), but it never developed, probably because the large majority of the people has –and prefer to use- its personal bicycle. Public bicycles remained a tourist attraction rather than an element of the transport system.

Cycling means also a way of “experiencing the city and its life”, being in physical contact with other people, preferring proximity shopping, being in touch with the seasons [City of Copenhagen - Cycle Policy, 2002; Copenhagen Bicycle Account

2011]. Cycling was never intended as “a goal in itself but rather a highly-prioritized political tool for creating a more livable city”, “A bicycle-friendly city is a city with more space, less noise, cleaner air, healthier citizens and a better economy” and everybody “on a bicycle can experience the city spontaneously, up close and personal. The more there is to sense and experience when you roll through the city, the shorter the trip feels and it becomes more attractive to cycle. Cyclists appreciate having things to look at but they also contribute greatly to life in Copenhagen’s streets. They make the city safer, less noisy and nicer for everyone to move about in” [City of Copenhagen - Cycle Policy, 2011]. The large majority of the citizens believes that cycling culture has a positive impact on urban life [Copenhagen Bicycle Account, 2015]. The socialization potential of bicycle was optimized by design, avoiding „back-street solutions“ and exploiting the flexibility of the means to expand its potential for exploring the city and participating to its activities. Bicycle accessibility of otherwise difficult to reach places increased the appealing of this transport solution and improved safety (*ad hoc* intersections and bridges) and comfort (even surface, clearance after snowfall) convinced more and more persons to prefer it. Given the fact that bicycles need extremely less space than cars for moving and parking, increased cycling had and still will free up more space for city life for everybody and revenue for city shops that profit from a larger number of customers [City of Copenhagen - Cycle Policy, 2011; Copenhagen Bicycle Account, 2013]. Cycling, as a part of the Danish identity, has been also proposed to immigrants to favor their integration. In contrast to Copenhagen, in many of the immigrant origin countries bicycle is not a popular transport mode and it is often forbidden to women. Courses for beginners organized by Red Cross were particularly appreciated by women who recognized the advantage of possessing an independent and cheap transport means to organize their life and get increased job opportunities [Ward, 2007].

Another way of experiencing the bicycle is represented by long-distance routes that should connect inner city with outskirts and, finally, with other towns. In addition to serving as home-workplace routes connected to the inner city network, they are intended to have recreational function [City of Copenhagen - Cycle Poli-

cy 2002] and, consequently, they have been conceived with a design that should be functional as well as panoramic. Wind and weather changes were considered a sensorial experience to integrate in this road category rather than an obstacle. Green Cycle Routes offer promenades along water surfaces such as harbors, lakes and channels, and dismissed railroad tracks in green surrounding are highly appreciated because of their beauty and for valorizing the quality of green and blue areas. The Svanemølle Route from Østerport Station to Ryparken Station, the promenade connection in Havnegade and the bicycle route along the old Amager railway have been already completed. Further 51 Km of green routes have been planned [Copenhagen Bicycle account, 2015].

In conclusion, Copenhagen is a bright example of global and long-term vision concerning its sustainable development. Its urban policy is totally aware of the interconnection among city form, mobility modes, and the effect of these two factors on social aspects and local economy. The documents produced along the years by the city administration demonstrate the professionality with which it dealt with all the aspects related to the idea of reconversion of the public space and mobility concepts. Probably any single keyword described in the Introduction finds its development in the theory and the practice used by Copenhagen to conceive, implement and constantly improve its development concept. This competence is somehow mirrored by the success of the city which managed to stably climb to the top of international metropoles in terms of appealing, economy fitness and life quality [nordic.businessinsider, 2017].

3.3 Amsterdam and the Dutch model

There is a strong analogy between the Dutch and the Danish approaches: the same clear concept that active modes must become main players in the general traffic policy and, consequently, must be integrated in the general plan concerning infrastructures and urban development. In the Dutch Mobility Memorandum (Nota Mobiliteit, 2005), it is indicated that: "All authorities will stimulate walking and the use of the bicycle as the main means of transport and as a link in the

journey chain from door to door. Municipalities, water boards, provinces and city areas will do this, amongst other things, by ensuring a bicycle network which complies with the main traffic requirements of cohesion, directness, attractiveness, safety, and comfort. The authorities will also ensure parking facilities for bicycles which meet the user demands in terms of quality, quantity, and location". It is a strong statement that let no doubt about national objectives. Furthermore, it was followed by supporting legal actions, such as the indication that bicycle parking stores at the railway stations are regarded as integral part of the stations and the non-negligible detail concerning the liability in case of accidents: Dutch legislation assumes that car drivers are the dangerous actors in the traffic, not the cyclists, and consequently they must take the responsibility for avoiding collisions because they are liable [Dutch Ministry of Transports, 2009]. Similar between Amsterdam and Copenhagen is also the awareness that: a) the citizen support is determinant for the successful implementation of any political measure and that therefore all the social actors must be involved in the project development process; b) a city that bases its transport concept on bicycle mode represents an image and economic value that must be advertised with appropriate communication at international level for keeping the leadership in this innovative urban vision.

3.3.1 The national framework

In the Netherlands, municipalities are not let alone in designing active mode solutions but strongly supported by national guidelines and technical information. They have access to all the know-how pieces necessary to enforce an effective plan and then can adapt these indications to their specific context. Thirty years of cumulated and critically analyzed experience are the background on which the local administrations can build *ad hoc* solutions without the necessity to start from scratch. This "historical knowledge" is outsourced to organizations with specific competences and different institutional goals. Such organizations provide local administrations with material and advice. One of the available instruments is the Cycle Balance Score [Borgman, 2003] that weights the infrastructure quality

according to a method issued from a general infrastructure benchmarking promoted by the Cycling Association (Fietsersbond) and can be used to orient improvements. There is a good correlation between this score and bicycle use and, therefore, modifications that can improve it are considered predictive of successive traffic habit changes. These data are crossed with complimentary information taking in account more general factors concerning spatial-economic, demographic, cultural, and geographical references [Dutch Ministry of Transports, 2009] to determine what are the most relevant issues to cope with to improve the cycling praxis. Fiets Beraad collects and distributes statistical data and case experiences and CROW is a platform that “makes knowledge applicable in the practice”, publishing recommendations and guidelines, among which the standard manual for designing infrastructures suitable for bicycle traffic [CROW, 2007] and that represents the absolute reference in the field.

The Cycle Balance concept deserves a deeper analysis because the approach used to collect and exploit the data is as much important as the technical output. It was foreseen to collect objective data to help the local administrations -that are finally responsible for traffic policy implementation- to adopt meaningful actions. The starting point was that there is a correlation between infrastructure quality and cycling attitude and, therefore, it was necessary to identify the most critical parameters making the door-to-door trips maximally attractive, comfortable, and safe. Twenty-four factors describing the local cycling conditions in more than 100 towns in the Netherlands were benchmarked for comparing the performances and learning from different experiences. Data were obtained from official documents, questionnaires, pre-existing databases, and “measuring bikes”, namely bicycles conceived to record information pieces as diverse as speed, noise, vibration, pauses, and manoeuvres on 12-16 randomly selected routes inside each town for a total of 30-40 Km of trip. Cars were used in parallel on the same journeys to directly compare bicycle competitiveness in terms of time and costs. Survey design, data collection, and analysis were provided by local branches of the Cycling Association and resulted in the first large-scale relevant, comparable, and reliable set of information concerning cycling infrastructures and conditions.

Towns were ranked and average/ best scores listed. Large cities and small towns have evident different problems and reasons for choosing specific alternatives, but the final results seemed convergent: a survey conclusion indicates that “you are a thief of your own time and money” if you do not use the bicycle for short trips in the large towns [Borgman, 2003]. Because of its commitment, the Cycling Association has become an acknowledged and respected partner for discussing in a cooperative environment “on facts rather than emotion” [Borgman, 2003] how to implement the self-enhancing process for which good cycling conditions lead to more cycling and more cyclers to better cycling policy, namely further improved cycling conditions. The idea of local debate is pivotal in this approach and avoids detachment between citizen needs and political decisions. The initial survey has been updated by follow-up data collections that involved more and more towns and analyzed further parameters. Finally, the nomination of the Cycle City of the Year in the frame of a national contest represents an incentive, a successful communication opportunity, and a lever to stimulate local authorities to look at the best references in the field.

3.3.2 Political *versus* personal reasons for choosing bicycle as the transport means

The reasons why the Dutch government decided to integrate bicycle in the transport policy are economic: it “improves the flow of traffic in towns, does not take much room, either on the road or when parked”, it does produce neither CO_2 emission nor noise, provides vital daily exercise opportunity and, therefore, healthier and more productive citizens [Dutch Ministry of Transports, 2009]. Mobility, air quality, climate, energy as well innovative technology are all political issues in which cycling transport mode can substantially help in reaching the –often compulsory and expensive- objectives of sustainability [Jonkhoff, 2011; City of Amsterdam, 2012]. Furthermore, providing infrastructures for bicycle transport is extremely cheaper than alternatives based on motorized vehicles, improve accessibility for companies and facilities that depend on motorized transport, increase social and traffic safety [Dutch Ministry of Transports, 2009, City of Am-

sterdam, 2012]. Private citizens choose bicycle -in the Netherlands as well as abroad- for less rational reasons: they simple enjoy riding and arriving at work or school faster and in good mood [Veisten et al., 2011]. Their decision is utilitarian and hedonistic, whereas economic or ideological reasons are statistical less relevant or the main motivation for only restricted sub-groups, such as long-distance commuters [Heinen et al., 2011]. Since cycling is practical and relaxing, it is popular. Since it is popular the cyclist mass imposes its visibility and traffic adapts to it, namely cycling becomes less dangerous and the improved safety makes cycling even more attractive for any other, even though belonging to disfavored population groups [Dutch Ministry of Transports, 2009].

3.3.3 Compact cities and use of the limited space

Amsterdam, as well as most of the Dutch towns, is a densely built city which conserves most of its historical structure of mixed activities in the same restricted areas. This condition determines that most of the metropolitan trips (utilitarian trips performed for activities such as school and work commuting, shopping, leisure) are shorter than 7.5 Km. Given the speed of 15 Km/h for the average cycler (comparable to the bicycle speed measured in Copenhagen), it means less than 30 min for the longest trips, namely the time that people accept to spend for reaching their job [Dutch Ministry of Transports, 2009] and that is the time that Marchetti's rule identified as the constant used to build towns in any historical period [Marchetti, 1994]. The physical hindrance imposed by the presence of the channels impaired the transformation of the old walkable town into a car-city by means of street widening [Peach, 2011] and this fact prevented the physical reorganization of urban structures that made obsolete the bicycle in other old European cities. Nevertheless, it was not only a question of chance. Urban development in the Netherlands has been conceived to maintain dense cities as a consequent choice to limit sprawling, preserve its territory, and to optimize transport [Dutch Ministry of Transports, 2009]. Large Modernistic development schemas failed because of strong citizen opposition [Mak, 2012]. When necessary, independent satellite towns were built –following the Stockholm concept-

instead of adding external layers to the edge of the originally existing center. The background idea is that “the siting decision for a new residential area influences the way in which people will or can travel”. Therefore, the guidelines indicate that “it is important that new business and, particularly, residential sites are not built on the edge of expanding metropolitan districts, but rather within the daily cycling distance of 3 km from the central areas of large and medium-sized cities. If there is no space, then building a new city or a new center is preferable to a new expansion site at the city’s edge” [Dutch Ministry of Transports, 2009].

In the specific case of Amsterdam, the rapid increase of the car traffic in the 1960s coupled to the narrow streets of the old town led to serious congestion in the center and promoted the migration of the business to the city’s fringes. Downtown employment decreased as a consequence of the suburbanization and commuting time increased, causing a further decline of bicycle use in favor of car and too many cars caused a major parking problem. At this point, the city asked whether it should “adapt itself to accommodate motorized transport or should consciously avoid doing it” [Langenberg, 2000]. Since 1978, the city began a consistent policy of support to cycling based on the idea that bicycle demands less space, namely frees space for the city and improves urban accessibility. Funding was secured and the initial measures were taken aimed at obtaining the first “Main Bicycle Network” and implementing complementary cycling infrastructures [Langenberg, 2000]. In the long-term Traffic and Transport Plan (2000-2010), cycling was completely integrated in the general traffic and transport policy that dictated the strategic planning for urban and environmental policy. The goal was to switch on bicycle as many as possible trips shorter than 10 Km giving priority to cyclists and restricting unnecessary motorized traffic by channeling the necessary motorized traffic into corridors outside the residential areas [Bakker et al., 2011]. The appealing of cycling longer distances was encouraged by the construction of panoramic routes boarding water surfaces and green areas [Langenberg, 2000]. It was also considered the space competition between pedestrians and bicycles. For this reason, the most crowded streets of the historical center have been redesigned to increase the width of both the footpaths and the

cycling tracks at the expenses of car roads. Further space was recovered by removing lighting poles substituted with lamps attached to suspended wires [Bakker et al., 2011]. Amsterdam built a specific department (60 employees) to coordinate, supervise, and implement its cycling policy among the 14 city areas that are autonomously managed. Coordination was also foreseen to create an integrate infrastructure network involving the neighbor communities to simplify the trips of long-distance cycling commuters.

3.3.4 Clear priorities for infrastructures

A set of successive Long Term Policy Plans defined how conditions should evolve and allocated the necessary resources to reach the goals. The first set of actions addressed the trip speed. By preventing bottlenecks, cyclers could increase their average speed from the present 15-16 Km/h to 25-30 Km/h. It means that distances till 15 Km could become attractive for utilitarian cyclers since they could be still traveled in around 30 minutes. Long-distance commuters could also profit from an integrated multi-modal transport system. Combining the flexibility of cycling with the long-distance transport offered by train, public services can be exploited more conveniently and the bicycle can optimal close the gap of the first and last kilometers. "**Cycling in the chain**" becomes possible facilitating the direct transport of bicycles in trains and metros and building secured parking facilities at the stations. Amsterdam designed also a "park and bike" program that makes available a bicycle for visitors parking their cars in dedicated areas at the city edge.

Of course, effective utility cycling needs reliable infrastructures. A bicycle-friendly city must have a continuous network of cycle paths wide enough to avoid congestion, secured junctions, synchronized traffic lights, comfortable path surface, segregated bridges and underpasses to avoid busy roads, interconnection with bicycle highways for improving inter-local commuting. Conventional transport modes depend on infrastructures that create barrier and cause vacuum [Jacobs, 1961], bicycle mode can easily re-connect the urban texture with minor investments. As already reported for Copenhagen, infrastructures must consider bicy-

cle parking facilities as well. The main problem of Amsterdam is to succeed in satisfying the increasing demand for safe parking places, better if covered and manned. The overwhelming investments for the next years will be devoted to create enough places to deal with the present and future needs, given the fact that cycling share increases constantly (over 40% growth in the last 20 years) [City of Amsterdam, 2011]. Underground store rooms, removal of abandoned bicycles, theft control, and a communal regulation that obliges new buildings to provide adequate parking facilities are further initiatives to tackle the parking shortcoming. Last but not least, there is the safety issue. Amsterdam knows an increasing number of accidents in which cyclers are involved, mostly together with cars. This clearly indicates the still present deficits in infrastructures, specifically in terms of traffic segregation, path width, and junction design. A more drastic hypothesis considers limiting scooter and moped circulation [City of Amsterdam, 2011; 2012] to prevent collisions.

3.3.5 Specific problems, opportunities, and perspectives

Amsterdam dedicated a significant part of its efforts to evaluate social aspects related to cycling. For instance, the administration analyzed the cultural factors which influence behaviors. Minorities issued from foreign countries have often no familiarity with cycling and use it statistically less frequently than integrated Dutch people. Educational programmes have been launched to close the gap by removing some cultural prejudices. In his thesis dedicated to this subject, Koolhof [2013] arrived to the conclusion that “the non-Western immigrants in the Netherland has a habitus in which cycling is not perceived as normal, “*gewoon*”. They are rather acquainted with other modes of transport and adopted them unconsciously in their habitus”. Furthermore, Orthodox Muslims think that a woman should not cycle and most of them never cycled in their countries of origin. This behavior does not change automatically when they move to the Netherlands, despite the fact that this condition limits their possibilities to travel independently and therefore to participate actively in the Dutch society and to improve their integration and occupational chances [Harms, 2006]. Koolhof [2013] noticed that

the current public policies understand the necessity of introducing newcomers to the field of cycling. They talk about the bicycle in the *inburgeringscursus* and offer cycling lessons. In particular, cycling education has been proposed as a means to alleviate female immigrate mobility and integration [Koolhof, 2013]. However, this approach has not been very effective because was limited to technical aspects, whereas it did not aimed at changing people behavior, that is culturally shaped. For instance, Moroccans and Iranians want to be seen in an expensive car since it is a mode of transport with status, in contrast the bicycle is perceived as a mode of transport for poor people who cannot afford a car [Koolhof, 2013]. The consequence is that in these cultures men are ashamed to cycle [Koolhof, 2013].

Another stimulating concept concerns kids' autonomy. It can appear surprising to find in an official governmental document dealing with transport policy one priority that is the development of traffic conditions promoting the independence and autonomous circulation of children "from a young age". The point is recalled and a whole paragraph is dedicated to the subject of kids who can cycle themselves without supervision to school and extramural activities [Dutch Ministry of Transports, 2009]. It seems that independency is a major value in the Dutch society [Mak, 2012] and what can give to a kid more personal freedom than a bicycle to discover the world around him? Consequently, there are educational initiatives to train kids in cycling (and bicycle maintenance) in the cities because there is a clear association between such training and increased cycling as well as safer cycling.

In contrast to what has been reported in other cities, bicycle sharing had no great success in the past in the Netherlands and the reason was attributed to the elevated ownership among the population. Nevertheless, in the past few years there is a new interest for a bike service thought for long-distance travelers that use another transport mode to reach a town and need the bicycle for short trips once at the destination. The Dutch Railways owns a bicycle fleet waiting for users at the largest train and bus stations. In contrast, the administrations identified as a critical issue the elevated rate of bicycle theft. It is a major problem in the Nether-

lands that has been matched with preventive actions (manned parking structures, ownership chips) and repressive measures (police controls, national bicycle theft register).
An interesting monetary initiative for supporting active transport mode considers the introduction of a fixed budget for commuting. It is an initiative supported by companies that try to match the emission goals for their business. Since they are responsible also for the amounts caused by employee transport to and from the company, they try to incentive bicycle by offering a flat travel contribution. Since bicycle is the cheapest means of transport, employees can increase their total net income shifting from motorized transport to bicycle. Companies also provide firm bicycle and facilities (secured parking, showers) to the employees as well as offer incentives proportional to cycled distances.

Similarly to Copenhagen, also in the case of Amsterdam the approach used to conceive the urban reorganization was systematic and considered from the beginning the implications that this transformation could exert not only on the mobility, but on the social variables. It was foreseen that the development of a sustainable city relies on a specific urban structure that must be compatible with a mobility that can contribute to mitigate social and economic problems. This concept contributed to make Amsterdam a realized example of “just city”, namely a city with “a better quality of human life within the context of a global capitalist political economy” (Fainstein, 1999). This achievement is the result of a complex of coordinated actions which refers to the theory of urban planning management. It is worthy to cite that in Amsterdam “there is a highly consensual mode of decision making, with elaborate consultation of social groups and heavy reliance on third-sector organizations for implementation of policy. In conformity with the vision of the new urbanism, spatial forms are physically diverse, development is at very high density, and population is mixed by class and, to a lesser extent, ethnically. These achievements are within the context of a relatively equitable distribution of income, a very extensive welfare state, corporatist bargaining over the contours of the economy at the national level, and public ownership of urban

land. All this came partly out of a tradition of planning and compromise but also out of militant struggle by workers' parties for much of the century and by squatters and street demonstrators more recently" (Fainstein, 1999). This history probably also contributed to the relevance that Amsterdam administration attributed to cycling for social integration and improved access to opportunities for minorities.

3.4 London

Can an analysis start from a moral perspective? I believe it should be admitted, if it helps in understanding the meaning of the problem and, with London, the problem is that the available documents (Johnson's administration) are not factual, but rather look like advertisement. Instead of describing, there is the impression that they try to sell a self-representation of success depicting a vision as it would be already the reality. Beside this, it clearly emerges that the focus of the urban development in London follows the traditional interest for speculative building rather than to set the conditions for a mobility based on cycling. Beyond the rhetoric declarations and the ephemeral plans proposed in combination with the Olympic Games [LTGDC, 2009], cycling infrastructures have never been considered in the development plans if not as a mere complement of leisure complexes [LTGDC, 2009]. According to an independent users' opinion platform [Thisbigcity, 2013], the realizations remain negligible. The administration performed its polls as well but sample number and interview selection criteria used for preparing the surveys concerning the citizens' attitudes towards cycling were largely insufficient to get statistically reliable data [TfL, 2010a; TfL, 2011]. Only in 2012 the standards were improved by increasing at least the number of cyclers in the poll sample [TfL, 2012]. As a consequence, the percentage of whom was concerned by the insufficient safety more than doubled with respect to the values recorded in the previous surveys. Nevertheless, despite the availability of "real data" reporting people expectations and concerns, the reference document used for developing the announced "Mayor's Cycling Revolution" (!) is based solely on theoretical hypotheses [TfL, 2010b]. Major's claims [TfL, 2013] express the ideology (this

term looks more pertinent than vision or strategy) of London's administration towards this issue but remain a mix of stereotyped slogans and proposals missing the necessary consideration for the technical issues.

The "Cycling Revolution" [TfL, 2010b] is not an analysis focused on quantitative and qualitative needs necessary to promote cycling, there is no defined objective in terms of infrastructure, no deadlines to implement precise projects, no commitment to act on regulatory instruments to obtain more cycling-friendly conditions, neither the wish to use the cycling policy as a means to change the city perception, fruition, and to promote healthy behaviors and social integration. It deals exclusively with an abstract parameter, namely the "trips that could be reasonably being cycled". These are basically all the short trips performed by people who could potentially have access to a bicycle and in 50 pages the authors dedicate no more than two sentences to remind the possible actual reasons for which people do not cycle (it is not safe and comfortable to do it in London now, there are cultural backgrounds that ignore or refuse to bike, there are not the necessary support infrastructures such as safe parking places and showers in working places). Instead of data, there are assumptions that postulate a condition that indeed totally diverges from the reality. For instance, the average speed of a cycler is considered 15 Km/h but it has never been measured in London traffic conditions. The available data from Copenhagen and Amsterdam indicate that such a speed can be reached, but only in the presence of infrastructures and services that are not at all comparable with those of London.

The impression is that the aim of the administration is improving the statistics rather than modifying the urban shape and people awareness about sustainability and social attitudes. Consequently, the attention is attracted by low hanging fruits: instead of investing to widen the basis of active cyclers, the total number of cycled trips can be increased with minimal effort by pushing the present regular cyclers to cycle a bit more. These represent a tiny minority (more than 50% of all the trips by bicycle are done by only 2% of the cyclers and in ten years their number augmented of only 3%, whereas the trips doubled) of white, male, young professionals who live in the inner city [TfL, 2010b]. Apparently, the "bicycle pro-

ject" has been conceived for this category of (mostly) vehicular cyclers who cycle because it is trendy and increases their fitness [TfL, 2011]: the administration plans to allocate a low budget for infrastructures but these are concentrated mostly in the center of London. This despite the fact that the real potentiality for improving utility cycling resides in outer London and should involve other social groups. Of course, rhetoric would be not sufficient for implementing a bicycle-based mobility in this context. The investment costs would be extremely elevated because of the city surface extension and because they should act on the perception people have towards cycling. In the reality, the administration does not seem keen to engage itself in this field, rather the opposite. For instance, it did not make mandatory the incorporation of walking and cycling infrastructures in new estate development projects and avoids proposing homogeneous solutions for cycling viability at the municipality level. The consequence is that in a recent comparative analysis of bicycle infrastructures [Meggs et al., 2012] the authors concluded that "perhaps the most infamous "crap cycle ways" in Europe are those of London, where some 30-40 districts have each invented their own approach". The London cycling concept appears therefore as a further discriminatory element to implement gentrification and keep separated yuppies from ethnical minorities, reach from poor people. The document admits that "travel behavior in London changes very little and very slowly" [TfL, 2010b] and reshaping the city by heavily investing in infrastructures with the aim of moving benefices from strong lobbies to common people is clearly not the choice the administration prefers. Instead of it, it proposes more advertising and trendy events to push the cycler core to travel (or maybe simply to "show up") more frequently.

Here are reported in details "Mayor's visions" for the future and their critical points [TfL, 2013]. The document begins with the statement that "cycling will be treated not as niche or marginal, but as an integral part of the transport network" to become "normal part of everyday life" because "transport is not just how you get around and cycling shapes a city". The Mayor calls for a brave policy without compromises, lobbying on the central government to obtain laws supporting the cycler rights, but he remembers as well to complain that –indeed- he does not

control the vast majority of London's roads and, therefore, he will be not responsible for delay and doubtful results. The administration will allocate roughly 1 billion euro in ten years, namely 100 million/year or annual 12 euro/person, and appointed a Cycling Commissioner to coordinate the related policies. He underlines the specificity that the cycling mode would represent for his city: it is not considered as an alternative to private motorized transport (apparently sufficiently controlled by the congestion charge introduced by the previous administration), but as a means to alleviate the suffering public transportation. Otherwise, there is no ambition of using the transport policy to reshape the city and the social behaviors. The first draft considers creating a cycling path network overlapping with that of the underground and the major bus routes, an idea that is difficult to follow when the document speaks about green corridors and linear parks. Where to create them, if motorized traffic remains untouched, no filtered permeability measures are foreseen, and the space was a limiting factor already before building the proposed segregated bicycle routs? It follows the usual list of infrastructures that are necessary to set up a cycling network with safety, comfort, and speed features sufficient to make it appealing for (London) citizens. The amount of new potential cyclers is huge but in contradiction with the expected number quoted in the detailed section. This is extremely more reductive and will accept to double the number of trips by bicycle mode in 15-20 years (by 2030!), namely raising it to a tiny 5% of the total urban travels, whereas the previous plan goal was to reach the 10% by 2012. This clearly unambitious goal contrasts with the demagogic tone of the document ("Timid, half-hearted improvements are out – we will do things adequately, or not at all"), but is more coherent with the planned expenses. Continental towns with cycling traditions suffers less of urban sprawling than London, possess already a good infrastructure network, and spend anyway similar amounts/year for cycling transport mode as has been now planned for London: how can London's Mayor believe to transform its large city into a place where everybody will be willing to cycle with no extra, substantial investments? Probably it does not. This could also explain why the investment policy seems more addressed to vehicular, energetic cyclers (the fast commuters that

should use the bicycle “Superhighways”) rather than to less impavid social groups. There is a striking difference with Copenhagen’s reports, always openly self-critic concerning its achievements even after 15 years of successful bicycle policy. In contrast, “London cycle network appears comprehensive in map-form” but this is an illusion since it “is simply London’s road network plus a little paint” [Thisbigcity, 2013] sold as accomplished *ad hoc* infrastructure. Calling a blue lane a “cycle superhighway does not make it something it is not and does not promote the conditions to start biking. There is no point being fast if it is patently scary” [Thisbigcity, 2013]. This user general disenchanted opinion emerges also in the official survey in which all the indicators concerning bicycle use turned to negative [TfL, 2012]. However, the real problem of London is that the administration wishes to obtain results without taking any decision concerning the critical issues. For instance, the dense mixed-use development of continental Europe cities is the first requisite to make bicycle appealing for moving around, but London report spends no word about sprawling and zoning, the two pillars of the city speculative building development. Furthermore, no analysis of the evolution of the traffic volumes has been incorporated in the document. However, the administration claims that “no reduction in motor vehicle access” and in car-parking slots will be necessary, namely most of the roads will remain shared by different traffic modes as at the present and no public space will be reallocated for active mode facilities.

This non-choice will not change the habits of vehicular cyclists, but will not recruit potential cyclers who need safer conditions. In general, the administration hopes that the problems will eliminate reciprocally (something like: more bikers will mean less car drivers, therefore some parking space dedicated to cars will be automatically available for the new bikers…) and no decision that could arise complains of some influential lobbies will be necessary.

Also some details witness of the lack of accuracy in preparing the proposal, as it is exemplified by the idea of moving cycling on the back-streets. The experiences in other countries have already shown that this model does not work (people prefer to drive on populated places for safety reasons and use bicycle to visit “use-

ful" places such as shops, theaters, offices. Cycling must not be a punishment or an activity to hide far away from amenities) and is not useful to make the town more socially dynamic, attractive, and safer. The opportunity of exploiting cycling to gain back public space ("it shapes the city", as the Commissioner himself rhetorically reminded!) is lost.

Here and there some keywords appear in the document, such as filtered permeability, greenway, "Quietways", linear parks, integrated modal transport, parking places. The impression is that they are just picked-up cherries, since no modality for their realization and integration in a global implementation plan seems having been thoroughly considered. The document refers to other potentially interested subjects that should support many initiatives. Nevertheless, it is no clear at all how much these other private and public entities are willing or in the condition to cooperate.

Finally, in the London plan there is no consideration for the social and cultural aspects that can influence cycling attitudes, neither reference to the available documentation produced in continental Europe. The administration simply hopes that communication and advertising alone will "inspire new cyclists" and hopefully reduce the incidence of "antisocial cycling".

An initiative that might be interesting was the launch of "borough projects" to stimulate slow transport modes inside specific districts. These realizations should make appealing short local trips and be used to evaluate what kind of investments will be more appropriate for the future infrastructure development. Nevertheless, their implementation was rejected by the potential users [TfL, 2012] because of the poor chosen technical layout. Two alternatives were proposed. The first foresees a complete physical segregation between motorized and pedestrian traffic by means of guardrails. It was intended for assuring safety and avoiding conflicts but was perceived as uniform and anonymous. In the second model, shared space was proposed to offer a more spontaneous, relationship-oriented and personal context. However, no measure was taken to equilibrate the relative force of the different traffic players. They got "equal entitlement to use the whole shared space" and the personal feeling was considered sufficient "to use space

with appropriate care" [Martin, 2011]. The result of this incapacity to dislike to some groups by formulating precise norms and implementing coherent layouts according to the foreign experiences led to a significant increase of the accidents [Martin, 2011]. Active modes were left with marginal and uncomfortable space [Charbonneau, 2011].

Summarizing, the London reality at the end of Johnson's term was deceiving and the development plan drafted for achieving the objective of a consistent increase of urban cycling did not appear reliable, nether for its theoretical aspects (contradictory and superficial) nor for its implementation strategy (hopes in lucky evolution, too scarce investments, no political will to decide when the resources become limiting and conflict of interest arise). This balance was in striking opposition with respect to continental city examples and the under-evaluation of social and urban planning aspects has probably strongly contributed to the scanty result. The new Sadiq Kahn administration promised to change register. During the election campaign he announced to wish chairing TfL "to turn it into a more efficient and more profitable public sector organization" and his aim was that of keeping transport costs affordable for the commuters [SadiqKahnForLondon Manifesto, 2016]. Active modes had to contribute significantly to this strategy for equitable transport policy, but the proposed measures were oriented to the expansion of the previous model (for instance, cycling on backstreets and investments concentrated on Superhighways) rather than adopting an alternative approach. Few ideas remained fuzzy ("backing the Rotherhithe-Canary Wharf cycle and pedestrian bridge" is not really a statement and saying "prioritize continuous cycling routes running through parks, alongside waterways" does not fix objectives and deadlines), there was no quantitative financial commitment and not clear indication that public space should be redistributed to reach the goals. After his election, he promised building new segregated cycling routes to improve the user safety, but the scheme remained the old, namely organizing (necessary) superhighway (the name does not correspond to the reality) but not the network for local displacement [The Guardian, 2016a]. The budget was not increased substantially with respect to the past and the route construction did not start as

planned [The Guardian, 2016b]. Safety did not improve, and the administration lost further time trying to find the equilibrium between different transport lobbies. A major impediment for an effective policy in favor of active modes has been so far the poor communication activity which impaired to gain the citizen support for more ambitious plans [The Guardian, 2017a]. Under such conditions, the administration transport plan [Mayor of London, 2017] remained a weak compromise between bombastic objectives and deceiving implementation measures. Although redistribution of the public space was mentioned, at the same time the administration indicated its will to preserve the motor vehicle capacity and the goals are pushed so far away (2041!) to have no meaning [The Guardian, 2017b]. In conclusion, London seems to preserve its character: enthusiastic announcements followed by scarce substance for what concerns cycling policy. The timidity and irresolute attitude of the present administration, together with the practical incapacity to spend even the allocated resources, induced the cycling activists to show disenchanted skepticism towards it [Arditti, 2017].

My personal impression of London policy concerning urban reorganization and active mobility is that the administrations realized to be late with respect to many European city competitors and tried to get a plan which cited the due references but did not digest the lessons of those experiences. Communication and implementation management –according to the stakeholder opinions- has been constantly very poor and politicians gave the impression of zig-zagging according to the changing influence of the different lobbies. Finally, the plan has never been really credible and the opinion of deceived users witnesses its flop.

3.6 Paris

The city of Paris did a lot during the administration of Mayor Bertrand Delanoë for improving its urbanity. There has been a clear commitment for recovering space for walkers as well as for re-approaching the city to its river. Nevertheless, although the bicycle-sharing service Velib has become an absolute success, bicycle has not been acknowledged as a credible means for utility transport. The transport policy focuses on public transit and the public space subtracted to car

routes and parking slots was mostly allocated to pedestrians. As it has been perfectly synthetized, “public spaces (have been made) more attractive to users to boost the economy and increase conviviality in the city” [Fleury, 2011]. This choice of allocating more space to the pedestrians has its good reasons since Paris has to accommodate a constantly increasing number of tourists but did not impact the urban mobility. It favored the “flâneur”, the stroller, the tourist who walks around without a specific aim. The cycling commuter cannot participate to this benefit since its driving space remained almost unchanged.

The administration never considered bicycle as a serious player in the transport policy able to contribute substantially to utility traffic. There was no plan to create a continuous network of segregated bicycle routs, neither the will to learn from foreigner examples how to deal with the safety and technical parameters necessary to set a functional cycling system. Since the access to public bicycles has not been paired to the possibility of cycling safely, the share of cycling on total mobility remained statistically negligible [Fuller, 2012]. Probably there is also a general cultural problem in dealing with this issue. Bicycles are not perceived by the average citizen as a transport means with the same rights and obligations of motorized transports. Consequently, also the few measures adopted to favor cycling (calming zones, possibility for the bicycle to use contraflow one-way streets, advanced start at the traffic lights, dedicated lines) are mostly not respected. Surprisingly, there is absolutely no effort performed by the police for implementing the traffic norms that should support cyclers. The consequence is an ever growing number of motorized two-wheel vehicles that occupy the space and use the priorities intended for bicycles [Charbonneau, 2011]. The administration clearly observes the conflicts over space usage and recognizes that it should be managed in a holistic way [Fleury, 2011] but for long time the transport policy did not consider structural changes and rather favored sectorial ameliorations and temporary tests. The rationale of this choice is that “the management methods should evolve alongside the technical knowledge to keep adapting the city to uses and expectations that are evolving” [APUR, 2010]. It can be objected that flexibility is always wise when an idea must be implemented in the reality, but the

final goal must be clear, otherwise such undefined attitude appears a sign of weakness. The only clear achievement was the success of the bike sharing service (Velib) which counts almost 300.000 annual subscribers. Things could change with the new administration which proposed an integral transport plan (Plan Velo 2015-2020) [Mairie de Paris, 2015] in which are indicated clear objectives (15% of the metropolitan trips performed by bicycle by 2020, namely 3 times more than in 2015), infrastructures that need to be built (new bicycle routes, dedicated parking lots, structures for intermodal mobility, reorganization of street design for promoting bike access), and a budget (150 million euro) that is three times higher than in the previous period. The experiences of other cities would indicate that the goals are too ambitious for being achieved but at least there is the idea that bicycle can become one significant actor of urban transport and that its integration needs the implementation of specific infrastructures. There is a project for a network of long-distance, interconnected major bike routes (reseau express velo) and the doubling of the overall path length to 1400 Km [Mairie de Paris, 2015]. The solutions for improving the cycler safety remain limited to the creation of dedicated zones ahead of the cars in the correspondence of the traffic lights, but at least the parking opportunities should be improved significantly in terms of both number and comfort. Finally, the municipality will further support the purchase of e-bikes and cargo-bikes and plan to add e-velib to the present offer of conventional bicycles. Despite the declared ambition to become the world capital of cycling, Paris official documents are available only in French.

3.5.1 The rediscovery of the Seine

In contrast to the prudent transport policy, there is a clear and systematic project for recovering the centrality of the Seine waterfronts. As the Mayor wrote, “it is time to define the role of the river in the new urban civilization”, reconciling the city with its past. The Seine, once the city center and its economic motor, had lost its former role as the vital texture in which the daily life took form. This awareness makes necessary to think about “the future of the embankment

roads…. since they cannot remain an expressway" [APUR, 2010]. The "Reconquering the embankments" project aims at giving back the embankments to the pedestrians, diversifying their use, and offering a space for sport, culture, and nature instead of parking slots. The administration approach followed a two-level policy: On the one hand to recall the river presence with ephemeral events, on the other to use the induced interest for the river to promote a more organic plan for the diversified use of the embankments. The plan integrates projects of different dimensions and impact that are unified by the goal of recovering space along the Seine for social activities, from one to the other of the city borders, and physically connecting the river with the city daily life. The urban space redistribution from vehicular use to socialization was implemented gradually but successfully and systematically.

The starting point of this campaign was Paris-Plages, in 2002. A long portion of the expressway along the river was transformed in an urban beach for one month. It opened a new window on the river and invited the citizens to participate to this experience. Furthermore, it showed for the very first time that it was possible a totally different use of the public space and that an alternative concept for the existing physical structures was feasible. The momentum was exploited when citizens were ready to believe in a change of the relationships between the city and its river. In the following ten years, the administration systematically implemented progressive measures to reconvert roads and parking slots into pedestrian zones. The UNESCO acknowledgment of the Seine embankments as a world patrimony justified the transformation work, although the river area looks nowadays more a theater background than an active participant in the city life. That is astonishing since a role for the waterfronts in an alternative transport policy –and not only as a place for leisure- seems implicit in some declarations. "The spaces that are specific to the river" are able "to fill in time that is imposed (transport) with time that is chosen (relaxation)" and this because of the water coolness and its capacity to connect the commuter to the season scent [APUR, 2010]. Furthermore, the environmental and ecologic concerns are recalled as well as the challenge to give form to an energy-saving city that must correct the urban struc-

ture of the car-based Paris of the last century. As the urban space has been transformed in the XIX century to shape it into a city adapted to the industrial revolution, do not we need a new space distribution that must answer to the present needs [APUR, 2010]? At this point, the bicycle-based trend that succeeded in other continental countries should be explicitly considered and integrated in the Paris master-plan by implementing the suitable structural reforms. It is still unclear if the new administration will be able to implement a mobility strategy based on bicycle ad to use this mobility form for improving the city sustainability and social cohesion by offering better accessibility to the resources for the citizens of the banlieus.

Paris approach to active mobility absolutely does not share the complexity of the plans conceived by Copenhagen and Amsterdam. There has been no apparent research in the theory of urban planning and management to prepare the administration documents and plans as well as also the objectives concerning active mobility were never very ambitious. However, the slow but progressive and pragmatic procedure of three legislative periods produced the astonishing result of recovering a huge public space from automotive to social use. Although the impact on cycling mobility was minimal, the practical and symbolic effect on urban landscape is impressive.

3.6 Orlando (FL)

There were some specific reasons of interest for a mobility plan (River Run project) based on cycling for the university area of the city of Orlando [Sommer, 2005]. The first is that the project has been conceived for a large US town, namely in the most paradigmatic automotive-centered country. The second is that it has been conceived as a development of some pre-existing tracks along rivers that were built for recreational purposes. The third is methodological and deals with the mix of bottom-up, communication initiatives envisaged by the plan proposers. The forth is that the idea was originally conceived in the absence of a clear political agenda similar to those established in Europe [Pucher, 1997; http://www.eaue.de/winuwd/175.htm; Netherland Ministry of Transport, 1995,

1999]. Such opinion-driven actions have a tradition in the States (Friends of Oregon, Critical Mass,…) and aims at influencing decisions by mobilizing the citizens [Sommer, 2005]. The accomplishment rate of such initiatives is, anyway, low when they propose complex solutions that need both technical expertise and time for their implementation. Reliable transport plans alternative to the car rely on professional skills and long-period support from the community, not the simple activism based on record of statistical data which indicate the potential preference of many citizens for safe cycling. Finally, the River Run project was not accepted by the Orlando administration, a lesson to understand for organizing future more effective actions in a “hostile environment”.

3.6.1 The Europe complex

We are used to consider the US standards as a sort of anticipation of our future. Consequently, it is ironical that the States must turn to Europe for collecting references related to traffic issues, to list the reasons of successful cycling policies, and to enumerate the urban differences (density, mixity) between European and American cities that allowed the successful implementation of bicycle-based transport policies [Buehler and Pucher, 2010]. At least in Northern Europe countries, cycling is by far more popular and safer than in the USA. Vehicular cycling, namely the US layout that offers -in the best cases- on-road lanes for cyclers near high speed car, is considered the first discouraging reason in polls [McClintock, 1992]. In opposite, the offer of off-road multi-use (bicycle/pedestrian) tracks rendered cycling in European cities appealing to commuters of any age. The result is that in the US less than 1% of the trips are made by bicycle (84% by car) whereas in the Netherlands, Denmark or Sweden active modes make almost 50% of the total utility trips [Tri-State Transportation Campaign, 1998; Census 2000; Sommer, 2005]. Nevertheless, towns like Davis, Boulder or Eugene show that political decisions favoring cycling can strongly encourage habit modifications and convince till 15% of the citizens to cycling regularly, although cyclers are -statistically speaking- rich white people who ride recreationally or as a sport, whereas commuting is not relevant [Felix, 2010].

A pragmatic regard at the European success stories led to the conclusions that optimized infrastructures paired to a clear strategic plan can result in practical conditions sufficient to modify cultural attitudes and transport choices [Pucher, 1997; McClintock, 2002]. The Orlando Planning Model for the River Run defined four steps [Sommer, 2005]: i) set the goals; ii) research/assess the technical parameters; iii) plan and implement the overall project; iv) organize communication to and participation of citizens to the plan progressive improvement. Summarizing, a clear long-term project that needed the agreement of political institutions – which had to cover the costs- and looked for public support for modifying the pre-existing conditions and transforming the urban mobility. The accent is on the necessity to operate with public procedures to gain the community trust, a prerequisite to justify investments in infrastructures the advantage of which could be questioned by part of the community.

3.6.2 "Push your agenda ahead"

The idea was to conceive a holistic plan for mobility because "agencies with narrow expertise and responsibilities…are ineffective at solving complex problems with interrelated and conflicting objectives" [Litman, 1999]. Despite the premise, the project goals remained fuzzy ("to *significantly* increase cycling's modal share") and the involved actors not clearly identified (Who are the decision-makers? To what population groups is the project addressed? What are the expected motivations of the potential bicycle track users?). Probably this initial weakness is due to the origin of the project that is a proposal issued from few professionals rather than the result of the contribution of a large community. The approach is not very accurate since refers to weak premises: "if it works in Copenhagen, why not in Orlando?" asks the author for which the two cities share social and economic comparable models (!), underestimating the pivotal structural difference between dense and mixed European cities and zoned and sprawled American cities. The US land use regulation did not support mixed-use urban structures enabling people to live close to where they work and shop. Therefore, for establishing a new mode of transportation, it is not sufficient that "planners

can study successful systems elsewhere,,,and adapt them to their particular city's characteristics" or even that "they can also go beyond this process of adaptation and assume a leadership role by introducing innovations" [Sommer, 2005]. More interesting is the attention payed to deal with cultural aspects that could oppose to active mobility in US contexts. In the project implementation plan, communication should be organized to overcome people fears towards novelties and gain their interest for a project that had the characteristics for becoming the proud of the community. Since prejudices exist, cycling should be perceived first of all as a cool choice and not as a stigma: you are forced to cycle because you cannot afford a car. A marketing-like campaign was foreseen for improving the image of commuting cycling image because otherwise most of Orlando area cyclists are recreational and not utilitarian ones. They drive to the parking lots at the trailheads of leisure tracks "travelling by bicycle to no destinations" whereas the message is that "bicycles are real transportation for real people, not a sporty toy" [Sommer, 2005]. "Cycling is not just a fashion sport", but –as the European examples demonstrate- can be an effective form of transportation: "door-to-door, cheap, and easy to park" [Maas, 1997]. The cultural gap must be filled-in before being able to convince administrations and users to shift their transport habits from motorized private car to alternative modes [Felix, 2010]. This modification is even more difficult in a context in which, in general, there are not at all suitable infrastructures for cycling and walking. Therefore, ecological awareness, possibility to improve personal health conditions, and natural attractiveness of the biking environment will probably remain good reasons to cycling only for a tiny minority and will not increase the number of utility cyclers.

Since urban space redistribution has a cost and investing in facilities that are not used is inefficient, implementing cycling infrastructures is acceptable if the new condition will encourage new habits in a consistent population group. Beside communication, the other pillar of the plan [Sommer, 2005] focused on the construction of complete "cycling-friendly" environment, according to the European experience. First of all, a network of connector cycling trails to link the long-distance off-road to relevant destinations such as university, public buildings,

shops, and sport/cultural centers. Then, infrastructures that guarantee rapid and safe travel and include facilities such as repair and parking opportunities, lockers, and showers at the final destinations. Green waves (traffic light synchronized according to cycler average speed that spare long waits at the road intersections) have been considered, following the example of Copenhagen. Finally, the proposal foreseen both intermodal transportation accessibility (Bus+Bike; bicycle wagons in the trains) and parking lots for pick-ups at the range of the trail networks to facilitate the access of driving&cycling commuters. No clear proposal was advanced for segregating pedestrian and cyclers, although the author recognizes the problem issued by having shared trails [Sommer, 2005].

3.6.3 Along the river: the perfect joy of cycling close to water surfaces

Commuting by bicycle using a dedicated green road can mean the great opportunity to combine daily recreation with transport time. The author underlines that in this case Orlando's sprawl might represent an opportunity because panoramic long-distance tracks could be traced along the waterfronts of ponds and rivers trapped in the municipality territory. Landscape differentiation could be improved by introducing alternation of open spaces, trees, and canopies. People could be motivated to cycle for health reasons and the pleasure of enjoying the natural environment in the vicinity of the always changing water surfaces [Sommer, 2005].

Orlando's proposal is an interesting study case because indicates that the excellent knowledge of many technical aspects can badly fail in producing an implementable plan in the absence of sufficient expertise in plan management and communication. Of course, it evidences also the difficulties to modify cultural backgrounds and remove the "invisible obstacles" of the prevalent ideology which conditions the reality perception by shaping the urban landscape with its symbolism. Probably it is not a case that the most critical (arrogant?) cycler tribes grew in USA, namely on a background that discriminates silent minorities.

3.7 Hints from the world

Other cities proposed transport models that are interesting either because original or addressing very peculiar problems. Although cycling may be not always pivotal in their strategy, some theoretical considerations remain meaningful and have been summarized.

3.7.1 Vienna, the policy attentive to the social factor

The city of Vienna developed two concepts that are intended to inspire all the different aspects of the local policy [Zech and Kail, 2011]. The first is the “gender mainstreaming”, namely the assumption that genders –and more generally social groups- have different needs and consequently biased perspectives and expectations. The city accepts to develop initiatives that are not shaped for a prototypic average citizen, but that should answers to the requests of a variety of real and different social groups. In terms of urban policy, it means the development of a “fair shared city” plan. According to this second concept, transport infrastructures must be calibrated to satisfy multiple exigencies and interests. Particular attention is given to the decision process to which citizens are invited to participate as consultants [Zech and Kail, 2011]. The requests for an environmental friendly policy for transport and public space use shaped the Master plan of 2003 and its reviewing in 2008 [Vienna City Administration, 2006] that allocated a preeminent role to active modes. The guidelines indicated the will to maintain a dense city structure, with short distances between relevant locations and mixed activities to support local economy and neighborhood feeling. Cycling and walking (“intelligent mobility”) are integrating elements of this “proximity strategy” because improve urbanity in the sense of social interaction and increased appreciation of public space. The administration organized also surveys to acquire specific information instrumental for good planning practice, such as age of cyclers, trip purpose, frequency and length of bicycle trips [Stadt Wien, 2006]. Specific programs (for instance the gap-closing program) have been implemented to provide the infrastructures necessary to improve pedestrian movement and bicycle trips [Vienna City Administration, 2006]. The accent is explicitly underlined in the administration vision: “high quality public space is not just a question of architectural

design and technical infrastructures, but also… of social knowledge". "Before designing a physical space we need to study the social space" [Zech and Kail, 2011].

Vienna administration, although at a lower level, seems to have been aware of the "comprehensive approach" developed by Northern Europe cities concerning public space reorganization and active mobility. In particular, it dedicated attention to the opportunity of redistributing opportunities to the citizens by redistributing urban space.

3.7.2 The Australian way

The development of Australian cities followed the sprawling patterns of North American cities and they shared the same problems. What is different is the stronger awareness of the impact that city plan and consequent transport conditions mean in terms of environmental as well as socio-economical costs. Australia has a strong tradition in theoretical analysis concerning city structure and development, and in studying the indirect costs of motorized transport. This background has probably forced the national government to support cycling as an alternative transport mode [Australian Bicycle Council, 2010]. A cultural shift was probably represented by the integration of the bicycle council in the Australian council for transport infrastructures. Its strategic plan established the goals for the period 2011-2016 which aimed at doubling the number of people cycling regularly. The plan implementation roadmap (cycling promotion, infrastructures and facilities, safety, monitoring and evaluation, guidance for best practice) recalls the experiences matured in continental Europe, with particular emphasis to "integrated planning" and the contribution of cycling to citizens' health. Integrated planning means that cycling specificities must be addressed "in all relevant transport and land use planning activities" because Australia expects a vast array of advantages from this choice: cycling spares space, is beneficial for the environment, makes the traffic more fluid, contributes to control obesity and chronic diseases, is cheaper and more flexible for the users, and favors their social interactions" [Australian Bicycle Council, 2010]. Recently, a private association (Bicycle

Network) was invited to submit its proposal for the transport development scheme of Sidney. It considers a 40 year program to achieve “A Productive City, A Liveable City and A Sustainable City” by increasing active modes, and specifically cycling opportunities [Eckersley, 2017]. The proposal follows very precisely the guidelines of experienced communities from Northern Europe (necessity of an interconnected system of protected bike roads, promotion of intermodality and technical measures which prioritize cycling, support of bike commuting for weak groups) and underlines the advantages of cycling with respect to private car transport (increased urban cohesion, neighborhood feeling, local economy, reduced traffic congestion, improved health, decreased investment and maintenance costs). It introduces as well an original measure, namely the adoption of a car dependency scorecard that assesses automobile use to monitor useful parameters such as the average speed and length of trips including peak hour averages, the percentage of trips made under 1, 3 and 5 Km, the proportion of people who commute within 15 min, 30 min and 30-plus min. It is expected that such data will help in demonstrating that cycling can be a valid alternative for many of the citizen trips.

Although my analysis of Australian cities is too limited to drive conclusions, it seems to me that that country experiences a strong dichotomy between a very strong theoretical expertise concerning urban sustainable development and a limited ideological propensity to dare the change from the present to an alternative method. The take-home message is that cultural debates should anticipate technical proposals.

3.7.3 Freiburg the pioneer of the filtered permeability

Although its limited dimensions prevent the direct translation of its experiences into solutions for large cities, Freiburg has historical merits and contributed to developing generally useful implementation strategies for a bicycle-based mobility. It understands itself as bicycle town and defined the first transport policies based on active mobility in the late 70th of the past century [City of Freiburg, 2012]. Urban development was designed to keep the structure compact and

shaped a “city of short distances” in which bicycle transport could represent an advantage in terms of convenience. Through traffic is separated from public space available for active transport and community activities. In general, the adopted planning solutions are not unique of Freiburg, but here have been implemented consistently and the newest realizations –such as the Vauban extension- have structures that prompt three quarters of the population to cycle to work and schools [Nobis, 2003]. Vauban district is a sort of giant cul-de-sac in which local motorized transport is limited whereas cycle and foot paths form short-cuts that make active modes extremely more practical and faster. This bicycle-profitable design is defined filtered permeability and is the leading principle used by the administration anywhere it is possible [City of Freiburg, 2012] to reach the 2020 aim of 80% of the trips made by environmental-friendly modes (walking, cycling, public transport) [City of Freiburg, 2012]. Quoting Le Corbusier’s sentence "La rue courbe est le chemin des ânes, la rue droite le chemin des Hommes", Freiburg decided to move to the next transport concept: the path of bicycle. In the context of filtered permeability, it is flexible, short, straight, convenient, and pragmatic and built on large pedestrian areas and a developed network of bicycle tracks connecting inner city and peripheries.

The example of Freiburg indicates also that keeping the prominence as an environmental-friendly town requires constant attentions, analysis, and investments. The fact of having built a bicycle route network in the 80es imposed later actions to update it to the new traffic conditions and citizen requests. The regional government analysis of 2010 identified the main weaknesses (insufficient space for bike parking, too narrow paths, poor intermodality, low safety, and high rate of thefts [PGV, 2010]) and these observations, together with a set of surveys and analyses collected between 2008 and 2012 [City of Freiburg, 2012], urged to promptly integrate corresponding actions in a new global plan - the “Concept for cycling policy 2020”. There are some points of this document that is useful to underline.

- Communication approach. Bicycle transport mode is presented as an essential player to reduce noise, pollution, and car crowding in the town. It im-

proves citizens' life quality and health. Furthermore, it is socially ethic because allows for the mobility of low-income people for which car is too expensive. Finally, bicycle infrastructures are more rentable than infrastructure for motorized transport modes, therefore cheaper for the community. The administration was very clever in exposing these arguments and in involving all the citizen organizations during the process of the plan elaboration

- Reactions to new challenges. Bicycles supported by an electrical engine become more and more popular and their presence imposes to evaluate their impact. Their potential higher speed could introduce safety problems and would request some infrastructure modifications (larger paths, wider curves), although at the present the legislators decided for the enforcement of speed regulators which deactivate the engine at speed above 25 Km/h. At the same time, e-bikes enable a significant enlargement of the "cycling distances" and make possible to envisage a bicycle commuter regional area with a radius of 30 Km. In this optic, the administration agreed to invest on long-distance routes to increase the number of cyclers among the commuters who drive to downtown from the surrounding villages. It can be also foreseen that e-bikes will widen the social groups (senior citizens) able to profit from this transport mode
- Infrastructure update. There is a constant investment for infrastructure maintenance as well as to buffer new needs. This objective is reached by direct actions such as the building of new protected parking places for conventional and cargo-bicycles but also imposing progressive improvements to private houses (mandatory construction of accessible bicycle rooms in new complexes or during renovation of old buildings). The experience acquired in many years of planning was summarized in a collection of building norms. The aim is to provide a complete network of effective infrastructures because it strongly improves bicycle appeal
- Esthetic as a functional item. A stimulating environment encourages the cycler. At the same time, the cycler can enjoy the environment more than a car driver because he is physically more exposed. This simple concept should be

considered when planning because appealing routes will be used more and, therefore, they will represent more meaningful investments

- Coordination efforts. There are two directions identified in the document: i) the different departments of the administration must work together to optimize the results; ii) both transport associations and other public/private entities must be involved in the survey and proposal work because decisions can be effectively implemented only together -and not against- the other players (for instance, to improve intermodality)

Somehow it is astonishing that a small town could so significantly contribute both theoretically and technically to the development of innovative concepts for active mobility. Sometime the occasional convergence of competences and cultural background simplifies progresses but the existence of a reference network of maybe less systematic but similar experiences in Germany and neighbor countries cannot be underestimated. As it is the case of Scandinavian countries and Holland, the presence of a system is beneficial to promote acceptance and show practical solutions.

3.7.4 Oulu – Infrastructures stronger than the climate

Oulu is a 195,000 citizen Finnish community located close to the arctic circle and is considered the utmost Northern city of EU. The town statistics of 2009 recorded 638 Km of streets with car access and 613 Km of cycle paths. Furthermore, Oulu defined a “Regional Cycling Development Strategy” in 2007 to improve the cycling interconnection with the immediate surroundings and the airport [Eltis, 2012]. This enlarged system covers at the present more than 1000 Km and represents the most extensive segregated cycling network per inhabitant in the world [Eltis, 2012]. The philosophy is to provide “separate channels through parks and green areas” independent from the motorized traffic and featured with their own bridges, tunnels, catwalks [Helsingin Sanomat, 2010]. Every year the number of bicycle paths –that are allowed to be used by inline skaters and joggers as well- increases on average of 20 Km, it is the most extensive in Finland,

and “bicycle routs are automatically calculated for inclusion in road construction in new suburbs” [Helsingin Sanomat, 2010]. The bicycle network maintenance is constantly scored at the top among Finnish towns and the snow cleaning of bicycle paths is prioritized over roads used by motorized transport. The result is that –on all-year average- 22% of the total trips are made by bicycle and all social groups profit of this transport mode [City of Oulu, 2014]. Despite the rigid winter climate, 15,000 utility cyclers enter the town each day and one third of the citizens uses cycling regularly even in winter. These data justified the claim that Oulu is the best winter cycling city in the world. The present situation is however the result of a long-term policy that began in 1972 with the approval of the first cycling plan and was implemented progressively in the successive 25 years. The administration adopted a regular biannual user satisfaction survey to monitor the citizen requests in terms of infrastructures and services. For instance, the efficient maintenance service is a key of the success and now the town can use its image of leader in cycling policy to advertise itself as a dynamic community with high standards of life quality [Eltis, 2012; City of Oulu, 2014].

Oulu is a striking example that good infrastructures (conceived as a continuous system, built according to reliable design, constantly managed, safe, pleasant) are the *condition sine qua non* to promote cycling whereas weather is not an issue if suitable logistic (parking places, locker rooms) is provided.

3.8 Urban sustainable growth: active mobility as a global issue

I wish to conclude my case studies with an outlook on cities and conditions which could seem less relevant for designing an urban plan for Milano but that are useful to appreciate some kinds of impediments not met in the reference cities evaluated above. Generally speaking, the analyses concerning urban form and the efforts to identify sustainable development trajectories for the cities of the future have been strongly focused on Western patterns. In such context, the main issues have been: i) the retrofitting of industrial areas, infrastructures, and inadequate housing in urban cores; ii) the design of more rational suburbs. Neverthe-

less, most of the largest and fastest growing cities are located in third world countries. For these reasons, scholars believe that “it is from emerging geographies from non-European and non-American urbanity that urban theory awaits (new) rebuilding” schemes [Keil, 2013]. It would be profitable to understand how the challenges of this rush development have been dealt with and if there is the possibility for a mutual learning process by comparing the policies undertaken in the different contexts. The Global South knows an accelerated phase of urbanization that involves a much greater volume of population than previous urbanization waves in Western countries and it is going to be realized at an extremely faster tempo under conditions of structural shortage of investments for infrastructures and job creation [McGee, 2013]. A common denominator of this growth is that it is performed under strict neoliberal ideology that seeks to deregulate any regulatory environment and creates segregation into unequal suburbs strictly separated for income and service offer. In contrast to Global North in which suburban expansions undergo a governance that involves also social actors (although private lobbies are often extremely more effective in influencing the policy than citizens), participative processes are generally absent in the Global South. The outcome of urban development at the global level is not unique and depends on the relative influence of the different forces that can act as “developers”. Schematically, suburb growth can sprawl by self-building, be led by the state/public authorities, or be organized by private speculators. Squatter settlements are often the first form of suburban structure built at the city fringes or at the interstices available along infrastructures. In many cases, when land becomes limiting and its price raises, authoritative governments expulse squatters towards further peripheries and use the cleared areas for expensive and prestigious building projects such gated communities, usually performed by private investors. Squatters can recreate informal settlements or been hosted in large high-density blocks [McGee, 2013]. Nevertheless, the informal economy that allows most of the settlement inhabitants to survive can be totally destroyed by population displacement and the longer distances can render impossible for many of them to reach their previous jobs. If on the one hand peripheral settle-

ments are transitory by definition, the restless process of modification should be led in a way to improve general conditions instead of favoring only the interests of the stronger stakeholders. In a sustainable prospective of development, this would mean preserving the equilibrium between city and countryside. The global North has introduced the “green belts” to protect its cities from asphyxia acknowledging that the land market price cannot be THE factor fixing the development. Of course, the value of farm land increases twenty times when it is declared suitable for construction, but increased air pollution and reduced fresh water procurement are not simple indirect costs. Deterioration can become irreversible. In the global South, poverty determines the priority of the immediate necessity over long-term planning and megacities devour farm land and use it to depose their waste although they depend on countryside for their supply in food, energy, and water. In general, it is not straightforward to transpose the lessons learnt in the global North into the actual conditions of the global South even when money is not the limiting factor. For instance, the enormous maintenance costs of the oversized infrastructures necessary for private automotive transport in dispersed North American suburbia have not impaired that similar development models have been re-proposed in (rich) Asian cities. Apparently, political elites wish to propose the life-style corresponding to the Western development model to their upper-income citizens regardless the costs –present but above all future- for the overall community. Is there any possibility to introduce the concept of sustainable active mode transport in the development schemes adopted by the new megalopolis? Or, would it be at least a priority in the agenda of international institutions that should take care of fair development? And, what is more relevant for this thesis, is it possible to learn something from the experience of the new megalopolis that can be used to improve a development concept for Milano?

3.8.1 Cities of Africa

In the next 30 years, African cities will grow faster as in any other continent [UN, 2012] and therefore their problems deserve a special attention. A complete review concerning the situation in African cities has been published recently [Un-

Habitat, 2014]. The accent of the study is on the opportunities that these cities might have in the future. In contrast, the collected data show a picture in which the present problems seem on the point to strangle the development chances. Low density informal settlements compose the large part of the urban landscape and exacerbate the mobility problem and the access to jobs. Sprawling proceeds by slum proliferation that progressively embraces peripheral towns and villages into the metropolitan orbit forming an “extended metropolitan region” with extensions along the major logistical arteries that form ribbon-like corridors. This informal growth process is not limited to large metropolitan areas but is reproposed also at the level of middle and small cities and it is anticipated that the urbanization of the next decades will produce mostly new dwellers residing in slums. The immediate problem related to this development model is that it destroys natural resources -like freshwater- that cannot be easily regenerated. Land and water supply shortage on the one hand and insufficient sanitation and waste management services on the other are the two major consequences of informal settlement and they over-proportionally hit marginalized citizens. If these represent the main drawbacks of the anarchist urban growth for common people, for the administrations the consequence is that all the infrastructures become more and more expensive because of the low density and large extension of the urban factory. The perpetuation of this “development model that has proven unable to deliver prosperity for all and which are more likely to deliver significant socio-political risks” must be reversed since it is evident that “there cannot be sustainable development without sustainable urbanization” [UnHabitat, 2014]. At the same time, the chronic fund shortage and the lack of a clear political concept concerning the urban challenges favored a transport model based on private vehicles, “a way of shedding short-term cost implications for the public coffers” [UnHabitat, 2014]. As the same report underlines, “road-based logistics have many hidden and recurrent costs, varying from loss of life in road carnage to higher road maintenance requirements due to excessive loads. The choice against developing denser railway networks, whether heavy rail for commodity transport or light rail for public mobility, has brought a host of externalities and

costs often not considered when infrastructure policy decisions are being made. Upfront expenditures of railway development may be high, but so are the longer-term benefits." In African cities short-term priorities prevail, hindering more sustainable developmental trajectories. Therefore, it seems that because of the "ubiquitous weakness of urban institutional and infrastructural capacities" [UnHabitat, 2014] as well as of the reliable statistical data necessary for rational choices, the fate of African cities is to grow into anti-economic structures the cost of which will impair their competitiveness and future development into functional systems. The unplanned growth implies environmental and health vulnerability, widespread insecurity, and social conflicts in urban areas as well because enclaves of wealth and privileges form isolated strongholds in the midst of sprawling slums. The Ebola outbreak in Monrovia is a paramount example of how bad sanitation, low access to healthcare, and social segregation led to high rate infectivity and violent riots. "These are no inevitable consequences of rapid urban population growth; rather, they are a consequence of political and institutional failure that inhibits effective urban planning, policymaking, investment and regulation" [UnHabitat, 2014]. In a political context that does not know democratic praxis and excludes citizens from participation, the few successful examples in terms of effective planning and urban outcome come from very authoritarian regimes. It is the case of the implementation of Kigali's master plan. Otherwise, "poorly governed cities have increasingly been "colonized" by criminal networks that exploit the services and infrastructure of weakly regulated urban settlements to further their own financial objectives" [UnHabitat, 2014]. Furthermore, in this context "efforts are mostly piecemeal and interventions in one sector can often be at odds with the intentions of other government departments" instead of being integrated and financially adequate.

African urban planning –even more than Western planning- should be necessary to eliminate the causes of segregation and exclusion in cities in which inequality has worsened rather than physically removing informal development that represent the only opportunity for the poorest citizens. Promoting citizen participation in the decisional process would be essential, as well thinking to a denser urban

form capable to provide more effective and less expensive services. This is true for electricity, waste removal, water sanitation as well as mobility access. “Poor and low-income youth are marginalized or excluded from employment opportunities and are often “trapped” within their neighborhoods by virtue of ethnic, class, religious and other types of segregation” [UnHabitat, 2014]. Consequently, improving mobility opportunities would favor the access to jobs, healthcare, and services and would facilitate cultural commixture. In this perspective, the 2000/01-year budget speech of the minister of transport of South Africa in which he announced a plan to promote greater self-reliance through a national bicycle transport partnership was a promising turning point [World Bank, 2002]. However, no effective action followed to declarations. Also the logic of United Nation Environment program seems at odd with its claims supporting sustainable development. “Private motor vehicle ownership is desirable because it absolves urban residents of the need to engage with low-quality public transportation”. At least it recognizes that “urban congestion can be debilitating to local economic production, efficiency, and competitiveness” [Peter and Swilling, 2012]. Consequently, it concludes that it would be desirable “reducing demand for transport and emissions through improved urban planning and transport systems design; shifting modes of transport and fuel use towards mass public transit systems - and biodiesel and cleaner energy, respectively; and, improving vehicles and fuel that are used in cities for transport”. Apparently, the lack of coordination among UN agencies in terms of strategies is similar to that governing the African city administrations.

In any case, it is astonishing that the Uno agency focuses on public transport as the only apparent alternative to private car. In the 2014 document there is no mention to active modes like bicycle as reliable players inside the transport policy whereas the previous ones at least cited them as a potential resource [UNHabitat, 2011]. Now, motorized public transport still represents a relevant –sometimes not affordable- cost for the community and the individuals, it is not very effective in dispersed settlements, and contributes to traffic congestion and pollution [Abane, 2011; Salon and Aligula, 2012]. In contrast, cycling is flexible, needs

minimal technological competence and training, and is extremely more affordable in terms of purchase and maintenance costs than any other transport mode. The only justification for the “motorcentric” choice of the UN agency could be the acknowledgment that it is difficult to overcome cultural reasons: “In vastly unequal African cities, perceptions of social status play a critical role in fostering identity and belonging” [UnHabitat, 2014]. Bicycling commuting in Dar-er-Salaam decreases with one’s increase in monthly income and is not considered an option in the city and this although the congested traffic and the availability of an insufficient public transport system [Nkurunziza, 2013]. The produced studies do not investigate the sociological reasons of this refusal [Nkurunziza, 2013], but car seems to be a status symbol (you cycle if you cannot afford a car) and its effectiveness in the context of the African mobility is apparently a secondary issue. I can report my personal experience: Nigerian students at our university refuse to cycle “because it is for poor countrymen”. Underestimation of cultural aspects can be a risk, but it can be that specialists still stick to a transport concept based on public transit because it is considered as the minor of the evils. For sure their analyses do not acknowledge yet the potential (or the necessity) to go beyond the dualism between public and private motorized modes [Yeh, 2009] and choose no-emission bicycle for thinning the city traffic. What actually happens is that, in the absence of the favorable cultural substrate, there is even the risk that cycling becomes a new discrimination factor between affluent (white) bikers who cycle for fun (with expensive models) and (black) commuters who have no alternatives, as in the case of Johannesburg [Malgaroli, 2016].

At least from what it can be understood from outside, it seems that concerning urban sustainability the African political elites have no real interest and probably too scarce awareness of the problem gravity to tackle it.

3.8.2 Global South Suburbs

Urban residents will grow from 3.6 billion in 2011 to 6.3 billion in 2050 and most of this increase will take in the Global South cities in which funding for infrastruc-

tures and planning expertise will remain insufficient for most of the populations, whereas estate industry will cut out privileged exclaves for upper income minorities. In such conditions, spontaneous suburbs exposed to natural hazards because built on floodplains, landslide-prone slopes, coastal areas will multiply to reach 60% of the total [UN, 2012; Seto et al., 2012]. The flood risk will become a constitutive condition and "local disasters" in poor slums will have no echo because will represent a constant. In many countries of Global South, sprawling generated a rapid growth of motorized two-wheelers that are faster than bicycles, at a high environmental and accident cost. Since the average length of commute increases, at the same time increase both the level of traffic congestion and the environmental impact of road traffic [World Bank, 2002]. Travel speeds are decreasing (downtown weekday traffic speeds in most cities are reported to average 10 km/h), the urban space devoted to active mobility is eroded, and the travel environment for pedestrians and cyclers is deteriorating. In some large countries, the proportion of bicycle trips has declined, and is continuing to decline, as incomes increase and as the perceived safety and security of cycling diminishes [World Bank, 2002]. Bicycles are still clearly viewed as an inferior mode to be abandoned as soon as the household can afford a motorcycle. While efforts have been made to segregate motorized and active transport in China, relatively little is being done elsewhere on a national basis, with the exception of some municipalities [World Bank, 2002]. Of course, the degree and the characteristics of suburban development are different in the different world areas and this will influence the final fragility of each constellation. Therefore, it makes sense to compare the features of suburbs in the world macro-regions.

Urban growth in the cities of Latin America during the years 1950-1970 was mainly spontaneous and resulted in the establishment of informal settlements (favelas) that either underwent consolidation or became completely marginalized in the following years [Heinrichs and Nuissl, 2013]. It followed an age of peripheries built under strict government control to provide social lodgings that finally let the place to a commercial development dictated by the real estate industry. This process took place under the control of authoritarian governances in which the

role of the state was to enable private investors to maximize their profits and where very often there was a strong personal and interest association between political elite and speculators [Heinrichs and Nuissl, 2013]. The urban fabric resulting from tis development model is a fragmented system in which poor settlements with bad infrastructures and connections to jobs, no amenities, and scarce services lie close but segregated from gated communities served by private suppliers and reserved to the affluent citizens. A two-class society grew, governed by the capital and supported by politicians with direct interests in the speculative investments. This low-density expansion impacts traffic, water supply, and green areas in large as well as relatively small centers in which the exclusion processes known for megalopolis are reproduced. Londrina (Brazil) is a half a million town paradigmatic of the urban growth under liberal ideology in an autocratic country. It is a low-density community formed of separated bodies such as gated communities for wealthy people, informal slums and blocks of public settlements at the town fringe for the others [Polidoro et al., 2011]. The urban structure imposes elevated costs for infrastructure maintenance that must be paid by the public administrators, intense traffic and consequent pollution, whereas soil sealing impairs natural drainage and causes flooding, erosion, and the clogging of the sewer pipes in the settlements reserved to low-income residents. In a context in which national policies aimed at improving environmental and energetic standards are often neglected, local administrations can make the difference. Bogotá represents an example of successful urban development in which active transport modes have been integrated in the traffic plan. In year 2000 the municipality published a master plan for bicycles in the city. The plan included the construction of 320 kilometers of cycleways over a nine-year period at an estimated cost of $120 million [World Bank, 2002]. The plan has been progressively implemented [NYC Global Partners, 2011], although the infrastructure standards are relatively low according to state-of-the-art parameters [Dutch Cycling Embassy, 2015]. Most of the over 400 km of bike paths in Bogotá are placed in sidewalks and this reportedly causes conflicts between cyclists and pedestrians. In the few cases where bicycle roads are placed in former car lanes, they are used as park-

ing lots for cars as well. In contrast, the service for bike parking at some Transmilenio stations (public transport system) has been very successful [Dutch Cycling Embassy, 2015]. The major drawback for utility cycling, however, seems being cultural, since biking is regarded as a sport or recreation for children, and not as a means of transportation. There is a common believe that biking is for poor people, so one hopes to earn enough money to buy a motorcycle or a car. Cars do usually not give way to cyclists (and pedestrians). Despite current policies to invert the paradigm, auto remains the king of the road [Dutch Cycling Embassy, 2015].

The same ideological development pattern is recognizable in India where gated communities and ghettos alternate in the suburbs and the capital imposes its rules with the support of corrupted administrators [Gururani, 2013]. Probably the system is nowadays even more authoritarian than in Latin America in terms of land acquisition and people displacement policies because the system of casts and different ethnicity simplifies the acceptance of group marginalization. The access to services, amenities, and recreational environment is restricted to the members of the upper class who can pay for a residence in the secured gated communities [Gururani, 2013].

China growth model is also governed by a marriage between an authoritarian public power and private capital, but the implementation pattern of urban development follows some peculiar lines. Before the economic reform of 1979, Chinese cities were very compact and mixed, with short distances between housing and working places and a traffic based on active modes. Suburbs were state-driven industrial settlements with no appeal. The present market-driven urban development has two major aims and two collaborating players. The first aim is to profit from the increasing price of the estate sector [Wu, 2013]. Public administrators dislocate residents of poor inner-city districts and rural residents to recover high-value building land surface and set the infrastructures necessary for edification. They subsidize companies to have them installed and make their gain by selling the rest of the land to private investors who build the residential buildings. A strictly regulated planning enables to provide high-quality residences for mid-

dle- and upper-class in gated communities that usually offer their own exclusive services [Wu, 2013]. The residual agricultural land trapped inside the new suburbs and the corresponding villages become the house of the unqualified, low-income workers until a new wage of land requalification will dislocate them towards a further periphery. In these suburbs there is mixity in terms of activity differentiation (services, residential areas, working opportunities), but evident social segregation. Amenities and environmental advantages are reserved to high-income people who reside in the top-class gated communities. This group is proud of its autonomy because the privilege of the physical segregation assures also a sort of political independence and this feeling of being diverse and better than the others is amplified by dubious exteriorities such as faked architecture and landscapes resembling to Western countries [Wu, 2013]. The most evident and internationally known consequence of sprawling in Chinese cities is the elevated pollution. For the moment, the government seems to have opted acting on the symptoms rather than the cause (city development pattern) and launched a large-scale campaign for the electrification of motorized vehicles.

As the examples show, the picture is highly different from city to city, according to the capacity and interest of the administrators. Although comprehensive planning for urban reorganization are not usually foreseen in Global South, emergencies (social but recently more and more environmental) impose to conceive solutions and it is interesting that many administrators refer to the experience of Continental Europe cities for solving the sustainability problems of their cities. It could indicate a paradigmatic shift from the automotive-based market-driven development to a model based on self-contained community: from Detroit to Copenhagen?

In this perspective, where is the position of Milano on the ax which connects the Global South megalopolis to the examples of successful implementation of a new mobility based also on active modes and which has required the reshaping of the urban form? Some of the city problems seem being universal, such as the tendency to create social segregation and pollution. However, Milano looks surprisingly closer to Global South cities rather than to other European examples con-

cerning its environmental fragility (recurrent flooding events), the paucity of cycling infrastructures, the existence of gated communities and the too often underestimated cultural attitude towards utility cycling. In Italy cycling is very popular as a sport, a common means for leisure, but in a large part of the population it is not yet perceived as an appropriate transport mode for decent adults.

3.9 Comprehensive evaluation of the case studies: common and specific features

At the global level, cities seem to grow according to aggressive liberal patterns that privilege short-term speculative advantages for restricted elites and do not take into account long-term costs and the aggravation of social inequality. Cities sprawl, traffic and pollution explode, and it is recognizable the implicit statement that mobility corresponds to motorized transport and that private car ownership is still a status symbol. In (most of) societies worldwide symbolic attributes, among which expensive cars, serve as external signs to underline the membership to the affluent society. Apart from some examples in continental Europe, it is difficult to find examples in which infrastructure planning has been led by the wish to create a sustainable urban factory. In the worst cases, the possibility to build a functional network of infrastructures is prevented by the dimension of the present metropolis and the lack of previous investments. At the moment, technological and organizational solutions for water and sanitation systems spatially adapted to scattered suburban landscapes still need to be envisaged [Monstadt and Schramm, 2013]. However, in the absence of a regulative public entity able to dictate universal standards, the predictable future will be based on extemporary solutions with reinforcement of social inequalities between poor slums and rich gated communities. The large majority of the population is physically marginalized and since it belongs to a disfavored community, it is stigmatized as much as being member of the elite is prized, a fact that contributes to the perpetuation of the social segregation [Perlman, 2007, pp 10-24; Genis, 2007]. In several nations, the alliance between authoritarian governments and private capitals is the motor leading to this *de facto* physical segregation between citizens with low and

high incomes and supports their discriminative access to services and amenities [Saez and Gallagher, 2009; Heinrichs and Nuissl, 2013; Wu, 2013]. Politicians should consider the long term consequences of such policy on the social cohesion and growth sustainability but there are good reasons to think that they will let to the next generation the ungrateful task. In this landscape, some contradictory signals come from China which highly invests in electrical mobility as a remedy against urban pollution but does not yet consider that the traffic congestion is also a problem of physical hindrance, still strongly relies on polluting mining and coal power stations for electrical energy production [Van Mierlo et al., 2017], and still promotes speculative real estate investments. The late messages from USA indicate the denial of any regulative effort at national level but diversified local policies, whereas in Europe the situation is highly diversified among States. However, there are bright examples of implementation of sustainable city growth. The key parameters for their success –anticipated in the Introduction and emerged by the Case Studies- are discussed below.

Top-down and bottom-up planning versus market-oriented city development Cities which developed for a century according to a mobility model shaped on private car need a significant reorganization of space distribution and new infrastructures to enable an effective utility transport based on active modes. This reconversion relies on planning for exploiting optimally the limited resources and the city experiences tell us also what kind of approaches succeeded. They were declinations of dialectic (just) planning in which citizens that had expectations (better mobility and life quality) and administrations that had concerns (finding solutions for traffic congestion and pollution, supporting access to resources, reducing medical costs,…) first agreed on strategies. The design and implementation was performed progressively by professionals but citizens were (and still are) regularly asked for comments. This has been the approach followed by Copenhagen, Amsterdam and Vienna for which the legitimation of centralized technical choices is the public judgment of the results. Paraphrasing Holger Reiners' considerations about architecture [Reiners, 2012], the persistent fracture existing

between citizens and planning has been removed by means of effective communication and explaining what planning, or its absence, can do for the citizen. This very pragmatic approach overcame the debate about planning as the opposition between a statist and centralized policy and the individual freedom. It is time to recall that the “freedom of sprawling” is mere prejudice and market-oriented development results in zoning and segregation. The experience of the continental Europe cities shows that citizens can choose the “freedom of condensing” their urban space when they can judge among different development opportunities. Strong design aimed at reaching sustainable development is supported when the individuals recognize the advantage of the proposal also for their own chances. What is not anymore acceptable is rather the old-fashion, Lecorbusian autocratic, approach for which planners are superior intelligences who cannot admit criticism. Modern and effective planning must be able of explaining the concepts, using the feed-back, identifying appropriate technical solutions, mediating, and assuming its responsibilities by implementing a coherent realization. Planning is not useful if it is a weak compromise, it must have a defined profile, but it must be able to convince with good arguments rather than to impose pre-formed solutions. Useful planning should be also able to find a balance between anticipating cultural changes and promoting them. Regular surveys (as in Copenhagen) are apparently effective means to involve citizens in plan implementation. Finally, it should be recalled that there are different urban typologies to which urban planning can be applied. Historically, the overwhelming attention of planners has been devoted to new settlements and, in the last 30-40 years to the revitalization of abandoned (industrial) areas. However, at least in Europe, the problems –and the solutions to look for- are mainly related to the requalification of the existing operative urban texture, a process that cannot consider *tabula rasa* scenarios but that should be able to constantly modify the same place over long periods, a process that can be used for introducing progressive changes, as envisaged by Sieverts [2000]. Somehow, this is the case of most of the European cities analyzed in this work: local, sometime temporary, setting are offered to the public as a test to convince them that the change is not a jump in the unknown. Paris represents

a successful example of this slow but effective method to increase the public acceptance of a new concept for the Seine banks. This temporal perspective makes even more necessary that urban physical modifications become the occasion to mitigate social inequalities and compose conflicts, such as frictions involving various groups which compete for the urban space, as for instance inner city residents and commuters or elders and young people. Freiburg or Copenhagen initiatives to promote a regional cycling network integrated with public transit has also the meaning to offer an alternative to commuters who have reduced car mobility downtown, as well as Vienna's diversified offers for the different social groups was intended to gain the stakeholders as active participants to the common project.

Public participation, decisional processes, and transparency. These points are critical: when the communication between administrations and citizens is clear and open, it does not matter how difficult the decisional process is because the acceptance of the final result will guarantee its successful implementation. In contrast, when there is no consistency between announced purposes and real commitment of the administration and the communication is political advertisement rather than will of sharing information, projects fail, realizations will remain underused, and investments will not pay back and solve the problems for which they have been employed. The effort devoted by some administrations (Copenhagen, Amsterdam) for dissemination and, in the opposite direction, to collect reliable data about the actually perceived bottlenecks, is astonishing for its volume and complexity but seems to contribute significantly to the success because enables to constantly tune the development according to the real necessities. London represents in this sense a negative example because the administrations never managed to convince of their good faith the public opinion and communicated demagogically rather than objectively the aims and the route to reach them.

City functions. The official task that Copenhagen foresees for itself corresponds to a sort of Utopia: “We will become the world’s most livable city, a sustainable city with urban space that invites people to enjoy a unique and varied urban life. We will become a metropolis for people” [Dahl and Hansen, 2011]. Such a vision mirrors Chesneaux’s idea of urbanity, namely the complex of the social interactions that physically happens in a settlement and, at the same time, establishes social norms and relationship rules [Gras, 2005]. He noticed that “urbanity is the result of the organization of the urban space” and that this parameter determines the specific kind of life. Apart from this existential task, cities have also other homework, such as the capacity to offer to their citizens jobs and equitable access to resources, to facilitate their integration, to provide identity and sense of safety, namely the fulfilling of all those elements which contribute to improve the quality of the life. The bet they did is that a city in which the mobility is mostly dependent on active modes becomes more appealing and this condition attracts new jobs and investments on the international market. The theoretical documents of most of the analyzed cities refer to the link between urbanity and public space redistribution in favor of the enjoyment and socialization enabled by the slowness of active transport modes.

Symbolic features. Cars are more than vehicles. They have represented a symbol of individual freedom and the promise of endless mobility opportunity, are images of power, masculinity, affluence. Substituting them with bicycles requires the necessity to demythologizing cars, namely a cultural effort that must be devoted also to the infrastructures which confer authority to cars. The transition from automotive to active modes seems being simplified by a favorable Zeitgeist. According to recent analyses, car is less appealing for young (European) generations who do not acknowledge the symbolic values older people associated to it [LeaseCar, 2017]. This “Disemotionalizing” (Entmotionalisierung der Automobilität, S. Bratz quoted in Wüst, 2013) trend that uncouples functionality (the car as a transport means) from perception (car as the representation of social success, individual freedom, personal power) will probably reduce the absolute importance

of cars and will change the relationship between users and such objects. Active mode can compete to fill in this vacuum and in the collective imagery we could pass from a model in which each family possesses at least two cars to another in which less than one car/family is sufficient because the rest of the transportation needs will be covered by valid alternatives, such as walking, cycling (with a special attention for the cargo-bikes), and public transport. Some specific actions promoted by cities (Copenhagen and Amsterdam) such as requiring compulsory bike boxes or showers in company buildings go in the direction of prioritizing cycling instead of car as well as taking urban space occupied by cars (street space, parking lots) to give it to cyclers objectively changes the power ratio –and therefore the symbolic meaning- between automotive and active transport modes. Spectacular has also been the progressive removal of cars from Paris riverbanks, although the conversion of this space for active mobility has not been sufficiently exploited.

Segregation, gentrification, inclusiveness, social discrimination, cultural integration, mixed activities, local economy and community welfare. The mobility model shapes the city. Chesneaux said that it would be meaningful to begin the planning process from the transport policy because it will determine the public space repartition. The reasoning that some cities (Copenhagen and Amsterdam documents are extremely explicit to this regard) did was that reconverting the mobility infrastructures could represent also the occasion to improve their physical and social cohesion. The access to the resources can be facilitated, formerly marginalized areas become reconnected, the proximity economy is supported by the higher rate of people travelling in the district and thus contributes to urban mixity. As the result, the community welfare is increased, whereas segregation and gentrification effects are restricted. The possibility to mitigate social discrimination acts positively on the inclusiveness of minorities and promotes their cultural integration. This process passes also by substituting symbolic references [Koolhof, 2013]. In Denmark and the Netherlands, both authorities and local associations are active in proposing cycling instead of private car transport to immigrants to

favor their integration and render immigrate women more independent [Ward, 2007; Koolhof, 2013; Walker, 2016].

Attractiveness, typicality, legibility neighborhoods and safety feeling. Active modes of transport improve the livability of the different districts. This condition makes them more attractive, they can emphasize their typicality and the increased circulation of people walking and cycling improves the passive security of the area. At the same time, active transport means also higher number of eye interactions with neighbors and finally stronger community interactions. These concepts were particularly important for Copenhagen which dedicated specific analysis to such aspects of utility cycling. Although not explicitly mentioned, Lynch's urban legibility concept seems pervading the mobility policy of many administrations. In particular, bicycle –as a slow mobility mode made highly flexible by filtered permeability- becomes the ideal instrument to discover a city to build highly personal mental maps. Bicycle reintroduces **serendipity** in urban contexts as well as enables the senses (seeing, hearing, smelling) to contribute to the city mental personal organization. Active modes, due to the movement freedom and safety enabled by selective permeability (Freiburg), are the ideal means to discover the urban environment and appreciate its particularities. In opposite, London –which relegated cycling to either desolated backyards or high-speed street lanes- seems to have completely missed the importance of path design and location for obtaining social-economic benefits.

Dense city, Marchetti's constant, zoning, and urban intensity. Active modes, for their characteristics, are more effective in dense cities where the distances are limited. Therefore, the first land use initiative that cities interested in increasing the share of active mobility enforced was a plan aimed at avoiding further indiscriminate growth and zoning. This caution is necessary to maintain urban dimensions in agreement with the Marchetti's constant with respect to active modes because, for values below such limit, people will be more inclined to experiment transport modes alternative to private car. Selective permeability (Freiburg) is

another effective solution adopted by bicycle-supporting cities to shorten the effective distances and reduce the journey times. The Dutch way is to create new satellite compact settlements rather than sprawl from a unique center and then incorporate them in an intermodale transport network. Australia looks at this model. Interesting are also the long-distance (panoramic) path thought for utility cycling developed by Oulu and Copenhagen to offer effective and pleasant connections also to commuters who live relatively distant from their jobs/studying places.

Sprawling, utility cycling, commuting time and costs, intermodality and access to resources. The main objective of the policies supporting active mobility expressed by the examined cities is to convince the citizens to adopt utility cycling, namely commuting using active modes that reduce traffic congestion and pollution. This is affordable if distances are below Marchetti's constant. Sprawling impairs the success of active mobility at two levels: i) it expands the physical dimension of the city region; ii) it dilutes the population and makes public transport more expensive and less effective, with the consequence that intermodality is depressed. Containing sprawling is therefore essential to establish a urban structure favorable for cycling and that at the same time reduces the time and costs of commuting. An expansion directed on few axes, as conceived by Copenhagen, is a useful compromise since it safeguards urban intensity and is compatible with combined commuting solutions such as B&R and B&R&B. A compact urban structure shortens all the distances and makes easier the access to any resource but also a more extended city surface is compatible with Marchetti's constant if cycling is integrated with effective public transit. In the case of more dispersed communities such in Oulu, a high quality segregated and highly interconnected network of cycling paths demonstrated to be a valid alternative. In other contexts, e-bikes could contribute to maintain feasible active modes over longer distances and the administrations begun reasoning how to integrate them in the present infrastructures.

Bicycle path design, filtered permeability, and Vision Zero program. Once defined a land use legislation which avoids sprawling and possibly contains the commuting distances, there are other measures that can strongly concur in making cycling attractive. The results of the periodic surveys performed by the cities clearly indicate that perceived safety and convenience of cycling strongly depend on infrastructure availability and design. Filtered permeability is very effective for promoting the use of bicycle as an alternative to car because selectively reduces the distances of active modes whereas renders longer and more cumbersome driving a car to move from one to another point of the inner city. Keeping segregated motorized and active modes is the other pillar for successfully implementing active mobility. Reliable infrastructures enable safe riding, shorten distances, simplify utility cycling also for children and elders, and combined with "stationary infrastructures" (parking slots, showers, workshops) contribute to render cycling affordable for anybody. In this perspective, also the aim of progressively reducing/avoiding accidents and casualties is achievable and having national (or even international) standards –such as in The Netherlands- would represent an advantage because would simplify the cycling behavior of tourists and long-distance commuters (Train+Bike commuters). The Copenhagen annual reports on cycling clearly evidence how the administration constantly tried to ameliorate the infrastructures to progressively fulfil the citizen expectations and, therefore, tempt them to become habitual cyclers.

Health. Both local and national administrations underline how convenient active modes can be for both the public health budget and the enterprises. They produced extremely detailed budgets concerning the fact that physical activity connected with regular cycling statistically represents a benefit which reduces occasional health disorders and prevents the insurgence of chronic diseases. This condition results in a clear advantage for work organization at any level because the rate of absence statistically drops. Consequently, many private enterprises, specially in Denmark and The Netherlands, started actions to support the active mobility of their employees.

Pollution. Noxious emissions from exhaust gas are dangerous for human health, the environment, and accelerate the corrosion of buildings and manufactured goods. Always more often cities must reduce the access or even close their centers to motorized transport to avoid exceeding the legal limits for harmful components in the air. Furthermore, there are EU guidelines and compulsory goals established by the international community and subscribed by EU concerning CO_2 emissions [EPRS, 2014; EU Action, 2017]. The respect of these norms implies direct and indirect costs for private and public hands that can be significantly reduced by shifting a significant share of the traffic from motorized to active modes, as for instance foreseen by Copenhagen municipality [Copenhagen Climate Plan, 2009].

Ecological footprint and loss of irreplaceable resources, impermeabilized soil, runoff, flooding and erosion. Considering cities as ecosystems is not simply the result of environmental sensibility, but the awareness that the loss of ecological equilibrium is a menace and a cost. The progressive impermeabilization of urban soil strongly contributes to runoff and the consequent effects of flooding and erosion. Some topographic conditions can exacerbate these problems but the communities at highest risk are those in which the perception that there is a limit to the growth is not diffuse. Concerning sustainability, there are administrations which search to anticipate the problems and others which try to postpone actions. For their geographical positions, the European analyzed cities are not in very dangerous environments and probably for this reason the analyses to this regard are in general not very detailed and usually gathered in the container concept of “sustainability”. However, the examples from the rest of the world indicate the global gravity of the problem.

Water, waterfronts and psychological functions of the environment. The idea of exploiting neglected waterfronts as a charming factor for increasing the appealing of bicycle tracks was at the beginning of my work. Water needs time for being

enjoyed, namely it is more and more appreciated when the speed of the observer slows down and he is exposed to the environment. In other words, it makes sense to dedicate waterfronts to slow transport solutions such as walking and cycling rather than to motorways. I did not expect that so many administrations shared my opinion and prioritized waterfronts for active transport considering that urban water landscapes are an opportunity to provide aesthetic pleasure, especially for long-distance routes dedicated to commuting cycling at regional level. The project proposed for Orlando mentions that using waterfronts as sites for dedicated bicycle roads could be a strong incentive for more frequent utility cycling. Copenhagen and Zürich explicitly refer to the strict relationship existing between active forms of transport and water resources. In particular, Copenhagen has realized several panoramic bridges dedicated to active modes above inner water basins and works at regional level to build long-distance cycling roads along channels. Paris started its policy of urban space re-distributions from the Seine banks and Oulu built its segregated bicycle roads to connect the estuary islands and thus to provide a peaceful alternative entrance to downtown "over" the water. London aims at better connecting its parks inside its bicycle infrastructures and, more generally, the psychological effect of natural elements has been widely acknowledged for maximizing people appreciation for bicycle roads and considered a natural partner for the pleasure of exercising by cycling.

3.10 Conclusions regarding the characteristics of sustainable mobility policies

Schematically, cities attribute to active/bicycle mode different tasks to accomplish in the urban context (Table 1).

Table 1. Administration expectations according to the plans conceived for bicycle mobility

Active modes, and specifically bicycle transport, have been considered instrumental to improve several of the plagues that affect modern cities and that are relate to people mobility

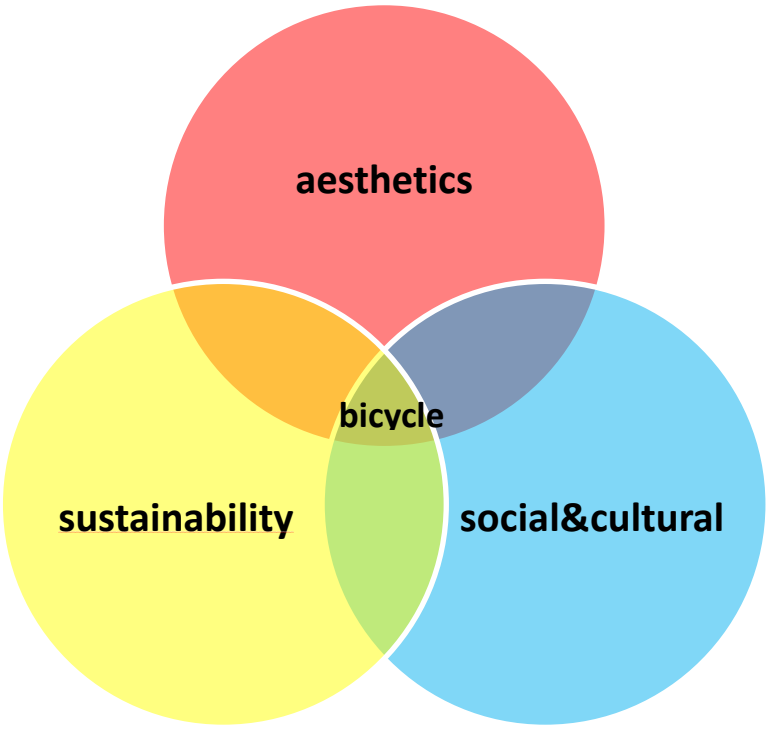
	Bicycle as the motor of urban policies				
	Mobility	Form	Social	Economy	Sustainability
Copenhagen	x	x	x	x	x
Amsterdam	x	x	x	x	x
London	x	-	-	-	-
Paris	x	-	-	-	x
Orlando	x	-	-	-	x

Although all the cities see bicycle as a potential player in urban mobility, only part of them considers that this mode not only needs specific infrastructures, but that can influence the development of the urban factory modifying its connectivity and providing new public space. This gain is usually due to roads and parking places that are conquered to motorized vehicles and that in the intentions of several administrations have a clear possibility to catalyze social activity and integration. In the past, “entire neighborhoods have been destroyed to make way for elevated freeways, and downtowns have been gutted to provide parking, destroying destinations simply in trying to get to them. Over 60% of the land in such a downtown might be dedicated to parking and streets, leaving an empty shell of a city – *as if bombed by car*. In Los Angeles, there are eight parking places for each car, in order to handle peak loads as traffic shifts from one area to another” and each car parking place can accommodate till 12 bicycles [Meggs et al., 2012]. Urban space distribution is at any time the results of previous social, economic, and technical conditions. It is a metastable equilibrium that can develop into new concepts, driven and pulled by different actors into different directions [FGSV, 2014]. The implementation of an alternative mobility policy, in which active transport modes will substitute a significant share of motorized transport, will impose radical changes to the present urban structure of many cities. This trend can be integrated in a process that is technical as well as social. Active mode contributes to

“improved democracy” by means of offering both higher access to mobility and structural conditions that create more equal modalities of public space sharing. The tender published for the next Velo-City2015 conference asked for contributions aimed at describing the role of bicycle in the urban development titling provocatively “Bicycle: future maker” [ECF, 2014]. Bicycle-based transport is claimed as the key to build functional metropolitan area where intermediate agglomerates are present. Also local economy is foreseen to improve as the consequence of the higher proximity and flexibility allowed by active transport. Furthermore, when correctly implemented, bicycle transport can effectively contribute to cut down pollution and determine a more sustainable and economic city development. Finally, the constructions of *ad hoc* infrastructures is often the occasion to render more appealing the urban landscape by recovering the access to neglected areas and waterfronts and planting trees along the paths. Cities need a structural reorganization that implies public space redistribution to support initiatives able to overcome their “growth constrains”. In this perspective, the implementation of a bicycle-based transport model is the occasion to begin a global urban renovation. As mentioned in the Introduction, if cities are investigated sectorally, by analyzing the drawbacks originated from their form, their transport system or their social problems, we’ll probably miss the evidence that these are often strictly connected. Exaggerating, bicycle might be considered as the pin on which a new (comprehensive) idea of city development can be envisaged (Fig. 5).

Figure 5. Bicycle-based mobility as the core element for sustainable cities: shifting from bicycles in the city to a bicycle city

An effective cycling infrastructure implies a complete reorganization of the urban fabric that can offer simultaneously the occasion to mitigate some social problems and, at the same time, improve the city esthetical and ecological quality



A higher rate of cycling, for itself, will not modify significantly any parameter related to traffic congestion, air pollution, or accessibility to amenities and jobs. However, the examples of the cities in which a systematic policy of incentive of active modes has been implemented showed that these can have an enormous impact on any aspect of urban life. This impact is due only partially to cycling, because this activity provides independent and cheap mobility, more elevated social interactions, local economic and aggregative activities. The major contribution is due to the effect of having redistributed the public space to implement the bicycle infrastructures. The gained space has regenerated and repopulated wide areas of inner cities, made the distances shorter, the ways more comfortable, the environment more enjoyable and attractive. In this sense the bicycle became the center of a revolution against those conditions which generated the common problems of cities dependent on a mobility model based on private cars.

Every city has its own specificities and consequently developed an individual set of concepts suitable to satisfy its needs in terms of urban development and

transport policy. However, the comparison among different situations shows that there are some constants that contributed to the strategy accomplishment. It is useful to summarize them because the list could inspire other administrations and be used to evaluate the credibility of proposed plans.

- Clear goal definition. The administration must define what are its objectives and in which time frame it wishes to reach them. Urban space is limited, it means that at the beginning of the project it must be clearly decided how to (re)-distribute it
- Budget availability. The costs must me correctly evaluated and the corresponding budget necessary to complete the investment must be secured
- Incremental implementation. The decision process necessary to define, review, and improve the initial proposal must be open and involve as many citizens as possible to be legitimated and gain public support. Once defined the general trajectories, the plan must be implemented by introducing as many progressive changes as necessary to increase the overall attractiveness and acceptance. Alternative solutions that allow for the necessary adaption to real conditions can be more effective to achieve the project spirit than remaining stuck to theoretical concepts defined *a priori* and that lose coherence in the praxis
- Communication skills. Resistances and cultural issues should be coped with information initiatives to widen the basis of citizens aware of the advantages of the changes. City development should be presented not as a technical issue for specialists, but as a subject of interest for anybody since it can determine a new idea of urbanity by means of the redistribution of public space. Health and socio-economic co-benefits should be clearly indicated and, generally speaking, dialogue becomes a pillar of planning
- Political coherence. Urban planning needs long periods to be implemented and the administration must maintain its original vision and resist to counteracting groups of interest. On the other hand, constant monitoring is necessary to evaluate the effect of plan implementation and to react to the continuously new needs of the “plastic urbanity”

- Transport policy and city planning go together. The approach must be as much holistic as possible because a correct planning is the base to implement an effective transport concept. Denser cities can become appealing if automotive transport –that is associated to noise, pollution, anxiety- is strongly limited and, as a consequence, active transport modes and social interactions are improved. One probable reason of Copenhagen success is due to the fact that “it managed to find a way to get the professions of urban and transport planners under the same roof and has created an integrated environment of urban and transport planning” [Koglin, 2013]. The opposite is apparently true as well: keeping planning and transport separated inside the administration prevents to see that some city problems must be tackled with a global strategy/infrastructure plan. The realized projects and the relative literature are a valuable reference for newcomers. Infrastructures and facilities must possess some quality and safety standards, be complete, interconnected, and serve as an integrated system for being attractive and be used by citizens belonging to different age and social groups
- Shared space. Most of the city plans underline the social aspect of active transport and that it is beneficial to support living streets in residential areas. Shared space has been proposed in the past as the solution to improve both street vitality and safety. The original idea, according to Mondeman’s concept [Shared Space, 2005], considers to recover economic vitality and community cohesion by eliminating regulated physical separation. The availability of more space to experience informally the streets will automatically increase people interactions. In its most provocative alternative, this concept considers a unique space (no sidewalks or bicycle routes, just a uniform surface) shared also with motorized vehicles. Building an environment that removes any physical separation and therefore creates incertitude in terms of rights was conceived to push all the traffic actors to negotiate with the others. Philosophically very stimulating, this radical view has shown some drawbacks in the praxis due to the objectively different capacity of negotiating specific of cars and weaker players such as pedestrians, women, elders, and blind peo-

ple. The update version proposed by the cities analyzed in this survey seems to be the “Autoluwe” concept, namely a space shared by active transports but strongly limited to car access. The effort is to overcome the conflicts between persons using different mobility means that Bauman synthetized as the daily “urban space war” to reaffirm the power on the city public space [Bauman, 1998]. This goal can be also obtained converting car drivers into occasional cyclists who could then experience cycler needs and fears.

Related to the idea that the risk awareness can improve the safety is also the debate concerning the mandatory use of the helmets for cyclers. Many cities oppose to this proposal because retain that can discourage adults to cycle but also because, apparently, wearing a protective helmet makes cyclers more imprudent and drivers overtake with less care cyclers that look protected. This opinion is supported by statistics according to which compulsory helmet decreases the number of cyclers, but often results in an increment of the accident and injury number [BHRF, 2014].

- Natural resources. Active mode has being conceived as an effective means to recover and revitalize natural resources such as parks, waterfronts, but also barren lands inside the urban factory. This is because they are ideal places for hosting cycling infrastructures and because the slow speed increase the chance to enjoy these environments

4. Milano

Since Milano is the object for which a developmental proposal should be designed based on the experiences of the other cities, it deserves a more detailed (historical) analysis.

4.1 Historic urban development

The city is positioned in the central sector of Padana plane and the first settlement was a roman fortress at the interconnecting junction among the main roads that linked Northern Italy to the rest of the Europe. City walls were modified several times until to reach (880) a circular development. At the same time the water from several independent rivers was collected into a main moat running all along the walls. This hydraulic work, initially conceived for defense reasons, became more and more interconnected to a wider channel network which was used mainly to trade goods. The wall and moat system evolved according to the military needs until the first draft of urban plan (1807) which implemented the reconversion to civil use of part of it. The modern shape of the city was conceived with Mengoni's projects [the rearrangement of the Piazza Duomo – Galleria in city center (1865-1877) and the railway stations Centrale and Porta Genova (1864-1865)] and Beruto's urban plans for the development of circular peripheral rings and the covering of part of the channels (1886-1889) (Sapere, 2016). The high rate of city development imposed the rapid sequence of updated urban plans. Pavia & Masera plan (1912) simply adapted Beruto's idea to a larger area, but is considered the most important for the city development because it designed the infrastructure network which still persists and promoted the systematic landfilling of the main channels (Navigli) in 1929. Its major limits were considered the zoning-like design, the lack of a circular bypass road and of public spaces (Oliva, 2016). The plans Albertini (1934) and Secchi (1942) were realized only in minimal part and did not shape the city structure. A new general plan was approved in 1953 which conceived a directional district for administration and finance services in the city center but did not modified the general concept of the Pavia & Masera plan. The general plan was later modified (1980) to introduce absolutely

new elements: reconversion of dismissed industrial areas (for instance, the Bicocca-Pirelli project of Gregotti, 1985-1987, and Foster's Milano Santa Giulia, 2005-2010), valorization of historical borrows (Isola and Porta Genova), displacement of traffic-intensive activities into peripheral areas (Rho-Pero Exibition center, designed by Fuksas), limitation of sprawling (in this case the effects were very limited, specially in the larger area represented by the independent but conterminous municipalities) (Sapere, 2016).

4.2 Recent planning policy

There are two administrative levels that are responsible for political decisions in the Milano area: the municipality that is in charge of the town and the province which is responsible for the municipalities belonging to the district around the center and corresponding roughly to a region of 30-40 Km in diameter. This "great Milano" is a typical example of "Citta' diffusa" or "Zwischenstadt", according to Secchi's [Togni, 2011] and Sievert's [Sievert, 2000] definitions, respectively. Hall defines the "Citta' diffusa" as "an anarchist development in the absence of control" [Paquot, 2000] in which the transport depends on cars because of the great dispersion and low density [Paquot, 1999]. It represents the South-European version of the American sprawl and shares with it most of the problems of investment, transport and maintenance costs, and of overall sustainability, as described in details by Camagni et al. [2002]. In the metropolitan area the pollution indicators exceed the legal limits compatible with human safety more than one day on three and the trend is markedly towards worse values [ISTAT, 2012]. Since the city is the hub for most of the services and industrial products built or commercialized in Italy, it suffers from an extraordinary high degree of commuting and logistic-driven traffic. The local administration is forced to reduce the automotive access to inner city for more and more days during the year with consequent economic and personal drawbacks. At the same time, the train and metro network is underdeveloped, totally saturated, and the maintenance chronically insufficient. The national transport policy has never promoted (credibly) "light-train networks" in metropolitan areas and in the last 20 years the investments in

the railway infrastructures have been mostly devoted to the rentable high-velocity mobility, whereas local transport means (regional trains) have not been renovated sufficiently to answer to the constantly increasing requests. As it has been suggested, the city would profit from a “technological pluralism”, namely an equitable investment distribution able to support alternative transport modes and to save not-renewable resources [Patton, 2011]. A direct consequence of a transport concept dependent on private cars is the overbuilding of infrastructures to accommodate motorized traffic and parking slots that impose a high share of impervious surfaces. In 2012, the index of soil consumption for Milano was already as high as 61.7% and the trend shows an increase in the last years although the EU recommendation to revert it [ISPRA, 2014]. Consequently, the buffering capacity of the residual permeable surface in the whole Milano area is not sufficient to accommodate the rainfall peaks and the frequency of overflowing caused by the several channeled underground rivers that drain the runoff water from the manholes constantly increases. The direct and indirect costs due to these events in the only month of November 2014 have been quantified to tens of millions euro and forced the municipality to ask for the state of emergency [MilanoOnline, 2014]. Flooding water invaded repeatedly metro stations, underpasses, parking and market areas paralyzing completely the traffic in whole neighborhoods, a condition that should be not acceptable in a modern city.

These conditions of environmental emergency could progressively affect the economic fitness of the city and, therefore, the necessity to reconsider its mobility and to reduce the dependency from motorized vehicles became evident. The first administration to transpose the national (“Norme per il finanziamento della mobilita’ ciclistica, legge 366, 1998) and the EU guidelines in terms of sustainable development and integration of bicycle transport into the overall viability plan was the province (Project MiBici), in the year 2005. It developed a plan for a Strategic Bicycle Road Network with the aim of promoting the bicycle as an effective transportation means for “primary transport”, namely for daily commuting to workplaces, services, and schools. The proposal was aimed at connecting the already existing infrastructures (mostly built by the different municipalities of the

metropolitan area), guaranteeing safety and coherence standards for the realizations, favoring the access to railway and bus stations in the perspective of multimodal transport opportunities, and creating a bicycle office for technical and information coordination [http://www.provincia.milano.it /mibici/rete_ciclabile/index.html]. Two technical documents describe the plan concept (Piano di settore) and the strategy for its implementation (Valutazione di fattibilita'). They mainly adopt some technical concepts previously elaborated in Northern Europe countries [http://www.provincia.milano.it/mibici].

There are some evident limits in this plan: i) the effort is almost exclusively concentrated on the cycling tracks, whereas the remaining infrastructures necessary to support cycling mobility are totally neglected; ii) the technical reference for the infrastructure design is an old work from the Kanton Bern (1991) by far less updated and tested than the Dutch CROW manual [2007] and –even more relevant- conceived for urban and cultural conditions that have nothing to share with Milano; iii) there is no analysis of cultural and social aspects related to transport policy and urban viability; iv) the feasibility is evaluated on models that rely on guessed, non-experimentally established values. The assumptions are of the kinds that "X% of the trips can be potentially performed by bicycle" because the distances are compatible with this transport mode, but there is no effort to evaluate what could be the actual number of trips that will be cycled at the present and as the consequence of infrastructure improvements; v) the cost-benefit analysis does not consider the indirect advantages of cycling for the community as well as for the individuals, neither the costs necessary to maintain and build new roads for motorized traffic in the absence of a shift towards cycling; vi) there is no credible action to promote intermodality. Two further aspects led to the defeat of the project, namely the lack of implementation of the indicated building/safety standards (as shown by some examples – Fig. 6) and the lack of the prompt repression of the bicycle infrastructure misuse. As it has been noticed in other countries, a single dangerous cross-road keeps away most of the potential users from the whole network and having cycling routs blocked by parked cars or used by motorcycles because no policeman prevents these misbehaviors nullifies any

benefit of the investment. The example of Figure 6 has not been reported to evidence building details but because it hints the mentality with which some projects are undertaken: since nobody really believes in a cycling mobility, the quality of the infrastructures is not relevant and it is sufficient to show that something has been realized.

Figure 6. Poor design, worse construction: the Binasco underpass connecting two portions of the bicycle rout flanking the Naviglio Pavese

The Binasco underpass has been reported as an example not for showing the engineering inexperience with which it was built but for underlining that it is the consequence of a cultural approach. According to this, it is not important to build effective infrastructures, but showing that something is done. In the specific case the angles of access are extremely narrow in both directions, impairing to see bicycles arriving from the opposite direction and to keep the speed to tackle the steep slope. There is no light to illuminate the tunnel and it has been built without manholes. Since the containment walls outside the tunnel are too low to protect the path from water and eroded sliding from the surrounding fields, the consequence is that muddy water runs and accumulates inside the underpass. The arrows indicate the limit reached by the water (higher than 80 cm). Slopes and underpass bottom are slippery because of the accumulated mud, but the major

danger is represented by accidental tumble in the deep water, especially in winter time.

On its side, the city municipality expected a major contribution to the active mobility of Milano from the implementation of the Raggi Verdi plan. The Raggi Verdi is a project that has been largely integrated in the city's Territorial Master plan and that was thought to improve both the bicycle transport and the access to green spaces in the Milano metropolitan area. The concept considers eight "rays" that should connect the city center with peripheral green areas and each ray should become a green corridor for itself in which relax, walking, and cycling should be available. Studio LAND, the author of the project, underlines the function of the corridors for improving the city permeability towards the surrounding countryside and to give visibility to the existing green areas in the inner city [Kiparland, 2007]. It refers to the pivotal importance of the landscape as a social catalyzer and a crucial element for psychological wellness, but the opportunity that the rays could represent for improving the utility cycling is neglected. Rays are proposed as leisure instruments with psychological relevance, not as commuter mobility infrastructures. Nevertheless, also concerning this aspect the available documents referring to the project [Cappelletti and Kipar, 2009; Kipar, 2010; Kipar 2012] strongly simplify the relationship between green quality (composition, dimension, relationship between open and dense spaces, choice of vegetable essence,…) and expected psychological effect [Knopf, 1983; Grahn and Stigsdotter, 2003; Kyttä and Kahila, 2005 Grahn and Stigsdotter 2010] by stating that any green element ("green declinations", according to Studio LAND) will contribute to satisfy the user expectations [Cappelletti and Kipar, 2009]. The documents are pervaded by references to spirituality and appear metaphysic in the sense that do not refer to any experimental (quantitative) survey dealing with the presumed healing capacity of (any) green surfaces. The project anticipates that the form in which the territory is organized can impact the social behavior, but somehow inverts cause and effect assuming that underlining (light) greening pre-existing structures will be sufficient to modify the perceived reality in the ab-

sence of major urban structural reorganization. For instance, most of the cities considered in chapter 3 clearly indicated that public space needs to be redistributed for recovering the surface to allocate active mode infrastructures and socializing activities. Or, as it happened in Vienna, the social analysis is considered a priority with respect to the technical design [Zech and Kail, 2011]. In Raggi Verdi such analysis is absent whereas any detail of technical implementation is thoroughly illustrated.

In comparison to other plans of urban requalification, it is surprising how the problems related to mobility are neglected. It is emblematic that the rays are considered a way to escape from the city instead of being an integral piece of the urban development plan [Kipar, 2012]. They are presented as an oasis apart from the city life instead of a resource to live the daily urban life in a (new) cultural context. Somehow the green rays are proposed as an “after-hour” element, a place where to go for a pause and maybe capable to improve social interactions [Kipar, 2010], an object of design rather than an infrastructure for utility active mobility able to tackle the problems of a modern city. In this perspective, the project is sterile in terms of solutions and its position towards dense city is contradictory: it is considered a positive development to pursue [Kipar, 2010] as well as a negative heritage to abandon [Kipar, 2012]. It accepts territorial planning as an instrument to reduce the impact of infrastructures for motorized traffic but does not even dare to propose infrastructures for active transport as an alternative mode to improve the urban fruition. It does not claim “new” space for cycling and instead of it suggests relegating it to back-streets, a choice refused by any city with successful active mode policy because it discourages potential users. A clear decision in terms of urban space distribution and transport policy is missing in the Raggi Verdi proposal. It is a pity because opportunely managed rays could build the main axes for a bicycle network alternative to combustion-based private car mobility and helping the connection of Milano inner city to its surrounding regions. Otherwise, in the absence of an overall plan for bicycle mobility, the 72 Km of bicycle circular track planned around the city will remain an anti-economic investment. As it is, the project seems a compromise between high expectations

and limited resources: if these are scarce, “environmental corridors” should be created “looking for space in hidden places”, as it is written in allusive marketing language [Kipar, 2012]. Looking at the available documents, Raggi Verdi is an objectively “conservative” proposal in the sense that does not deal with urban space redistribution for sustainable mobility but mostly addresses street design and esthetic. Summarizing, there is no will of using urban planning for reshaping the urban space, attitudes, and transport policy but simply the search for a superficial and punctual beauty. Finally, the project paied also its incomplete implementation since the axes that the Raggi Verdi project should generate remain, several years after their (partial) realizations, invisible in the city structure. On the other hand, the proposed infrastructures never met those technical parameters that, according to international experience, bicycle paths must possess for being safe and consequently used [City of Copenhagen, 2009]. For instance, they are not continuous and are often shared with motorized vehicles. This fragmentation, both in the design and the implementation, impaired the successful development of the project which remained an empty shell. As Nils Jensen (Copenhagen City Council’s Road Division) stated already ten years earlier, “money should be spent in selected places offering good facilities and not be wasted by painting a lot of cycle lanes which will not be respected by car drivers” [http://www.eaue.de/winuwd/175.htm].

At the present, the municipality tries to regain the time lost in decades of car-shaped development and to propose a new policy more attentive to non-motorized transport modes. Recently it produced a new overall Traffic Masterplan [Comune di Milano 2013a; 2013b; 2013c] and the official documents have been translated into exhaustive divulgation texts on the municipality webpages [Comune di Milano 2013c]. Astonishing, no direct mention of cycling is reported on the document concerning the environmental impact of the traffic [Comune di Milano 2013b]. Otherwise, the general recommendations concerning active transport (cycling and walking) [Comune di Milano 2013a; 2013c] recall the conclusions of any international document concerning bicycle policy published in the last twenty years and foresee the logic infrastructure network and accompanying

policies already successfully developed abroad for supporting cycling: speed calming and car-free zones, pavement refurbishing, parking places, *ad hoc* bridges and tunnels, inter-modality with train and underground, diffuse net of interconnected bicycle paths. Their implementation will request substantial financial efforts and a cultural shift of both planners and users, two aspects that are not detailed, but at least there is a comprehensive effort to tackle the issue. Finally, since 2008 there is a bicycle sharing service in the inner Milano area. There are 197 stations for 3,800 bicycles: as a comparison, Paris network counts 1800 stations and 20,000 bicycles. The station distribution ratio is therefore 1:10, whereas the city population ratio is 1:1.5 and, in terms of surface, Milano municipality is larger than Paris (roughly identical if the Paris peripheral municipalities served by the Velib are included). Although the served area is consequently extremely smaller in Milano, the users seem satisfied of the service and contested a negative article recently published [Vanni, 2014] that underlined the low quality of the available bicycles. One comment pointed out that Milano bike sharing service worked better than the one offered by London (!). Of course, it is easy to be better than the worst in the pool and it is a pity that the article did not address more substantial questions such as the choice to limit the service to the (affluent) neighborhoods of the center instead of using it to favor the commuters coming from the far peripheries. Summarizing, the critical issues of bike mobility in Milano are:

- Funding: the reality shows a very primitive infrastructure network, with a set of totally disconnected cycling paths that often are just painted strips on side-walks, abruptly stopped, and with no design for safe intersections. Therefore, the requested investments necessary to build a connected network of safe and rapid cycling routes with standard quality sufficient to induce people to cycle will be extremely elevated. In contrast, the administration set aside just 20 million euro for the period 2013-2015. It means 5 euro/person and year, namely less than the amount used simply to keep the quality standards in smaller towns that have already built a complete infrastructure.

- Objectives: integrating bicycle in the transport policy means making clear choices. Some space must be reconverted from motorized vehicle use to cycling, segregation must become the norm because it is more effective than shared structures, a complete network must be accomplished, filtered permeability, secure parking conditions, and pathway control and maintenance must be fulfilled to make cycling safe, convenient, and attractive. Investments that do not allow reaching this overall goal are probably not justified because they will not induce further citizens to become cyclers and cycling will remain restricted to few vehicular bikers.
- Rule implementation: the mentality must change. It cannot be tolerated that segregated bicycle paths are normally used by motorbikes or as parking places for cars. Bicycle transport must be perceived and accepted as a transport mode with the same rights of motorized vehicles. Communication should be envisaged to make clear this point to all the traffic players and police forces. Similarly, agreements with railway administration for intermodality transport are not worthy if commuter train are not equipped to carry bicycles.
- Statistics: the administration should also decide whether its aim is to improve statistics using tricks or to improve the reality by meaningful data analysis. The number of bicycle path Km does not mean anything in the absence of minimal construction standards, of network connectivity, and minimal intersection safety to make paths appealing. Similarly, the official number of bicycle trips in Milano (6% of the total) is in evident disagreement with the reality and with the statistic of the Large Milano (Provincia) administration. Relying on real data would be more useful to plan efficiently, even though real data would indicate that there is more work ahead.
- Beyond Raggi Verdi: With respect to the original proposal there is a welcome shift from the idea of using the radial corridors mainly for leisure to their exploitation for long-distance bicycle-based transport. Anyway, the practical conditions (safety, convenience, speed) must change for convincing potential utility users to replace motorized transport with cycling. So far, cycling remains a recreation activity.

Clearly, transport policy and general urban planning should be better coordinated at large metropolitan level and an improvement in this direction could come from the administrative reform which will replace Comune and Provincia with a single Metropolitan Area government. Both a fill-in development aimed at increasing the density and a polycentric model have been suggested [Camagni et al., 2002] to reduce the perverse sprawling effects that make active transport objectively more difficult, but these proposals do not seem to have found a great interest among the administrators. The scarce attention of local as well as national government for regional active mobility and integration between active and public transport modes has induced more than 150 associations to create a mobility lobbing network (Rete Mobilità Nuova) asking for a new transport policy [Mobilitanuova, 2013]. The aim is to have allocated more resources for local transport whereas at the present highways and high-speed trains drain most of the funding. So far repeated public rallies did not achieve any tangible effect, despite the support of some deputes at the national assembly. So far the new Milano administration (elected in 2016) is still busy in designing the new mobility strategy (prolongation of metro network, bus electrification, wider area served by bike-sharing, new protected bike shelters at the main train stations). Apart from the declarations of principle, a clear plan to build a safe and effective network of bicycle paths is not foreseen also for the strong resistance of a consistent part of the population [Ruzzo, 2017]. The economic power seems still pushing for a model based on private transport and the building of new infrastructures for cars. Astonishing, in a study published by Assolombarda (the Enterprise Association of Lombardy region) and dealing with Milano transport problems, there is no mention of the policies for supporting active mode and cycling in the European cities mentioned in the report [Assolombarda, 2012]. Of course, cycling has been totally ignored as a means to alleviate congestion and pollution.

4.3 Milano as a (former) aquatic city

As we have seen in the previous paragraphs, many cities used valorization projects to recover access to waterfronts and allocated these areas for social activi-

ties and active transport facilities. The relevance of water in the past of Milano is mirrored by the present nostalgia for the times in which it characterized the urban landscape and regulated the economic activity of the city [Colussi, 2013]. More than 50 titles dealing with the local channel system are available at the communal library Sormani and numerous are the local associations engaged for the requalification of the Milano waterways. The first channel network (I-IV century), mostly constituted by deviations of the many minor rivers interesting the area, was progressively integrated by extremely more sophisticated and demanding artefacts starting from the XII century. The initial water system was conceived for irrigation, defense, and sewage draining but it evolved into a complete network of navigable channels (Navigli) able to connect the city with the lakes of Como and Maggiore by means of the rivers Adda and Ticino, and with the Adriatic Sea by means of the Po river. Between the XIV and the end of the XV century the Navigli Grande (43 Km, plus the length of the Canale Regresso, the final part of connection with the Ticino that is set aside at the present, with a flow of 64 m^3/s; Fig. 7) and Martesana (38 Km, with a flow of 27 m^3/s) were completed and connected by means of a system of channels, docks, basins, and weirs (Cerchia dei Navigli) [Provincia Milano, 2006]. It means that the whole complex was finally composed by channels measuring more than 90 Km in length and served by 25 locks necessary to overcome the height differences.

Figure 7. Naviglio Grande

A large towpath runs along the countryside treat of the Naviglio Grande and it has been transformed in a comfortable two-way mixed path (pedestrians plus bicyclers). Such arrangement is preserved in most of the small riparian villages. The channel edge is often overgrown by wild vegetation (sometime as exotic as banana trees!). The present arrangement is already suitable –and largely used- for leisure but utility cycling is limited by the lack of connections between the towpath and the surrounding territory

With their large section (the Naviglio Grande reaches 25 m) and limited average slope (0.15%) they enabled the navigation from and to the Alp lakes, their markets, and their stone quarries and forests, essential for expanding the city building. Numerous villages developed as intermediate dockings for the floating trade (Fig. 8) and the Naviglio Grande became one of the most relevant axes for Milano economy in a period in which no other transport mode could compete in efficiency with ships and barges.

The Naviglio Pavese (34 Km, 12.6 m^3/s) was completed later to connect Milano to Pavia and, from there, to the lower course of Ticino and the Po (Fig. 9).

Figure 8. Dockings of villages alongside Naviglio Grande

Many villages along the Naviglio Grande used the former dockings to valorize their access to the channel.

Figure 9. Naviglio Pavese

The Naviglio Pavese forms a large basin (the previous harbor) soon after its entrance in the city and a set of close weirs enables to overcome the height difference between the plain level and that of the Ticino river.

Minor navigli (Paderno, Bereguardo, Fig. 10) and a number of channels (such as the Villoresi, but more than other 30 major channels with their derivations were indexed by the Director of the water system in the XIX century only for the Cerchia dei Navigli, namely the historical inner city, Bignami 1868] were built for local transport and supported both agriculture and industry (water mills). They have been also used to irrigate the orchards of city institutions (abbeys, cloisters, colleges, hospitals) as well as several “ville delle delizie” (“pleasure villas”) disposing of private parks with small lakes and cascades that contributed to the urban and peri-urban landscape specific of an aquatic city (Fig. 11) [Colussi, 2013].

Figure 10. Naviglio di Bereguardo and Navigliaccio

The Naviglio di Bereguardo was initially conceived to provide a direct communication link between Bereguardo castle and Milano. The water that flows from Naviglio Grande is nowadays used exclusively for watering the rice fields. The same irrigation purposes are consigned to the Navigliaccio (right down) that flows beside the Naviglio Pavese.

Figure 11. Villas alongside the Naviglio Grande

The landfilling ofl the inner city channels determined the death of the urban private parks. However, several villas with superb gardens still survive along the Naviglio Grande. Sometimes these parks mirror directly the channel waters, in other cases only the backyards and the service buildings are accessible from the towpath.

Although the main Milano basin (Darsena di Porta Ticinese, Fig. 12) accommodated the daily traffic of 70 merchant barges for day in the XIX century, the project of constructing a large and independent port for long-distance handle performed by large freighters was successively postponed and buried at the end of the XX century. The previous industrial exploitation of Navigli left only few witnesses (Fig. 13), most of them outside the city.

Figure 12. The Darsena, former Milano port and the place where Navigli merge

Only a small portion of the ancient Darsena was flooded for many years, whereas the rest of the basin and the surrounding dockings remained inaccessible and desolate, as detectable in the picture bottom/left (state at 2010). The gray panel hoisted over the edge shows the imposingness of the Darsena and its still remarkable trade and transport function in the 1970s.

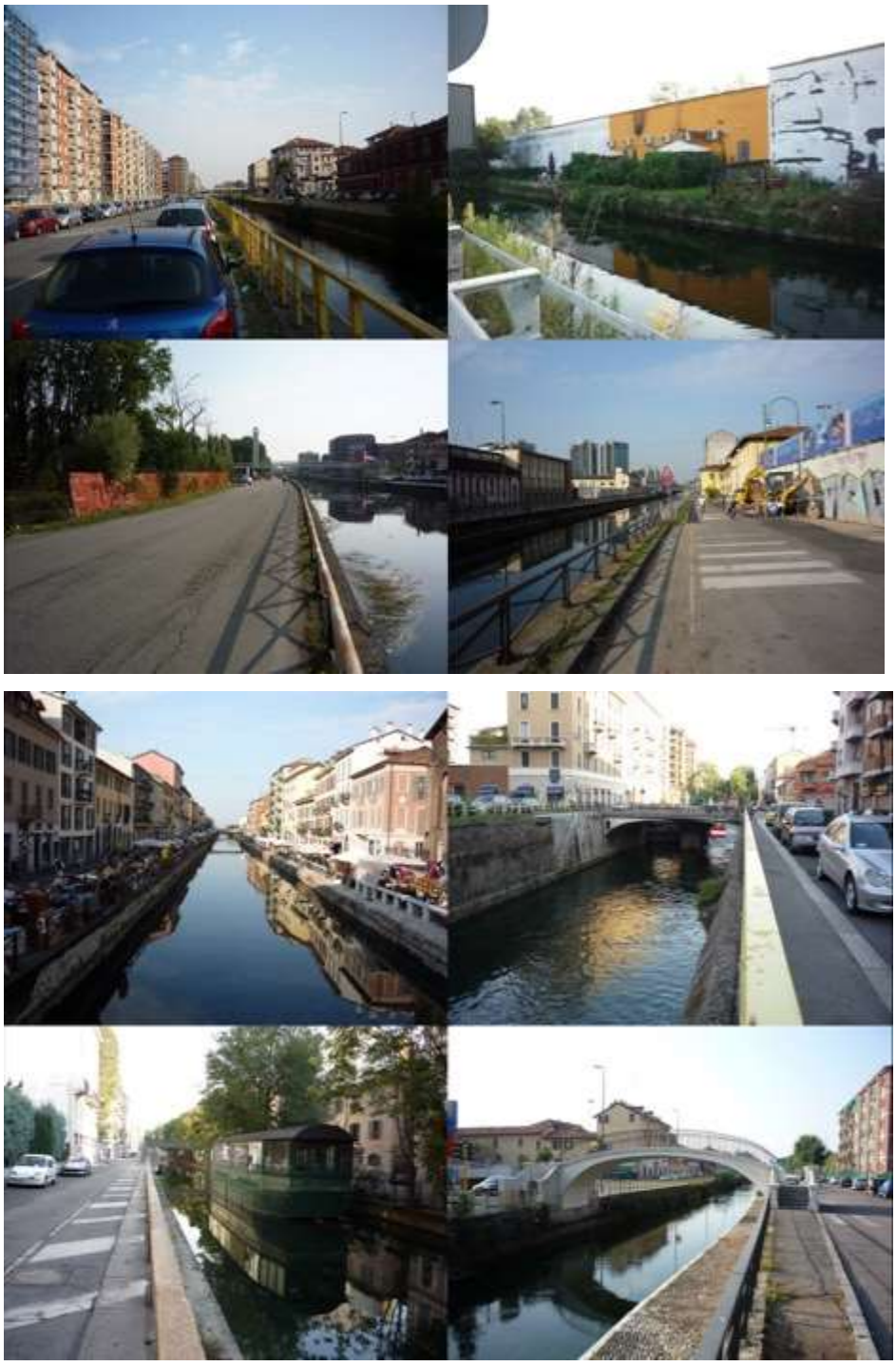
Figure 13. Ancient factories and navigation manufactories along Navigli

The water of Navigli was used directly to produce energy and to move mills but in the XIX and XX centuries the Navigli represented also the easiest access to transport goods inside and outside the factories. Some of the buildings that might witness of this ancient importance have been refurbished and now serve different interests whereas others lay abandoned.

At the present, most of the water runs hidden below the roads (the Fossa Interna, since 1930), only the Navigli Grande and Pavese are still open and accessible, and the Darsena remained dry for many years and was partially mutated into a parking place for cars. Navigli usability is however very limited because main through roads edge their banks (Figs. 14 and 15).

Figures 14 and 15. Navigli in Milano: the motorized traffic isolates this resource from social life. Peripheral environment (14) and Central areas (15)
The peripheral areas of Milano are desolated, but even more apparent is the complete lack of interest for the Navigli deducible from the urban design. Parking slots and industrial buildings are organized in a way that impairs to approach to the waterfronts. Otherwise, main traffic roads without bicycle path and sidewalk for pedestrian prevent even the fortuitous contact with the channels.
The accessibility to Navigli is limited even downtown, with the exception of special events (the monthly antiquary show along the Naviglio Grande, high left). Otherwise, no bicycle path, scarce and deteriorated sidewalks for pedestrians,

the priority constantly accorded to automotive transport and car parking necessity.



Lately, the lack of ordinary maintenance on the channel structures together with the load of the by-passing heavy traffic caused the repeated slide of some Navigli portions [CorriereDellaSera, 2014]. The pleas and the proposals for recovering at least part of this patrimony have been frequent and produced no result for long time. The situation changed with the unique occasion offered by the organization of the International EXPO 2015. The project accepted by the administration (Comune Milano, 2012; EXPO2015, 2014) had initially to be implemented by the end of 2014. It foresaw two main interventions: i) the recovery of the Darsena as a water surface surrounded by a leisure area; ii) the building of a new channel (Vie d'Acqua) that originating from the Villoresi channel would pass through the expositive area and finally flow in the Naviglio Grande. The Darsena proposal was largely accepted, whereas the Vie d'Acqua collected harsh criticism by the most influential NGOs. It is perceived as too expensive, absolutely not functional, capable of perturbing the ecosystem of the interested territory, and technically erroneous [Ecocitta', 2013].

Indeed, it is difficult to justify a 100 million investment to build a channel of no practical utility running through a countryside area. The only official justification (the channel would be used for tourist transport) does not consider that the elevated slope would impair this activity. It seems particularly illogic the idea of opening a new channel instead of recovering the huge asset of already available water canalizations inside the city. The alternative (not accepted) project presented by the architect Boatti [Boatti, 2008] had at least the merit to focus on the historical inner city waterways that – if recovered- would be more relevant for daily life, city form, and would represent the real heritage of EXPO2015 to the future of Milano. However, in both cases the content is focused on merely esthetic (architectonical) aspects. No contextualization in the frame of an innovative policy for sustainable transport and public space sharing was explicitly considered.

The EXPO2015 opened in March 2015. The Darsena rehabilitation (Fig. 16) was completed on time. In contrast, the structures related to the Vie d'Acqua project were never shelved. The new administration elected in 2016 has proposed to

open again a small portion (5 traits, for overall 2 Km) of the inner city Navigli and the first step will be a public referendum to hold in 2018 [Liso, 2017].

Figure 16. Darsena rehabilitation: state of work progress at 1.11.2014

The Darsena recovery (November 2014)

The new administration recently proposed to progressively recover the asset represented by the urban channels, considering also the re-opening of traits covered in the last century (Bravi, 2018). According to the experience collected abroad, the channel esthetic factors represented by water and vegetation will improve the attractiveness of the surroundings, such as the paths for both utility commuters and leisure walkers on the waterfronts as well as the local economic activities. Their presence and valorization will also impose a space redistribution and this could be the occasion to organize a more sustainable and inclusive mobility as showed by the Northern Europe examples. The improved visibility of the channels with their accompanying network of active mobility infrastructures could finally affect the transport symbolism and render utility cycling more “normal” and, consequently, acceptable and respectable.

5. Discussion

This section is mostly devoted to the illustration of the take-home message inferred by the analysis of the single cases, namely my "thesis" about what could be meaningful to consider for reorganizing the urban structure of a city with the characteristics of Milano. I felt that the argumentation needed to recall some theoretical aspects already mentioned in the Introduction and to be preceded by three short chapters dealing with issues which deserved a special mention. The first discusses methodological aspects to evidence how useful would be, at least at EU level, to collect and share uniform data for enabling simplified metadata analyses. The second summarizes the information relative to social and cultural aspects related to mobility. This aspect is completely ignored in the transport policy of several cities but the experience of the administrations which invested resources to deal with this subject clearly indicated that can be crucial for the implementation of a project. The third mention the introduction of completely new technologies and practices. They have the potential of totally modifying the urban mobility, but at the moment we cannot really anticipate how this evolution will impact the different aspects analyzed in this work. Nevertheless, it was necessary to remind their presence.

5.1 Methodology considerations

What are the teachings that it is possible to summarize after the analysis of the different development trajectories undertaken by cities around the world? The first concerns the methodology of a comparative work. The consistency of the available data is usually limited because in the different cities they are collected using diverging methodologies and grouped according different logics. This fact complicates the task of inferring general conclusions and identifying relationships among parameters such as transport characteristics, incentive/disincentive policies, or city structure and social conditions [Meggs et al., 2012]. Even the Eurostat initiative Urban Audit 2009 that had as the aim the comparison of a set of parameters among EU cities did not succeed in providing homogeneous and correct data [Assolombarda, 2012]. This issue has been recognized by the research

community which tried to improve the situation by conceiving the urban transport benchmarking initiative [http://www. transportbenchmarks.eu] to overcome these drawbacks and to help the comparison among mobility data collected in different European towns. Nevertheless, the annotation standards remain still clearly inefficient, as stated in a document of the Dutch Ministry of Transport confirming the lack of comparable figures [Dutch Ministry of Transports, 2009] and, more modestly, by my personal evaluation of two cities (Milano and Oulu) that scored similar official values concerning bicycle mobility but that the empiric experience would locate at the two extremes of the scale. “One hundred Km of cycling route” can statistically correspond to both a painted lane at the road edge and a 4 m width segregated track. Due to this objective limitation, case studies are probably more informative than the direct comparison of parameter scores because “quantitative” values are too often qualitatively evaluated. As pointed out previously, case studies enable to collect complementary information that finally offers a different way of comparison: not among homogeneous data, but between data that are presented and other that are not reported. It means that at the beginning I thought it was a prejudice for systematic comparison that the documents made available by the different administrations were not completely overlapping. Later I understood that this difference was exactly one of the meaningful points of the comparison: the different administrations had different aims (Mobility Policy, City structure, Social Aspects, Local Economy, Sustainability,…) and modalities to reach them and because of it they underlined some aspects and completely neglected others. Only few of them showed the capacity to target multiple goals, others considered to have a problem (for instance, mobility) and tried to find solutions for it without thinking to the challenges and opportunities that such a task could represent for tackling other city weakness. Comparison allowed underlying this spectrum of approaches, to show that cities are apple and orange and bananas and cherries. All are fruits –namely share the problem of sustainable development- but they pursuit their aim with different philosophies. My interest was to report and underline this variability in the case studies: the analysis modalities (process of identification of the issues and priorities), the self-representation and

transparency (availability of public documents and their presentation as a means to stress problems and solutions), the debate (the participation of the citizens in the assessment), and finally the possibility to examine what approach was more successful by judging the obtained results.

5.2 Social and cultural issues related to bicycle mobility

In Paris, as in many other cities, there is a service of public bicycles (Velib). A 35 euro annual subscription confers the access to an unlimited number of trips shorter than 45 min each and bicycle racks are accurately and densely distributed in the city and in the close municipalities. Cycling with Velib is cheap and practical, although not always pleasant in the chaotic motorized traffic. Once I was regulating the seat of my Velib when I was approached by one guy who you might guess having a marginal, but still average life: a scarf of a foot-ball team, mildly drunk at 6 pm, overall presentable. He asked me for some coins and since I answered that I had no cash with me, he apostrophized me: « Je vous connais, vous privilégié, vous qui payez avec votre carte, qui voyagez en Velib ». I realized that in his perspective cycling was perceived as a status symbol, not certainly for its cost, but because its use is associated to a certain social class. There is an apparent contradiction for which low-income people are proud of their private cars, whereas professionals enjoy the freedom of using transit or cycling. In Melbourne, a city which underwent inner-center gentrification, wealthy people living is the center walk and bike significantly more than lower-incomers living in the suburbs [Newman and Kenworthy, 2006]. Similarly, the rent prices in Paris inner city established a *de facto* social zoning that excluded poorer households from central areas in which bicycle may represent a valid alternative to personal car. Both cases somehow underline the power of urban structure on transport “preferences”. Poor people drive more, but the Australian survey showed that it does not mean automatically they culturally prefer it. Simply they have no choice because they have been expulsed to distant suburbs badly served by public transport. At the same time, prejudices towards active transport modes as “mobility for poor people” are real and, since poor people are perceived too often as

potentially dangerous, disfavored citizens will keep distance from “poverty symbols” that are perceived as danger indicators. The example of the Canberra University Rector who has been stopped by the police because he was walking along a street at night [Gras, 2005] clearly shows how personal choices are misinterpreted –or improper correlations are made- and that members of marginal social groups might wish to avoid cycling to prevent further argument reasons with authorities.

Specially Dutch analyses underline cultural aspects that can influence the use of bicycle. It can be matter of prestige, the necessity to offer a presentable impression or to preserve the image of authority in the own community. In some cases cultural and religious motives can merge and sometimes the results are unexpected. “Although cycling is not religious, the strongest correlation [with cycling attitude] however was found with the percentage of Protestants in a town”. This has been the most astonishing observation deriving from the analysis of the large Dutch benchmarking work known as Cycle Balance [Borgman, 2003]. Is it possible that being catholic impairs cycling more than heavy car traffic, no bicycle infrastructure and the theft plague? The author guesses that Calvinism shapes strong principles and sober lifestyles. Other works, accurately synthetized in Koolhof’s thesis [2013] confirm the strong influence of cultural and religious background relatively to the cycling propensity. I should add that the protestant practice shapes both a more participative society and a higher sense of individual responsibility, probably also a greater openness to dare innovative ways. As witnessed by the documents illustrating the decisional processes in Copenhagen and Amsterdam, these administrations based their transport policy on an approach which involved directly the citizens and that is largely unknown in Eastern and Southern European countries. It means that administrations find “normal” to take decisions ***after*** a public debate, as well as negotiation is normal at any level, trade unions take part to company decisions and students are trained to be participatory [Axelsson et al., 1991]. In other societies (autocratic, but not only, as it is the case of very conflictual democracies such as Italy or France) there is no interest in involving as many actors as possible in the decision process. Elites

believe that it is faster and more effective to impose plans and refuse to acknowledge the difficulty of their implementation without the support of, and often against, frustrated citizens to whom nobody asked for actual needs and wishes. In opposite, participative societies involve the individuals in the decision process (the so-called joint stakeholder approach [von Weltzien Høivik, 1997]), taking in account that the preliminary steps can be longer, but then people feel committed to the project they contributed to define and this condition contributes to its final implementation. This praxis requires personal responsibility and the implicit acknowledgment that compromises are necessary for the general profit of the whole community [Mak, 2012]. This does not mean of course that cycling rate is dependent of the government form but that the political practice and general mentality can influence the success of some reforms. In the case of cycling, the initial political problem was to redistribute the urban space, namely a structural reform which some groups could feel as an aggression to their “rights”. The process undertaken by the administrations implied the necessity to convince a large majority that both the community and the single individuals could gain from the change. At the end, it was a supportive citizenship that allowed the transformation process to be implemented and then progressively optimized, accepting all the discomforts of the transition period.

In other cases, it is cycling itself that is the object of refuse because considered disreputable, as it is in the case of women (Muslims, but also belonging to other religions, as a consequence of general economic and social norms) [World Bank, 2002]. In the case of recent immigrants, social, cultural and religious reasons can synergize. For several people with low income in large European or Global South cities, car still represents the symbol of social success while “bicycle is for poor farmers”, as Nigerian students told to me, has been reported for South America [Dutch Cycling Embassy, 2015], has been largely proved by Koolhof’s and Nkurunziza’s works [both 2013] and by the exhaustive World Bank report [2002]. More generally, cultural issues impairing active mode practice must not be underestimated if we wish that cycling will be used to overcome impediments due to archaic traditions and become a means for supporting social integration. In this

perspective must be observed with interests the initiatives of cycling teaching offered in Denmark and the Netherlands. For example, Amsterdam authorities noticed that new immigrants cycle less than old residents and considered to promote the integration of immigrant kids by facilitating their participation in the "most Dutch" mobility mode, namely by supporting their cycling. On the other hand, it must be recognized that bicycle and cycling can become themselves status symbols, as in the case of intrepid fixi riders with extremely expensive bikes.

5.3 Challenges

In the next years, some innovations will drastically change our relationship with cars. Car sharing and services such Uber are becoming more and more popular and have the potential of undermine the reasons for possessing a private car. As it has been underlined [Der Spiegel, 2017b], traffic volume could even increase because low prices and constant service availability could induce many users to (ab)use it, preferring public cars to public transit and even active mode for short distances. The fact that most of the future cars will be equipped with electric engines could reduce the local pollution but will have no direct effect on congestion. Furthermore, psychologically the idea of using a less contaminating means could promote a more frequent use of electric cars, with unclear global pollution effects [Van Mierlo et al., 2017]. Congestions could be alleviated by the introduction of robot-driven vehicles that will proceed emotionless and safer than human-dependent cars. Technically, although self-driving cars still need further optimization [http://en.wikipedia.org/wiki/Google_driverless_car], their development has already reached a mature level in road-traffic tests (August 2014: 1.100.000 Km driven in standard traffic without accidents, with the perspective of reaching 10 million Km without accidents in 2019 as the mere consequence of computer speed improvement), the new Mercedes S-class offers already automatic driving in specific conditions [Wüst, 2013], and Daimler development project Future Trucks achieved the aim of producing reliable self-automotive lorries for highway traffic [Wüst, 2014]. From the point of view of the urban traffic, in which motor vehicles cross their ways with pedestrian and cyclers, the introduction of cars

able to detect and react to any object better and faster than human beings and designed to respect the traffic rules might crucially simplify the safe co-existence of multiple transport means. Of course, the development is not without risks and requests the consideration of ethical issues since finally the outcome of accidents will be decided by software and the human factor –relegated to active modes- will represent the most unpredictable factor [Dworschak, 2016]. A final concern is represented by the possibility to manipulate the car software to induce accidents. At the moment the technology is not hacker-safe. It would be useful foreseeing how these new technological scenarios will impact behaviors and transport habits to model strategies and plan suitable infrastructures. A somehow specular problem concerns the increasing number of e-bikes on the bicycle routes. In most of the European countries the rule is that they must be equipped with a mechanism which automatically deactivates the electric engine when the speed reaches 25 Km/h [https: //www.wertgarantie.de/Home/Themen/Blog/Fahrrad-verliebt/e-bike-tuning.aspx]. At these conditions, e-bikes could be easily integrated in the normal traffic. However, these means can potentially reach speeds of 45-50 Km/h and the kits that allow their “tuning” towards higher performances are largely accessible. The co-existence of tuned (illegal) e-bikes with standard bicyclers (sharing of the same spaces) would strongly enhance the accident risk. Dissuasive measures to limit tuning should be therefore considered before the phenomenon will reach uncontrollable dimensions.

5.4 Overall take-home message and a proposal for Milano

Sprawling is a reality in most of the world and has become a reality even where it was prevented for a long time because of specific policies, such as in Sweden and Eastern Europe [EEA, 2011]. It has been justified as the consequence of the “natural” human wish of living in pavilions with a small garden instead of in flats. Cultural imprinting through constant conditioning aimed at proposing uniquely “a one-dimension world” might better explain this pretended genetic preference. Nevertheless, no matter what are the reasons, sprawling now claims for ideas able to solve its dependence on car for transportation, its inadequacy for promot-

ing the social fortuitous interactions that should represent the urban life, and the effect of social segregation and marginalization that it causes. Whereas aiming at increasing social mixity can be only a long-term political project, operating on the infrastructures can offer in relatively short-term an alternative to ameliorate mobility needs and to reduce some of the economic and environmental costs of sprawling.

Very often the debate on urban structure moves from the dream of ideal cities to the fatalist realism that nothing can change. In the praxis, the realization of totally new optimized cities on empty spaces following a detailed plan –as it happened for Brasilia or in Italy with Latina- is improbable, at least in Europe. Similarly improbable are the repeat of dirigiste actions such those that destroyed ancient urban structures to adapt the cities to the new transport modes, as the reshaping of Paris under Haussmann and of Milano under Mussolini. On the other hand, the costs imposed by the ville diffuse and its transport concept has become one of the major issues for the urban policy. The progressive reconversion of the existing cities would be a rational attitude, for instance densifying and rendering more mixed sprawled agglomerates would optimize the resources. At the same time, the Zwischenstadt can be envisaged as a chance for transport concept based on bicycle. Part of the over-dimensioned and under-exploited network of roads, dismissed railways, abandoned lots and barren land present in such context could be conveniently transformed in an interconnected system of bicycle paths made efficient by selective permeability design, according to the principles originally adopted in Freiburg. “It is crucial for cities to realize that urban cycling facilities can be achieved at low cost if they are incorporated into every new project. Whenever a street is repaved, a signalization is implemented or changed, or an intersection otherwise redesigned, a major opportunity exists”. Consider “low-cost conversion of a street that was unnecessarily wide. In the process of such “road diet” and related conversion measures, traffic becomes more predictable and more compliant” [Meggs et al., 2012]. In Western Europe, the average speed in peripheral-urban areas is around 20 Km/h [Orfeuil, 2005], whereas the average length of the urban journey is below 5 Km [Servant, 1996]. Safe and direct

corridors would make cycling more convenient than car driving –in terms of time as well as of costs for distances till 5-10 Km which would include most of the urban trips. It means that people living in low-income and peripheral suburbs would have a convenient alternative to travel to work and to social events. As suggested by the anticipations elaborated by the city of Freiburg, electro-bicycles could increase this radius to 25 Km. Taking into account also the additive shortcomings of driving a car to a city center (paucity of parking slots, parking costs, traffic jam on the access roads), bicycle would remain competitive not only in the dense and clogged downtowns but even in a relatively sprawled or low-density fringe region in which the commuting distances are statistically between 10 and 20 Km. In the case of Vienna, commute cyclers drive on average 12 Km for reaching their working or studying place and are ready to prolong their journey if the detour allows accessing to safe cycling routes [Stadt Wien, 2006]. Although they represent a minority, such utility cyclers belong to all the age groups, use regularly their bicycle during the year, and there is no significant gender bias. Therefore, they represent a clear example of successful and feasible mobility based on active transport over large areas that are representative of sprawled conglomerates. What is encouraging, their number can be increased by policies of focused investment in infrastructures and, as the case of Oulu indicates, weather conditions are not critical if riding is safe.

Shifting part of the traffic from automotive to active modes is ineludible to maintain fluidity in the metropolitan area of Milano. The take-home messages summarized in paragraphs 3.9 and 3.10 indicate what aspects and solutions are critical for a successful urban renewal and what mistakes can compromise the effort. Bicycle infrastructures are inexpensive in comparison to those necessary to sustain private and public motorized traffic, can be more capillary, and integrated into intermodal systems can offer mobility options also to long-distance commuters. Locally, cycling routs would be the middle-range neuronal system through which people permeate to local centers of a “regional metropolis” such Milano and connect each other. Bicycle flexibility in terms of parking and permeability would encourage “proximity opportunities” such shopping, cultural and leisure

activities, supporting community initiatives and neighborhood life, as successfully experienced in Copenhagen and Amsterdam. What is still missing in Milano are safety and the accessibility to a well-organized route network that would render the access open to anybody, from pupils to elders with no restriction due to personal driving skills. There is a final appealing aspect: the design of the cycling paths can be exploited to underline the value of the specific natural beauties of Milano "waterways". Accommodating the cycling paths on the waterfronts would transform commuting from being perceived as "lost time" -to compress according to the Marchetti's rule- to "gained experience" able to satisfy the natural need for the peaceful and calming landscapes trapped in the urban complexity of the "villes diffuses". Nevertheless, since space is limited, a well-defined planning at regional level should be performed to preserve high-quality, large, and diversified green areas instead of dispersing this capital into infinite parcels. The goal is to move from the car-city of the 20th century to the sustainable city of the 21th century and active modes can significantly contribute to achieve it.

There is anyway a critical point that often impairs the realization of rational developments. Societies have been challenged by crisis also in the past. Many of them managed to modify their habits and structures to find a new equilibrium but in many other cases they were not able to adapt to the new conditions and collapsed, sometimes they completely disappeared in a very short time period. In his key assay dealing with this issue [Diamond, 2005], the author identifies in the loss of natural resources the main reason of the sudden aggravation of the daily conditions to which followed riots and fatal final conflicts. The members of these societies had a long time to observe the initial decline and to foresee the long-term consequences of the policies that led to such a decline. However, the dominant elites did not wish to renounce to (part of) their privileges and postponed painful decisions. They constantly delegated to the next generation the burden of them and irrationally preferred to believe in a miraculous remedy able to solve the impasse. Somehow, the picture resembles to the present situation. We know that we are consuming more non-renewable resources than we produce, that we accumulate waste and toxic byproducts at a pace for which the recycling is im-

possible, and we know that this disequilibrium is not sustainable for basic physical reasons. Nevertheless, we cannot implement even the mild objectives that have been fixed by the international community with the hope of preventing further worsening of the scenario. Indeed, extremely more drastic actions would be necessary to invert the trend, but they are unpopular and not compatible with the actual “development model” to which we are devoted and that is based on increasing consumption. The international leaderships look for short-term support because “in the long run we are all dead” (according to the bon mot attributed to JM Keynes) and they prefer to let to others (and in the future) the responsibility to modify acquired privileges and comfortable habits.

One of the non-renewable resources that we are exploiting is land, in terms of both useful surfaces of territory and physical-chemical soil structure and quality. Moving the traffic ideology from automotive to active transport would at least slow-down the constant disruption of this good. The successful experiences in few European countries have shown that this shift is feasible, namely that it is possible to obtain social consensus on a policy aimed at working for this change. Nevertheless, the same concepts are observed with the highest skepticism under the cultural perspective of the citizens of most of the other nations and cannot be expected that the economic elites and the politicians leading such countries (to which Italy belongs) will risk their fortune and carrier to illuminate voters and consumers about the insanity of their habits. Any limit to the individual propensity to consume is still perceived as a sort of withdrawal and the promotion of active modes crashes with the still pervasive symbolism related to the possession of an individual car.

With this preface in mind, I’d draft a proposal of urban reorganization for Milano. This city experiences several infrastructural problems common to other low density metropolitan cities and Italian political and cultural context may represent a major impairment to effective development into a mobility model in which active modes would contribute a significant share. The comparative survey (Chapter 3) gave useful indications about what might be meaningful to undertake for improving Milano living conditions. I explicitly used the term “living conditions” instead of

"traffic" because introducing infrastructures for active transport would be a unique occasion for re-shaping the urban fabric and moving away from the automotive paradigm, reorganizing social and personal behaviors, and effecting local economy and urban landscape perception. It is the occasion to give physical interconnection to areas that grew dispersed and to mitigate the present sprawling by making the isolated settlements functionally denser.

There are some very preliminary pieces of information inferred from the overall case analysis and that will apply to Milano:

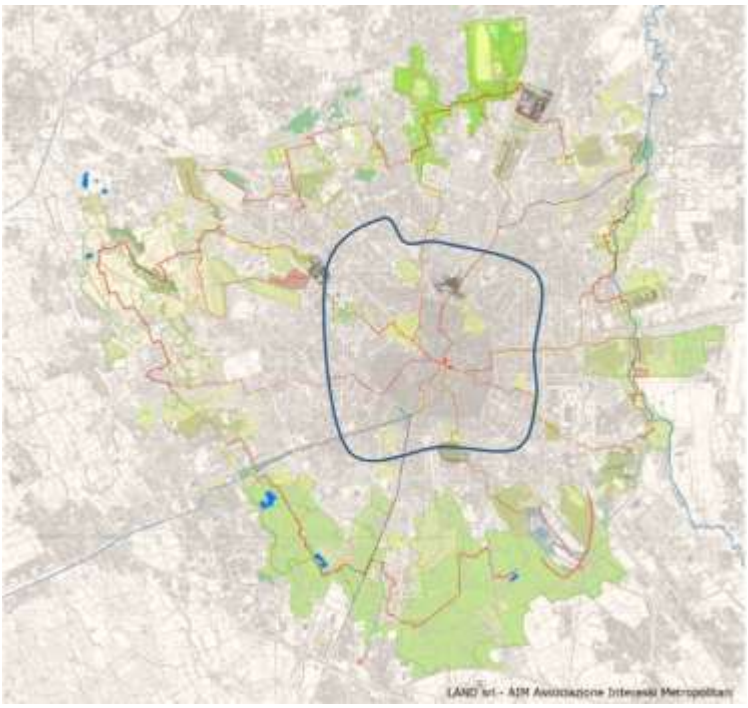
i) **preserving the *spiritus loci* is useful for the success of any development, in contrast with the assumption of the lecorbousien modernism that it is possible to build without relationship with the past and the place. For Milano, it practically means the opportunity to recover the network of its "waterways" and their re-integration in the daily life, as for instance Paris successfully did with the Seine in the recent years;**

ii) **the distribution of the urban space and the re-organization of the city transport infrastructures is crucial to tackle –as explicitly mentioned in the city plans of Copenhagen and Amsterdam- other urgent problems such as successful social integration of minorities, easier access to job opportunities for marginalized communities, reduction of the pollution and of the environmental damages due to insane soil impermeabilization over extremely large surfaces;**

iii) **Milano should reconsider some choices and dare a sustainable development based on utility active modes that requires significantly more systematic *ad hoc* infrastructure investments than those planned by the leisure-oriented Raggi Verdi proposal that was presented as a flag of ecological innovation (Fig. 17). Active modes should be not considered a posh trend but integrated as significant transport elements able to contribute to daily transport needs and therefore useful to reduce the traffic congestion. Furthermore, active modes cannot be simply confined to factors of "transport policy", but should be exploited as means to improve city cohesion and modify its social and economic relationships.**

Figure 17. Raggi Verdi theoretical development

The Raggi Verdi idea is to connect green areas present in the surroundings of Milano to the center by means of paths in form of spokes and the green areas among them with a circular path (red lines in the map). The spokes could be useful if implemented as secured paths exclusively devoted to bicycle (but it is not the case at the present), whereas the peripheral route has no capacity to act as a collector for long-distance utility bikers because it is too far away –and consequently imposes too long trips- from the line encompassing the external city ring (blue line). In the proposed form, Raggi Verdi circular track remains a leisure route with no direct scope of integrating commuting transport. As a comparison, the connecting external ring proposed by LAND for the Raggi Verdi project (brown) measures roughly 75 Km (radius of 5 Km), whereas the alternative ring indicated in blue in this map (radius of 3 Km) would measure 30 Km. This significant distance decrease shortens the commuting time for those who need to travel between two peripheral sites using the peripheral circular route. Original map elaborated from Studio LAND, adapted by the author



Milano is a city plagued by pollution and mobility emergency but, for the reasons indicated above (pages 170-171), it cannot be expected that in the middle term train will serve as the buffer alternative to reduce motorized traffic. At the same time, most of the logistic-related traffic cannot be easily accommodated by other transport modes. Therefore, it is strictly necessary to propose a system that might alleviate the global volume of traffic by removing from the road network a significant part of the commuting transport now still dependent on private cars and motorcycles. At the same time, Milano region is absolutely flat and the climate –at least in comparison to Central-Northern Europe- favorable for active transport modes. Walking in inner cities and cycling in the peripheral and external zones would be a practicable alternative in the presence of infrastructures that secure the access to citizens of different ages and skills. According to the foreigner experiences, the dimensions of the "great Milano area" (30-40 Km in diameter) are compatible with intermodal mobility involving cycling as a utility transport means to cover the first and last Km. Furthermore, the low building density of its enlarged metropolitan area and the frequent dismissed structures would simplify the identification of the space necessary for constructing a well-connected network of cycling infrastructures. It can be also expected that bicycle routs would provide more cohesion to the diffuse urban agglomeration and by such a way valorize those residual barren lands that have been trapped into the metropolitan structure and that now represent unappreciated "void places".

The bicycle-based mobility model would resemble to a progressively more porous system of segregated paths organized according to the principle of the filtered permeability. Few major long-distance, large "bicycle highways" should start at the most external metropolitan area. Their function would be that of providing a set of radial and direct axes capable to drain, collect, and direct the commuters from the hinterland to preferential accesses at the city borders. Since the distances to reach the center are relatively long (15-20 Km) for those who live in the most distant periphery, it should be expected that the preferential utility users for these external, long-distance traits of the bicycle network will be relatively trained and rapid cyclers or users of B&R intermodality. This condition

would simplify the technical design of these paths because they will serve a pretty homogeneous group of cyclers that can drive at speeds of 25-30 Km/h. The concept of bicycle highways for long-distance commuters has been successfully integrated in the transport plan of Copenhagen and Amsterdam (see dedicated sections above) and a 100 Km long bike highway (RS1) will connect the whole Ruhr district, a 180 million euro investment which is expected to alleviate the automotive traffic by eliminating 50.000 cars/day [SpiegelOnline, 2015]. The guarantee of straight, protected, and fast paths would make cycling convenient in respect to motorized modes that suffers from longer actual distances due to the lack of preferential lanes and traffic jam. The same routes will switch off their utility function during the week-ends to serve an extremely more heterogeneous and numerous public (families, leisure cyclists) interested in accessing to the countryside from the inner city or to reach downtown from the peripheries. Under these conditions, the average speed will significantly decrease but the convenient path width will still safely accommodate more people considering that velocity will decrease when cycling becomes a relaxing activity. The double function of a single infrastructure complex would further improve the profitability of such investment. In this perspective, the routes designed for moving a significant part of the commuting traffic volume during the working days would become “leisure corridors”, reminding the “Raggi Verdi” philosophy, at week-ends. Nevertheless, this second use opportunity would just remain a positive side effect of a precise and integrated new commuting transport concept based on active modes rather than the goal of the viability remodeling. At any case, bicycle path construction standards would be necessarily stricter than those envisaged for the Raggi Verdi concept and should improve substantially the present conditions (Fig. 18).

The access corridors (bicycle highways) would change their technical design and their function once reached the external city fringes (10 Km from city center). Here the utility cyclers are expected to be extremely more various (children, elders, cargos) and their flux will cross more often the conventional traffic.

Figure 18. Poor design and insufficient technical concepts for the building of bicycle paths

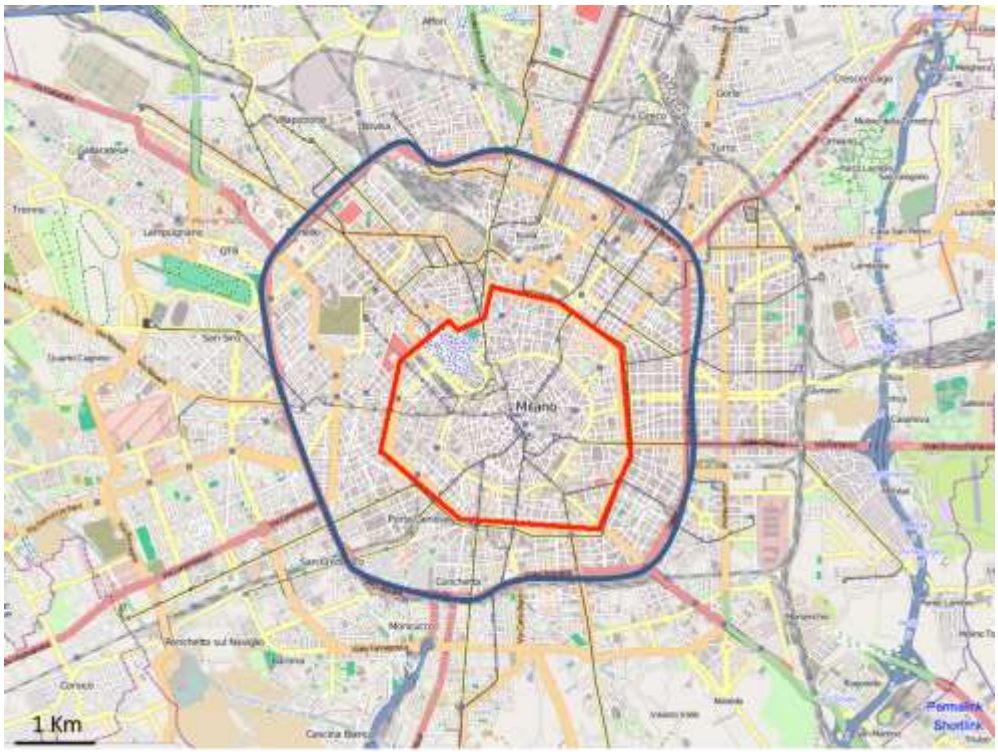
Water is a decorative element and a good mate for cyclists, as evinced from foreign experiences. Nevertheless, the new bicycle pathway along the Naviglio Pavese was built internally with respect to the channel. In other cases, the path measures 80 cm even in highly frequented peripheral traits in which the same route is used by both runners and cyclers. Otherwise "cycling paths" are built (better: simply painted) on the sidewalk, with frequent priority loss and roadway restrictions, or on the space normally used by motorized modes because unrestricted parking impairs the traffic to proceed along independent axes.

Therefore, the safety standards must be reinforced as well as the awareness that sporty cyclers must have towards slower and less reactive route mates. Two rings of continuous bicycle paths should connect tangentially the radial bicycle path structure to assure the possibility to reach further metropolitan areas without detours and avoiding passing to the city center in which the speed is dictated by pedestrians. These rings should roughly follow the lines of the two borders indicated in Figure 19 (external pink, internal red, 1 and 2-3 Km apart from city cen-

ter). The ring proposed for the Raggi Verdi project (Fig. 17) is by far too external (5 Km) and would impose too long detours to cyclers for being attractive.

This intermediate zone would be also the most appropriate for installing “commuter hubs”, namely exchange stations for intermodality transport. Local trains would move commuters from the rest of the region (30-60 Km from Milano) according to B&R and B&R&B intermodality thought to complete the travel chain and enable commuters to reach their final destination. In this perspective, also bicycle routs with low construction standards and/or not connected to the rest of the cycling networks but that can facilitate the access to the “loading” intermodality stations in the peripheral areas can become useful because improve the overall connectivity with the central metropolitan areas. The implementation of a functional network of bicycle paths and an access design based on filtered permeability inside the inner urban area should enable the fast and safe displacement to final destinations.

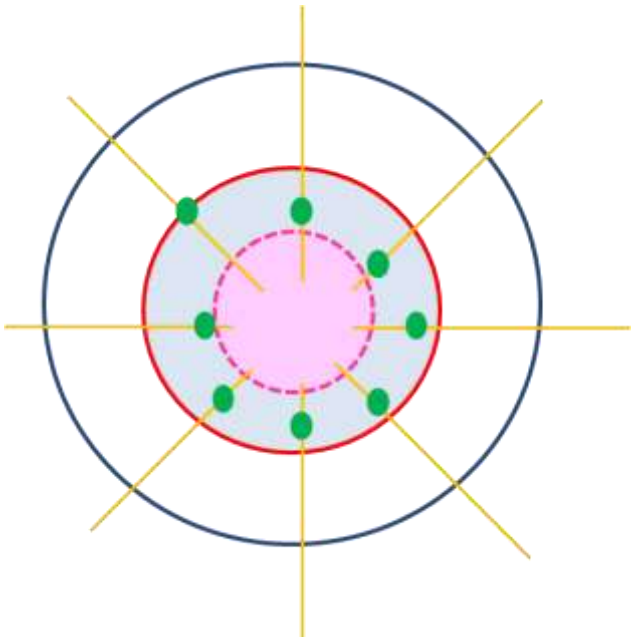
Figure 19. Identification of the circular collector pathways (external and inner rings)



The two rings corresponds to the "ecopass border" (red, inner city limit) and the peripheral road that incorporate the "larger city center" (pink), including the main railway stations. This external ring could be stretched a bit at the eastern side to better serve a university campus and the third major railway station

To reach the most central part of the inner city, reserved to pedestrian, cyclers, and public transports, the closest concentric city ring should be envisaged as a network of "shared streets" for cyclers and walkers, parallel and segregated from those used by conventional traffic. This urban space should be designed for being a social aggregator (open air markets, coffee shops, small gardens, and children corners). The speed will be further reduced to improve contact with the other people and serendipity. Nevertheless, the advantage of bicycle mobility would be preserved by a consequent filtered permeability concept aimed at preserving the shortest ways to active modes. This inner city network will support most of the (very short) trips that statistically are performed in a city (Fig. 20).

Figure 20. Schematic representation of the active mobility for Milano commuters



The concept foresees the identification of axes with the capacity to facilitate the fast and safe access of commuters to inner city. These axes (oranges) should be bicycle tracks of large capacity either independent or combined with light-trains for integrated multimodality options. A peripheral circular track (blue) should function as a commuting cycler collector. A second circular track (red) should link the main axes close to the city outer center (pale blue). If the inner center (pink) would remain optimally close to private cars and accessible only to active modes and public transit, the outer center would remain open to cars, but bicycle use should be supported by a filtered permeability design. This should stimulate many commuters reaching the end railway stations (green) to use bicycles for reaching the final destination

According to the experiences of other cities, both evaluated in the previous section or reported elsewhere [Urbanpromo Green, 2017], this mobility concept would favor the constitution of new microdensity at aggregation points, improved social mixity and integration, improved passive control against vandalism and theft. For the community it will result in reduced direct (infrastructure investments/anti-pollution actions/faster circulation of indispensable motorized traffic) and indirect costs (health and psychological disturb care). It should be also underlined that sparing money (and time) for transport would preserve money (and time) for other activities. Finally, a safer city could promote a higher level of independence for the children. Amsterdam pointed out this exigence as a primary objective of its policy and pursued it by increasing the traffic safety in the school surroundings introducing specific limited access and speed for cars and investing in training pupils at driving their own bikes. Hopefully, more independent young citizens would result in a calm, but probably necessary, revolution for the Italian mentality.

A primordial infrastructure of such a model already exists and is represented by the routes running along the two main still existing channels, the Naviglio Grande and the Naviglio Pavese. They constitute continuous routes and could serve as commuting transport axes capable to guarantee high speed and to link downtown

to the outskirts as well as the villages and the small towns surrounding Milano, similarly to the long-distance paths used by Copenhagen commuters. Furthermore, they fulfil (and might fulfil even better, whether a careful design of the adjacent areas would be implemented) to esthetic criteria since they are "green/blue" corridors edging water surfaces and fields. Somehow, they have the capacity of driving the countryside till to downtown and would represent an opportunity to valorize peripheral city districts that still remain mainly neglected at the present. Recovering the channel waterfronts to the daily life would offer to Milano the possibility to link to its past of aquatic city and to what has been its peculiar –and lost- urban structure. Nowadays, the potential of Navigli as the motor to start a transport revolution is prevented by lack of strategy rather than the need of relevant investments. Whereas the design of the inner city waterfronts will need to be reshaped to accommodate both cyclers and walkers, along the extra-urban course of the Navigli axes the already existing routes possess the standards of safety and continuity to function as "bicycle highways". Such characteristics are totally lost when the Navigli approach the city center (Fig. 21) since the cycling paths stop abruptly at the city fringes. From that point on, high-speed motorized roads run along most of the urban course of the channels and an integration and requalification of the (insufficient) already available infrastructures will be necessary to match the goal of providing a safe and continuous cycling network to reach the city center. If the present traffic prevents the physical approach to the Navigli and their appreciation, converting these roads into active mode routes would free new waterfronts and slow down the velocity of the beholder, offering him the chance to enjoy the view and avoid the traffic-jam stress. The attractiveness offered by water and vegetation would be emphasized whether the design of bicycle route along the Navigli would consider the planning instruments developed for maintaining the landscape quality standards of the American National Scenic Byways [NSBP, 1995]. In this program aimed at safeguarding the beauty of selected roads in the view of promoting the tourism and the local economy, a particular emphasis was given to the corridor management, namely the road environments. Defining the critical dimensions of such corridors,

the optimal land use inside their boundaries, and the economic activities compatible with their goals is crucial to preserve and enhance their intrinsic ecological, historical, panoramic, and recreational qualities.

At the present, only bold vehicular cyclers dare to use the “missing links” during working days since the commuter is pushed without transition from the secured pathway inside the wild urban traffic (Fig. 21). Another element of danger that contributes to keep away the less audacious potential utility cyclers is that motorcycles ride regularly -and at elevated speed- traits of the bicycle paths. The feeling of impunity could be discouraged by controls but authorities never showed attention for this kind of misconduct. Personally, I counted three police controls (all performed by the same municipality) during more than 900 trips of 30 Km each along the Naviglio Pavese.

Figure 21. Missed in transition: Lack of connection between the bicycle paths flanking the Navigli in the countryside and the inner city street network

The bicycle pathways that have been built along the countryside traits of the Navigli finish abruptly in the peripheral areas. Large roads with no protection for active transport modes become the only way to reach inner city. These pictures have been recorded an early Sunday morning during the summer holidays, but otherwise all these roads are very busy with car, bus, and truck traffic.

This observation introduces another aspect of the implementation of mobility policies based on active modes. According to the experiences described in the case studies (for instance, Amsterdam), it seems critical to address also cultural prejudices towards cycling and interiorized behaviors. Systemic communication would at least create a different sensitivity towards cycling as a utility mode and cyclers as traffic players with the same rights of the others. Another approach is proposing a mix of very basal incentives and disincentives addressed to the individual choice and intended to achieve progressively the aim. According to the "nudge theory", it is possible to obtain behavioral modifications by soft and indirect pressure. "A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to implement. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not" [Thaler and Sunstain, 2008]. The approach is effective (for instance, reducing drastically the portion of street available for car driving "imposes" a significant speed decrease without the necessity to indicate a speed limit) and is often presented as liberal because not coercive, despite being sometimes criticized as a manipulative paternalistic attitude [Farrel and Shalizi, 2011]

6. Afterword: final personal remarks

I wish to conclude this work with some considerations that reconnect the analytical effort necessary for an objective evaluation of the collected documents and data back to the subjective level of the personal reasons which urged me to choose and develop this subject, and that are described in the Preface.

6.1 The city of the future

It was necessary a titanic cultural effort to move away from the mentality of Margaret Thatcher who stated that “Any man who rides a bus to work after the age of 30 can count himself a failure” [Schwartz, 2012]. Now car symbolism might be even substituted by bicycle symbolism [Copenhagenize, 2014]. «Motor cars were once a symbol of freedom – a way to achieve personal independence. They took us places where we couldn’t otherwise travel – they brought us to our destinations faster, and we didn’t need to abide by a schedule or rely on anybody else to become mobile. Things have changed. We took it too far. The freedom of mobility that made cars so desirable is exactly what now makes cars so undesirable. Too many of us wanted that freedom. Too many of us bought inexpensive real estate in places that depended on motor vehicles even to buy a carton of milk. So many of us became hooked on cars» [Schwartz, 2012]. In contrast, «bicycle is a fitting symbol for any progressive party who aspires to be agents of change» has commented the author who described the bicycle campaign of an Indian politician who used this transport mode to visit the marginalized citizens in peripheral districts [Copenhagenize, 2014].

Cycling –and specifically utility cycling- is part of the idea that life quality for “everybody” as well as the economic efficiency of the urban community may re-start with clear and meaningful decisions concerning public space design, urban structure, and transport policy. Active policies in these fields will dictate the perspectives for a model of urban development that must be fair and reliable for a modern and democratic society. Many Central Europe cities and towns seem particularly aware of this challenge and that it is the time to move ahead in that direc-

tion. There is, and always will be, a competition among transport modes inside the city and the citizen will select the most suitable. Nevertheless, the city design is not neutral in this competition, rather it will operate as a pivotal factor for determining relative convenience and to influence the final individual decision by offering a specific mix of infrastructures. Therefore, city planning cannot claim the neutrality of a referee since it decides what means will be less expensive, faster, more comfortable and safer. There are no practicable conditions for cycling and no economic sustainability for public transport in a sprawled city, but the situation can change to the opposite in a "redensified" city where active modes may become more convenient than automotive driving. It is also a political choice that of implementing effective inter-modality to expand the advantages of using bicycles over long distances. We are talking about the possibility to develop a town without congestion and pollution, with a more dynamic and relaxed social life instead of a Moloch city, anti-economic in its request for energy, commuting time, investment and maintenance costs. Cities are not static entities. Even though they have been initially conceived for one exclusive transport system, they can and should adapt to others. The urban structure is dynamic and should be constantly remodeled to favor the best transport combination according to the productive and private needs of the community.

In the "Invisible cities" Calvino reports some acute observations concerning "the towns which adapt to the different times, continue to give form to the desires along the years and the changes" and the others, "the towns in which the desire of representation cancels the city….obliged to remain immobile and similar to themselves for facilitating the memory… they perish, collapse, disappear" [Calvino, 1972]. "The city is the place of the imagination: what has been realized, what is planned, what has been considered but never realized. The city is the place where the possible can become reality….different towns take successively place on the same soil and share the same name, born and die without meeting each other". "The catalogue of the shapes has no limit, until every shape will have not found its city, other cities will be born. When the shapes will finish varying, then it will begin the end of the cities. They dilute into reticules without origin

and end, cities like Los Angeles…that have no shape. The places merge, the city is everywhere, it is its own outskirts… does it still exist an outside or when moving outwards you just pass from a non-place to another?" [Calvino, 1972]. These words might appear in the clearest program for urban regeneration: cities as entities in constant development to realize visions, urbanism as the art of envisaging possibilities that go beyond mere mechanical multiplication of amorphous elements. Furthermore, an implicit recall to esthetic because attractiveness motivates positively our behaviors: smart (and functional) cities make happy citizens.

6.2 The rediscovery of the slowness

The mitigation of the drawbacks due to a century of city design conceived for automotive transport can be successfully achieved, as demonstrated by several examples, but the problem of the time budget devoted to (commuting) transport should be envisaged using new concepts. For instance, it could be more convenient and effective having a constant movement of cyclers at 20 Km/h promoted by light synchronization (the so called "green ways") than a stop-and-go traffic of cars, even though it can potentially reach faster speeds. Being potentially slower can result in becoming faster in the reality whether the city structure is designed to amplify the qualities of slow players, for instance by introducing filtered permeability. Lanes, streets, avenues, roadway have a function that derives from their physical characteristics and they will serve preferentially some transport modes, for instance traffic objects with different speed. Indeed, speed is more than a quantitative factor, it is a crucial qualitative factor that guides the modality of interaction among citizens and between citizens and their space. The city of Copenhagen implemented in specific areas an invisible dissuasion strategy against automotive through traffic that is not based on signals and rules, but technical concepts, such as narrower car lanes and shared lanes for cars and busses, that slow down the speed and consequently discourage the car use [Dahl and Hansen, 2011]. By such a way it is possible to regulate the velocity to which people move through the urban space. This factor will contribute to determine the characteristic of the social interactions and the potential appreciation of the surround-

ing environment. Since active transport modes reduce the speed and make people more exposed in comparison to car drivers, they respond better to the psychological need of interacting with other humans and not with inanimate objects [Bahrdt, 1961]. Nevertheless, the possibility to profit of this two-direction perception of the urban context (the subject observing the environment whereas advancing, the spectators looking at the moving object) is amplified or diminished by further factors that can free or compress it, such as the perceived safety and the traffic congestion. If I feel safe, I can let glide my glance slowly around and I am not forced to concentrate my attention exclusively on what happens in front of me. By designing the public space it is possible to select the actors that will populate it (for instance, the ratio between cars, busses, motorbikes, bicycles, and pedestrians) and both the velocity and the comfort of the persons who move in that space. At low speed, the quality of the space (temperature, colors, texture, odors,…) becomes more vivid because the details have the time to be remarked and appreciated. For the very same reason, there is probably no sense in investing in expensive flower decorations along avenues on which cars run at 100 Km/h, whereas the quality of the urban recreational areas is very appreciated by walkers and cyclers [Dahl and Hansen, 2011]. Milano, especially in a future perspective which considers the re-opening of (part of) its inner Navigli, would profit from slowness because both commuters and tourists would have the chance to enjoy its waterfronts.

Now let me start from the beginning: « *Il y a un lien secret entre la lenteur et la mémoire, entre la vitesse et l'oubli ».* What is more relevant for our personal final balance, having done in a hurry many things that have been soon forgotten or fewer experiences that graved our personality? Do we exist because we have some strong memories or because we have the pale memory of having done many things? If we accept that lost memories correspond to empty blocks in our existence, time pieces in which we were absent and do not bring anything to us, we should be consequent and remove the conditions that make us refractory towards stimuli and regain the capacity to interact with people and environment.

Urbanity has to do with this reflection and urban planning with design solutions “to create awareness of the other” [Foret, 2011]. Mobility speed and physical exposition influence the perception of the surrounding environment and active modes encourages the most face-to-face contact between strangers and serendipity in the sense of “discovering something by accident when looking for something else” [Foret, 2011]. For the community, the urban structure that enables the mobility of an average family with four bicycles stored in the cave instead than four cars parked in garages implies a net advantage by far beyond the immediate calculation of costs for transportation, pollution credits, and land availability. For each single citizen, active transport is a way to enjoy the town at a slow pace and with no stress. For the community, a new public space repartition that promotes slowness and guarantees equal access to mobility and that improves the fair sharing of the resources and the social richness is the guarantee of social comfort. It represents as well a cultural shift towards a world in which citizens will have the chance to meet more frequently and collect more memories.

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