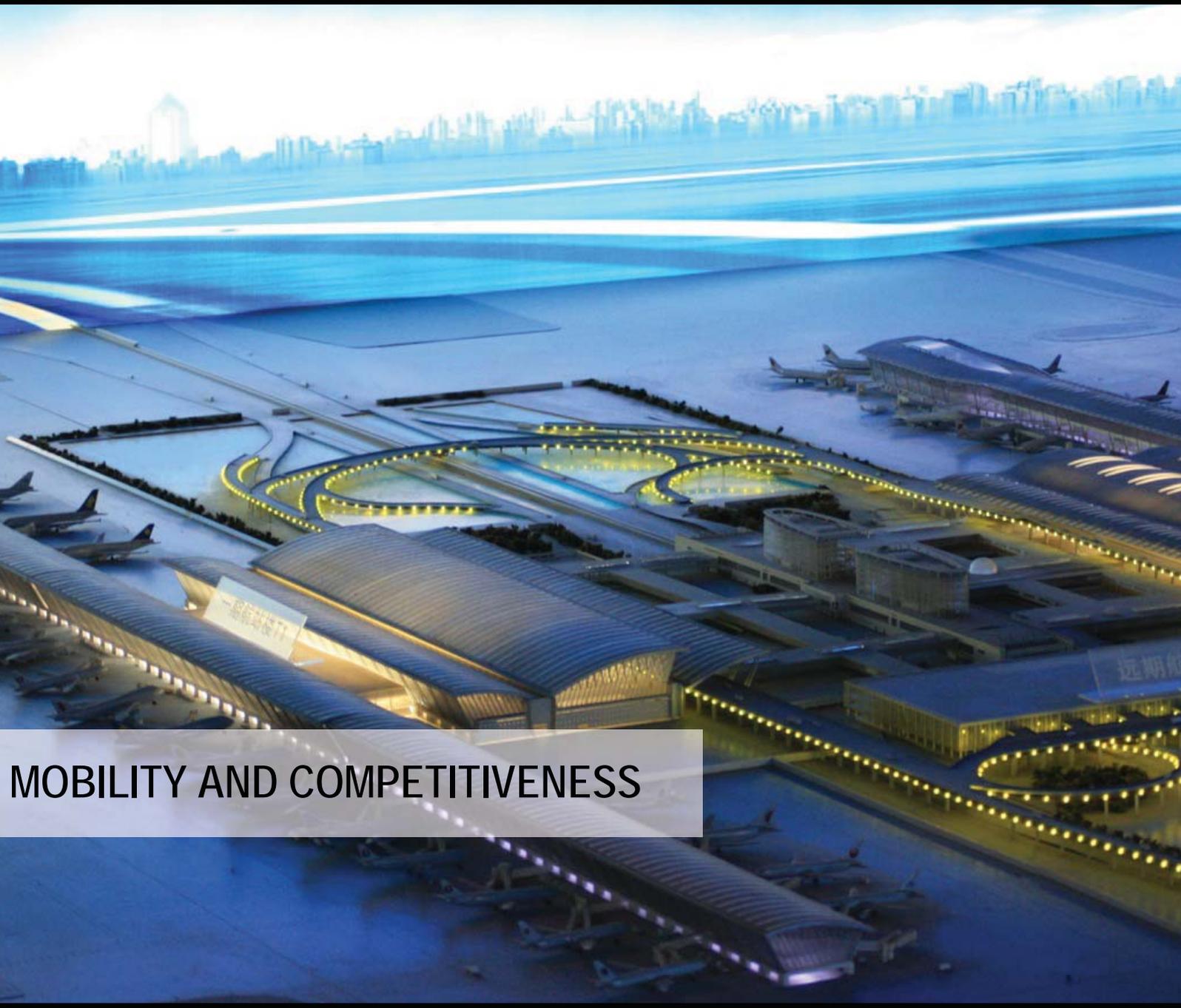


TeMA

Journal of
Land Use, Mobility and Environment

Urban sprawl processes characterize the landscape of the areas surrounding cities. These landscapes show different features according to the geographical area that cities belong to, though some common factors can be identified: land consumption, indifference to the peculiarities of the context, homogeneity of activities and building typologies, mobility needs exasperatedly delegated to private cars.

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MOBILITY AND COMPETITIVENESS

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EDITORIAL PREFACE: MOBILITY AND COMPETITIVENESS

ROCCO PAPA

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The identification of sources and factors of regional and urban competitiveness is of central importance in a period of increasing globalization.

In spatial economics the important role of transport and communication is one of the fundamental principles of spatial economics and the theme of the relations between competition among regions and cities and policies and/or infrastructural facilities related to mobility has been widely faced in urban planning, social science and urban economy fields: regions and cities with better access to locations and markets and with better connections with global centers of commerce will be more productive and competitive than more isolated regions and cities. Policies to improve economic competitiveness of regions and urban areas by investments in transport and communications infrastructures are a primary policy field of economic policy.

However the relation between transport and economic development is more complex (Spiekermann and Wegener, 2012). Transport infrastructure has been a necessary, though not sufficient, catalyst to economic growth and expansion, particularly in urban areas (Cervero, 2009). Negative impacts that congestion, pollution, poor efficiency of transport system can drop the competitiveness level of a city.

This issue of TeMA argues for carving a new relationship between transport infrastructure and cities competitiveness that balances the goals of economic productivity and community place-making. Often considered to be in conflict, they need not be. In other words, the issue explores the contribution that infrastructural systems and/or procedures and tools for mobility planning and management can provide to the raise of the levels of competitiveness and livability that cities achieve. The broad topic includes both theoretical contributions and others more closely linked to policies/practices for mobility that positively affect the efficiency and livability of urban systems, increasing their potential for attracting businesses and families.

This general theme can regard different topics:

Contributions may explore the following topics: competitiveness and interrelationships (material/immaterial) among territories; widespread mobility, land values and territorial marketing; accessibility, mobility infrastructure and urban efficiency; local public transport and increase in urban livability; government policies for competitive mobility in

historical cities; the parking network as a strategic factor for urban competitiveness; infrastructure and innovative systems for public transport.

In the FOCUS section of this issue the subject of competitiveness is faced through its several aspects. In particular, the paper by Giuseppe Roccasalva and Amanda Pluviano focuses on the morphological clustering of industrial sites and how alternative concepts for planning development may be generated, using space syntax methodology and a comprehensive mapping of industrial distribution to analyze the evolution of Turin (capital of car manufacturing in Italy) and its relationship to industry from 1920 to the present. The paper by Simona Tondelli and Filippo Scarsi the estimation of the costs and benefits generated from the building of the new Cispadana regional motorway (Emilia-Romagna Region, Italy) is described. The study focuses on the price variations of the industrial buildings property values in the real estate market after the new motorway will be built, aiming at developing a forecasting method, which could be repeatable and applicable to other kinds of externalities. The paper by Ilaria Delponte focuses on the existent relationship among transport system, ICT and the city. The article by Mehdi Moeinaddinia, Zohreh Asadi-Shekarib and Muhammad Zaly Shahc deals with the relationship between urban structure and travel behavior. The article of Paulo Nascimento Neto, Tomás Moreira and Zulma Schussel focuses on housing policy with a critical analysis on the brazilian experience. The paper ends up that technology involvement in transport is carrying on a new way of planning them and tries to draw out some further conclusions regarding the intervention on existent cities in a changing world and the demand of updated skills in the planning field.

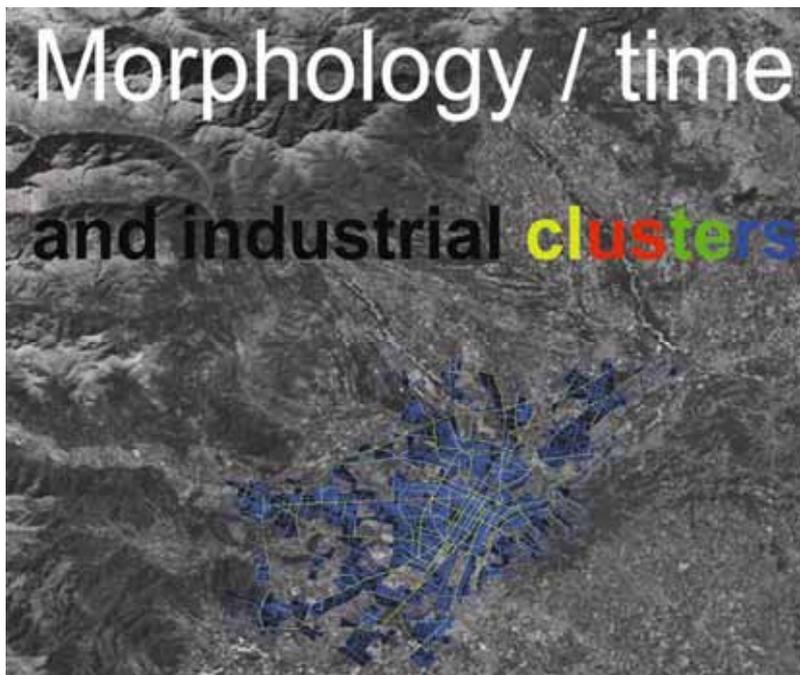
The LUME section includes different papers on the general subject of the integration between Land use, mobility and environment: the paper by Antonio Laurino and Raffaele Grimaldi, which studies the existing Italian carsharing experiences, trying to understand its strengths, that have allowed its development, but also possible limits and weaknesses; the article by Tiboni Michela and Silvia Rossetti which arguments the need to regain the right measure while dealing with urban planning: only in this way the usability of the urban an public spaces will increase for everyone, both vulnerable users and not; the article by Sara Bouchon and Carmelo Dimauro, aimed at providing some insights related to the evolution of the critical infrastructures disaster mitigation strategies from the sole protection towards resilience; the paper by Rosa Grazia De Paoli, which focuses on the mitigation of seismic risk, and which intends to blaze a new methodological trail that aims to identify safety traits in urban spaces; the article by Mauro Francini, Maria Colucci, Annunziata Palermo and Maria Francesca Viapiana which starts from the topic of smart cities and communities and present the research program whose objective is embodied in the virtualization of the territorial heritage in general and, in particular, of the cultural heritage in order to restore it in network as a "common good" for citizens and visitors.

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THE CLUSTERING EFFECT OF INDUSTRIAL SITES:

TURNING MORPHOLOGY INTO GUIDELINES FOR FUTURE
DEVELOPMENTS WITHIN THE TURIN METROPOLITAN AREA

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ABSTRACT

As urban societies seek to redefine themselves following the decline of manufacturing, they are left with physical and social transformations supported by successive stages of industrial growth and shrinking. At the same time, new paradigms are developed in urban planning to address the challenge of cities that are declining and cities whose population is rapidly rising. As such, these attempts raise the need to understand the impact of the street network on how cities thrive or shrink, additionally to social, cultural and economic changes. This paper uses space syntax methodology and a comprehensive mapping of industrial distribution to analyse the evolution of Turin (capital of car manufacturing in Italy) and its relationship to industry from 1920 to the present.

The paper focuses on the morphological clustering of industrial sites and how alternative concepts for planning development may be generated. The analysis showed that industry began within the urban core along the primary routes of global-scale movement. However, as a new era of economic production took place at the end of the 20th century, the street network and industry followed a different spatial logic. Industrial activities spread along the periphery in island clusters in close proximity to global arteries of movement. Turin's centre, on the other hand retained a backbone of integrated streets that enabled its reinforcement when industry relocated. The analysis of their historic development shows that new concepts should be informed by quantitative analysis of the evolution of the urban street network and its effects on economic activity, such that the configurational logic described may provide the basis for future guideline policies.

KEYWORDS:

urban morphology, configuration analyses, industrial development, econometric analyses

FOREWORD

The article is based on studies of Laq-TIP (High Quality Lab – Territorial integrated project) in collaboration with formative experiences of the MSc in Advanced Architectural Studies, UCL. Basic concepts of Space Syntax theory are applied in order to develop new morphological rules for future industrial developments in the Metropolitan Area of Turin (AMT). Although Space Syntax analysis is not extensively and technically explained, the paper draws on the results displayed through graphic and visual analyses. The main configurational properties are highlighted and the location of industrial sites are initially questioned in this light. A series of correlations between the development morphology of industrial sites and the syntactic measure of choice¹ were proposed and some general properties about clusters presented. The last part of the article asserts that though traditional strategies of regeneration took place in Turin's city centre, key questions are left open regarding the distribution of present and past island clusters in the city's periphery areas.

1 INTRODUCTION

Cities and regions grow, shrink or collapse and accordingly sustain significant changes to the economic, social and environmental conditions. Over the last 30 years most mechanisms and internal systems have been investigated and published, but the forecasting or monitoring methods still lack effective policies. In the next 20 years, the City of Turin is facing strategic choices for a regional context broader than their administrative boundaries. Turin has published books and made attempt to forecast, describe and share future scenarios. The complex role of city space needs to be fostered with a new methodology with the aim of raising the awareness of local authorities whose actions are connected not only with their administrative boundaries but overreaching also in time.

The transformation of society in the last few decades has in a substantial way changed regional economic, social and physical structures. In particular, investments in transport infrastructures aim at urban regeneration and regional integration. In the last year, LAQ-tip has studied how various places are reproduced and transformed in the metropolitan area of Turin (AMT). The studies focused on the effects on local physical environments and social activities, and the interdependency between these two aspects, in relation to the development of the AMT. The data gathered includes interviews, document studies, statistical analyses and geographical information. The basic aim is to develop tools The Research Centre uses as predictive and monitoring methods for informing public authorities about the influence of spatial choices on the logic of urban structure.

Since 2000, much analysis of urban and territorial forms has paid great attention to the relations of configuration and land uses in the urban grid. There have been many different experiments with configuration analyses as an interpretative tool for the existing urban socio-economic and environmental city structure. A number of socio-economic, environmental and transportation data regarding the AMT has been collected and geo-referenced, and a consistent number of indicators becoming quality factors for guiding urban transformations.

Such data was assessed to provide insight on:

- the unforeseen effects of the masterplan and transformation of the city structure;
- the location of activities according to their likely public success and use;

¹ It is a syntactic measure applied to global and local conditions, measuring the movement "flow" through a space. A space has a strong choice value when many of the shortest paths, connecting all spaces to all spaces of a system, passes through it.

- movement patterns and flows in cities as shaped by the street network;
- the evolution of the local centres and sub-centres that makes cities liveable;
- how patterns of security and insecurity are affected by spatial design;
- how spatial segregation and social disadvantage are related in cities;
- how buildings can create more interactive organisational cultures;
- how existing cities, urban areas and buildings are linked in the configuration of the urban grid, and simulate the likely effect of new interventions.

These studies of Turin's city fabric are mainly driven by Space Syntax theory, a scientific-based methodology and analytic tool used to transform urban qualities such as movement, urban growth, activities and transportation growth from an undervalued resource into a tangible manageable asset for making local public authorities aware of socio-economic and environmental impacts. The following section will summarise three basic concepts of this theory: the theory of 'natural movement', 'centrality' and the 'movement economy'.

1.1 BACKGROUND CONCEPTS

Space Syntax was developed to understand space as an aspect of social life (Hillier 2007). A scientific methodology was developed in order to uncover the underlying structure pertaining to (city) space by way of its configuration. The rules of language are based on syntax as the sequence and connection between words that give meaning to our sentences. Spatial configuration (Space syntax) is the meaningful sequences and links in an urban grid, it is examined by way of the axial map. The axial map represents the linear nature of urban open space. The urban environment is reduced to an axial map that is a matrix of the 'fewest and longest lines' representing potential patterns of movement (Hillier 1996). According to Hillier, it is this patterning of movement that over time gives shape to an emerging urban environment called a city. The relationship between the urban grid and movement is referred to as the theory of 'Natural Movement' (Hillier 1996) and suggests that all things being equal, movement flows are systematically influenced by the spatial configuration of the street network. Thus, the urban grid plays a crucial role in movement, rather than other factors such as attractors or magnets (i.e. land use functions which influences the proportion of pedestrian movement within a system). This is because the urban grid has a pattern of integration which has the potential to draw different types of movement, generating more movement in some places compared to others. Integration is a configurational property measuring a line's 'depth' or 'shallowness' within the system, such that deeper lines or spaces result in more segregated integration values, which have the by-product of reducing the potential for movement and thus co-presence.

Moreover, if the grid has an impact on movement, this in turn will have an effect on the distribution of functional land use. The theory of the 'Movement Economy' (Hillier 1996) suggests that areas naturally attracting high levels of movement will attract movement-dependent land uses, such as retail. According to Hillier, such areas will have higher densities of development than other areas, and because of this will then attract more land use activities which will benefit from close proximity to those already there. Referred to as the 'multiplier effect' (Hillier 1996), this process generates many aspects associated with city life often taken as a given such as:

- diversity generated by a mixture of land use;
- co-presence of people intermingling as they participate in different activities;
- the vibrancy of well utilized spaces attracting more uses and more people.

Further to this, the movement economy contributes to the formation and location of core areas. 'Live centrality' or the element of centrality that is led by markets, retail, entertainment, along with other activities that benefit from movement, emerges as a spatially led process that changes over time (Hillier 1999). In 'Centrality as a Process' (Hillier 1999), Hillier explains how the process is dependent on both configuration and function, driven by the social and economic life of urban societies: as settlements grow, land uses are located according to the movement economy. Based on the study of several English town centres, core areas will emerge as linear segments of a most integrated line, which then, gradually become more convex and compact due to a process of grid intensification, in particular, where local grid conditions follow a 'two-step' grid pattern. As settlements grow, the pattern of integration changes, shifting the centrality outwards. With linear growth moving away from the centre, local sub-centres emerge along radial routes, with even smaller scale sub-centres developing away from the main radials. Significantly, the process works at a global and local level; globally, the process seeks those locations with respect to the settlement as a whole; locally, it is the local grid conditions that give rise to the centre.

2 SCENARIOS FOR THE *URBANIZED LANDSCAPE*

The complexity of mixed use cities requires a more accurate way of describing the configurational patterns that impact functional land use distribution. One of the basic questions is how to build new development scenarios for industrial spaces? How do these areas counteract or influence their configurational properties? Hillier describes the process of the 'deformed wheel' (Hillier *et al* 1993) that whilst governed by varying socio economic factors pertaining to different cultures, remains evident in all cities, such that the fundamental city form is a network of linked centres and sub-centres, at all scales of growth. It is also a dual process (Hillier 1996) between a foreground network of public space, shaped by micro-economic factors, and a large background network of residential space, shaped by cultural factors. Thus it is in the public realm – those movement-rich and integrated areas where people come together that the private realm divides.

The town planner and scholar Sieverts makes a claim towards redefining the European city in its contemporary state. He defines this as '*urbanised landscape*' or '*landscaped city*' – '*the built up area between the historic city centre and open countryside, between the place as a living space and the non-places of movement*' (Sieverts 2003). In this space, he proposes that rather than reinforcing the traditional assumptions about the two – romanticised historic centre and destructive suburban sprawl, this '*interpenetration of open space and built form, with open space as the binding element*' offers new creative potential (Sieverts 2003). Only by redefining this relationship is it possible to address the realities of the contemporary city in their totality, opening the possibility of a new model of order, which according to Sieverts, is more akin to the 'pluralistic and democratic society' of contemporary times, rather than the old model of a centralized city.

How is it possible to build scenarios for the (intermediate) non-place of movement? While syntactic analysis has provided the core theoretical framework for studying the configurational qualities of industrial sites, Sievert's view is considered when confronted with the results of the city 'as it is' and the proposition of the city 'as it could be'. An urbanized landscape can be reinvented through 'meaningful' open space.

3 OVERALL SYNTACTIC ANALYSIS

The spatial configuration of the city of Turin was examined over three periods, representing key phases of industrial development and decline – 1920's, 1970's and 2010. To start with, the city's grid structure, by way

of the foreground network was examined, followed by the functional – spatial relationship, specifically that of industry.

A series of syntactic measures – choice, integration, ... – (Hillier 1996) were selected in order to understand and describe the logic of the city structure and explain some key relationships. The foreground network was studied through the measure of choice, which at a global level (R_n) sets the parameters for movement within the system. Then, a smaller radii (R_{1000}) was used to get a better picture of the local street network in order to identify where and how localised centres are formed as well as to understand the differing patterns of movement between the two scales.

Looking at the street network, central Turin (1926, R_n) is characterized by a highly regular grid structure stemming from the historic core, which extends outwards to the north, west and south. This pattern becomes less regular as it grows outwards, forming an interface between two overlapping structures: the regular grid from the core moving out, and a secondary more organic network from the countryside moving inwards. The outer network is connected to the inner grid by way of long axial lines, carrying primary movement.

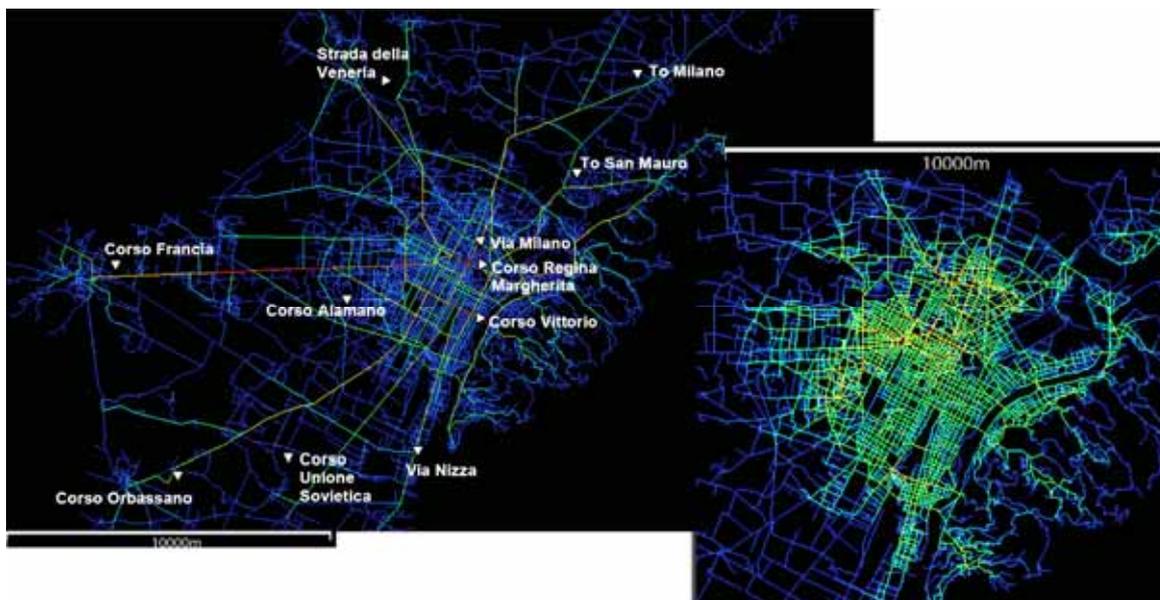


Figure 1 Global choice (R_n) measure and Choice R_{1000} : Segment Map Turin 1926

Starting with the global choice measure, in 1926, a series of intersecting lines can be observed that pick up the central grid structure.

Within the central area, the historic core has the highest values: bisecting streets Corso Regina Margherita and Via Milano, forming the Porta Palazzo square (intersection of the two roads), Turin's historic market place.

Further south along the grid, Corso Vittorio, traversing the city from east to west is also picked up in red, along with numerous parallel routes either side. This is attributed to the highly regular grid, which tends to distribute movement more evenly than irregular grids. A series of radial lines carry movement from centre to edge: Corso Francia (westward), Corso Orbassano (southwest), Corso Unione Sovietica and Via Nizza (south), Strada della Veneria (northwest), and the road to Milan in the northeast. We also see a lateral road outside the city, which, until 1912 was surrounded by the customs barrier (*cinta daziaria* from the 1906 masterplan). This ring road would have connected the surrounding villages without entering the city. Shifting

to a more local radius (R1000) a different picture emerges. The long axial segments previously identified in the global structure have now disappeared: a dense network of shorter lines in the central area as well as a selection of shorter lines in the surrounding network picking out the most likely 'through movement' paths at a local level. Here it is possible to recognize the 'seeds' of what are today some of the local centres of the quarters. In 1926, these constituted small neighborhoods or villages of a few streets. In this historic urban structure, some centres are bigger than others – for example Rivoli (historical village of the Savoy) – to the western limit of the system, is already quite sizeable compared to other surrounding areas.

The generic structure of Turin is made by a strongly centralised core with a network of centres linked to the centre by long radial lines set into a background network of residential space defined by shorter and deeper lines. As the system grows over time, this structure, to a large extent is maintained, despite urban expansion.

By 1970 greater urban consolidation has spread in most directions, resulting in a more widely distributed foreground network of global movement routes. Where the originally bisecting streets of Porta Palazzo in the historical centre had the highest choice value in 1926, there is now a decrease and a shift in high value to the west – Corso Potenza. This is attributed to 'centrality', the process by which centres shift over time as the network grows (Hillier 1999). Also, according to the concept of 'deformed wheel', Turin has to be aware of the internal core, which sustains present and future developments.

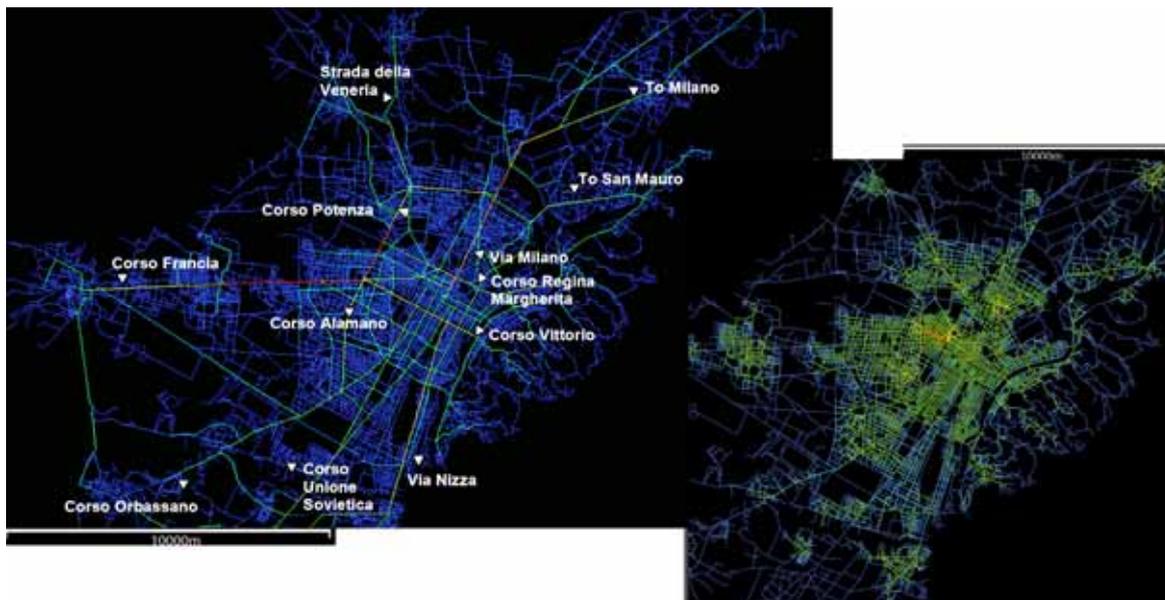


Figure 2 Global Choice (Rn) measure and Choice R1000: segment Map, Turin 1970

Further changes to the 2010 foreground system are identified by way of a new ring road – the freeway located outside the city boundary. Looking at the 1926 radial road, by 1970 it had largely broken. Given the completion of the freeway in 1976, the 1970 map suggests an outer network in transition – the old ring roads are making way for the freeway roads and their connectors – notably the western extension of Corso Margherita, and Allamano in the west. With the most notable post 1970 addition of the freeway along with its global connectors, the original global movement spokes in and out of the city are to a great extent maintained, despite the urban growth – largely constituted within the background structure – that has occurred over time.

At local choice, however, it is apparent that the 'seeds' emerging in 1926 have now developed into a number of sizeable centres.

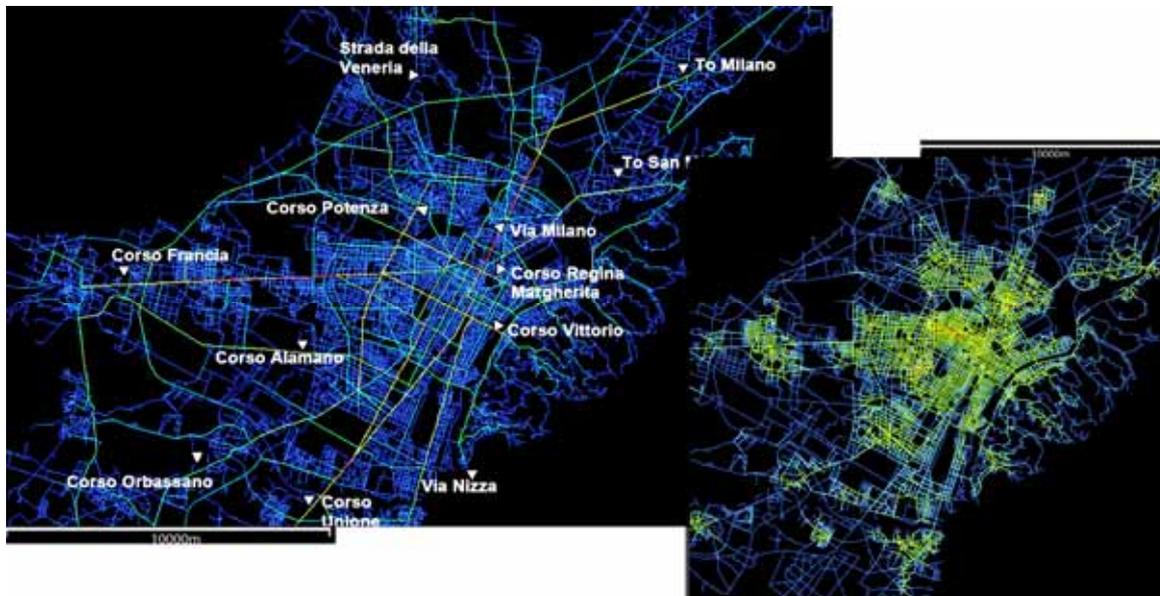


Figure 3 Global Choice (Rn) measure and Choice R1000: segment Map, Turin 2010

According to Hillier, town centres are articulated where grid intensification coincides with the globally strong alignments (Hillier 2009). Local properties are interrelated to global properties so that each centre is defined in relation to the system as a whole. This is picked up through local choice measure R1000, with the concentration of convex centres located along the global routes. In fact, a number of these formations become visible by 1970, which continue to grow more 'convex-like' by 2010, with newer ones emerging as grid intensification continues. While this gives a clear indication of the emergence of centres, a comprehensive study of each local centre is not covered in this article. However it is important to say that town centres and their emergence help explain the city's configuration in relation to functional distribution, in this case industry.

As stated above, movement – by way of local and global networks, becomes key, not just because it gives shape to the overall spatial system, but because it influences functional distributions within space by way of the Movement economy (Hillier 1996).

4 CASE STUDY: INDUSTRIAL SYNTACTIC ANALYSES

The syntactic analysis focused on the functional – spatial relationship related to industrial distribution. The aim was to find the clustering logic of industrial distribution (linear logic, disperse logic, detached logic and so on...). As the main literature has shown, movement is influenced by the spatial configuration of the urban network. According to Hillier, the 'movement economy' impacts the functional distribution of land use: a spatial system emerges, and as it does so it generates movement patterns, influencing land use distributions. These in turn create 'multiplier effects' – i.e. influencing further distribution of certain land uses to certain areas with further feedback on the local grid as it adapts to further development (Hillier 1996). This explains why land uses such as shops and markets seek movement rich locations within the grid, and other uses such as administrative or business zones are located in quieter zones in close spatial proximity to

the live centre. Examining the distribution of industry, it was initially assumed that industrial distribution is heavily dependent on the foreground network, such that it may facilitate the transportation of materials as well as workers to and from industrial areas and into the wider network.

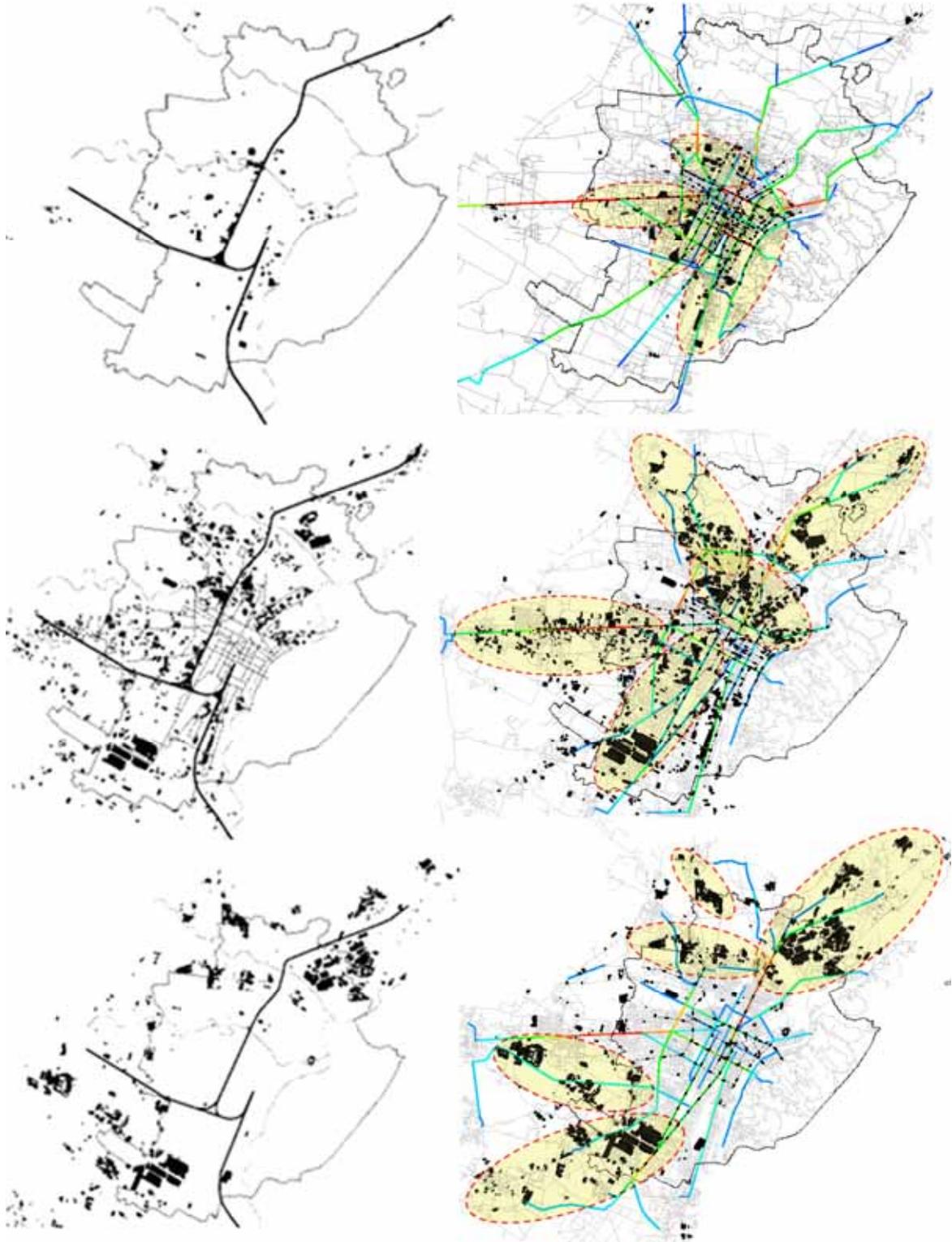


Figure 4 Diagram of industrial units and cluster concentrations highlighted in yellow with a selection of most relevant choice measures

Starting with 1926, and without considering areas beyond the city limits, three distinct clusters of industrial growth are identified.

The first cluster sits immediately north of the city historic core, spreading west to east along the river from the intersection between the Dora River and the northern railway line. From historical accounts, traditional manufacturing such as textiles and armaments were located in this area. A second cluster is located further south along the same railway line (the 19th century western city edge). The third area is in the southeast of the city: bound by the southern railway line and the River Po to the east.

Upon first observation, the main organising logic at this point appears to be proximity to the railway lines and water. Overlaying the industrial layout with the segment map however, in the majority of cases industry is nestled either between the railway lines and/or the river, and along or within close proximity to global choice routes. There is a linear pattern of industrial distribution alongside the railway lines, it is possible to see that high choice routes run parallel to the tracks. This suggests that the railway infrastructure is embedded within the city's movement network, meaning that those industries seeking proximity to the railway lines also benefit from proximity to global movement. Furthermore, in the early twentieth century, Turin had a comprehensive tram network system. The tramlines were traced over the system and overlaid onto the segment map. It is possible to highlight that the main tram routes follow the global choice routes and the shorter tramlines coincide with the more local choice routes (picked up at R1000), further enhancing movement efficiency between industry and transport infrastructure.

Regarding the remaining industry within the city that appears more fragmented and randomly located, almost all are located either on or in close proximity to the global choice routes of highest value. In particular, there are a number of units located within the western fabric of the city – an area under rapid expansion characterized by a less regular grid structure. Again, industry is located either on or close to global routes identified in the segment map. Combining all industrial units in the system, and creating a 500 metric 'buffer' around the top 10% global routes, the analysis found that 82.18% of units are located within these parameters.

From these results it is maintained that for industries that did not depend on the proximity of the railways or water, configuration played an important part, spreading in a linear fashion along global choice routes, setting the stage for future industrial settlement.

By 1970 – Fordist organisation at its peak – two overriding patterns emerge: firstly, industrial activity is heavily intensified within the confines of the city: the areas previously identified in 1926 – the traditionally industrial Borgo Dora north of the city has extended further north towards the Stura River, and significant linear consolidation along the railway lines has developed. Secondly, a distinct pattern emerges from the outer edges of the city centre spreading outwards into the surrounding periphery.

This pattern is consistent in all areas – from the north, west and southern edges of the city; as the central agglomerations spread outwards they take on a very linear form. Overlaying industry with Choice, the dispersal follows along or within close proximity to the main global choice routes. Measuring the relationship between global choice routes and industrial distribution, a very high 59.26% of industrial units are located within 500m of the highest 10% global choice routes highlighted on the segment analysis.

Returning to the city area, as more industry is rapidly introduced into the system the previously linear patterns in 1926 have consolidated into thicker agglomerations of almost entirely industrial areas, which, as they grow, start to occupy areas, which configurationally would benefit from other land use functions. Syntactically, this is shown by the high amount of industry in the north and western parts of the city occupying high local choice segments. This explains the overwhelming appearance of industry that

characterized Turin's city in the second half of the twentieth century. This is also supported by the value of 18.09% of industrial units found to be located within 500m of the highest 10% local choice segments.

Is it possible to hypothesize that as industry settled along global routes in close proximity but not in the 'live centre', as highlighted locally, they continued to expand (due to the manufacturing boom) into dense agglomerations, in places occupying parts of the network that, all things being equal, would have carried other land-uses?

Following the beginning of decline after the 1980s, the transformations are equally substantial. One part of the system has experienced massive deindustrialisation, yet another has experienced new industrial growth.

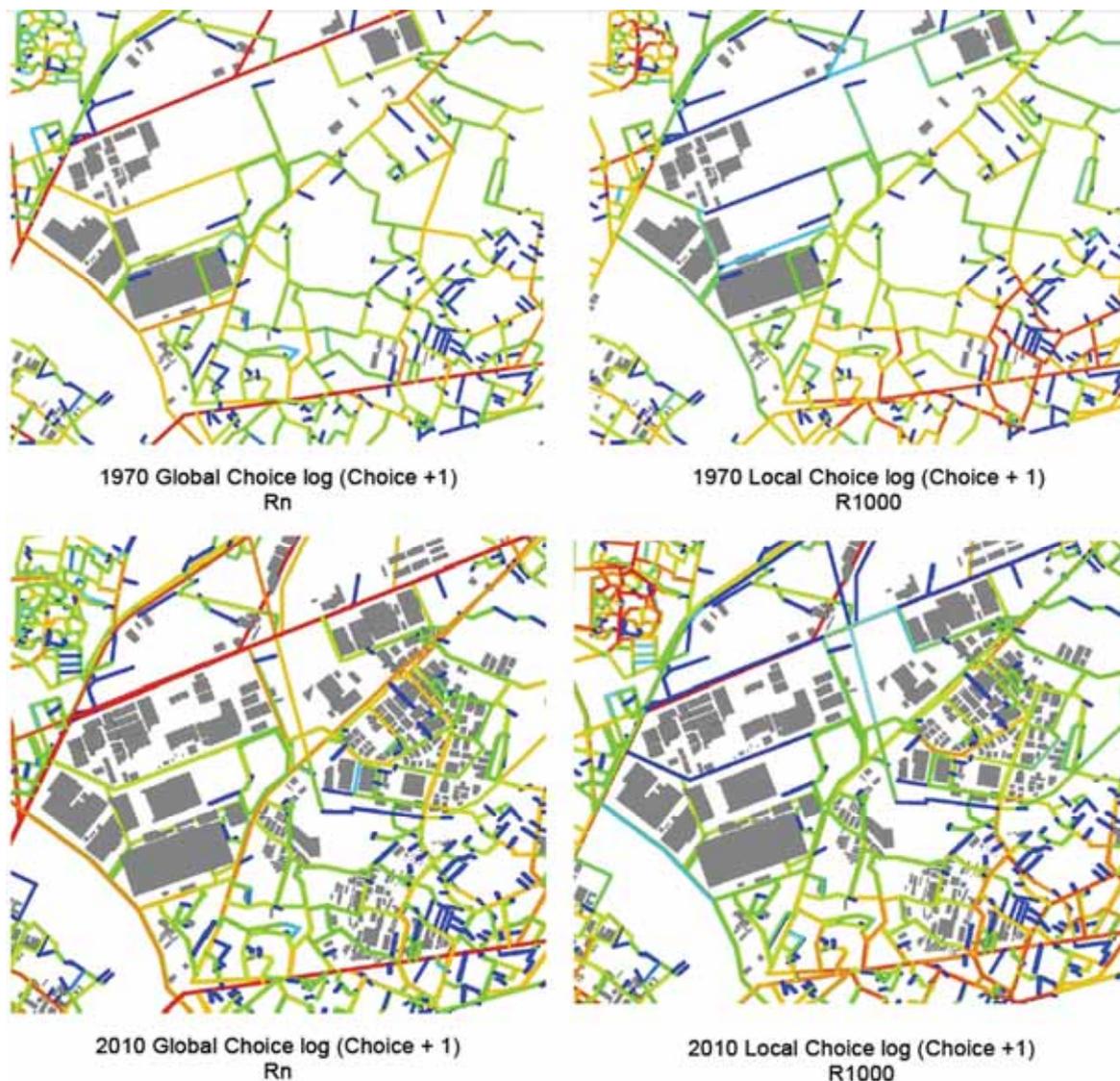


Figure 5 The biggest industrial site of Turin Metropolitan area. Comparison of local choices in a cluster expansion period

By 2010 a reversed pattern of industrial distribution is presented. With the exception of the largest plants in the system – FIAT Mirafiori to the south and IVECO to the northeast, with their adjoining agglomerations – the city centre is almost entirely devoid of industry. The remaining industry is located on the boundary edge of the city, and when viewed as a complete picture forms agglomerations that cross the administrative boundaries. They are positioned at the edge of two systems: the edge of the city, and the edge of the

surrounding town centres. Syntactically, comparing the 'Fordist' period and the 2010 maps, linear pattern has formed discrete clusters. Global movement routes again play an important role, as the clusters are located off a portion of one of these segments, often nestled between two choice segments. Overlaying the freeway (also picked up by global choice) we see a visible correlation between the freeway and the clusters. Unfortunately it was not possible to obtain a statistical correlation isolating the freeway routes, however regarding the overall relationship between industry and global choice, it was found that 2010 displayed a lower, yet still high value of 38.6% of industry settling within 500 m from global choice routes. Examining local choice measures, the transformation from linear to clustered form in relation to the surrounding centres is even more visible. By comparing the 1970 segment map to today, in the transition from linear to cluster, the relationship to local movement is less varied than in 1970, with industry consistently nestling in low local movement areas.

Comparing the 1926-1970 periods to the 1970-2010, much of the grid intensification took place between the first phases of study. Thus, in broad terms we can assume that land use and grid intensification was occurring as a 'live' process.

As these centres grew over time, industry, as it happened within the city, sought the most peripheral areas in relation to the town centres. These have emerged as almost entirely mono functional clusters with weak local properties bound by high global properties (Pescarito area), from a spatial dimension, grid intensification and the movement economy explain how this process takes place: linear agglomeration takes its cue from global properties of the network, and island clustering, once settled according to global network, depend on local grid conditions.

By extension, it would seem that linear dispersal represents a 'first phase' of (industrial) organization, and 'island clustering' a subsequent phase. These conclusions are based on observing local and global patterns illustrated on the segment analysis, but would need to be further substantiated by more detailed empirical evidence. However, it is possible to draw some evidence from the significantly lower value of 7.62% of industrial units located within 500m of the highest 10% local (R1000) choice routes .

4.1 LOGIC OF CLUSTERING FROM 1970 ONWARD

In examining Turin's industrial evolution, there has been a dual process occurring since the 'crisis point' from the late 1970s onwards: significant deindustrialization by way of vacant and decommissioned sites within the city boundary, and at the same time, a process of industrial clustering along the edges between the city and wider metropolitan area. Up to the 1970's, industry was widely dispersed within the city centre – particularly the northern and western parts of the city. This is further supported by the high 38% of street segments containing industrial land use.

However by 1989, nearly 1 million m² of industrial land stood vacant and abandoned (Dansero 1996). By 2005, almost all of it had been reused.

Studying the breakdown of transformation, what role, if any, did configuration play as to the capacity for transformation of industries? In order to examine the role of configuration and industrial transformation more closely, industrial units were converted into points correlating land use values with syntactic values (these points represented the phases before and after transformation - ie. industrial peak, those sites lost through deindustrialization and those remaining after post-industrial transformation). A comparison was then made between the R-values for each set of points. However, no significant correlations emerged, making it difficult to ascertain the role of configuration in industrial transformation.

Moreover, comparing industrial streets segments that have been transformed into new uses, (Ex Industrial streets) to current industrial streets, all show higher mean values. Segment Length and Metric step depth² show that industry tends to be located in street segments of higher length compared to non-industrial streets, as well as the system as a whole. Industry is also located in areas of greater step depth than those without industry. Step depth, in segment analysis, follows the shortest angular path from selected segments to all other segments within the system, thus it confirms again the shift of industry from close proximity to global choice routes to areas nestled deeper in the system when measured from the global movement routes.

Comparing ex-industrial streets to non-industrial streets, all syntactic measures tested were consistently higher in ex industrial streets segments compared to non-industrial streets. Metric depth (Rn) measured much lower in industrial streets at 407.193 compared to 711.179 confirming the trend for more recent industry to seek deeper locations compared to in the past.

A summary of spatial-physical properties can be drawn from the logic of industrial cluster development:

- During the period of economic growth (1926-70), global choice measures coincide with railway accessibility in the positioning of industrial sites. There is a correspondence between global movement, industry and the railway system.
- During the period of economic growth (1926-70), industrial clustering emerges through linear expansion. Clusters become denser and expand but they occupy land within the city core that is syntactically suitable for other uses.
- During the period when industry relocates from the city to edge (1980-2010; knowledge society), linear clusters become islands of discrete clusters.
- Linear clustering depends on global choices measure while island clustering is influenced by local choices measures. The latter is visible in 1926 and 2010 period of analysis; it shows a locally introverted morphology that reinforces the cluster.
- Shifting from industrial to other uses, the configuration displays higher mean values in the deindustrialized sites and a preference for new industrial sites to be situated in areas with long segmented length and step depth.

These are general and flexible rules, however they can orientate how clusters cooperate and adapt within a resilient planning policy.

5 CONCLUDING REMARKS

As explored through Scott, Harvey and others, space is central to industrial production, and the relationship changes over time according to transitions within the cycle of production. The study found that spatial configuration contributed to understanding the logic of industrial distribution. Furthermore, spatial configuration elucidated the relationship between industrial land use with regards to the pattern of the cities as a whole.

In the urban evolution of Turin it was found that industry moved and re-agglomerated over the three time frames studied. It began as a linear process within the city and evolved into clusters towards the city edge and surrounding towns. It was found that choice – a measure of movement throughout the system – played an important role. In particular during the early years of industrial growth and as Fordist accumulation took hold, reaching its peak around the 1970s, a significant proportion of industry was located along the primary (global) movement routes. This figure became smaller over time as Fordism reached its maturity and a new

² Syntactic measures which are directly connected with the length of the linear nature of urban spaces.

era of organisation took hold: industry spread, initially in a linear fashion away from the city, to form new agglomerations, favourable to the demands of flexible specialisation and smaller interrelated industries. Such arrangements are supported by configuration, with syntactic evidence of global and local choice routes indicating a pattern of industrial settlement: industrial clusters located in 'islands' of weak local choice values routes situated in close proximity or leading off high value global choice routes.

Despite deindustrialisation that characterised Turin's city centre throughout the 1980s, industrial sites have transformed to accommodate the emergent 'knowledge society' (Torino Internazionale 2006). Industry left the core, and despite a period of decay and social unrest, the city has regained its image as a safe, vibrant, and culturally rich centre for its citizens. How does this investment on the centre reconcile with its surrounding periphery? Returning to Sieverts, he suggests that it is to a great extent because of this one sided love that issues pertaining to an 'unloved suburbia' remain unchallenged (Sieverts 2003, 17). For this reason, the division between city and countryside is maintained, despite the changing urban and social reality. Turin's masterplan argued for a '*polycentric city open, able to unite people rather than isolate them.*' (Torino Internazionale 2006). Syntactic analyses displayed an overriding monocentric structure that persists. If the 'non-places' of semi agricultural landscapes scattered with freeways, supermarkets and monofunctional industrial parks dominate the outer suburban belt, how have the recent changes addressed this world? While further detailed investigation of these areas would be required to ascertain a more complete view of the relationship, the results from this study concur with Sievert's view, that while readapting to the needs of the 'knowledge society' which occupy the city core, the focus has again returned to the city, leaving unanswered questions relating to the surrounding environment.

It is possible to conclude, however, that configurational analysis has demonstrated the powerful contribution of space in facilitating post-industrial change. Currently, a new public organization is studying the new Strategic Plan for Turin³. It is suggested that spatial configuration, by way of the interdependence between local and global networks, can further assist and should be taken into consideration when future questions pertaining to the surrounding urban territory are raised and new planning strategies are proposed.

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³ 'Torino Strategica' took the legacy of 'Torino Internazionale' and is studying new strategies for the Metropolitan Area of Turin.

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THE NEW CISPADANA MOTORWAY

IMPACT ON INDUSTRIAL BUILDINGS PROPERTY VALUES

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ABSTRACT

Infrastructures, through externalities, modify the territorial status quo: by creating advantages and disadvantages, they lead to inequalities and territorial cohesion problems. In this paper, the estimation of the costs and benefits generated from the building of the new Cispadana regional motorway (Emilia-Romagna Region, Italy) is described. The study focuses on the price variations of the industrial buildings property values in the real estate market after the new motorway will be built. Thanks to the hedonic pricing method, using a multiple linear regression model based on ordinary least squares method (OLS), the contribution of the accessibility on the industrial buildings' pricing has been isolated; it was then possible to forecast the rise in the industrial buildings prices that will be due to the accessibility variation produced by the new infrastructure. The purpose of such a procedure is the setup of equalization mechanisms, which can rebalance the territorial effects through the so-called "land value capture" tools. Thanks to a relatively quick phase of development and implementation, the described application could be used both as a tool for the ex-ante evaluation of different infrastructure projects and as an ex-post analysis tool for the monitoring of an existing infrastructure. Furthermore, thanks to the chance to understand the contribution of each territorial feature to the final price of the good, this application could provide a common knowledge base which could be used to support the public administration's capability of negotiation with the private partner, both in the participatory planning processes and in the public-private partnership procedures.

KEYWORDS:

Transport externalities, hedonic price, land equalization, land value capture

1 INFRASTRUCTURES AND EXTERNALITIES

An infrastructure has multiple impacts on the place where it is built, producing a complex relationship with the territory, which is defined by several factors. The generated phenomena are different by typology, origin, diffusion, length and place, linked with a complicate interaction of causes, actors and systems which are themselves different in terms of interests, background and activities (Maibach, 2007; May, 2006, Wegener-Fürst, 1999). Among all these impacts, this paper focuses on the so-called “externalities”. An externality is defined as an effect sustained by a subject (receiver) due to an unintentional action made by an another subject (emitter) (Ceriani, 2006).

The externalities include both benefits (i.e. reduction of road congestion, trip-length, transport’s generalized cost, road accidents, ...) and costs (i.e. environmental costs, as air pollution, noise, vibrations, but also others kind of costs like urban or territorial segregation, ...) variously distributed by time and space (Ceriani, 2006; Ferri, 2006). Costs and benefits are reflected in the political, administrative, economic and fiscal areas of all the institutions involved in the phenomenon, not strictly limiting themselves to the territory physically concerned by the infrastructure; they affect policy targets and decisions and they spread out over different time horizons. It is possible to regard transport infrastructures as a means for territorial externalities and fiscal interdependences, for development opportunities or threats, in relation to the dimension of positive and negative effects which are generated for each local authority (Ceriani, 2006).

The first attempts to quantify the externalities were made in France at the end of the sixties (Plassard, 2003), first by using cost-benefit analysis techniques, then using traffic forecasts and estimations of the saved time; however, it soon became clear that a huge transport investment could not be properly evaluated considering just its users’ interests. There was a need for more complex analysis involving also the effects whose value could not directly be evaluated and, even if no successful practices of quantification of these effects were developed, the idea of structuring effects started to assert itself – also due to a period of major growth of the construction sector. These structuring effects were defined as some indirect effects, concerning the improvement of local development and wealth, which were supposed to be automatically generated after building an infrastructure in any area (Plassard, 2003). Nowadays, the “structuring” effect could be accounted as nothing but a kind of “political myth” (Offner, 1993), which could not be a valid reference for a technical-scientific viewpoint. One needs to talk about complex system (Plassard, 2003; Eboli-Forciniti-Mazzulla, 2010): any infrastructure must be considered to be part of a transport network, which in turn is a small part of a complex social and economic system, belonging to a specific historical period and shaped by many pre-existing structural trends. Here, causality is not the main topic anymore; one needs to focus on “congruence” (Offner, 1993) between territory and infrastructure, which consists of a mutual and multi-articulated adjustment. A valid representation of that complex scene is given by the Swiss model TRIPOD (ARE, 2007), which is based on three fundamental principles (transport effects, potentials, actors) that are interdependent and cyclically interconnected, whose output is a full set of territorial effect.

From the above, it is clear that infrastructures, through externalities, modify the territorial status quo (Ferri, 2006). By creating advantages and disadvantages, that is disparity, building infrastructures lead to inequalities and territorial cohesion problems, calling for a setup of territorial equalization mechanisms (Adobati-Ferri, 2009). They consist usually of economic tools which are used to compensate the higher costs (or the lack of benefits) borne by some actors because of some definite planning actions, through benefits (i.e. usually a surplus of income) which are enjoyed by some others actors because of the same planning choices; in the end, they allow to achieve a substantially equalized situation among all the various areas and all the involved stakeholders. (Bruzzo-Fallaci-Guaragno, 2004). First of all, to carry out these compensatory

arrangements, it is necessary to establish if the externalities are produced and then, in that case, the generated costs and benefits need to be quantified and georeferenced (Ferri 2006, Adobati-Ferri, 2009).

In this paper, the estimation of the costs and benefits generated from the building of a new infrastructure is described through the case study of the Autostrada Regionale Cispadana (Emilia-Romagna Region, Italy), a new regional motorway currently at the design stage. We focused on the price variations of the industrial buildings in the real estate market after the new motorway will be built, aiming at developing a forecasting method, which could be repeatable and applicable to other kinds of externalities. Thanks to the hedonic pricing method, which is recurring in transport literature (Camagni, 2003; Camagni, 2004; De Ciutiis, 2008; Pavese, 2007; Cervero-Murakami, 2009, Hess D.B., Almeida T.A, 2007), using a multiple linear regression model based on ordinary least squares method (OLS), the contribution of the accessibility on the industrial buildings' pricing, has been isolated; it was then possible to forecast the rise in the industrial buildings prices that will be due to the accessibility variation produced by the new infrastructure. Once the price differentials are estimated, conclusions have been drawn at the end of this paper and a few hypotheses have been suggested about the feasible equalization mechanisms, focusing on value capture tools (Smith-Gihring, 2010; Milotti-Patumi, 2008; Scopel-Beria, 2010) and on a set of best practices (Buchanan, 2007; Greater London Authority, 2010; Milotti-Patumi-Sumiraschi-Vaghi, 2007; Milotti-Patumi, 2008; Scopel-Beria, 2010, Sumiraschi, 2010).

2 THE CASE OF THE NEW CISPADANA MOTORWAY IN EMILIA-ROMAGNA REGION

The Autostrada Regionale Cispadana will be a toll-motorway placed in the northern part of Regione Emilia-Romagna (Italy), planned to be a west-east link in order to improve the existing motorway network (A13, A22). The road layout is about 67 Km long, housing 6 toll gates, crossing 13 Municipalities belonging to 3 Provinces. As of today (April 2011), the administrative course and the whole project are at an advanced stage, and the General Contractor has been entrusted with the project.

To thoroughly analyze the spatial effects, the study area had to be extended in order to include a wider area, rather than just the directly concerned territories (Ferri, 2006; Plassard, 2003; Ferri-Adobati, 2009; Ceriani, 2006); thus, the study area has been extended to 50 Municipalities, classified in nodal-Municipalities (the ones where toll gates will be located), crossed-Municipalities (the ones which will be physically crossed by the motorway), first-belt-Municipalities (the ones which will be contiguous to the first two typologies of Municipalities) and external-Municipalities (the ones which will be contiguous to the first belt ones or which will be even more distant from the infrastructure), as shown in figure 1.

Aiming at determining if and how the accessibility affects the industrial buildings prices (that is the testing territorial effect), the hedonic pricing method has been applied, as above mentioned. This method can break down the value of a composite good, like a building, into the value of its constituent characteristics, allowing to understand the contribution which each feature brings to the final price of the good itself. Moreover, the hedonic price method makes it possible to point out the contribution of those characteristics which cannot be quantified monetarily (Camagni, 2003). Here in this paper, a multiple linear regression model is used, which is based on the following equation: $y_j = \beta_0 + \beta_1 \cdot x_{j1} + \beta_2 \cdot x_{j2} + \dots + \beta_n \cdot x_{jn} + \epsilon_i$ [1] where β_0 = constant term, β_i = explanatory coefficients of each independent variable, y_j = dependent variables, x_{ji} = independent variables, ϵ = error term, $j = (1, 2, \dots, m)$ number of distinct observations of the representative sample, $i = (1, 2, \dots, n)$ number of independent variables.

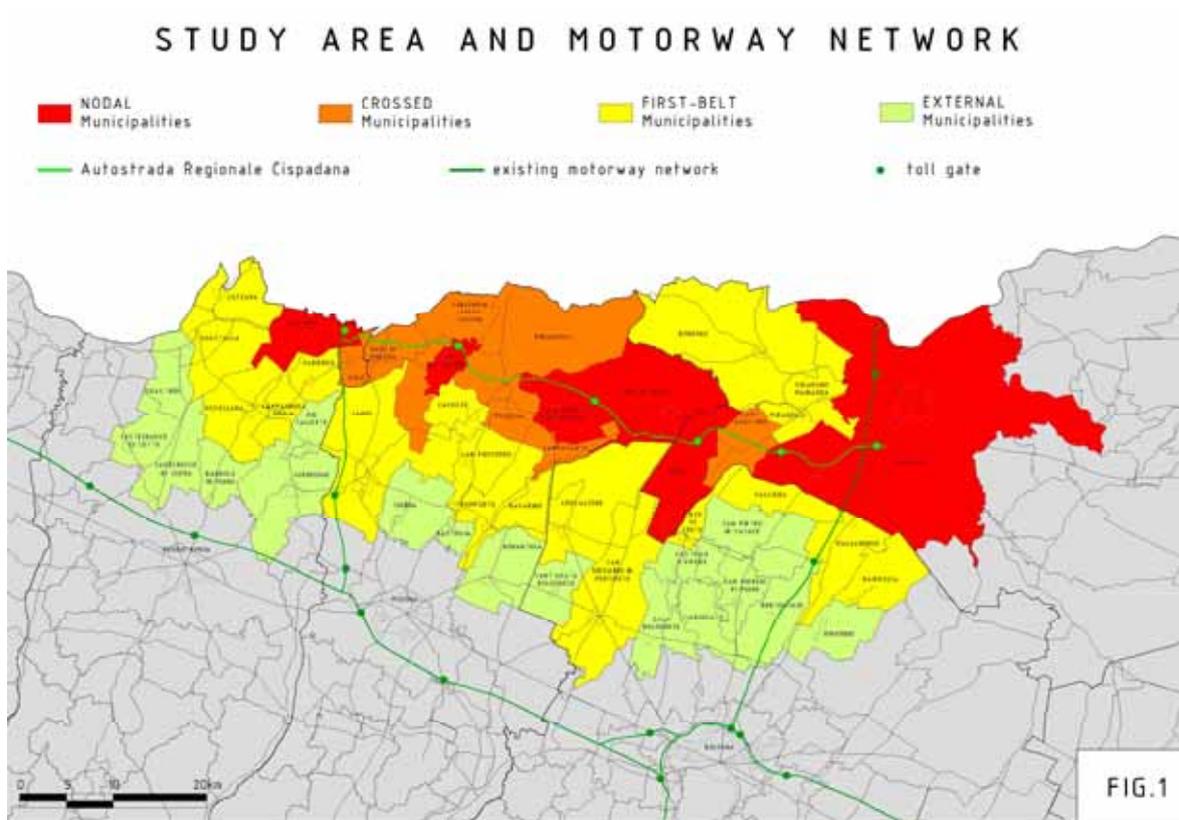


Fig. 1 Study area and motorway network

Once the values of the dependent and independent variables are obtained from the j -observations, by solving the equation [1] it is possible to know the values of the β_i coefficients; once assumed the price of the industrial buildings as dependent variable, the economic meaning of those β_i coefficients is the contribution to the formation of this price of each feature (i.e. each dependent variable) which has been supposed to be explicative of the price itself (Camagni, 2003).

The equation solution, that is the determination of the vector β consisting of the β_i coefficients, is the following one: $\beta = (X' \cdot X)^{-1} \cdot X' \cdot y$ where: $y = (m \cdot 1)$ vector of the m observation of the dependent variable, $X = m \cdot (n+1)$ matrix of the m observation of the n independent variables, $\beta = (n+1) \cdot 1$ vector of the β_i coefficients to be estimated. This method is called Ordinary Least Squares (OLS) (Simonotti, 1997).

This solution has to be verified by performing some tests, which ensure the statistical significance of the results. In this work, the following tests have been performed: Student's t -test, the p -value, the Variance Inflation Factor (VIF), the coefficient of determination R^2 , the adjusted coefficient of determination R_c^2 and the Fisher's F -test (Simonotti, 1997; Realforzo 1994; Cottrell, 2005). The data processing was made with the open-source software Gretl (*Gnu Regression, Econometrics and Time-series Library*), using the White's HCO correction to avoid the heteroscedasticity in the error's terms (Cottrell, 2005).

Due to the regional scale of the study, the reference territorial unit is the Municipality; the 6 variables used in the regression model are referred to this unit dimension:

1. PRICE – DEPENDENT variable – average price per square meter for industrial buildings [EUR/m²]. Source: quotation price from the National Observatory of real-estate market, base period: 1st semester of 2010.
2. PLAN_FEES – INDEPENDENT variable - Planning fees for new industrial buildings [EUR/m²]. Source: parametric regional charts, implemented by each Municipality through town council resolutions.

3. SERV_DENS – INDEPENDENT variable – density of business services, defined as the ratio between number of services units and population, for each Municipality. Source: Emilia-Romagna Region GIS database (base date: December 31st, 2009) for services units, Istat - National Institute of Statistics data (base date: January 1st, 2010) for population.
4. ENTERPR_DENS – INDEPENDENT variable – density of enterprises of Industry and Construction sectors, defined, for each Municipality, as the ratio between number of employed workers and number of firms. Source: SMAIL Emilia-Romagna - Regional Monitoring System for enterprises (base period: December 2009)
5. KM_HUB – INDEPENDENT variable – length of the shortest way from each Municipality to a regional road-rail distribution hub [Km] Source: Google Maps online cartography, to search for the shorter trip to the two main regional intermodal transport hubs (Interporto di Bologna and CePIM - Interporto di Parma), as prescribed by the Regional Transport Plan (PRIT)
6. ACCESSIBILITY – INDEPENDENT variable – shortest access time from each Municipality to get to a motorway toll gate, calculated in the current road network scenario [minutes]. Source: traffic simulation model of Emilia Romagna Region, D.G. Network Infrastructure, Logistics and Mobility System, Transport Planning Office.

2.1 RESULTS

The regression model's results are shown in table 1:

	β	std. error	t test ($ t < 2$)	p-value (< 0.05)	VIF (< 10)
const	215.675	76.950	2.803	0.008	...
PLAN_FEES	23.923	7.601	3.147	0.003	1.620
SERV_DENS	3.612	1.040	3.473	0.001	1.624
ENTERPR_DENS	9.897	3.858	2.565	0.014	1.089
KM_HUB	-1.058	0.359	-2.949	0.005	1.188
ACCESSIBILITY	-2.435	0.694	-3.509	0.001	1.224
coefficient of determination	$R^2 = 0.705$	$R_c^2 = 0.672$			
Fisher's F-test	$F(0.05, 5, 44) = 23.246 > F_t(0.05, 5, 44) = 2.427$ $P\text{-value}(F) = 2.39 \cdot 10^{-11} < 0.05$				

Tab.1 Regression model's results

Each variable passes the control tests, ensuring their statistical significance. By substituting the value of the β coefficient in the equation [1], it is possible to get the regression equation for the case study:

$$PRICE_i = \text{const} + 23.923 * PLAN_FEES_i + 9.897 * ENTERPR_DENS_i + 3.612 * SERV_DENS_i - 2.435 * ACCESSIBILITY_i - 1.058 * KM_HUB_i + \epsilon_i$$

Focusing on the average values, it is possible to split the average price as shown in table 2.

Therefore, it is possible to analyze the contribution of each characteristic to the final price of the industrial buildings. The variables ACCESSIBILITY and KM_HUB present a negative value, which means that they are inversely proportional to the dependent variable PRICE. The constant term (named "const"), which is the portion of the price not explained by the five independent variables, is about the 40% of the average price of the representative sample.

	β	Average value	β * average value	% (elasticity)
PRICE	...	543.784 EUR/m ²
const	215.675	1	215.675	39.66%
PLAN_FEES	23.923	8.372 EUR/m ²	200.276	36.83%
SERV_DENS	3.612	52.624 enterprise/1000 people	190.065	34.95%
ENTERPR_DENS	9.897	28.860 min	-70.268	-12.92%
KM_HUB	-1.058	42.592 km	-45.077	-8.29%
ACCESSIBILITY	-2.435	5.366 workers/enterprise	53.113	9.77%
		TOTAL	543.784 EUR/m ²	100.00%

Tab.2 Decomposition of the average price

This quite high value is related to the regional scale of the study, which does not allow to identify a set of specific features for each building impacting on prices (i.e. manufacturing and structural characteristics, measurements, residual service life, facilities and systems supplied, etc.). However, the aim and regional perspective of this study make it possible to deem the regression model and the estimated β -coefficients reliable. The β -coefficient for the ACCESSIBILITY variable, as shown above in table 2, is equal to 2.435: the motorway accessibility effect is 2.43 EUR/m² for every minute saved to get to a motorway toll gate (in relation to an average distance of 28.860 minutes for each Municipalities of the representative sample). This value is the so-called hedonic price of the ACCESSIBILITY variable.

After having estimated the hedonic price, the effect that the construction of the Autostrada Regionale Cispadana will have on the average price of the industrial building has been estimated by using the following equation (Camagni, 2004):

$$\text{Hedonic price [EUR/m}^2\text{*min]} * \text{Variation of accessibility [min]} = \text{Variation of the building's average price [EUR/m}^2\text{]} \quad [2]$$

The accessibility variations were calculated comparing the results from the traffic simulation model, which was run for both present and future scenario. In the future scenario, all other variables were kept constant to the present values so that it was possible to value the effect of the variation of accessibility only.

As shown in figure 2, in view of 11 Municipalities (22%) which do not show any prices variation, since their access time to a motorway toll gate did not change, the others 39 Municipalities (78%) face a rise of the value of the industrial buildings. More specifically, 8 of them (16%) report increases over 10% and others 3 Municipalities show a rise of industrial buildings prices over 17%.

The average variations are reported in table 3, in relation to each typology of Municipality (nodal, crossed, first belt, external).

The global average variation of the price of the industrial buildings is +5,24%. By subdividing the results over the four typologies of Municipalities, it is shown that the farther Municipalities are from the motorway (the external ones and the first belt ones), the lesser the benefits, when compared to the closer ones (crossed and nodal Municipalities); the last two typologies' growth is near twice than the average value. Contrary to what it would be expected, the crossed-Municipalities get an higher benefit than the nodal-Municipalities, which were supposed to be the greatest recipients, because of the presence of a motorway's access point.

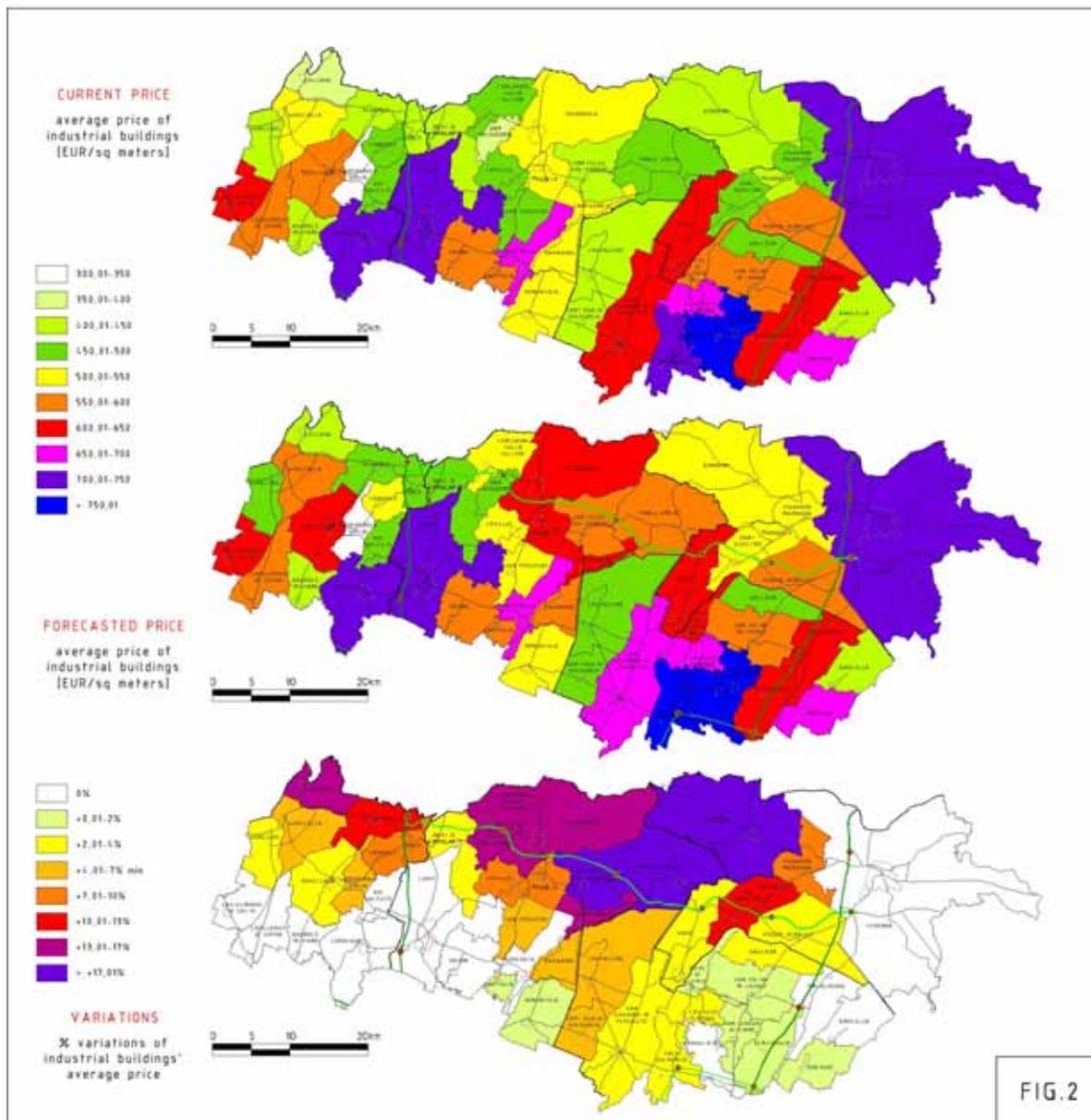


Fig. 2 Forecast of the rise in prices of the industrial buildings

Municipalities	present accessibility [min]	future accessibility [min]	variation [min]	present price [EUR/m ²]	future price [EUR/m ²]	variation [EUR/m ²]	variation [%]
TOTAL	28.72	16.38	-12.34	543.78	573.83	30.05	+ 5.24%
NODAL	29.57	8.14	-21.43	525.47	577.65	52.17	+ 9.03%
CROSSED	32.16	9.00	-23.16	478.46	534.87	56.41	+ 10.55%
FIRST BELT	32.33	19.19	-13.14	511.52	543.52	32.00	+ 5.89%
EXTERNAL	22.31	19.06	-3.25	618.64	626.56	7.91	+ 1.26%

Tab.3 Forecasted average value by typology of Municipality

This is due to two key factors: 1) boundary conditions; in the present scenario, the crossed Municipalities face a worse accessibility condition (they have an average accessibility of 32.16 minutes, against 29.57 minutes of the nodal Municipalities); therefore, the future presence of a closer toll gate (even if not in their municipal territory) will bring a higher benefit with regards to saved time. 2) the presence of the city of Ferrara among the nodal-Municipalities; Ferrara is the only nodal-Municipality which already has a toll gate of an existing motorway (A13). Because of that, the Municipality of Ferrara will not get any benefit regarding motorway accessibility (and so it will get no rise of industrial buildings' prices) and it contributes to reduce the average value of gained accessibility for all the nodal-Municipalities. Indeed, if the average values are calculated without counting the city of Ferrara, the nodal Municipalities gain the biggest benefits, as it is shown in table 4.

Municipalities	present accessibility [min]	future accessibility [min]	variation [min]	present price [EUR/m ²]	future price [EUR/m ²]	variation [EUR/m ²]	variation [%]
TOTAL	28.72	16.38	-12.34	543.78	573.83	30.05	+ 5.24%
NODAL (w/o Ferrara)	33.83	8.83	-25.00	553.80	553.80	60.87	+ 10.99%
CROSSED	32.16	9.00	-23.16	478.46	534.87	56.41	+ 10.55%
FIRST BELT	32.33	19.19	-13.14	511.52	543.52	32.00	+ 5.89%
EXTERNAL	22.31	19.06	-3.25	618.64	626.56	7.91	+ 1.26%

Tab.3 Forecasted average value by typology of Municipality, excluding the city of Ferrara

The small difference in benefit between the nodal-Municipalities and the crossed ones is due to the short distance among the nodal points of the new motorway (the average distance is about 11 km), so that the segregation effect for the crossed territories is weak. In other words, the polarization of the benefits around the access points of a transport infrastructure, that is the "tunnel effect" created due to the refraction law (Plassard, 2003), is essentially absent.

3 CONCLUSIONS

Through the hedonic price method, which was developed using a multiple linear regression model based on ordinary least squares method (OLS), it was possible to value the effect of the motorway construction on the industrial buildings' pricing by isolating the contribution of accessibility and then calculating the rises in the industrial buildings prices, due to accessibility variations produced by the new infrastructure. It is clear that the work which was developed and shown above, it is only a partial analysis. Indeed, a more complete analysis should take care of the dynamic aspect of land value and price's variations. To get over the static perspective here adopted, it would be necessary to include the time variable and the mutual variations: for example an increase of price of more accessible areas could be accompanied by a progressive decrease in price of marginal areas. Moreover, to have a full picture (qualitative, quantitative and georeferenced) of the territorial effects, it would be necessary to repeat a similar analysis for all the externalities typologies; only then it will be possible to determine the "receiver-Municipalities", the ones which will bear the costs generated by the new infrastructure, and the "payer-Municipalities", the ones which will get some benefits in comparison with the whole sample's average.

Anyway, the achieved results make it possible to make some considerations about the benefits of the described model, with particular regard to its application in urban planning context. The purpose of such a

procedure is the setup of equalization mechanisms, which can re-balance the territorial effects. Generally, the so-called “land value capture” tools are adopted (Smith-Gihring, 2010; Cervero-Murakami, 2009, Milotti-Patumi, 2008; Hong, 1998): they consist of a set of actions which aim at recovering some of the produced generated benefits, by introducing some duties and taxation, which will be applied on the increased property values. This paper does not intend to enter into the details of the operational instructions, which will need to be set up in detail for every single case, by considering the specific legislative and fiscal background. However, it is possible to point out some general guidelines.

Nowadays, because of the general lack of public resources, it seems necessary to introduce a clause about the tax revenues’ use, ensuring that the tax revenues will actually fund the equalization actions and that they won’t be used for any other purpose of the Local Authorities. The taxable basis should be defined so that the tax will weigh as much as possible upon the beneficiaries only. Moreover, a taxation proportional to the benefits should be appropriate; in such a way, the tax would be diversified in order not to be too damaging for the payers. For this reason, the introduction of a threshold value for the taxation could be an useful tool, as seen in London’s Crossrail Link project (Greater London Authority, 2010; Buchanan, 2007). In that case, the only taxed properties are the non-domestic ones which exceed a fixed threshold of rateable value. In such a way, the taxation weighs only on those enterprises which have a dimension that easier allows to face the additional charge. We also need to focus on the time variable, especially on the revenues’ cash flow. In general (even if it could be considered as a necessary but not sufficient condition) the most successful experiences are characterized by the presence of a definite time and work schedule; for example, in the case of the Copenhagen Metro, the success of the project was reached also thanks to a straight planning the whole intervention in harmony with the different time schedules of each element (Milotti-Patumi, 2008). On the other hand, the lack of accurate time constraints and the non-compliance with the scheduled times have often main obstacles to the implementation of a value capture tool; this is evident, for example, in the case of the Quadrilatero Marche-Umbria project (Corte dei Conti, 2009).

In the end, thanks to a relatively quick phase of development and implementation, the described application could be used as a tool for the ex-ante evaluation of different projects and as an ex-post analysis tool for the monitoring of an existing infrastructure. Finally, thanks to the chance to understand the contribution of each territorial feature to the final price of the good, this application proved to be very useful in participatory planning processes (Urbani, 2001). Indeed, the tool discussed in this paper allows to deal with some very complex phenomena, as the interactions between transport infrastructures and territory, and it allows to synthesize them in a clear and explicit way, showing the existing mutual interrelationships. For this reason, this tool could provide a common knowledge base which could be used to support the public administration’s capability of negotiation with the private partner, both in the participatory planning processes and in the public-private partnership procedures. In fact, it could be used to provide members of the public with the information they need to understand the project and decision process; furthermore, the use of a mathematical tool supports the transparency and clarity of the procedure with respect to every involved actor, and could help in regulating their contribution according to the benefits they’ll gain from the new infrastructure and could support the Public Administration in carrying on negotiation processes with private stakeholders.

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IMAGES SOURCES

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Fig. 1 and 2 are from the Authors.

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TRASPORTI, ICT E LA CITTÀ

PERCHE' ALLA CITTA' INTERESSANO LE ICT?

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ABSTRACT

The paper is focused on the existent relationship among the three elements cited in the title. The innovation in transportation, allowed by new ICT solutions is one of the most important point of development for cities nowadays: this, not only for the process of rationalization and reduction of externalities due to urban mobility, but also and above all thanks to the economic dynamics that technological knowledge boosts in those cities in which local entities, enterprises and research gather together and grow in terms of competitiveness. Deepening transportation, new solutions have main outcomes in the field of the road safety, street security, urban traffic, harbor handling, territorial risks (environmental and industrial), to cite a few. All of these topics own many connections with the work of planners. According to what technology allowed to them, they are expected to exploit it keeping advantage by the new discoveries in current planning activities, in dialogue of the new ITS. The paper ends up that technology involvement in transport is carrying on a new way of planning them and tries to draw out some further conclusions regarding the intervention on existent cities in a changing world and the demand of updated skills in the planning field. To better clarify future findings, the author propose a case-study, referring to the projects of the Innovation Pole of Advanced Research in Safety, Security and Intermodality in Transport Systems, sited in Genoa (IT), inserted in a step-wise logic of development of regional competitiveness and clusterization.

KEYWORDS:

urban competitiveness, ICT, transport

1 TECNOLOGIE E CITTA'

Le tecnologie dell'informazione e telecomunicazione (Information and Communication Technology, ICT) risultano essere ad oggi un imprescindibile strumento utile non solo alla quotidiana attività dell'individuo, ma anche alla promozione ed all'esplicitarsi di politiche ed indirizzi rivolti alla collettività. Si potrebbe dire che una delle più stupefacenti sfaccettature del fenomeno di integrazione fra la tecnologia e la socialità sta nella capacità di scienza, industria e vita urbana di intravedere e realizzare insieme nuove applicazioni.

Negli ultimi anni, l'attenzione volta alle ICT è stata motivata innanzitutto dai benefici sociali che il loro dispiegarsi ha comportato (nei campi dei trasporti, dell'educazione, della partecipazione e, non ultimi, nei processi di pianificazione) e dalle loro potenzialità di intervento nella mitigazione di emergenti questioni urbane. In seguito, la crescita di tali applicazioni negli impieghi quotidiani di vita e di lavoro ed, in maniera più strutturata, a servizio della governance di modelli e processi (pubblici e privati, istituzionali e non), ha comportato la necessità di annoverare sempre più stabilmente lo sviluppo delle ICT nelle politiche urbane, inserendole, a pieno titolo, nelle agende di programmazione strategica in seno alle diverse istituzioni.

Accanto alle prospettive del settore privato, che gioca indubbiamente un ruolo di primo piano nel campo, le convenienze economiche e le velocizzazioni significative, che sono state riscontrate grazie a tali progressi, hanno incoraggiato anche le autorità locali a formulare i loro obiettivi di sviluppo delle tecnologie di comunicazione e informazione.

Le ultime applicazioni, dispiegandosi in configurazioni e combinazioni rese possibili da un coacervo di tecnologie a disposizione, mostrano tutte le loro potenzialità e talvolta anche imprevedibili impatti nei processi di insediamento urbano, di mobilità della popolazione, nell'imprenditoria e nel commercio. Allo stesso tempo, alcuni autori segnalano come, nel legame fra impegno delle municipalità sulle ICT e cluster di città, ci siano differenti gradi di influenza tali da toccare effettivamente (o no) la visione strategica della città; tale grado è infatti differente a seconda delle identità/potenzialità/dinamiche degli organismi urbani stessi. Il panorama dei contesti urbani, quindi, non appare nient'affatto semplice da leggere, ma costellato di condizioni e particolarità che rendono i case-studies più o meno "disponibili" ad un ulteriore avanzamento tecnologico che dia effetti in area urbana.

Nelle ultime due decadi, la relazione tra telecomunicazioni e territorio ha attirato molti interessi anche accademici (Hepworth and Ducatel 1992; Mokhtarian, 1991; Nilles 1988; Mokhtarian and Salomon 2001), che hanno avuto ad oggetto complessivamente la volontà di investigare impatti sociali e spaziali derivanti dall'impiego delle tecnologie ed interpretarne gli effetti in un prossimo e remoto futuro. Alcuni, da subito, si sono occupati degli sviluppi inerenti il telelavoro e le possibilità di accedere in remoto a qualsivoglia informazione e la conseguente sostituzione di "viaggi reali" con tele-attività (Boghani et al. 1991; Garrison e Deakin, 1988). Sempre in quegli anni, Freeman e Perez (1988) dividono le ICT in due categorie: "evolutive" e "rivoluzionarie". Nel primo caso, si parla di miglioramenti avvenuti in una precisa traiettoria tecnologica, come i telefoni cellulari sorti ad un certo punto da una lunga catena di invenzioni; qui, in merito agli effetti territoriali, le nascenti possibilità abbassarono da subito drasticamente la spesa trasportistica, accelerando quel processo di decentralizzazione urbana che emerge solo nel lungo periodo. Nel caso di quelle cosiddette "rivoluzionarie", esse si pongono al centro di un paradigma socioeconomico, fondato su un complesso di tecnologie dell'informazione che consentono l'immagazzinamento virtuale, la manipolazione e il recupero dei dati, la loro digitalizzazione... Questa recente declinazione delle ICT non tocca un preciso settore dell'economia, ma potenzialmente tutti i settori. Ovvero, tutte le componenti, hardware e software, sono parte di una rivoluzione sia tecnologica che organizzativa.

Grant and Berquist (2000) sostenevano una dozzina d'anni fa che le ICT si sarebbero trovate a ricoprire lo stesso ruolo che fu delle autostrade nel secolo addietro e che così come l'auto ha plasmato la città in allora,

ci sono buone motivazioni per cui anche le ICT, convertendo gli spostamenti fisici in quelli elettronici, possano cambiare l'impronta delle metropoli, costruirla ed al tempo stesso trasformarla. Per questo, Shen nel 1999 suggerisce di misurare l'accessibilità non solo rispetto alla mobilità fisica ma mediante la combinazione di opzioni di trasporto e modalità ICT. Negli stessi anni, Horan e Jordan (1998), Couclelis e Getis (2000) promuovono fermamente una integrazione fra transport planning e ICT policy, queste ultime incorporate nel più ampio spettro delle politiche urbane finalizzate all'innalzamento dei livelli di accessibilità. Recentemente, l'associazione italiana della Telematica per i Trasporti e la Sicurezza (TTS Italia) ha proposto una sistematica classificazione delle strade vigente a livello istituzionale, aggiornata con livelli di servizio offerti che tengano conto anche della dotazione ITS.

Chiaramente, ciò interessa forse più i pianificatori che gli stessi esperti di telecomunicazioni. Mentre Martinotti e Boffi (2002) confermano che queste tecnologie offrono inequivocabilmente nuove informazioni e mettono in contatto con nuove fonti di dati utili alla vita comune, Couclelis e Getis (2000) puntualizzano d'altronde che tali innovazioni, sul lungo termine, lasciano intatti gli attuali interrogativi circa la sostenibilità dei nostri ritmi sociali. Banister afferma nel 2004 che sono assolutamente discutibili le conclusioni tratte da scenari così imprevedibili: essi mostrano infatti una moltitudine di plausibili alternative. Nel panorama europeo –egli sostiene- nemmeno le politiche territoriali di impronta tecnologica più "strong" hanno sufficientemente invertito la rotta in fatto di sostenibilità.

Ad oggi non risultano ancora del tutto presenti analisi che esaminino gli effetti di interrelazione fra le ICT e la città in termini generali, tuttavia alcune ricerche sono state indirizzate ad investigare le ricadute dell'ICT sulla forma urbana. Janelle e Gillespie (2004) asseriscono che, in effetti, è ancora troppo presto per poter tracciare bilanci riguardo a come cambieranno la percezione degli spazi, le destinazioni d'uso del territorio per le attività umane e la domanda di trasporto in conseguenza dell'offerta ICT.

Taluni tuttavia, già da molto, parlano di città digitale (Fistola, 2008; Moccia, 2008).

2 TECNOLOGIE E FORMA URBANA'

Poiché sono forze sia centrifughe che centripete a dare forma alla nuova metropoli dell'era dell'informazione (e non una decisa centralizzazione o un progressivo dissolvimento urbano, come era stato preannunciato), la rappresentazione che sembra più confacente alla realtà odierna (e prevedibilmente futura) è un tessuto reticolare spazialmente distribuito, che sta evolvendo in una costellazione di agglomerazioni di punti: questi ultimi hanno dotazioni ICT, operano su scala regionale e comunicano tramite infrastrutture fisiche ad alta velocità e connessioni digitali.

Città, periferia e campagna si sono polarizzati in centri e sub-centri che rendono la geografia degli insediamenti umani molto articolata, in cui non mancano disparità di dotazioni fisiche e telematiche, che possono portare ad un accentuato fenomeno di gentrificazione (Bontje, 2001). Da una parte, la disponibilità di risorse tecnologiche permette l'emancipazione anche dei suburbi, dall'altra la scelta pubblica di sviluppare tecnologie secondo una politica di bassa tassazione e di scarsi servizi porta all'isolamento della metropoli dalle opportunità derivanti.

Paradossalmente, i ricercatori che hanno studiato le implicazioni spaziali dell'odierna civiltà dell'informazione sembrano indicare che la configurazione urbana sempre più frammentata sta dinamicamente evolvendo verso forme maggiormente policentriche e complesse e che, velocemente, si sta sempre di più disperdendo e deconcentrando. Persino laddove -negli Stati Uniti- sono stati presi provvedimenti, è stato complicato contenere, almeno in parte, l'espansione (Bolan et al., 1997). Tuttavia gli stessi autori si interrogano se si tratti davvero di urban sprawl o di una modalità nuova di svilupparsi della città, in quanto le perplessità

sull'inadeguatezza dei modelli urbani tradizionali a "catturare" le dinamiche odierne rimangono. Lefebvre (2003) dice che il nostro modo di guardare la città è affetto come da una miopia, perché continuiamo ad osservare gli odierni fenomeni con le lenti del passato industriale o addirittura agrario. Effettivamente Hall ci aveva avvertito: le nuove dinamiche metropolitane appaiono sempre più globalizzate, post-terziarie, policentriche e "informatizzate". Egli stesso fu tra i primi a segnalare l'indifferibile necessità di reinterpretare il modello urbano tramite il rapporto fra città fisica e innovazione tecnologica (Hall 1999).

La forma urbana emergente della civiltà dell'informazione è di fronte a molte sfide: muoversi nella direzione di uno sviluppo il più possibile sostenibile e "smart" e di una sempre maggiore qualità delle vite per i cittadini. Appare chiaro, di fronte ad esse, che gli sforzi condotti sulla pianificazione fisica e l'efficientamento del sistema di trasporto non costituiscono da soli la risposta alle criticità urbane.

Ma oltre che dal punto di vista degli immediati effetti fisici che determinano sull'assetto urbano, le ICT possono mostrare la loro influenza anche in un altro caposaldo del rinnovamento urbano. Il Green Paper on Urban Environment del 1991 parla di tre componenti cooperanti nel processo di rinnovo della città: la riqualificazione dell'area urbana (salubre e non anonima), la rivitalizzazione sociale ed economica e lo sviluppo durevole e sostenibile, su cui i progetti a bando promossi dalla Unione Europea sono stati improntati (Veronesi et al. 2012). Al secondo concetto si rifanno i temi dell'occupazione, della vitalità del tessuto imprenditoriale, lo sviluppo di know-how, etc. Ad esso si associa, in chiave più moderna ed ampliata, un'ulteriore concettualizzazione che riguarda un altro aspetto decisivo per la metropoli attuale: la competitività della città e fra città (Governa e Saccomani, 2004; Hohn e Neuer, 2006; Laurila, 2004). Essa si articola certamente in una concatenata serie di logiche causa-effetto, tuttavia è indubbio che una certa vitalità imprenditoriale (fortemente inserita nel sistema di governance territoriale), foriera di ulteriori dinamiche economiche, dà luogo a quelle opportunità che consentono alla città, in un mondo così competitivo, banalmente di continuare ad esistere, non solo –per usare un'immagine- sulla carta geografica, ma su di un monitor che ne rilevi le pulsazioni.

Infatti, l'interrogativo è quanto le ICT possano contribuire all'innalzamento del grado di competitività della città non tanto (o per lo meno non solo) dal punto di vista della dotazione infrastrutturale (che riduca la domanda di trasporto e che permetta una più razionale distribuzione di mezzi e persone, modificandone anche la forma), ma anche e soprattutto nel processo di rivitalizzazione economica e sociale che essa innesca.

3 PERCHÉ ALLA CITTÀ INTERESSANO LE ICT?

Le imprese finalizzate alla conoscenza di rete appaiono ad oggi indispensabili alla vitalità di città e regioni (Malecki e Veldhoen 1993; Storper 1997; Florida 2000) ed alla centralità geografica delle attività economiche; localizzazione, natura e durata delle agglomerazioni urbane appaiono quindi in connessione biunivoca con esse. Il grande background presente in letteratura a riguardo dei cluster industriali, dei distretti marshalliani e dei milieux d'innovation non fa altro che suffragare tale interdipendenza.

Come noto, infatti, le imprese ICT sono spesso raggruppate fra loro, si può dire essere una loro caratteristica distintiva. Nella loro marcata specializzazione, esse condividono i benefici tipici delle economie di scala e di agglomerazione. Inoltre, le aspettative in merito al loro insediamento è molto alta da parte del livello locale, poiché ci si auspica una loro gravitazione in termini di addetti e di acquisizione di risorse finanziarie e di opportunità economiche. In altre parole, le aziende ICT possono avere una vera vocazione a coinvolgersi nella pianificazione territoriale locale e, se sono in grado di avvantaggiarsene, possono recitare un ruolo anche istituzionale, entrando in maniera ordinaria nelle prassi di governance (Delponte e Ugolini 2011).

Certo, il privato ha necessità di aggregarsi per recitare tale ruolo e di collegarsi con altri in maniera organica e strutturata, rendendo così credibili e giustificate le competenze e le risorse dedicate nel lungo periodo. La capacità di comporsi in poli/distretti/cluster è un requisito fondamentale per la candidatura degli sviluppatori delle tecnologie ICT in qualità di attori coinvolti a pieno titolo nel processo di sviluppo territoriale. In questo modo, un cluster coeso e strategicamente delineato non è solo rappresentativo della parte industriale ma si pone come uno degli interlocutori all'interno dei processi di trasformazione territoriale, anche se evidentemente caratterizzato dalla sua professionalità tecnologica. Ciò appare in linea con la definizione di Porter¹, per cui i cluster sono da intendersi come concentrazioni geografiche di imprese ed istituzioni interconnesse tra di loro, a causa di un particolare campo su cui agiscono.

La città deve mostrarsi inoltre competitiva nei confronti delle aziende potenzialmente insediabili. Alcuni studiosi individuano almeno una serie di tre fattori irrinunciabili che influenzano la scelta localizzativa delle imprese ICT: i caratteri di accessibilità della città all'interno della digital global economy, le infrastrutture di trasporto (fisiche e telematiche) e l'attrattiva di quanto offerto dal contesto urbano secondo la valutazione della classe dirigente dell'economia della conoscenza (la cosiddetta "high-tech elite"). Il grado di attrazione della città non riguarda solo gli spostamenti privati, ma anche quelli organizzati su vasta scala, che debbono ad oggi essere sempre più efficienti, in conseguenza dello sviluppo dell'e-commerce e dei servizi BusinessToClient o BusinessToBusiness. Questo modello di distribuzione è una delle molteplici cause anche della forma urbana moderna: si configurano agglomerazioni urbane adatte al conferimento di prodotti in andata e ritorno da un punto, spesso vicino agli aeroporti (Kasarda, 2000). Quello che si osserva ad oggi è un arcipelago di variabilità di forme, clusterizzate su duplici forze di dispersione e deconcentramento. Lo sviluppo delle ICT è quindi, non solo induttore del cambiamento della forma urbana, ma quest'ultima può rappresentare un requisito affinché tale sviluppo avvenga.

4 UN ESEMPIO DI POLO ICT

4.1 LE POSSIBILITÀ DELL'ICT NEL CAMPO DEI TRASPORTI

Se da un lato si stanno investigando le implicazioni (mutue) fra tecnologia e disegno della città, dal punto di vista trasportistico le esperienze finora condotte nei paesi dell'UE, negli USA ed in Giappone già dimostrano che l'introduzione delle ICT (e in particolare delle tecnologie ITS, "sistemi di trasporto intelligenti") ha contribuito significativamente a migliorare l'efficienza, la sicurezza, l'impatto ambientale e la produttività complessiva del settore. Già nel Secondo Libro Bianco "La politica europea dei trasporti", la Commissione Europea parla di riduzioni dei tempi di percorrenza (15- 20%), dei consumi energetici (12%) e delle emissioni di inquinanti (10%), nonché aumenti della capacità della rete (5-10%) e diminuzioni del numero di incidenti (10-15%). Analisi condotte su scala internazionale riportano che gli ITS hanno generato su scala mondiale un mercato che nel 2010 è giunto a 18,5 miliardi di dollari, con un trend di crescita medio annuo

¹ Il concetto di "cluster" industriale fu introdotto da Porter nel 1990 e sviluppato in seguito dalla scuola della New Economic Geography, che ha origine dalle teorie di Marshall sui distretti industriali. La stessa scuola dei distretti industriali ha permesso di definire le caratteristiche dei cluster. Porter definisce i cluster come gruppi di imprese concentrate geograficamente, che competono nella stessa industria o in industrie collegate, e che sono connesse da relazioni verticali ed orizzontali, incentrate intorno ad una specializzazione produttiva. Il concetto più interessante dal punto di vista delle discipline del territorio è quello di concentrazione spaziale; spesso infatti si fa riferimento al territorio solo ed esclusivamente come fattore di vincolo o come fattore "vischioso" amplificatore della distanza. L'accezione di sistema territoriale permette invece di intenderlo come fattore indispensabile alla crescita delle attività, poiché costituiscono il risultato storico di passate relazioni che ne hanno determinato non solo la forma ma anche i rapporti, le capacità, il modus operandi. Le dimensioni e le caratteristiche del sistema, in questa logica, non sono stabili, ma variano al variare delle relazioni intercorrenti. A questa dimensione si associa una scala a cui fare riferimento, caratterizzata dai collegamenti sociali e territoriali consolidati e intessuti dalla popolazione (Cfr. Porter, 1998).

del 15% nel decennio 2000-2010. L'Italia è uno dei Paesi europei a più alta densità di traffico interno e la domanda di mobilità è cresciuta esponenzialmente negli ultimi anni, ma nello stesso tempo essa è mutata profondamente: si è passati dallo spostamento "casa-lavoro-casa" allo spostamento multiplo nel quale il viaggio è costituito da un insieme concatenato di mete da raggiungere. Come dimostrano le esperienze internazionali, per affrontare le sfide poste dall'aumento continuo della domanda di mobilità occorre adottare un approccio "di sistema" nel quale informazione, gestione e controllo operano in sinergia ottimizzando l'uso delle infrastrutture, dei veicoli e delle piattaforme logistiche, in un'ottica multimodale ed intermodale. Gli ITS in Italia sono in realtà un settore attivo sin dagli anni Ottanta, ma caratterizzato dai più rilevanti sviluppi a partire dal decennio successivo, in parallelo con la crescita del settore negli altri maggiori Paesi industrializzati. Istituzioni centrali, amministrazioni locali, aziende, Istituti di ricerca, Università e gestori pubblici e privati della rete italiani, hanno preso parte a tutti i Programmi Quadro di Ricerca e Sviluppo della Commissione Europea con risultati significativi.

A livello nazionale, il Parlamento italiano, in particolare, con la legge 556/88 ha autorizzato l'allora Ministero dei Lavori Pubblici, di concerto con il Ministero dell'Interno, all'istituzione di un centro per il coordinamento delle informazioni di regolarità e sicurezza del traffico. Il successivo DM 154/90 ha istituito e regolamentato il CCISS (Centro di Coordinamento Informazioni Sicurezza Stradale) ed ha posto quindi le condizioni per l'effettivo avvio operativo. Il CCISS opera oggi avvalendosi di una moderna centrale operativa di recente attivazione dove vengono ricevute, elaborate, immagazzinate e trasmesse ai cittadini tutte le informazioni di infomobilità (incidenti, rallentamenti, eventi perturbativi statici –cantieri- e dinamici -congestione, eventi meteorologici, etc.-). ITS per la gestione del traffico e della mobilità sono in esercizio in numerose città italiane, tra cui Roma, Torino, Milano, Firenze, Bologna, Genova, Perugia, Napoli, Brescia, Salerno, ecc.. Inoltre, quasi l'80% delle Aziende di Trasporto Pubblico Locale sono dotate di sistemi di localizzazione e monitoraggio delle flotte mirati a migliorare l'offerta del servizio. Infine, i progetti sugli ITS sono stati finanziati nell'ambito del programma PON (Programma Operativo Nazionale) Trasporti 2000-2006 e 2007-2013 e sono stati in parte realizzati o in corso di realizzazione nell'ambito delle Regioni dell'Obiettivo 1 (Basilicata, Calabria, Campania, Puglia, Sardegna, Sicilia), oltre ai progetti ITS promossi nell'ambito del Programma Elisa e finanziati dal Ministero degli Affari Regionali.

In campo autostradale, il settore delle autostrade a pedaggio ha rappresentato e rappresenta in Italia un naturale ambito di sperimentazione ed applicazione di sistemi e tecnologie innovativi (ticketing, pricing e in generale servizi connessi alla monetica). È importante rilevare anche che il Ministero delle Infrastrutture e dei Trasporti a marzo del 2003 ha pubblicato la Versione 1 dell'ARchitettura Telematica Italiana per il Sistema dei Trasporti (ARTIST). L'obiettivo di ARTIST (cui converge la stessa Direttiva n. 40) è stato quello di fissare linee guida di riferimento necessarie affinché le diverse applicazioni ITS potessero essere compatibili, integrabili ed interoperabili fra loro.

All'interno di questo quadro, ci sono tuttavia dei rallentamenti, culturali e gestionali.

L'informatizzazione della società ha permesso la costruzione di una grande quantità di banche dati e quindi potenzialmente vi è la possibilità di usufruire di un significativo insieme di informazioni. Questa possibilità, allo stato attuale, è in parte solo teorica, in quanto non è ancora diffusa una cultura della gestione e condivisione delle informazioni, che permetterebbe di accrescere la conoscenza di sistemi complessi quali il trasporto, la mobilità e la logistica.

Su questi temi, tuttavia, le opportunità e le prospettive appaiono ampie.

Nell'ambito delle applicazioni dell'Infomobilità, riveste particolare importanza la disponibilità di una connettività territoriale idonea a collegare con elevata capacità di trasmissione tutti i soggetti localizzati sul territorio. L'innovazione tecnologica applicata al settore dei trasporti e della logistica ha apportato un

notevole incremento delle prestazioni nel contesto. Questo ha fatto sì, ad esempio, che applicazioni di Infomobilità ed ITS e di logistica applicata all'area portuale siano diventati ormai molti diffusi, con notevoli vantaggi sia per gli operatori che per la comunità. Ad esempio, il forte flusso di mezzi pesanti da e verso i porti è spesso causa della congestione della circolazione sulla rete autostradale, nelle città e nelle aree portuali e si ripercuote in disservizi e costi sull'intera catena logistica.

Si rendono necessari quindi interventi, non solo di tipo infrastrutturale, ma anche di tipo gestionale volti a migliorare l'utilizzo delle infrastrutture esistenti, intervenendo sulla definizione di nuovi processi e l'introduzione di nuovi sistemi e soluzioni. Negli ultimi anni, si sta diffondendo anche lo studio di sistemi particolarmente evoluti che hanno l'obiettivo di gestire al meglio i sistemi di trasporto, intesi come un processo "continuo" e non più frammentato, che forniscono supporti significativi nella scelta delle decisioni.

Inoltre, la complessità crescente della filiera logistica e la necessità di farsi carico di una catena sempre più lunga, che in alcuni casi arriva addirittura alle fasi finali della produzione dei beni stessi, mette sempre più in evidenza il problema della sicurezza dei prodotti e del personale che su queste opera.

Altro settore coinvolto è quello delle Telecomunicazioni: la filiera ha come obiettivo l'integrazione e lo scambio di competenze per la progettazione di infrastrutture atte a fornire il necessario supporto al tracciamento "any time & anywhere" ed al trasferimento intermodale di merci (e persone adibite alla sorveglianza delle stesse nel percorso dal punto di partenza alla destinazione), attraverso mezzi marittimi, aerei, e terrestri (questi ultimi per via ferroviaria e/o autostradale).

4.2 LE POSSIBILITÀ DELL'ICT NEL CAMPO DEI TRASPORTI

Come accennato in precedenza, l'evoluzione nel campo dell'informatizzazione, delle telecomunicazioni e dell'energia hanno portato a processi accelerati di sviluppo "globale" che sempre più necessitano di porsi in sinergia con l'elemento territoriale al fine di perseguire ulteriori margini di crescita e di avanzamento tecnologico.

Stante la decisività del processo di territorializzazione delle politiche, cui la Comunità ha dato avvio fin dallo Schema di Sviluppo dello Spazio Europeo, alla politica industriale si chiede di saper indirizzare le sue risorse su percorsi di sviluppo economico-impresoriale – anche nell'ICT- capaci di autosostenersi e dare reale valore aggiunto al territorio.

In tal senso, per coloro che investono energie e capitali nello sviluppo di prodotti di mercato, la verifica della coerenza con il quadro programmatico europeo, nazionale e regionale (a seconda delle scale coinvolte) contribuisce direttamente alla concreta fattibilità delle proposte, grazie ad un decisivo collegamento fra politiche di sviluppo settoriale e la pianificazione ordinaria.

Nei tempi più recenti, ma secondo un'antica tradizione culturale, la scelta operata a livello regionale in Italia ha optato per il finanziamento concesso ad aggregazioni di imprese in Poli di Ricerca e Innovazione.

Detti poli sono definiti come raggruppamenti di imprese indipendenti, start-up innovative, piccole, medie e grandi imprese, nonché organismi di ricerca attivi in un particolare settore o ambito territoriale, destinati a stimolare l'attività innovativa, incoraggiare l'interazione intensiva e lo scambio di conoscenze ed esperienze, contribuendo al trasferimento di tecnologie, alla messa in rete e alla diffusione delle informazioni.

I Poli di ricerca e di innovazione devono operare al fine di favorire:

- la realizzazione di progetti di ricerca industriale di significativo impatto sull'assetto economico, tecnologico e sociale della regione;
- lo scambio di conoscenze ed esperienze,
- il trasferimento di tecnologie,

- la collaborazione, la messa in rete e la diffusione delle informazioni tra i soggetti che costituiscono il Polo, mediante la messa a disposizione di infrastrutture aperte da usare in comune e la realizzazione di attività di animazione.

La costituzione del Polo di Ricerca e Innovazione "T.R.A.N.S.I.T. Tecnologie e Ricerca Avanzata Network Sicurezza Intermodalità nei Trasporti", secondo i requisiti richiesti dalla Regione Liguria nel bando a valere su Fondi europei F.E.S.R., risponde alla necessità di mettere a sistema le competenze dei singoli favorendo la creazione di un network e di specifiche attività condivise tra i soggetti nell'ambito prescelto. Il Polo risponde così alla necessità di tendere ad un'offerta integrata, sinergica e condivisa di prodotti, tecnologie e servizi, promuovendo la stessa fuori dai propri confini territoriali. T.R.A.N.S.I.T. quindi diventa luogo di aggregazione di grandi aziende e PMI, per coprire i fabbisogni specifici ed approcciare progetti complessi e innovativi, con il supporto degli Enti di Ricerca.

Infatti, senza pretesa di esaustività, si può affermare che le possibili evoluzioni delle sfide attuali alla competitività saranno legate alcune ai vettori, altre saranno di carattere regolatorio e tariffario, altre ancora implicheranno innovazione nei sistemi di supporto alle decisioni e gestionali. In qualsiasi caso, di volta in volta, verranno ricercati, dai diversi soggetti interessati, una maggiore efficienza (in particolare ove i trasporti e la logistica costituiscono una leva competitiva) e un innalzamento dei livelli di sicurezza e una migliore accessibilità ed integrazione modale. La sfida è impegnativa sia per l'ampiezza del comparto (quello dei trasporti e della logistica), sia perché innumerevoli sono le tecnologie e i know-how richiesti con cui si deve saper interagire: di qui la scelta di identificare un polo settoriale ove focalizzare gli sforzi e gli investimenti, anche al fine di traguardare un orizzonte temporale intorno al 2020. I soggetti proponenti hanno proceduto in tal senso individuando, sulla base delle più significative specificità imprenditoriali e di ricerca presenti sul territorio ligure, i settori prioritari a livello nazionale, interregionale, e regionale, che possono fornire, in prospettiva, le migliori ricadute per gli Enti costituenti il Polo e il contesto territoriale di riferimento.

Considerate le potenzialità e le carenze del milieu generativo del polo (organizzato mediante un'accurata swot analysis), il polo si aggrega su traiettorie di sviluppo e sulla progettualità all'interno delle filiere individuate.

Secondo quanto emerso dall'analisi, nell'ambito della gestione dei sistemi di trasporto e della logistica vi è ancora ampia possibilità di ottimizzare il processo utilizzando sistemi gestionali e di supporto alle decisioni. Questi permettono di perseguire soluzioni ottimali secondo un approccio "multi vista" che considera fattori quali i costi diretti, il tempo di esecuzione/completamento delle prestazioni e gli effetti sulla società in termini di fattori ambientali e sicurezza. L'utilizzo di questo approccio permette quindi un significativo miglioramento delle prestazioni dei sistemi senza dover investire ingenti risorse per l'ammodernamento delle attrezzature, consentendone un miglior utilizzo. L'idea base per lo sviluppo di questi sistemi consiste nell'integrare tra loro i seguenti fattori: la gestione ed impiego delle informazioni esistenti per creare una "memoria" storica dei processi e quindi una base di conoscenza, guidando gli algoritmi. Tali algoritmi apprendono il comportamento del sistema dalla base informativa esistente e quindi possono stimare l'evoluzione del sistema anche su base multicriteriale.

In ultimo, nella filiera safety and security, fermo restando che le esigenze in termini di offerta tecnologica sono in continuo divenire, i soggetti proponenti del polo hanno identificato alcune priorità di intervento: la gestione della mobilità passeggeri in ambito urbano tramite sensorialità eterogenea e sistemi di regolazione quali i portali di controllo accessi; poi sistemi di supporto alla distribuzione urbana delle merci per esempio tramite HUB-merci, ottimizzazione del packing e routing e gestione intelligente delle flotte, tracing e tracking di merci e vettori; soluzioni avanzate per il trasporto pubblico locale e regionale (intermodalità passeggeri, ticketing elettronico, servizi flessibili, ecc.); sistemi di gestione della catena logistica diretta e inversa (ad

esempio, catena rifiuti). Per quanto concerne le tecnologie portuali e marittime: automazione dei terminal (operazioni di carico-scarico) e dei varchi di controllo, sistemi innovativi di inoltro delle merci, sistemi di controllo della navigazione quali i VTMS, Vessel Traffic Management System. Tali prospettive convergono evidentemente nella lettura delle priorità degli enti di governo preposti alle attività di cui sopra, specie in un contesto logistico-portuale come quello genovese.

In senso evolutivo rispetto a quanto promosso dai bandi regionali per i poli, il MIUR emette nello scorso maggio il Decreto Direttoriale 30 maggio 2012 n. 257 (Avviso per lo sviluppo e il potenziamento di Cluster Tecnologici Nazionali). La scala di riferimento si allarga, ma più che in senso geografico, si afferma una logica di selezione di priorità nazionali che intende mettere in grado i diversi attori su suolo nazionale di far evolvere mediante le ICT le già consolidate e numerose vocazioni territoriali esistenti. Come sottolineato nel decreto, la rapida integrazione delle tecnologie abilitanti dischiude nuove opportunità per il mercato e la società, in termini di nuovi prodotti, nuovi servizi, nuovi mercati, nuovi settori produttivi, diverse modalità di organizzazione della produzione, delle istituzioni, dei servizi sociali ed in particolare della Pubblica Amministrazione. In tale ottica diventa fondamentale perseguire una linea di azioni ed interventi coerente con le agende strategiche comunitarie. Per valorizzare questi spazi di opportunità e quindi il loro impatto sulla "mutazione strutturale" dei sistemi economici Regionali, assumono rilevanza le operazioni strategiche inter-istituzionali (che coinvolgono imprese, università, enti pubblici di ricerca) con valenza inter-disciplinare ed internazionale, finalizzate ad integrare ricerca-formazione-innovazione (Delponte e Ugolini, 2011).

In tale quadro, il MIUR attribuisce particolare rilievo strategico alla nascita e allo sviluppo dei cosiddetti Cluster Tecnologici Nazionali da identificare come propulsori della crescita economica sostenibile dei territori e dell'intero sistema economico nazionale. Più in particolare, i Cluster debbono intendersi come aggregazioni organizzate di imprese, università, altre istituzioni pubbliche o private di ricerca, altri soggetti anche finanziari attivi nel campo dell'innovazione, articolate in più aggregazioni pubblico-private, ivi compresi i Distretti Tecnologici già esistenti, presenti su diversi ambiti territoriali, guidate da uno specifico organo di coordinamento e gestione, focalizzate su uno specifico ambito tecnologico e applicativo, idonee a contribuire alla competitività internazionale sia dei territori di riferimento sia del sistema economico nazionale.

Il Cluster può essere strutturato secondo diversi modelli organizzativi (quali un modello "hub&spoke" o un modello "federato"), con l'obiettivo di stabilire e valorizzare ogni possibile connessione con analoghe esperienze esistenti su tutto il territorio nazionale, attraverso progetti di ricerca interdisciplinari connessi alle tecnologie abilitanti e alle loro relative applicazioni, e anche attraverso pratiche lavorative eccellenti ed approfondimenti teorici, giungendo allo sviluppo di una massa critica di competenze interdisciplinari, di capacità innovative e di creazione di imprenditorialità emergente dai saperi scientifici e tecnologici (start-up, spin-off di ricerca), capacità di distinguersi per un forte impatto sociale e di risposta alle grandi sfide sociali.

La natura e il ruolo dei Cluster Nazionali può essere tanto più rilevante quanto più si caratterizzano riferendosi a un numero limitato di aree tecnologiche e applicative trasversali, all'interno delle quali far confluire in modo coordinato e organico anche le migliori esperienze e competenze esistenti sul territorio nazionale.

La presenza di un Polo prima e di un Cluster poi si inserisce nel mainstream della cultura imprenditoriale italiana (fondata sulla piccola-media impresa e sui distretti) nell'intenzione di supportare i milieux locali, nell'inscindibilità di rapporto fra territorio e le sue realtà urbane e tessuto economico. Questo in un'ottica complessiva che porti progressivamente elementi di pregio già presenti ad elevarsi al rango di vocazione territoriale di livello nazionale. La vera necessità, e forse anche la sfida odierna, è non rompere il nesso fra quanto sostenuto, anche finanziariamente, nei bandi Poli e nei bandi Cluster e le realtà urbane. Per due ragioni assolutamente biunivoche: la città non può vivere senza l'innovazione delle aziende, perché, a lungo

termine, ne vengono meno i presupposti occupazionali e la generale dinamicità che porta ad un progressivo spopolamento. Allo stesso tempo, l'imprenditoria non può fare a meno della governance locale, perché in parte ne condiziona gli sviluppi, i rapporti e gli esiti, soprattutto nelle tecnologie ICT dove gli enti pubblici si pongono potenzialmente come primari utilizzatori.

La prima sfida appare quindi quella di rendere auspicabile -se non obbligatoria- tale partnership, laddove questa logica non sia già stata "forzata", da tempo, dalle dinamiche di mercato: queste ultime infatti hanno reso indispensabile un nuovo modo di fare impresa e una rivisitazione critica in merito alla conduzione degli enti locali.



Fig. 2 Impostazione metodologica Polo T.R.A.N.S.I.T

5 INTERROGATIVI E SFIDE

Il Terzo Libro Bianco del 2011 "Roadmap verso uno spazio unico europeo dei trasporti – Per una politica dei trasporti competitiva e sostenibile" può essere molto utile nel tirare le conclusioni di quanto soprarichiamato. Esso, dopo accurate analisi, sostiene principalmente essere i due principali margini su cui agire per una pratica dei trasporti meno inquinante e congestionante la città e con minori esternalità economiche: la tecnologia dei veicoli (abbattimento pressoché totale dei fattori emissivi nocivi è ciò a cui si mira nella ricerca dei motori) e i sistemi intelligenti di trasporto, sviluppati e sviluppabili grazie alle potenzialità delle telecomunicazioni.

Verrebbe da domandarsi cosa c'entri la pianificazione urbanistica e territoriale, laddove queste due indicazioni siano accolte in maniera riduttiva e semplicistica. Come già richiamato, l'aspetto tecnologico è parte (ed evoluzione) di una logica ben più ampia, che fonda la propria riflessione intorno all'intervento sulla città esistente.

Essa infatti non riguarda solamente la progettazione "componentistica", ma è compito che spetta principalmente all'urbanistica (Fistola 2008), che, ad oggi, gode di moderni ausili per promuovere un assetto urbano il più possibile armonioso. Gli obiettivi di riqualificazione, rivitalizzazione sociale ed economica e di sostenibilità del Libro Verde sull'Ambiente Urbano possono essere perseguibili grazie a ulteriori mezzi fino a poco tempo fa impensabili e che sono disponibili oggi al pianificatore.

Allo stesso tempo, questo riconoscimento pone interessanti interrogativi rispetto alla formazione e qualificazione delle figure professionali che si trovano ad affrontare le sfide dell'oggi: non soltanto riflessioni in merito alla conformazione degli insediamenti odierni e futuri e nemmeno solo teorie e tecniche della circolazione, ma anche capacità di dialogo con i nuovi ambienti abilitanti che permettono soluzioni urbanistiche e di processo. Tutta la scommessa dell'odierno "smart planning" si gioca su questo². Ed è a questo, cui poli regionali e cluster nazionali intendono prepararsi.

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² Sull'area 8 "Smart Cities and Communities", il Settimo Programma Quadro ha finanziato progetti volti alla sperimentazione in ambito urbano di studio, implementazione di politiche ed azioni finalizzate alla costruzione di percorsi che possano indirizzare le agende municipali nell'ottica di una evoluzione della città e del suo hinterland improntate ad una maggiore vivibilità, efficienza, dotazione infrastrutturale fisica e telematica. L'area metropolitana genovese ha visto approvati tre progetti sulle call di cui sopra: in particolare, il progetto "TRANSFORMAtion Agenda for Low Carbon Cities", in cui è previsto anche un coinvolgimento della parte universitaria, è risultato vincitore proprio sulla tematica "smart planning".

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IMAGES SOURCES

Fig. 1: Genova, il nodo urbano-portuale di san Benigno. L'autore della figura è l'ing. Anna Chiari

Fig. 2: lo schema è una rielaborazione dell'autore.

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THE RELATIONSHIP

BETWEEN URBAN STRUCTURE AND TRAVEL BEHAVIOUR:
CHALLENGES AND PRACTICES

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ABSTRACT

Since urban structure indicators influence travel behaviour, they have been widely studied. The goal of these studies was identifying effective factors to have sustainable transport patterns. However, investigating these factors has been problematic and the results are not reliable enough to be used universally. There are two main reasons for this: firstly, because socio-economic indicators impact neighbourhoods with comparable design differently; and secondly, factors such as income, and age, as well as self-selection factors are not easy to be evaluated. This paper addresses challenges and practices in this area to propose new objectives for further studies that cover previous shortcomings.

KEYWORDS:

Urban structure indicators; Travel behavior; Different socio-economic contexts; Sustainable urban transport planning; Land use; street network; Public transport

1 INTRODUCTION

Structures and forms of cities must be taken into consideration in order to reduce car externalities in urban areas. Although various cities have different indicators, urban structures have similar factors such as land use, street network, private motorized facilities, and public transport infrastructures. These indicators affect private motorized trips. Literature on this field is filled with the studies that have shown the relationships between urban structure indicators and transport behaviour. Yet, there are some scholars who claim that the influence of urban form on travel behaviour is limited (e.g., Boarnet and Crane 2001; Handy et al., 2005; Stead, 2001). These researchers have not found enough evidence to prove that urban forms significantly influence motorized trips. They claim that built environment traits are weak in defining travel behaviour. For instance, the residents of areas with comparable density, diversities, and designs may show different travel behaviour since they have diverse socio-economic characteristics such as income and age. As a result, these factors need to be controlled. The location of the investigated residential areas relative to the metropolitan center structure is another example that makes different travel behaviour for areas with similar 3D (density, diversities, and designs). This has often been disregarded especially in North American studies.

Generally for the purpose of controlling factors, objective (e.g., demographic indicators) and subjective measures (e.g., attitudes towards choosing travel mode) are utilized. Some scholars such as Cervero and Kockelman (1997) involved a wide range of objective control variables such as age, employment, household members and vehicles, parking cost, transit cost and distance from city center. Cao et al. (2009) believes that self-selection factors may alter pedestrian behaviour. While some studies consider socio-economic factors, considerable researchers like Naess (2009) think that urban form influence travel behaviour even if self-selection and socio-economic indicators are paid attention. Some built-environment academics such as Srinivasan (2002) are convinced that spatial variables such as corridor factors should be taken into consideration since they prominently affect travel behaviour.

Although previous studies made attempts to produce reliable results by involving both self-selection and socio-economic indicators, their results are still questionable. This is mainly because they have evaluated selected areas of a city or selected cities of a country. Moreover, effective socio-economic indicators are varied depend on the neighbourhood under study which creates limitation for the results and data collection. As a result, the influence of urban structure on travel behaviour can hardly be described by these studies. There are some studies that evaluate representative areas within a city and the results may be reasonably generalized to that city. But quantitative generalization to other cities remains problematic. Along this, this paper proposes considering various cities that have different socio-economical traits to cover self-selection and socio-economic indicators for further research. Thus, the outcomes of future research will be reliable to be used around the world.

In addition, some factors such as park and ride facilities, shape factors and car trips facilities have not been investigated thoroughly. This paper however tries to encourage further studies to investigate the effectiveness of park and ride facilities on personal vehicle usage to see whether the criticism around this issue is constructive. In previous literature, intersection and block density were used to evaluate connectivity. These factors which are also significant in describing the figures of the cities and the patterns of the street networks also can be evaluated by future research to describe shape factors besides connectivity. As a result, instead of block density and intersection density, polygons per area and nodes per polygons besides considering location of neighbourhoods are proposed to be taken into consideration by

future studies. Moreover, since the studies on efficiency of the automobile trips facilities in reducing private motorized trips were scarce, it is also recommended to investigate this issue more deeply in further studies. The relationship between urban structure indicators (e.g. land use, street network, public transport and private motorized trips infrastructures) and travel behaviour is evaluated by various studies. This paper presents the structure of urban form to indicate the factors that are prominent in case of travel behaviour in urban areas. Urban form, travel behaviour and how they affect each other in various studies are discussed in this review.

2 CHALLENGES AND PRACTICES

2.2 LAND USE

The relationship between land use and travel behaviour has been the subject of interest of many researchers (e.g., Handy and Mokhtarian, 2005; Kuzmyak and Pratt, 2003; Modarres, 1993; Morris, 2004). For example Cervero and Kockelman (1997) studied the effects of density, diversity and design on trip generation and choice of travel mode. Some scholars have improvised Cervero and Kockelman's study later on to 4Ds by involving accessibility of destinations in it (e.g., Cervero, 2002; DKS, 2007; Ewing and Cervero, 2001 and 2010). Accordingly, car usage ratio is under the influence of several main factors, which are: density (population and employment density), diversity (mix land use and jobs proportion), design (non-motorized design variables like walking facilities) and destinations accessibility (DKS, 2007).

Although density is not the only factor that influences vehicle miles travelled (VMT) (Crane, 1996; Dunphy and Fisher, 1996; Handy, 1996; Myers and Kitsuse, 1999), population and employment densities are two land use indicators that affect travel behaviour (e.g., Boarnet et al., 2004; Chatman, 2008; Ewing et al., 1996 and 2009; Frank and Engelke, 2005; Greenwald, 2009; Pickrell and Schimek, 1999; Schimek 1996; Sun et al., 1998; Zhou and Kockelman, 2008). Naess, 2005 found that the density of jobs and population in the local neighbourhood affect the dwelling on travel behaviour. But this effect was small compared to the distance of the dwelling to the city center. Several studies conclude that the population and job density within the metropolitan area clearly affects travel behaviour. But the density within a local neighbourhood is not likely to affect travel behaviour.

Holtzclaw (1994) found that the number of cars and VMT per household will reduce, if density increases. Along with this finding, Burchell et al. (1998) and Ewing (1997) also found that higher density decreases VMT. Kitamura et al. (1997) also claimed that the percentage of non motorized trip has positive relationship with residential density. Higher dwelling unit density reduces daily car use per household (Zagars, 2007) and higher commercial density also decreases vehicle kilometres travelled (VKT) per person (Heldel and Vance, 2007). Higher household density is another effective factor that reduces VMT (Bhatia, 2004; Chatman, 2003; Holtzclaw et al., 2002; Kuzmyak 2009).

Since mix land use provides walkable destinations, it decreases the percentage of private motorized trips. This characteristic of mix land use makes it the interesting topic of research for a lot of scholars (e.g., Chapman and Frank, 2004; Frank and Engelke, 2005; Frank et al., 2009; Heldel and Vance, 2007; Kockelman, 1997; Kuzmyak et al., 2006; Kuzmyak, 2009; Pushkar et al., 2000; Sun et al., 1998). The other

significant effect of mix land use is that it makes more job-housing balance. Having a job per housing balance around 1.0 can decreased motorized travel (Kuzmyak and Pratt, 2003; Weitz, 2003). Similarly, the results of Crane and Chatman's (2003) study show that the average commute distance can be reduced by 1.5% when the percentage of employment experiences 5% increase in metropolitan areas. Job-housing balance considered effective on VKT and VMT by various studies (e.g., Bento et al., 2003; Cervero and Kockelman, 1997; Ewing et al., 1996 and 2009; Greenwald, 2009; Kuzmyak et al., 2006). It is prominent to consider the geographical scale in this case. Jobs-housing balance is effective to reduce out-commuting at a city level. In a local suburban neighbourhood scale this issue may reduce in longer commuting distances for the non-local employees, although jobs-housing balance can reduce average commuting distances among the local residents.

The indicators related to the land use design are also significant to motivate or demotivate individuals to use their private cars. Although land use design is much more than just street networks, Kulash et al. (1990) utilized simulation to study traditional and conventional networks. They found that VMT in traditional patterns of circulation is 57% lower. It should be taken into consideration that studies which focus on street network variables are criticized due to their ignorance of the location. On the other hand, correlations between street design and VMT is found to be substantially reduced or vanish in studies that control the distance to the city center. Bhat and Eluru (2009) studied types of urban neighbourhoods and their effects on VMT per household. Cao et al. (2009) found that urban neighbourhood affects vehicle miles that an individual drives. The neighbourhoods in new urbanism areas also influence daily miles travelled and VMT per household (Khattak and Rodriguez, 2005; Shay and Khattak, 2005).

Urban travel behaviour can be affected by non-motorized travel facilities and patterns of the streets. Driving gets reduced by more walkable communities (Handy and Mokhtarian, 2005). The effects of sidewalk width on VMT per household were examined by Cervero and Kockelman (1997). Length of sidewalk also considered by Fan (2007) as an effective factor for reducing miles travelled per person in Raleigh-Durham, NC. VMT can be also altered by bicycle lane density (Bhat and Eluru, 2009; Bhat et al., 2009).

Moreover, travel behaviour is under the influence of parking facilities as the segments of design factor. Availability of parking spaces increases private motorized daily trips (Moeinaddini and Zaly, 2011). When parking areas are convenience and cheap, motorized vehicles' ownership and usage increase as well (Litman, 2006; Mildner et al., 1997; Morrall and Bolger, 1996; Shoup, 1997; Weinberger et al., 2008). Vaka and Kuzmyak (2005) found that when parking costs increase 10%, vehicle trips reduce between 1 to 3 per cent. Park and ride facilities are also provided to motivate people to alter their private travel modes to public transport (Bolger, 1995; Noel, 1988). Yet these facilities have been also criticized since they consume lands and motivate people to use automobile at least to reach car parking in transit stations (Parkhurst, 2001). They also negatively affect car reduction strategies, although these strategies were part of the target of their policies (Meek et al., 2009).

Travel behaviour can be altered by destination accessibility. For instance accessibility to shops reduces VMT per household (Bhat and Eluru, 2009). In this regard, the relationship between VMT and the accessibility of household job per household by public transport (proportion of households that can reach public transport for their work trips) was studied by Bahatia (2004). There is also a negative relationship between vehicle mile and hour travelled with job accessibility by cars (Cervero and Duncan, 2006; Cervero and Kockelman,

1997; Ewing et al., 1996 and 2009; Greenwald, 2009; Kockelman, 1997; Sun et al., 1998). The negative effect of job accessibility by public travel modes on VMT per household is evaluated by Frank et al. (2009) and Kuzmyak (2009). It is also found that travel behaviour can be influenced by distance to the Central Business District (CBD) (Boarnet et al., 2004; Naess, 2005; Pushkar et al., 2000; Zegras, 2007). Travel behaviour is also under the influence of distance to transit station and bus stop (Bento et al., 2003; Frank and Engelke, 2005; Frank et al., 2009; Hedel and Vance, 2007; Pushkar et al., 2000; Zegras, 2007).

2.2 STREET NETWORK

Street and square arrangements influence form of cities more than other factors (Crawford, 2005). Since the indicators of street network are the significant part of urban structure and form, they influence travel behaviour greatly. Studies on this issue have utilized a wide variety of scales from neighbourhoods to cities to find the relationship between factors of urban street network and travel behaviour. Street network influences trips to local destinations such as grocery stores and primary schools more than longer trips, although the accessibility to the transit stop can encourage the use of transit for longer trips like daily commutes.

Street density influences travel behaviour (Cervero and Kockelman, 1997; Bento et al., 2005; DKS, 2007). It affects vehicle kilometre travelled (VKT) per person negatively (Hedel and Vance, 2007). Some studies that took pedestrians and walking trips into consideration, have proposed that street length affects travel behaviour. Sidewalk length affects daily transit travel time, daily walking time by person, and miles travel by person (Fan, 2007). Sidewalk ratio also can alter transit mode choice (Cervero, 2002).

Intersections are the important parts of urban street network structures. The density and the proportion of four-way intersections can decrease non-work vehicle miles travelled (VMT) per person (Boarnet et al., 2004). It is also found by Cervero and Kockelman (1997) that four-way intersections influence VMT per person. Higher proportion of intersections per road kilometre reduces VKT per household (Pushkar et al., 2000). The proportion of connected intersections is significant for miles travelled per person (Fan, 2007). The influence of the proportion of three-way intersections on individuals who use private cars per household also studies by Zegras (2007). The relationship between intersection density and VMT is estimated by ample studies (e.g., Chapman and Frank, 2004; Ewing et al., 2009; Frank and Engelke, 2005; Frank et al., 2009; Greenwald, 2009; and Chatman, 2008).

Various studies show that intersection density influence street connectivity. In order to determine street connectivity Zhang (2006) calculated the proportion of four-way intersections in origins and destinations. Connectivity index can be defined by the proportion of intersections per total number of intersections and dead-ends. This index is a value between 0 and 1, and values over 0.75 are desirable (USEPA, 2002). Dill (2004) asserted that more connectivity can increase walking and biking. VMT can be decreased by connected road networks (Kulash et al., 1990). So more local street connectivity decreases traffic jams (Alba and Beimborn, 2005).

Intersection density also affects transit mode and trips (Frank et al., 2008 and 2009; Greenwald, 2009). The possibility of transit mode choice is increased by higher proportion of four-way intersections (Cervero, 2007; Lund et al., 2004). The rate of connected intersection alters daily transit travel time for individuals (Fan, 2007). The relationship between four-way intersection density and non-personal motorized vehicle choice for work has been studied by Cervero and Kockelman (1997). Walk mode choice and trips are also under the influence of intersection density (Boarnet et al., 2008; Ewing et al., 2009; Frank et al., 2008 and 2009). The

higher rate of four-way intersections can increase walking desire (Boarnet et al., 2011; Boer et al., 2007) and bike trips (Chatman, 2009). In this regard, the impact of intersection density on cycling also was studied by Greenwald (2009).

VMT and car usage can be reduced by grid street patterns. Connected roads, that these patterns provide, increase walking rate and decrease car usage (Crane, 1996; Ryan and McNally, 1995; Plaut and Boarnet, 2003). It is found that the residence of the areas with grid-street-patterns take more non-work motorized trips (Boarnet and Sarmiento, 1998). Among grid, cul-de-sac, and mixed street patterns the second one causes more and further trips (Crane and Crepeau, 1998). Some scholars such as Rajamani and his colleagues (2003) examined the influence of cul-de-sac rate on transit and walking mode choice.

Fused-grid street pattern are those cul-de-sac streets which are linked to each other by green areas to offer connectivity for non-motorized trips. These patterns not only enhance the liveability of community, but also raise non-motorized trips (Frank and Hawkins, 2007). Some researchers believe that providing accessibility for non-motorized modes and reduce connected roads for driving that are possible by applying special street network patterns can decrease traffic volumes and increase green travel modes (e.g., Glotz-Richter, 2003). An example of these patterns would be ring roads for motorized vehicles. Zhang (2004) also asserted that connected street patterns increase non-motorized mode and transit choice for both work and non-work trips. Path directions can influence transit and walking modes for commute trips (Rodrigues and Joo, 2004).

Size, length, and density of blocks may be created by street patterns which affect travel behaviour. Walking trips are affected by block size (Boarnet et al., 2011; Hess et al., 1999; Joh et al., 2009; Targa and Clifton, 2005). Moreover, block length influences miles walked per person (Boer et al., 2007). The effects of block density on VMT per household have been studied by Bhat et al. (2009). The efficiency of quadrilateral blocks for non-personal vehicle choice to take trips to work and VMT per household is also studied by Cervero and Kockelman (1997).

Travel behaviour alters by the patterns of the streets. Marshall (2005) took an attempt to classify and analyze the different types of street patterns. Kissling (1969) evaluated the significance of linkage and nodal accessibility level that are affected by network structure. A study done by Xie and Levinson (2011) shows that street network arrangement and connectivity are the important parts of network topology. Some attempts have been taken to find a method for identifying and classifying grid patterns (e.g., Yang et al., 2010). Jiang et al. (2009) proposed human mobility patterns for the structure of street network. Borchert (1961) by using the number of road and street intersections per square mile defined the patterns of metropolitan settlement.

Crawford (2005) reviewed the different types of street patterns during Medieval time, Renaissance, Baroque, Industrial era, Modernism, and New urbanism. In his study the formation of street types (grid, radial, and irregular) is described. According to Kostof (1991) capitalist expediency, military necessity, religious symbolism, simple haste and aesthetic preference caused streets to form like grids. The mentioned studies indicate the history of street forms only and travel behaviour has not been focused by them.

2.3 PUBLIC TRANSPORT

Mobility and accessibility are important indicators of urban growth. Cities are built to lessen travel and enhance exchange opportunities (Engwicht, 1999). Public transport in cities came into existence to fulfil transportation needs as well as mobility and accessibility demands. Public transportation has developed fast and during this period automobile usage caused a lot of externalities (Litman, 2009a); therefore, the need

for vast public transportation system felt more than ever. Economic development, mobility enhancement, and health improvement are some of the various benefits of public transport development.

Public transport has a significant role in reducing vehicle travel kilometres (Litman, 2009b). A study done by Nelson and his colleagues (2006) in Washington DC revealed that rail transit system reduces traffic jam and therefore, aids car users. Lower private driving and greater public transport usage as the result of better quality for public transport systems in Toronto also reported by Schimek (1996). With regard to the benefits of public transport mobility, a wide range of studies propose the preference of using public transportation, and decreases the tendency to use personal vehicles to have sustainable development.

Public transport can be evaluated by different kinds of indicators. Accessibility, availability, affordability, reliability, safety, and security are branches of these factors. The rate of public transport usage increases sharply, when an area alters toward more urban development (Litman, 2009c) since accessibility needs also increase. The requests for public transport systems grow since they provide more accessibility compared to personal travels. As a result, more and convenient accessibility raises public transport usage and reduces private car usage. If transit access increases, the number of cars and VMT per household will decrease significantly (Holtzclaw, 1994).

Accessibility of public transport can be affected by land use planning. Transit oriented development (TOD) patterns in this regard can increase the rate of pedestrians and trips by public transport (Cervero and Gorham, 1995). Traditional neighbourhoods however have higher rates of transit and green trips (Friedman et al., 1994) and people travel more by public system rather than using personal cars where commercials and residential land uses are located close together (Cervero, 1996). A study done by Florez (1998) shows that in three neighbourhoods in Caracas traditional patterns had fewer private motorized trips, less travel times, and more public transport usage. This issue can be the result of traditional characteristics of the design of the local area and their location relative to relevant trip destinations. Estupiñán and Rodríguez (2008) found that neighbourhood traits and contextual variables relate to a developing country affect public transport trips. This study was done in Bogota in Colombia.

The distance to the nearest rail station has relationship with transit trips (Kitamura et al., 1997); in a sense that the closer to station, the less people drive and the more the use public transit modes (MTC, 2006). The walkability of areas near stations also can increase transit trips (Ryan and Frank, 2009). Therefore, the quantity of car ownership among the residents of TOD is lower in comparison with other areas (Evans and Pratt, 2007).

Indicators related to availability may affect urban public transport. Travel modes are under the influence of infrastructures and facilities which are fragments of availability factors. Therefore, considering the facilities for public transit users during planning process is important (Asadi-Shekari and Zaly Shah, 2011). Almost half of the transit users prefer to take taxi or travel by automobile in the absence of transit services as reported by Transit Performance Monitoring System (FTA) in 2002. Many researchers such as Hale (2011), Hensher (2001), Kittelson et al. (2001), Polzin et al. (2002), and Xin et al. (2005) took availability effective and utilized it in their evaluations of transit services.

Affordability also has attracted scholars' attentions in public transport evaluations. The results of the studies done by Hensher and King (1998), TRL (2004), and Litman (2004) show that an increase of 1% fare drops the rate of passengers up to 0.4%. Transit costs affect people from low and middle class priority to choose travel mode, therefore, expenses relate to public transport have mobility advantage. Quite predictably, affordable costs make public transits popular among greater groups of people (Litman, 2011). Litman

(2011) and Plozin et al. (2008) believe that when people alter their travel behaviour to public transport they can save operating and parking costs, vehicle ownership and its insurance expenses. McCann (2000) in this regard says that people who make use of good public transport facilities spend less on transportation and are able to save 3000\$ per annum.

Ridership can be affected by the quality and quantity of transit service. The results of the studies that have been done in this area show that reliable public transport has the quality to encourage people to change their travel behaviour from private car usage to public systems of transportation. However, technical improvements are needed for such reliability. Studies such as Levinson (1991) and Turnquist (1981) show that maximum reliability can be attained by controlling run time and headway delay. Information and public involvement are other social factors that affect the reliability of public transportation systems.

Urban public transport usage is also under the influence of convenience, safety, and security. Indicators such as safe and secure facilities are significant in evaluating public transportation system. Litman (2005) considers transit trips safer than private car usage. In fact, private motorized users are under safety and security threat such as aggressive driving (STPP, 1999). Garcia (2005) suggests that in order to decrease safety risks, transit trips should be handled by responsible people.

2.4 PRIVATE MOTORIZED

When population rose and industrialization got popular, the usage of private motorized vehicles started to grow sharply in urban areas. To tackle this issue, in 1980s and 1990s congestion pricing was established. Some of these strategies proposed by some organizations were successfully implemented, to name a few: the toll rings in Norway (Larsen, 1995), the Area Licensing Scheme in Singapore (Behbehani et al., 1984), Congestion Pricing in Stockholm (2006) and London Congestion Charging (2003). These strategies raise costs of transportation by personal vehicles; as a result people get motivation to alter their travel behaviour. Although the toll rings in Norway established for funding of urban highway construction, lately the fees have been raised, so in the future they will reduce the traffic. Generally, people welcome ways that reduce their costs of living (Loukopoulos et al., 2004; Salomon and Mokhtarian, 1997).

Private motorized trips facilities influence travel behaviour. When convenience arises by excess of cars and cheap ownership, private car usage increases undoubtedly. There are not enough studies which casted light on efficacy of private motorized trip indicators such as distance of a private motorized trip, cost and proportion of private cars passengers and etc.

3 DRAWBACKS OF PREVIOUS STUDIES

Several studies have examined relationship between urban indicators and car usage at various scales from site to local and regional. However, previous efforts have some major drawbacks that make their results insufficient to cover different urban structure indicators and various socio-economic contexts. Firstly, they just cover some cities of a selected country or some neighbourhoods from a single city. Although previous studies can describe the impacts of urban structure on car usage in different socio-economic contexts by means of analytical, qualitative generalizations describing how the causal mechanisms tend to operate, analytical results from one study in a particular city cannot be generalized to different cities. Secondly, there are limited studies that evaluate effectiveness of various urban indicators in reducing car usage in one relationship model. Since urban structure indicators affect each other, relationship behaviour can be changed by impacts of these indicators. Finally, there are limited literature about the effectiveness of park and ride

facilities, shape factors and private motorized trips facilities. Accordingly, this paper suggests that further studies evaluate the effects of various urban structure factors (including park and ride facilities, shape factors and private motorized trips facilities) on travel behaviour in different cities around the world in one relationship model. This issue leads to find effective urban structure indicators in various socio-economic contexts. The effects of these indicators can be used to have more reliable car reduction strategies.

4 CONCLUSIONS AND DISCUSSIONS

Different urban structure indicators (e.g. land use, street network, private motorized facilities and public transport infrastructures) that have more impacts on car usage are discussed in this paper. Table 1 summarizes effective indicators that are significant in urban structure and travel behaviour relationship studies. Although, there are ample studies that evaluate urban structure and private motorized trips relationship, there are not sufficient studies that examine this relationship in various socio-economic contexts. The scale of majority of studies are various from site to local cities and they usually consider different neighbourhoods in a city or different cities in one country and there are very few studies that consider various cities in different parts of the world.

Urban form indicators were selected from one or two sets of land use, street network, private motorized facilities and public transport indicators and there are limited studies that consider combination of these indicators in one relationship model. For instance, just two types of networks in different neighbourhoods compare with each other regardless of the effectiveness of other indicators. In addition, there are limited studies for some effective indicators such as park and ride facilities, street network shape indicators and private motorized trips facilities.

Consequently, future studies can examine relationship of urban structure indicators with travel behaviour in various cities with different socio-economic contexts. This relationship can be estimated for land use, street network, private motorized facilities and public transport indicators separately and also in one relationship model. Further studies also can try to evaluate the effectiveness of indicators that have not been investigated thoroughly.

Nowadays there is an interest among researchers who are working on sustainability to think about future sustainable cities and some of these researchers consider these future cities without cars and propose some ideas to reach these car free developments. Urban structure model that is suggested for future studies can help to predict structure of car free developments. This structure can be a combination of all effective indicators that are use to build the model. Future research may also examine fast changes of urban structure indicators by updating their data sources and evaluating the urban structure and travel behaviour relationships in different parts of the world to cover the changing results.

Overall, currently, more green and sustainable urban areas are needed. To have these kinds of areas having fewer private motorized trips in cities is a prominent goal. So future research will attempt to evaluate the relationship between private motorized vehicle usage and urban structure indicators to indicate how this relationship can be used to reduce private motorized vehicle usage in urban areas in different parts of the world.

Urban structure indicators	Travel behaviour indicators	The direction of the impact
Household density	VMT per household	Negative
Population density	VMT per household	Negative
Job density	VMT for commercial trips per person	Negative
Retail job density	Non-work VMT per person	Negative
Dwelling unit density	Daily car usage per household	Negative
Job-housing balance	VMT per household	Negative
Land use mix	VMT per household	Negative
Plaza density	Daily car usage per household	Negative
Population centrality	VMT per household	Negative
Accessibility to shopping	VMT per household	Negative
Distance to CBD	VKT per household	Positive
New urbanism neighbourhood	VMT per household	Negative
Bicycle lane density	VMT per household	Negative
Street block density	VMT per household	Positive
Intersection density	VMT per household	Negative
Proportion of 4way intersections	Non-work VMT per person	Negative
Proportion of 3way intersections	Daily car usage per household	Negative
Street density	VKT per person	Negative
Sidewalk length	Miles travelled per person	Negative
Street connectivity	Walk, bike and transit mode choice	Positive
Job accessibility by transit	VMT per household	Negative
Distance to transit stop	VMT per household	Positive
Walk minutes to transit	VKT per individuals	Positive
Distance to Metro	Daily car usage per household	Positive
TOD	Commute VMT per person	Negative

Tab.1 Some effective urban structure indicators based on previous studies

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HOUSING POLICY

A CRITICAL ANALYSIS ON THE BRAZILIAN EXPERIENCE

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ABSTRACT

The last decade has revealed significant advancements on social housing in Brazil. Along with the implementation of the National Housing Policy (2004), the National Housing System (2005), and the National Housing Plan (2008), a consistent model to face the Brazilian housing deficit was created. The prime execution program, called Minha Casa Minha Vida [My Home My Life] program (PMCMV), assembles the government and private agents to build a million houses for low income people. Based on the outlined context, this paper seeks to evaluate the relationship between National Housing Policy and PMCMV, discussing its implications on housing outlook in the country. The results reveal a theoretical and conceptual unbalance between these two policies, allowing speculation on the prevalence of the economic component over the social one.

KEYWORDS:

Brazilian housing policy, housing, housing deficit, social housing

1 INTRODUCTION

A great evolution in the principles and methods of the housing policies in Brazil since the 1970s can be identified: after a standardized model without urban and social concerns during the 1970s, passing by an implosion process during the 1980s and a conceptual reconstruction in the 1990s, arrives in the 2000s with innovative principles and methods resulting in a new housing policy.

The beginning of 21st century represents a period of significant progress of the urban policy in Brazil. Approval of Law No. 10.257/2001, known as the City Statute, set guidelines and compliance mechanisms of social function of the city and the property, based on popular participation and enabled by a series of urban instruments (BRAZIL 2001). Concomitantly, a board that would coordinate the urban development policy of the country, Ministry of Cities, was created in 2003, integrating the policies related to the subject (MCIDADES 2011).

The Municipal Master Plan (MMP) was adopted as a basic instrument of the urban policy, whose contents would be responsible for establishing strategies to fulfill the social function of the city and the property. In order to ensure its effectiveness, Ministry of Cities has developed activities to support the cities financially and train public administrators and civil society on this new concept, its scope and the importance of popular participation in the PDPs (Rolnik, Nakano, Cymbalista 2008)¹.

Along with the promotion of Participatory Master Plans, Ministry of Cities has been working to develop a strong strategy in housing sector. After the establishment of the National Housing Policy in 2004 (which defined guidelines and instruments), the National Housing System in 2005 (structured on a subsystem focused on social housing and another one focused on the “market housing”), and the National Housing Plan in 2008 (which outlined strategies that shall be used to fulfill the housing needs until 2023), a consistent model for dealing with the housing issue in the country was developed.

This set of instruments has established a new institutional framework, strengthening the coordination of actions and resources of the various government levels and agents involved in solving housing problem in Brazil. At local level, cities were urged to prepare their own Local Plans for Social Housing and make, in a democratic and participative way, strategies to reverse the housing situation related to irregular settlements, precariousness in housing quality and deficit of new unities (Nascimento Neto, Moreira 2010).

As result, since 2005 there has been an increase of investments in housing programs supported by the resources of National Housing System. The prioritization of this issue by federal government and improvement of macro-economic scenario stimulated an extremely favorable outlook, sponsored by the Programa de Aceleração do Crescimento (PAC – Growth Acceleration Program), which leveraged a large number of housing programs and projects that create an optimistic scenario for the coming years (Bonduki 2008).

To Rolnik, Nakano and Cymbalista (2008), the plentiful amount of credit and subsidies – which makes reaching the lower classes – and the sociopolitical process established finally permit to discuss (in a consistent way) the wide access to urban land in Brazil. At the same time, the amount of resources destined to social housing – which are promoted by Programa de Aceleração do Crescimento (PAC) and Minha Casa, Minha Vida [My Home My Life] program (PMCMV) – has increased (Freitas, Pequeno 2011).

However, despite these improvements, recent studies have shown many limitations to the Brazilian housing policy, such as the recurrent deficient integration between housing and land policies. Historical difficulties faced by cities to control land use and the occupation remains the major challenge for public managers and

¹ In theory, the extent of Master Plan was wide. However, after ten years of the City Statute, it becomes evident a series of limitations, among which stands out the precariousness in the implementation of urban instruments, the submission of urban land to real estate lobby and the use of popular participation as a way of legitimizing practices engendered by hegemonic sectors of society (Rainer 2007; Rolnik, Klink 2011; Santos Jr., Montandon 2001).

makes National Housing Policy risk making the same mistakes of the 1970s' model, (re)producing a model marked by socio-territorial segregation and a precarious urban environment (Bonduki 2008; Rolnik, Nakano, Cymbalista 2008; Rolnik, Klink 2011).

The increase of the amount of public constructions has resulted in a housing boom, which, along with a poor regulation of the land market, tends to reduce the housing production – especially for the poorest people (Bonduki 2008). As Rolnik and Klink (2011) pointed out, significant injection of funds from Minha Casa Minha Vida program created an overheat in real estate market, which found it difficult to build new social housing units due to the high cost of the land and the lack of deployed infrastructure. Besides, the cities show a very low capacity, and on the urge of capturing part of the significant volume of investments, end up risking spending them inappropriately or using them to fund projects based on an excluding urbanization model, hegemonic in Brazil.

In this context, the following question is highlighted in this paper: is there a conceptual articulation between National Housing Policy (NHP) and its main policy of execution, Minha Casa Minha Vida program? Or did the conflict among social, political and economic interests lead to the establishment of divergent public policies? Our starting point is the following hypothesis: the strategies for the implementation of Minha Casa Minha Vida program do not find converging points that suit the principles established in the NHP and, therefore, in the National Housing Plan, generating distortions on the process of intervention on the housing problems in Brazil.

This paper is organized into three major sections: first, we discuss methodological issues; then, we examine the NHP and the PMCMV; and finally, we discuss similarities and contradictions between the aforementioned instruments for the implementation of housing policy in Brazil.

2 RESEARCH METHODOLOGY

Seeking to achieve these goals, we developed a case study, focused on social housing policies in Brazil, specifically the National Housing Policy (main legal milestone) and its main execution policy, *Minha Casa Minha Vida* program. The case study method can be understood as a research strategy that analyses a contemporary phenomenon in a deep way, in which there is not a clear definition in the boundaries between the phenomenon and its context and there are multiple sources available (Yin 1994).

This research is based on two complementary steps. The first one, exploratory and descriptive, provides a theoretical and conceptual deeping, relating to the contextualization of National Housing Policy (NHP) and *Minha Casa Minha Vida* program (PMCMV), with the objective to understand its formulation process, its implementation process, as well as its main guidelines. According to Gil (2002), this step seeks to describe the characteristics of a particular phenomenon, establishing relationships among identified variables. Bibliographical and documental analysis was adopted as a research technique. Results are shown in the next two chapters.

The second step, analytical, proceeds the exploratory and descriptive one, once, as stated by Gil (2002), the analysis of a phenomenon demands its prior identification and detailed description. Thus, step 2 discusses the hypothesis established in this paper by comparative analysis between the NHP and the PMCMV. Results are shown in chapter five.

Relying on the policy cycle² described by Frey (2000) and discussed by Trevisan and Van Bellen (2008), this paper focuses on the analysis of the second step of the policy cycle (implementation), treating in a less deep way the first and third steps (formulation and impacts control).

² As stated by Frey (2000), the public act can be divided into partial steps – formulation, implementation and impacts control – which form the political cycle, an important element of the public policy analysis.

3. NATIONAL HOUSING POLICY IN BRAZIL

Set up in 2004, the National Housing Policy (NHP) was the first milestone of the prioritization of housing issue, led by Lula's Government³, and had, as a primary goal, the idea of resuming the planning process of the sector and ensuring institutional conditions necessary to promote access to decent housing for all segments of the population, especially the lower class (MCIDADES 2011). Its elaboration process was led by the National Cities Council (subordinated to the Federal Ministry of Cities), based on an extensive participatory process grounded on a series of workshops, culminating in a final version of the NHP, approved by the National Cities Council in December 2004 (MCIDADES 2004).

Retaking old demands of social movements for housing and urban reform, the NHP has brought significant advances in the field of social housing – promoting urbanization, regularization and urban integration of precarious settlements, and improving in housing quality and provision of new units (Andrade 2011; Rolnik 2009) –, once it considered the integration between housing policy and urban development policy essential to achieve its goals (MCIDADES 2004).

In order to ease its implementation, a set of instruments was determined – of which the National Housing System and the National Housing Plan (PlanHab) must be highlighted. The National Housing System (NHS) establishes the basis of the NHP institutional project, providing integration among the three government levels and between public and private agents, setting rules for the financial articulation required to accomplish the goals of the referred policy. Its structure is organized based on two subsystems: the National Market Housing System (NMHS) and the National Social Housing System (NSHS) (MCIDADES, 2004).

As Andrade (2011) highlights, the NSHS (created by Law No. 11.124/2005 and regulated by Decree No. 5.796/2006) has great relevance, once it focuses on the lower class, providing subsidies that shall meet the needs related to the production of new housing and the livability improvement of inadequate dwellings. The author also emphasizes the importance of the National Fund for Social Housing (NFSH), which was also created by the aforementioned legislation, in order to centralize resources for social housing programs.

With the creation of the NSHS, a new management model for social housing funds was established in Brazil (these resources are handled by a Management Council formed by government representatives, civil society and academic institutions). This model was democratic, participatory and decentralized, and promoted the creation Municipal Housing Councils and Social Housing Local Plans⁴, allowing the adaptation of strategies to cope with housing issues within the local reality (Andrade 2011; Nascimento Neto, Moreira 2010).

The implementation of these instruments was overseen by the President Luiz Inacio Lula da Silva, reelected in 2007, when the elaboration of National Housing Plan (PlanHab), a major component of the new NHP, was started. This plan was completed in 2008, after an intense participatory process. According to Bonduki (2009), the PlanHab aims to delineate public and private strategies to equalize the needs of the country within 15 years – a long-term strategic plan linked to actions of short and medium term. The strategy requires simultaneous actions in four essential facets: financing and subsidies, institutional arrangements, civil construction productive chain and urban land strategies. These facets are intrinsically linked: there will be no substantial changes unless simultaneous actions in four facets are carried out.

3 The housing issue has been taken as one of the main banners of the candidate Luiz Inacio da Silva (Lula) for the presidential elections of 2002, tracing its historical commitment to the theme. In this context, his performance stands out as a general coordinator of the Projeto Moradia [Housing Project], created in 1999 with the objective to develop a strategy to face the Brazilian housing deficit, based on coordinated actions of housing production and control of the land market (Bonduki 2009; Andrade 2011).

4 The Social Housing Local Plans (SHLP) is the most important management instrument of municipal housing policy, which guides the decision-making, express the main guidelines and formulate a long-term strategy to solve housing deficits by 2024. Along with NHP, NHS and PlanHab, it structures and embodies the social housing municipal policies (Nascimento Neto, Moreira 2010).

It's important to emphasize that this development process started from the understanding of the existence of a "social debt" accumulated in Brazil, which resulted from social inequality and income concentration, expressed in territorial segregation of urban spaces and difficulties in accessing the formal housing market faced by the lower class.

Rescuing the background theory of this public policy, we can observe a view based on concepts of social production of urban space. These concepts were widely discussed by Mark Gottdiener (1997), who made up his work based on a confrontational dialogue with the previous studies of David Harvey (2005) and Lefébvre (1999)⁵.

Gottdiener's arguments (1997) also fit in this context. By demonstrating the complexity of the social production of urban space, the author argues that space is fundamental in the process of capitalist (re)production, not as a substrate, but as an active element that establishes a dialectical relation with the society in the (re)production of cultural, political and economic values. There is a multiplicity of interests and stakeholders involved with land issue that sometimes prioritize the usage values, and other times prioritize exchange values, depending on the conditions under which they are placed, regardless the categorization of classes – so valuable to Marxism. This condition results in a permanent conflict of interests around the social space, not only as an area full of socio-cultural value, but also as an abstract space.

Several intervention strategies for the National Housing Plan (PlanHab) (which considers a joint and coordinated action essential) involving (1) resources supply, (2) formatting of appropriate institutional arrangements, (3) promotion of the supply chain of the civil construction focused on social housing and (4) urban strategies to control land speculation and the access to urbanized land are elaborated based on this theoretical and conceptual understanding. In brief, universal access to decent housing is sought, with minimum standards of basic infrastructure, public transportation and social services, understood as forms of social inclusion.

Reinforcing the understanding of adequate housing as a component of social inclusion, Cesar Eduardo Marques and Renata Bichir (2001) studies reveal a "spatial pattern of social segregation" in Brazil, formed by a process of socio-territorial reproduction of low incomes. For Torres and Marques (2004), this model of poverty concentration creates negatives externalities, producing poverty reproduction circuits that are difficult to break by individual clipping policies that do not add the variable *space* while one of its inputs.

Contributing to the discussions, Raichelis (2006) states that the analysis of urban poverty and of the urbanization model that suggests expanding the periphery refers to the links among social classes, work and city access. Within this model, the interdisciplinary approach of housing problems establishes itself as a theoretical and practical need among the various sciences. This articulation demands the participation of a range of specialists, who bring their views of the reality (Floriani 2004). Andrade (2011) reaffirms the above, emphasizing that the strategies adopted in the PlanHab reaffirm the government posture of facing housing problem from the perspective of participation, diversity, interdisciplinarity and complementarity.

4. *MINHA CASA, MINHA VIDA* PROGRAM (PMCMV)

A strong investment of public resources directed to urban areas – led by the launch of the *Programa de Aceleração do Crescimento* [PAC – Growth Acceleration Program] – was part of Lula's decent housing

⁵ According to Limonad (1999), the understanding of the social production of space as an essential part of the reproduction of social conditions of a capitalist production can be credited to Lefébvre (1999), although the author saw the space issue purely as a regulatory role. Besides, David Harvey (2005) emphasized the importance of space production as a fundamental mechanism of capital accumulation. Although Lefébvre and Harvey's formulations have great importance, their discussions – based on the dialectical relationship of the class struggle – are seen by many authors as insufficient against contemporary socio-economic organization, which established new relations of production and consumption, hindering the identification of the class struggle classical dialectical relation.

defense program and could be noticed after 2007. Being part of a strategic action plan, PAC is a set of measures intended to encourage private investment, increase public investment in infrastructure and promote economic growth and an improvement of the living conditions (BRAZIL 2007). According to Andrade (2011), the projects got around R\$ 500 billion between 2007 and 2010 – including a program of slum interventions of around R\$ 13 billion of the total amount.

Despite PAC's relevance, the urge for investment in housing sector got significant leverage only with *Minha Casa, Minha Vida* [My House, My Life] program (PMCMV) – created by the Provisional Presidential Decree No. 459/2009 and subsequently approved by Law No. 11.977/2009 –, which intended to finance housing constructions through real estate market in a partnership with public sector, aiming to build 1 million houses by 2010 and another million between 2011 and 2014.

In general, the Program provides four modalities of housing financing: (1) one directed to families with incomes up to 10 minimum wages, through the National Program for Urban Housing, whose subsidy percentage depends on the family income level; (2) a subsidized line, directed to families with incomes up to three minimum wages, that would be appointed by local governments, (3) one directed to collective operations in urban and rural areas (self-management task forces); (4) and credit supply for infrastructure of housing projects (Shimbo 2010).

There is a consensus among many authors that the PMCMV's main motto was to boost the Brazilian economy⁶ in a time of international crisis – right when there is an increasing input of international funds in the housing production market (Bonduki 2009; Shimbo 2010; Andrade 2011; Bastos 2010). Despite the consensus, the authors show different degrees of distrust in its implementation.

Indeed, one cannot deny the advances achieved with the increase of subsidies and taxes incentives, which reached the lower class – where the largest portion of the housing deficit can be found. The data presented by Andrade (2011) reinforce this statement: there has been a 900% increase of the resources between 2005 and 2009, allowing the NFSH and the PMCMV to serve families that were once excluded from traditional system of financing.

Despite the increase in investments and subsidies, the distribution of the units offered to different classes can still be questioned. The group that earns up to three minimum wages – which concentrates 90% of the housing deficit in Brazil – shall get 400,000 housing units, whereas the group that earns up to 10 minimum wages shall get 600,000. These numbers indicate a mismatch between the supply created by the PMCMV and the housing deficit, suggesting that the focus of the housing policy, although to a lesser extent than in the past, is still concentrated on the production of housing-commodities that will be consumed by the middle class (Bastos 2010).

Another recurring question refers to housing quality built by private enterpriser. The urge of public power to pursue the number of 1 million houses leads to the risk of encouraging the reproduction of remote settlements built in the 1970s – which have low housing standards, are in inappropriate locations and detached from national deficit profile (Shimbo 2010). According to Andrade (2011), there is a significant recurrence of housing complexes located in remote areas of the cities – where the land prices are lower and there is precarious (or no provision of) public transportation and social facilities – in the projects hired by the PMCMV until now. Besides, the contiguity of similar housing complexes generates a pattern similar to the 1970s': the difference is that nowadays they are no longer built by the government (only funded).

Although one might argue that the PMCMV, besides financing through civil construction companies, also offers a financing line directed to social entities (a new version of the *Programa Crédito Solidário* [Solidary Credit Program], with funding for self-management task forces), the distribution of resources is significantly

⁶ Only in the first step of MCMV (2009 - 2001) the investments were of over R\$ 34 billion.

uneven. As Lago shows (2011), between 2009 and 2011, the *PMCMV Entidades* [PMCMV - Entities Program] hired about 9,000 units, while the private production hired by PMCMV financed 449,000 units.

5. ARE WE OVERCOMING THE HOUSING DEFICIT IN BRAZIL?

The analysis on the National Housing Policy and the *Minha Casa, Minha Vida* Program presented in this paper permits identified certain mismatches in the treatment of housing problem in Brazil. Before talking about the critical analysis of these points, however, it's necessary to take one last consideration.

Indeed, one cannot deny the advances in the last decade in terms of access to decent housing: the creation of the Ministry of Cities, the formulation of the National Housing Policy, the National System of Social Housing, the National Housing Plan (PlanHab) and the *Minha Casa Minha Vida* program (PMCMV) brought answers to the main demands that have been historically claimed by social movements for urban reforms and housing.

However, the execution of the PlanHab guidelines through the Program *Minha Casa Minha Vida* program led to a series of distortions between the original intention and the actual result. In this paper, we chose to discuss two key-issues: the deficit and the (sometimes nonexistent) integration between housing policy and land policy; and the prioritization of the PMCMV in boosting the civil construction industry at the expense of tackling the housing deficit.

Historically, the scientific community has been warning society about cities' low administrative capacity as a main obstacle in urban policies, especially in the housing policy. Not coincidentally, the cities' institutional strengthening was one of the main axes of the PlanHab, trying to overcome the difficulties of implementing this public policy, which should be linked to the social policy and to the land policy.

The recurring cities' inability to control the land use and occupation constitutes a major challenge for the public managers, and make the National Housing Policy risk making similar mistakes to those of the 1970s model, (re)producing a model characterized by socio-territorial segregation and a poor urban environment (Rolnik, Klink 2011). For Rolnik, Nakano and Cymbalista (2008), the integration between housing policy and land policy is essential, once it would allow the control of land speculation in order to avoid the maintenance of a certain urbanization pattern in Brazil – where the most needy are systematically apart from the areas occupied by the market, requiring increasing investment for their integration with the urban grid.

In this context, cities' first actions are inevitable for the development of Municipal Master Plans (MMP) and the Social Housing Local Plans (SHLP) – which, when matching strategies, allow the adoption of urban instruments in order to control land speculation and ensure social justice and access to urbanized land, as well as social management of land appreciation.

It is precisely at this point that lays one of the biggest misunderstandings between the National Housing Policy and the *Minha Casa Minha Vida* program. While the first sets out the Social Housing Local Plan (SHLP) as a basic instrument to access the resources of the National Social Housing System (NSHS), the funding provided by the PMCMV have no connection with the municipal planning instruments – such as the MMP or the SHLP (Buonfiglio, Bastos 2011; Andrade 2011). This observation acquires more troubling outlines if we observe the amount of money involved: while the NSHS handled R\$ 2.4 billion in 2009, the resources invested in the MCMV exceeded R\$ 34 billion.

Based on the foregoing observation, a weakness in the municipal government's ability to coordinate the urban housing policy becomes evident, even though the Municipal Housing Council and the SHLP do exist. In the words of Buonfiglio and Bastos (2011), it is possible to observe the crucial role played by civil construction companies and real estate developers: these agents not only define the location and the target

audience, but also the design, type and quality of the buildings. It is the housing market interfering with and defining the demand for social housing, which is not a market demand.

Thus, although the Brazilian Housing Policy has added important concepts regarding the democratization of urbanized land and the quality of housing production, in the PMCMV, the integration with urban policy was abandoned, leading to standardization housing units of poor quality and peripheral location (Andrade, 2011; Rolnik, Nakano 2009).

In addition to that, it's possible to notice a difficulty in leverage new projects of social housing, in view of the rising costs of urbanized land. As observed by Rolnik and Nakano (2009), evaluations made in the 1970s already indicated the excessive increase in land prices during a boost of real estate industry without a urban-land strategy. Bonduki (2009) contributed to the abovementioned, stating that the raise in land prices (driven by the demand for social housing building without the adoption of appropriate land instruments) generates a simple transfer of public subsidy for real estate speculation, distorting the program purpose.

Bonduki (2009) also states that even though the National Housing Plan has made a range of housing alternatives at lower cost available (like urbanized land with building materials and technical assistance offers), the PMCMV focused on the production of units aligned with the interests of real estate market. Not by chance, despite the amount of resources involved, the quantitative targets are «shy in the lower class, because the subsidy average unit value is higher than it would be necessary in a strategy that aimed guaranteeing the right to housing to all» (Bonduki 2009, 13, author translation).

In the scenario outlined, a “corporate urbanization” is established as hegemonic. Thus, the *Minha Casa Minha Vida* program has been acting more as a guarantor of capital accumulation standards than as a driving force for the implementation of the PlanHab (Bastos 2010). This consideration also identifies a complementary conflict that, although it occurs in the backstage, is directly related to the matters discussed in this paper.

Since, on one hand, the federal government recognized, in 2003, the social demands as a priority, and on the other hand, the continuous need for capital accumulation, there has been a constant struggle among antagonistic social groups: while there is an attempt to maintain the participatory urban planning principles⁷ (which are typical from the formulation process of the National Housing Policy), there is also a conflict for an economic interest hegemony (above a social interest hegemony), which overlaps the surplus value of real estate market over the right to decent housing.

Thus, if the NHP defended the inclusion of the population and third sector organizations in planning and management process, it is also possible to observe the State downsizing in favor of the market, leading to disputes among cities to attract investment and obtain resources to develop the private sector (Vainer 2000). Inserted in this process, the urban management has been shifted to search for competitiveness: the city became a product, marketed in a highly competitive market (Vainer 2000, 2003).

Given the abovementioned, a prevalence of market logic in Brazilian housing policy becomes clear. Although the democratic management is always present (in different levels), if, for instance, we consider that the exhaustive participatory process of the Social Housing Local Plan tends not to achieve similar success compared to real estate market lobby, we must recognize certain hegemony of the civil construction sector over the Social Housing Local Plan. However, it is necessary to emphasize the speculative nature of this statement, once it is a hypothesis to be investigated in future studies.

⁷ Instigated by theoretical discussions in Brazil led by Erminia Maricato, Raquel Rolnik and Nabil Bonduki, the assumptions about participatory urban planning are based on the desired conflict among social groups, seen as a key element to the transformation of the city (Vainer 2003), which would allow us to overcome the Brazilian pattern of exclusionary urban planning (Maricato 2000).

Based on the discussed issues, one can still say that the National Housing Policy is pressed between the government agenda (mainly related to the quantitative target of new units) and the civil construction sector, which is mainly concerned about a maximized absorption of resources through the construction of a larger number of housing units, but not about any architectural or urban issues (Andrade 2011). For Shimbo (2010), from the moment that the housing policy paradigm started being governed by private logic, the corporate management model fits the operationalization of the policy itself. Both State and company look for quick results and solvency of the system.

Given this confluence of interests, Buonfiglio and Bastos (2011) highlight the concentration housing policy resources in the "*housing market production*", where even families that earn up to three minimum wages are able to access the housing projects through private real estate developers.

Thus, although the significant amount of investments and subsidies is desirable when it comes to dealing with housing problems in Brazil, the actions implementation methods, which transfer the responsibility over their execution to real estate market – generating what Shimbo (2010) calls "social housing market" –, is worrisome. For the author, the current housing policy shows an excessive autonomy of the civil construction and development companies in comparison to the State, «whose numbers work as an indicator of the performance of the policy itself, even though it depends institutionally and financially on public agents» (Shimbo 2010, 342, author translation).

6. FINAL REMARKS

This paper discussed the articulations and disagreements between the National Housing Policy (NHP) and their main form of execution, the *Minha Casa Minha Vida* program (PMCMV). Discussion was based on the questions: *is there a conceptual articulation between the National Housing Policy and its main form of execution, the Minha Casa Minha Vida Program? Or did the conflict among economic, political and social interests lead to the establishment of divergent public policies?*

The current scenario outlined in the country has engendered a significantly positive process of increasing investment in the housing sector (with great urge to the production of social interest housing), the inconsistencies between the policy and the housing program (which should be corresponding) are clear. Although the investigations only allow preliminary observations, the hypothesis outlined in this paper was partially confirmed, and a lack of appropriate adhesion points between the NHP directives and the implementation dynamic of the PMCMV could be seen.

The deficient - and sometimes nonexistent - integration between housing policy and urban policy aggravates the precariousness of social management of land appreciation in Brazilian cities, reducing the (already) limited forms of access to housing by lower class.

Besides, the conflicting overlap among the several government level actions, the NHP guidelines and the PMCMV goals lead to disjointed initiatives, such as the elaboration of Social Housing Local Plans (SHLP) and housing projects financed by the *Minha Casa Minha Vida* program, which makes us question the level of subordination of housing projects before the planning guidelines, or the correlation between the planning tools and the access to federal resources.

The argument here is that by failing to create a link between the SHLP and MCMV resources, the federal government itself weakens the main mechanism for reconciling the guidelines outlined in the National Housing Plan and the local reality, which is an efficient subject of change. If we adopt the classical definition of public policy as "what the government chooses to do or not do" (Dye 1984 apud Souza 2006), it becomes possible to speculate about the inadequacy of the social component in the *Minha Casa Minha Vida* program,

which shows concerns that are more compatible with a program of economic stimulation than with a housing program whose purpose is to overcome the Brazilian housing deficit.

Although the results are not deep enough to support a hypothesis, it's possible to end this paper with a provocative enquiry: urban programs that are displaced from social policies that promote them make up the basic substrate that makes the political patronage go on. We ought to highlight that this study's purpose is to contribute to investigations regarding trends in implementing housing policies in Brazil, which adds support to the deepening of a theoretical discussion on this issue, and has no intention of ending the discussions on the subject.

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THE ITALIAN WAY TO CARSHARING

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ABSTRACT

Carsharing is increasing its role worldwide as an alternative and more sustainable transport mode. After focusing on the main characteristics of carsharing, starting from the analysis of the literature on this topic, this paper studies the Italian carsharing experiences, trying to understand its development and growth and possible limits and weaknesses of existing experiences. The presence of a national coordination structure (Iniziativa Carsharing - ICS), unique in Europe, surely helped the development of the system. Summarising the conclusion, in the first part we discussed the peculiarities of ICS based on the concepts of standardisation of the service and interoperability among different operators. We saw how carsharing in Italy has great potentiality that now is limited in part due to a scarce integration of the service within broader transport policies and in part due to cultural reasons, as many Italian drivers still seem to consider their car as a "good" rather than as a "service". In the second part we deepened the case of Milan's carsharing that, to date, represents the most successful initiative in Italy. Context characteristics and the introduction of toll schemes (Ecopass, and then Area C) seems to suggest that other mobility policies, external to carsharing itself, might have a significant role in its development and in general the available data suggest great potentiality for the service in the future. Concluding, it seems that the result of carsharing initiatives will depend largely on mobility policies that both the national government and municipalities will introduce in the future to promote both sustainable mobility and a cultural change aimed at changing transport behaviour.

KEYWORDS:

carsharing, sustainable mobility, urban mobility

1 INTRODUCTION

Carsharing¹ (hereafter CS) is increasing its role worldwide as an alternative transport mode (Costain et al., 2012), that could contribute to a more sustainable urban mobility. This paper studies the Italian carsharing experience, analysing its development and growth, and possible limits and weaknesses of existing experiences. The paper first discusses the main characteristics of CS; then a literature review will be presented, followed by an analysis of the current situation in Italy evidencing the essential role of the national coordination structure *Iniziativa Carsharing* (hereafter ICS) created by the Ministry of the Environment to boost car sharing initiatives. In the last part we will focus on the case of Milan's CS, then final considerations will be drawn.

A traditional CS organization maintains a fleet distributed in neighbourhood locations, users rent cars and usually pay electronically on a time and distance basis² (TCRP, 2005). Vehicles are used by different people in different moments of the day, whereas private cars are in general parked for the majority of the time consuming urban space. The typical CS organisation relies on a centralised system for bookings, data collection and billing; users reserve the car by internet, by phone or call centre deciding the location and the usage time (Sullivan and Magid, 2007). Since CS members pay only variable costs (if there is no annual fee), they can estimate the cost of an auto trip in advance and compare it with the alternative transport modes (public transport, car rental, taxi, etc).

2 CHARACTERISTICS OF CARSHARING: A LITERATURE REVIEW

In the last decade the application of CS schemes worldwide has been positive, but it is still far from a level that can deliver significant aggregate benefits (Duncan, 2010). According to the results of the European Project Momo (Loose, 2010), at the beginning of 2009, there were approximately 380 000 CS participants in Europe. Users are usually driven by environmental reasons when joining CS, but economic considerations have gained increasing importance in time too (Loose, 2010).

The majority of the studies on CS are based on surveys among the members of CS organizations, however in many cases the sample dimension and differences in data collection and study methodology make it difficult to compare the results. Many researches focus on the analysis of existing experiences deepening the characteristics of both the users and the system, evidencing the peculiarities that can make CS a viable alternative in urban contexts (TCRP, 2005; Sullivan and Magid, 2007). Other studies tried to analyse the market potential of this service (Shaheen, 2001; Shaheen and Martin, 2006; Shaheen et al., 2008), the socio-economic characteristics of the users (TCRP, 2005; Andrew and Douma, 2006) and the overall impacts determined by the system (Cervero et al., 2007; Shaheen et al., 2007a; Martin et al., 2010a, 2010b).

Starting from the literature review, in the next paragraphs we will present the main characteristics of typical CS systems (user profile, overall impact on mobility and environment).

¹ Different expressions are used in literature; carsharing, car-sharing, car sharing and car clubs (in the UK) here we will use the first one.

² This in order to consider both the cases of high mileage trip during short rental time and low mileage time during long rental trip (VTPI, 2010).

2.1 CARSHARING: DEMOGRAPHIC AND TRAVEL CHARACTERISTICS OF USERS

The typical carsharing users show some common characteristics worldwide, here we report the main ones (further information can be found in the cited studies):

- Carsharing seems more attractive to men (Harmer and Cairns, 2011; TCRP, 2005; Loose, 2010);
- Average age of the user is 25 – 45 (TfL, 2008; TCRP, 2005; Huwer, 2004; Muhr, 2009);
- The majority of members are singles or live in small households (TCRP, 2005; Cervero and Tsai, 2003; Harmer and Cairns, 2011; Loose, 2010);
- Members are in general well educated people with median or higher than average income, cost sensitive and environmentally conscious (TCRP, 2005; Andrew and Douma, 2006; Cervero et al., 2007; Muhr, 2009);
- Users live in location well served by public transport and CS is seen as a mean to increase members mobility, it is mainly used for recreation/social activities (Synovate, 2007; TCRP, 2005; Cervero and Tsai, 2003);
- Trips frequency and average miles per year are quite low (less than 10 000 km) since members use public transport for the majority of their trips (Haefeli and Matti, 2006; TCRP, 2005);

In general, CS users rely on public transport for daily commuting trips for work and study reasons (Synovate, 2007); a recent survey in the UK (Harmer and Cairns, 2011) evidenced that the average frequency of use made by members is quite low (75% of the members hire a car up to 5 times a year) with a distance travelled up to 40 kilometres per trip (64% trips). In Belgium, surveys in Brussels (Muhr, 2009) and the Wallonia Region (Muhr, 2010) evidenced that the majority of members use CS cars at most three times per month, mainly during their free time. These results are similar to the Italian ones, where – at the national level – the frequency of use of CS is about 1 run³ per member per month, with an average trip length of about 40 km and 6 hours in duration (Mastretta, 2010a).

2.2 IMPACTS

Even if an agreed methodology for evaluating CS still lacks, there is general agreement about some benefits entitled by CS:

- Reduction in vehicle ownership⁴ (TCRP, 2005; Martin et al., 2010a; Martin and Shaheen, 2010b; Shaheen et al., 2008);
- Saved transport costs (Shaheen et al., 2008; Cervero et al., 2007; Barth and Shaheen, 2002);
- Reduction in vehicle miles or kilometres travelled (Cervero and Tsai, 2003; Cervero et al., 2007; TCRP, 2005; Shaheen and Cohen, 2007b; Koch, 2001);
- Increase in public transport use (TCRP, 2005; Shaheen et al., 2008; Shaheen and Cohen, 2007b; Koch, 2001);
- Reduction in pollutants emission (Martin and Shaheen, 2010b);
- Reduction in parking spaces requirements (Sullivan and Magid, 2007);

Regarding the number of vehicles removed from the transport network per CS vehicle, a homogeneous quantification is difficult, nevertheless there are several estimates ranging from 6.8 (Cervero and Tsai, 2003) to 10.8 (Lane, 2005) but considering also the cars sold or not purchased, the number of cars taken off the streets could be nearly 20 per CS vehicle (Harmer and Cairns, 2011). Concerning the decrease in pollution,

³ With run we mean the use of CS after a reservation

⁴ Both in terms of vehicles sold after joining carsharing than in terms of avoided car purchasing.

the data usually presented focused mainly on CO₂ reduction, while data on local pollutants (PM₁₀, PM_{2,5}, NO_x, etc.) are less common.

3 THE ITALIAN WAY TO CARSHARING

3.1 THE ROLE OF *INIZIATIVA CAR SHARING*

In Italy, CS has gained increasing importance thanks to the institution, unique in Europe, of a national co-ordination structure known as *Iniziativa Carsharing*⁵ (hereafter ICS), promoted by the Ministry of the Environment in October 2000. Before the institution of ICS, the only initiative active in Italy was the one promoted by the environmental association “Legambiente” in Milan.

ICS derives from a broader legislative Decree⁶ regarding sustainable mobility aimed at “*promoting the implementation of structural changes to permanently reduce the environmental impact of traffic, through the introduction of sustainable mobility solutions*”.

ICS is a legal agreement among municipalities, in the form of a co-ordination structure among the main Italian cities, supporting the set up of local CS services integrated in a standardised operational scheme. In particular, ICS offers⁷ to the cities:

- technical and legal consultancy;
- project support for designing the system and the service;
- communication and promotional support on a national level (a specific logo known as “Io Guido Car Sharing” has been created to characterize the national circuit of ICS);
- promotional, communication and marketing support on a local level;
- call centre services;
- technologies for the management of the fleet and the service;
- assistance during the initial operational period.

ICS works on a federative basis (ICS, 2003), so municipalities can choose their own Local Company for the CS service which has responsibility over operational, commercial and managerial aspects. In particular, local operators maintain responsibility for site specific aspects like prices and market policy, vehicles maintenance and cleaning, planning investments, customer satisfaction and cooperation with other mobility services companies. In order to promote CS initiatives, the Ministry of the Environment provided an initial funding of approximately 9.3 million Euro in 2000 and further 10 million Euro in 2005⁸. ICS is responsible for administering the funding and assigning the grants in order to finance the start-up of new CS organizations. In the first phase of the program, in order to avoid the proliferation of different standards and solutions, ICS directly provided assets and services to the operators (Mastretta and Burlando, 2007a); now ICS provides support mainly through reimbursement of the expenses incurred directly by the organisations for the purchase of assets and services that meet the standards, operating rules and requirements of ICS (Mastretta and Torriani, 2005). In general, even if the co-funding could reach the 50% (ICS, 2003), in practice it is normally a maximum 20-25% of profit and loss account (Loose, 2010).

⁵ For further information on ICS see <http://www.icscarsharing.it>

⁶ Decree n.267 of 27th March 1998 by Italian Ministry of the Environment.

⁷ ICS website accessed March 14, 2012.

⁸ ICS website accessed March 14, 2012.

3.2. ICS NUMBERS

To date, there are twelve cities actively involved in ICS⁹, which have to respect some parameters:

- interoperability among operators;
- homogeneous interface towards the consumer for all the normal service access operations;
- unitary service identity;
- fixed homogeneous standards regarding services, emissions and safety (ICS, 2003).

Fig. 1 represents the members' trend in the Italian cities included in the ICS circuit from 2003 to February 2012; a constant growth can be observed in part due to the activation of new services during the years and in part due to the development and improvement of older initiatives.

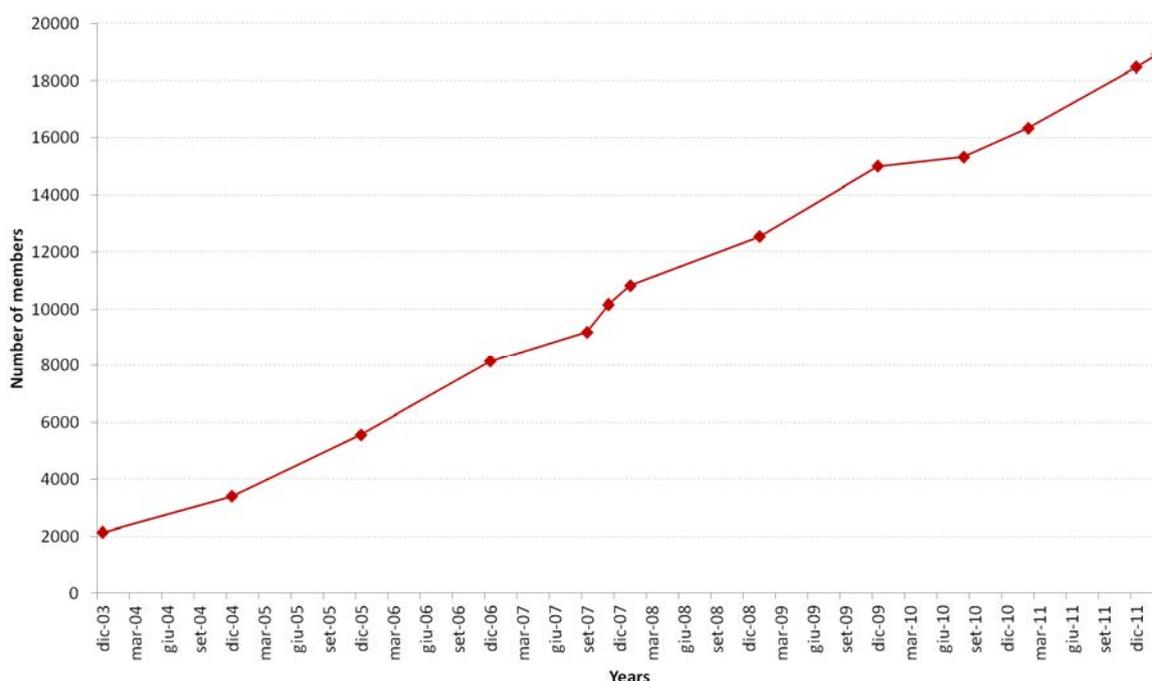


Fig. 1 - ICS members' trend (Source: our elaboration on Mastretta and Burlando 2007a, Mastretta and Burlando 2007b, Mastretta 2008b, Mastretta 2009, Mastretta 2010a, Debandi 2010, ICS website (February 2011 data), ICS website (December 2011 data))

Comparing (Tab. 1) the Italian values (at the beginning of 2009) with those of other similar European countries in terms of population (France, Great Britain and Germany), differences, in terms of number of members, emerge with respect to the nations where the service is older and much more developed (values for France are probably underestimated). As pointed out by Burlando (2012), the Italian model differs from the one used in many European experiences where the development of CS systems has, in general, followed a two phase process¹⁰; the Italian case is characterized by a strong public intervention and it is based on many independent local operators instead of a national centralized structure.

⁹ ICS is opened to any institution that has approved the constitutive convention of ICS and the agreement subscribed with the Ministry of Environment; to date 29 cities and 3 Provinces joined ICS (ICS website accessed March 2012).

¹⁰ An initial phase based on small organizations followed by an expansion phase through the merger of different companies to reach a stronger entrepreneurial organization (Burlando, 2012).

COUNTRY	POPULATION ON 1 ST JANUARY 2009	CS MEMBERS	CS VEHICLES	MEMBERS- VEHICLE RATIO	% OF CS CUSTOMER ON POPULATION
Austria	8 355 260	11 000	169	65	0,13%
Belgium	10 753 080	6 932	248	28	0,06%
Denmark	5 511 451	5000*	225	22	0,09%
Finland	5 326 314	2 232	38	59	0,04%
France	64 350 226	13 000**	700**	19	0,02%
Germany	82 002 356	137 000	3 900	35	0,17%
Great Britain	61 595 091	64 679	1 459	44	0,11%
Ireland	4 450 030	63	9	7	0,00%
Italy	60 045 068	15 850	498	32	0,03%
Netherlands	16 485 787	27 000**	1 832	15	0,16%
Portugal	10 627 250	100	12	8	0,00%
Spain	45 828 172	2 504	127	20	0,01%
Sweden	9 256 347	14 889	more than 492	30	0,16%
Switzerland	7 701 856	84 500	2 200	38	1,10%

*approximated, ** estimated values in Loose, 2010.

Tab. 1 - Carsharing in Europe (Source: our elaboration on Eurostat Statistics (website accessed April 2012, Loose 2010))

Table 2 provides data for the twelve cities of ICS where a service is available today (in grey we evidenced the cities where the service is no longer available)

CITY	START UP	CORPORATE ORGANIZATION	POPULATION*	PRIVATE CARS PER 1000 INHABITANTS**	CARS	MEMBERS	PARKING LOTS
Bologna	August 2002	LPT	383 251	522	44	1 166	31
Brescia	February 2010	PS	193 879	657	6	187	3
Florence	April 2005	PS	373 446	549	23	842	28
Genoa and Savona*	July 2004, June 2009*	M	607 906 and 62 553	467 and 571	78	2 347	55
Milan	September 2001	LPT	1 324 110	548	134	4 882	77
Modena	April 2003	M	185 706	630			
Padova	September 2011	P	214 125	580	10	40	10
Palermo	March 2009	LPT	654 735	599	36	663	44
Parma	February 2007	P	188 258	591	18	368	12
Rimini	March 2003	PS	144 301	599			
Rome	March 2005	P	2 761 477	693	104	2 232	68
Turin	November 2002	M	907 563	618	121	2 600	82
TOTAL					618	18 921	422

Tab. 2 - ICS organizations at February 2012 (Source: Mastretta 2010b, *Italian National Institute of Statistics 2011 (website accessed March 2012), **Comuni-Italiani.it elaboration on Automobile Club d'Italia 2009 data (website accessed March 2012), ICS website February 2012 data (website accessed May 2012)). LPT = Local Public Transport Agency, PS = Private subject, P = Public subject, M = Private-Public subject.

The overall number of members is 18 921 with 618 cars and 422 parking lots. Milan has the highest number of members, followed by Venice, Turin and Rome, that represent also the oldest CS organizations in Italy. A recent survey¹¹ (IPR, 2009) analyzed also the characteristics of CS users in ten cities where the service was active at the time. The study confirms Italian users to fit the common characteristics found in the literature, where the majority of users are well educated male (58% of respondents) living in small households with one or zero car, using public transport every day (41% of CS users have a public transport season ticket and 19% of them has purchased a season ticket simultaneously or after joining the CS service) while the car is daily used by 35% of CS members (IPR, 2009). The main reason for joining CS is the absence of a car in the household, followed by the cost effectiveness of the service; the number of CS trips is quite low (less than 3 trips per months for the majority of the users) while the average mileage per month is just around 50 km. Finally CS is mainly used for leisure reasons or for shopping, while work related use is minor. Fig. 2 represents the trends for the cities listed in Tab. 2:

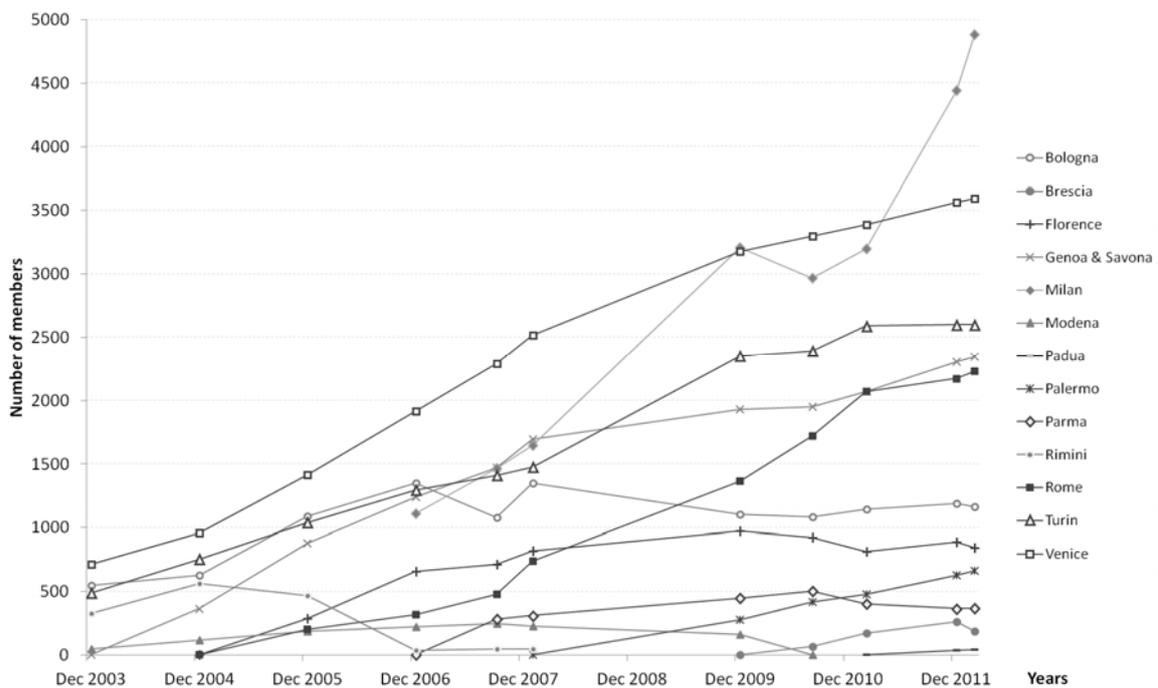


Fig. 2 - Members' trend for the ICS cities (Source: our elaboration on Mastretta and Burlando 2007a, Mastretta and Burlando 2007b, Mastretta 2008b, Mastretta 2010b, Debandi 2010, ICS website data accessed on February 2011, December 2011 and May 2012)

Whereas CS service is older and the population is higher (Turin, Rome, Milan, Genoa), there has been a constant growth in the number of members while in smaller cities with a relatively new service, the growth has been much lower (Brescia, Palermo, Parma). Florence and Bologna differ from Venice in terms of members' trend even if they have a similar population and a relatively old CS service. In Bologna, membership increased from 550 users in 2003 to 1 191 members in 2011, while in Florence the value grew from 288 in 2005 to 890 in 2011. On the other hand, Venice experienced a faster growth in the number of users from the initial 714 to 3 564 members in 2011. The reasons for these differences probably lie in the

¹¹ Financed by the Ministry of Environment and based on both CATI and CAWI technology.

context characteristics¹² of Venice, that has a peculiar urban structure that limits car use and does not encourage car ownership (in Tab. 2 Venice has the lowest level of private car ownership among the ICS cities).

3.3. INCENTIVES TO PROMOTE CARSHARING INITIATIVES

In order to promote the use of CS, ICS suggests some tools that municipalities can introduce to increase membership. Free access to Limited Traffic Zones (LTZs), use of public transport reserved lanes, free parking in city centres and discounts (30-50%) on the annual fee for the CS service if users have a public transport season ticket.

CITY	WEBSITE OF THE CS ORGANIZATION	FREE ACCESS TO LTZ	USE OF PT RESERVED LINES	FREE PARKING IN BLUE AREAS	DISCOUNT ON THE ANNUAL FEE
Bologna	www.atc.bo.it	x	x	x	x
Brescia	www.carsharingbrescia.it	x		x	x
Florence	www.carsharingfirenze.it	x	x	x	
Genoa and Savona*	www.genovacarsharing.it	x	x	x	
Milan	www.guidami.net	x	x	x	x
Padova	www.carsharingpadova.it	x	x	x	
Palermo	www.carsharingpalermo.it		x	x	
Parma	www.parmacarsharing.pr.it	x	x	x	
Rome	www.atac-carsharing.it	x	x	x	x
Turin	www.carcityclub.it	x	x	x	
Venice	www.asmvenezia.it	x	x	x	

Tab. 3 - Incentives applied in the ICS cities to boost carsharing initiatives (Source: websites of CS operators)

Another initiative introduced by ICS, and financed by the Ministry of the Environment, to promote CS concerns the introduction of incentives for scrapping polluting vehicles in exchange of a subscription to CS (one year free subscription to CS service and a 50% discount on the second year subscription plus a bonus of € 600 for the use of CS service). Concerning the success of CS initiatives, the above mentioned survey (IPR, 2009), also evidenced a limit for the diffusion of the service related to the scarce propensity of drivers to share their own car: only one third of the respondents state that they would share their car without problems, while for the majority of the drivers the emotional bond with their cars seems very strong, meaning that car is not seen just as a means of transport and a status symbol, but also as a sort of extension of the space of their "intimacy"(IPR, 2009). This cultural aspect clearly contributes to the final result of CS initiatives, evidencing the importance of a cultural change.

4 CASE STUDY: MILAN

4.1 MILAN'S CONTEXT

Milan presents a central business district (offices, business activities, services, etc), somehow coincident with the historical centre, entailing great mobility in the urban area, and a big and much more dispersed

¹² Venice is built on an archipelago in a lagoon formed by 177 canals in the old centre (nearly 90 000 inhabitants), transport is possible only on water or on foot, so the car use is limited to the part of the city on the mainland (nearly 180 000 inhabitants).

productive area right outside the city. According to AMMA¹³ data (AMMA, 2006), there are 841 000 non residents daily entering in the city, among them nearly 510 000 use private car (410 000 vehicles with an average of 1.2 people on board and 21 000 motorcycles), while 311 000 use public transport (176 000 by train, 71 000 by underground and 64 000 by buses or trams). Considering the whole mobility in Milan's area, 53% of the trips are made within the city (31% of which by public transport), while the rest are cordon trips (to enter or exit from the urban area, 47% by public transport) that in part start (or end) from municipalities included in the first belt around Milan.

4.2 CAR SHARING INITIATIVES IN MILAN

Milan has been a pioneer in Italy for CS since it had formerly two organizations providing the service. The first one, *Carsharing Italia*, was created in 2001 (in 2006 it joined the ICS network) by the environmental association "Legambiente". The second one, *GuidaMi*, born in 2004, was supported by the municipality of Milan and by the Ministry of the Environment. In 2007, the Local Public Transport company *ATM Group* (owned by Milan's municipality) took control of *GuidaMi*, followed in 2010 by the acquisition and merger of the other CS operator in Milan, *Carsharing Italia*. *GuidaMi* offers an interoperable service within the ICS network (i.e. *GuidaMi* users can access CS services in other ICS cities without subscribing a new membership); in December 2010, a new pilot project of electric CS has been launched in Milan known as *E-vai*, run by FNM Group (the main transport and mobility group in Lombardy, owned by the Regional Government), which is not part of the ICS circuit.

GuidaMi is a two ways service (i.e. car should be returned to the initial location) where users reserve the car by the internet or call-centre, choosing the time and the pick-up location; to unlock the car members use their smart card, then pick the keys in the car and start their trip. *GuidaMi* has adopted all the incentives described in paragraph 3.3. Concerning the costs, members pay an annual fee (120 €, that can be reduced by 50% if the member has a season ticket to public transport) while the usage cost depends on the category of vehicle and considers both time and kilometres travelled.

VEHICLE CATEGORY	MODEL	HOURLY RATES [€/h]		MILEAGE RATES [€/km]
		7:00 – 24:00	00:00 – 7:00	
ECONOMY	Smart, Panda	2.2	1	0.45
CITY	500, Y, Grande Punto	2.4	1	0.55
FLEXY	Doblò Persone, Doblò Combi	2.6	1	0.65
PREMIUM	Prius*, MiTo, Giulietta, Touran	2.8	1.5	0.75
CARGO	Doblò Cargo, Ducato	3.00	1.5	0.80

Tab. 4 - GuidaMi usage costs (hourly and distance costs) (source: GuidaMi website accessed March 28, 2012)

As shown in Tab. 2, to date Milan represents one of the most successful CS experiences in Italy in terms of members.

¹³ Mobility Agency of Milan.

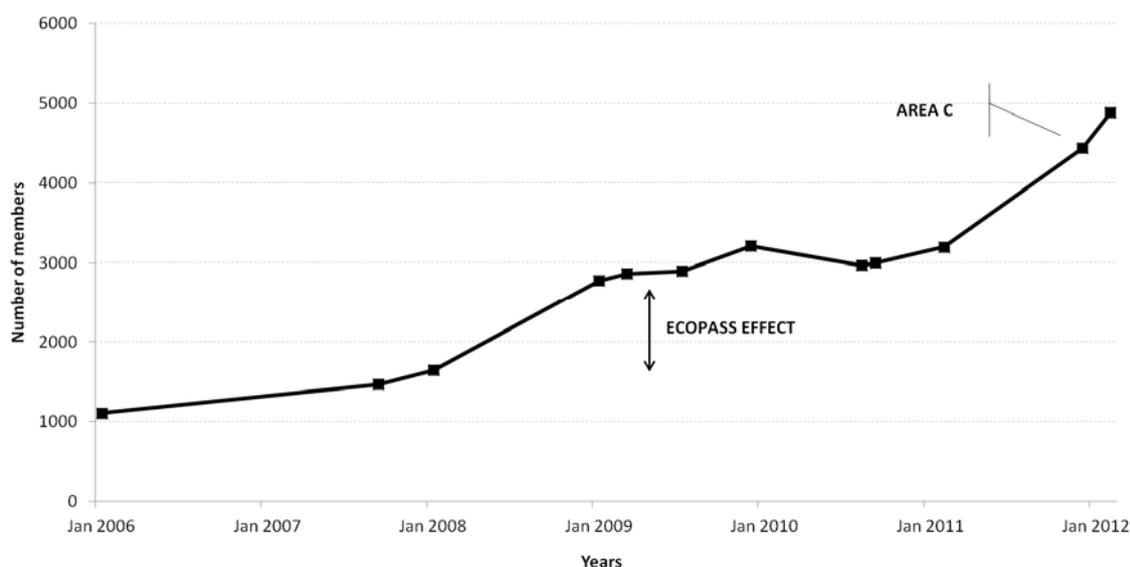


Fig. 3 - GuidaMi members' trend in Milan (Source: our elaboration on Mastretta and Burando 2007a, Mastretta and Burando 2007b, Mastretta 2008b, Salucci 2010, Mastretta 2010a, Debandi 2010, Leverano 2010, ICS website (accessed on February 2011, December 2011 and May 2012))

The increase in the number of members between January 2008 and January 2009, derives in part from the introduction on January 2008 of a charging scheme, known as *Ecopass*, applied at the most polluting vehicles entering the city centre. The major effect has been a shift towards cleaner, and thus toll-exempt, vehicles and an increase in the use of public transport (Rotaris et al., 2010, AMAT, 2011), but Fig. 3 also suggests that some drivers probably gave up to their old and polluting cars, relying on public transport and CS for their mobility needs. On January 2012, following a public consultation, the *Ecopass* scheme has been substituted by a new charging scheme, known as *Area C*, focused on congestion rather than pollution: every vehicle entering the central area now has to pay a 5 euro toll.¹⁴ This new scheme and the shift in the parking policy for CS cars from garages, where they were barely visible, to the "on street parking" (entailing greater visibility) can in part explain the increase in membership between December 2011 and February 2012. Further data are needed to evaluate the impact of *Area C* on CS usage, however we see a sharp increase in GuidaMi users in 2012.

GuidaMi cars are chosen mainly for economic reason and they are used during free time and for shopping related occasions in Milan (Salucci, 2010). The following Figure considers three indices that evidence a decrease both in the average distance per run¹⁵ and in the average duration of a run in time together with an increase in total runs which might suggest an use of CS for short trips (around 40 km).

¹⁴ From Monday to Friday, from 7h30 to 19h30.

¹⁵ With respect to the values of the base year 2006 (64km/run and 10.6h/run).

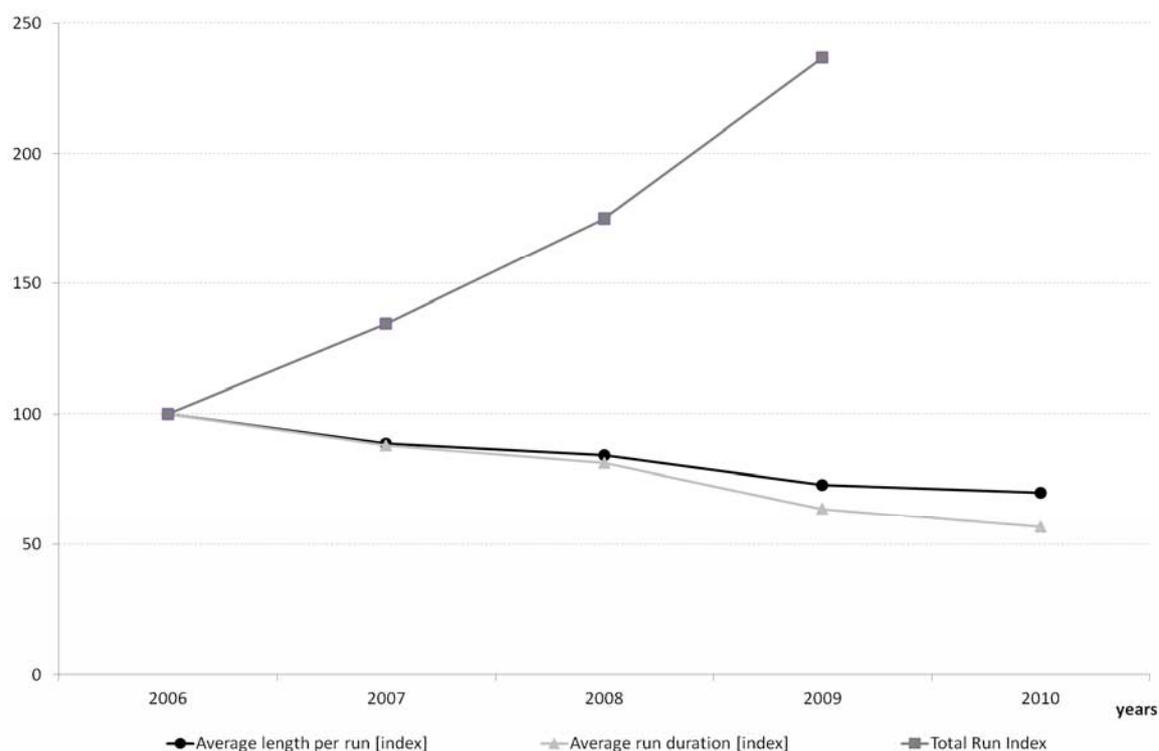


Fig. 4 - GuidaMi performance indices (Source: our elaborations on Mastretta and Burlando 2007a, Leverano 2010, Salucci 2010)

Milan has implemented all the incentives suggested by ICS (see Tab. 3) and the impacts on its CS service have been somehow relevant if compared with other Italian experiences. New parking policies based on a more complex pricing structure¹⁶ and on the strict sanction of incorrect behaviour, together with the improvement of public transport, might increase the importance of CS.¹⁷ Moreover CS service can still be improved increasing its capillarity or integrating its service with those of other operators in the transport sector (car rental companies, railways operators, etc.). The impact of CS in Milan could be evident only if the problems here briefly summarized will be faced within a broader urban transport strategy.

5 FINAL CONSIDERATIONS

This paper, after a general literature review, tried to present the current situation of CS in Italy, analyzing the role and characteristics of the national coordination structure created to boost CS initiatives. We discussed the peculiarities of ICS based on the concepts of standardization of the service and interoperability among different operators. We saw how CS in Italy has great potentiality that now is limited in part due to a scarce integration of the service within broader transport policies and in part due to cultural reasons, as many Italian drivers still seem to consider their car as a “good” rather than as a “service”. As pointed out by Burlando (2012), CS seems to have the necessary characteristics to overcome the existing gap between mobility offer and demand that could contribute to satisfy the modern transport needs so, a greater role seems possible for it. In the second part we deepened the case of Milan’s car sharing that, to date,

¹⁶ For example, introducing higher rates and shorter pricing periods at more convenient parking spaces (like on street spaces and parking near building entrances) during peak hours in order to increase turnover and foster higher-priority uses.

¹⁷ According to some newspapers (*Corriere della Sera* 15/01/2010), an estimate made by the Automobile Club Italia, fixes the number of cars double parked every day in Milan around 60 000 and 100 000.

represents the most successful initiative in Italy. Context characteristics and the introduction of toll schemes (Ecopass, and then Area C) helped the diffusion of the service and in general the available data suggest great potentiality for the service in the future. Concluding, the result of CS initiatives will depend largely on mobility policies that both the national government and municipalities will introduce in the future. A legislation concerning CS is needed in order to promote the involvement of private initiatives; bearing in mind the costs for municipalities entitled by CS services, mobility policies should evidence the advantages, both in economical and practical terms, offered by CS with respect to private car also considering the social role that CS might have for low-income households (and students) that could have access to a car on a pay as you use principle.

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IMAGES SOURCES

Front page Figure: <http://www.viaggi-lowcost.info/come-muoversi/car-sharing-piu-lo-usi-meno-lo-paghi/attachment/carshareonly/>

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L'UTENTE DEBOLE QUALE MISURA DELL'ATTRATTIVITÀ URBANA

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ABSTRACT

The main users of nowadays urban spaces are not only “standard men”, adults and healthy people like suggested by the image of the Vitruvian man, but weak users like children, the elderly and the disabled as well.

As reminded by Lauria all these people have many needs. And, as said by cardinal Tettamanzi, *the rights of weak people are not weak rights*.

In the last decades European cities have been largely dominated by cars and vulnerable users have been confined in residual spaces. Thus, there is nowadays a need of a new “measure” for the urban design, to ensure an easy access and use of the city also for the weak users.

This paper doesn't aim at proposing planning, design and management solutions for urban spaces: many other researches have already dealt with those issues and among the most recent there are Caramona et alii (2010), Colarossi e Latini (2008), Rotondo e Selicato (2010). This paper argues instead the need to regain the right measure while dealing with urban planning: only in this way the usability of the urban public spaces will increase for everyone, both vulnerable users and not. The aim is to build a “friendly city”, as it has been called within the CeSCAm (research centre for friendly cities) activities.

Children may represent the brick on which the urban projects have to be based: a city where children can move around without risks and fears is a city where the quality of life is high and it is a city characterized by a great attention on sustainable mobility issues, on proximity spaces, on green areas...

KEYWORDS:

Urban spaces, weak users, urban competitiveness

1 VERSO UNA CITTÀ ACCESSIBILE A TUTTI

Negli ultimi anni è iniziata ad emergere, in ottica di incentivazione della mobilità sostenibile, la tendenza ad un approccio innovativo di pianificazione basato sull'*accessibilità*. Il territorio è, infatti, un sistema complesso e ricco di relazioni e la necessità di coordinare e fornire approcci integrati tra la pianificazione urbanistica e quella dei trasporti, al fine di favorire una maggiore sostenibilità degli spostamenti sistematici e non, è ormai un dato di fatto. A lungo termine, la pianificazione urbanistica e l'uso del suolo possono influenzare fortemente la sostenibilità dei sistemi di trasporto, ad oggi ancora troppo sbilanciati a favore del mezzo individuale motorizzato.

Il libro verde dell'Unione Europea (Commissione delle Comunità Europee 2007) evidenzia, tra le sfide della mobilità urbana da affrontare, quella di un trasporto urbano accessibile e anche in Italia le leggi regionali che affrontano il tema del governo del territorio evidenziano con sempre maggiore convinzione la necessità che gli obiettivi quantitativi di sviluppo complessivo vengano declinati in stretta connessione con la definizione dell'assetto viabilistico e della mobilità.

Ma chi sono i fruitori dell'opera di chi pianifica la città e il suo sistema di mobilità? Sono gli "uomini standard", adulti e sani, o sono, anche, bambini, anziani, disabili...in generale "utenti deboli"?

E quali devono essere i caratteri dello spazio urbano affinché i cittadini scelgano di muoversi con sistemi che possiamo definire più sostenibili rispetto all'autovettura privata?

Sempre più di frequente nelle nostre città l'utente debole, il pedone, che è per eccellenza fruitore anche del trasporto pubblico, tende ad essere emarginato in uno spazio pubblico progettato e costruito a misura di automobile.

Lungi dal voler affrontare in questo articolo il tema della pianificazione, progettazione e gestione degli spazi pubblici urbani (tema che trova ampia trattazione nella manualistica italiana e straniera, all'interno della quale si richiamano, tra i più recenti ed esaustivi, i lavori di Carmona et alii 2010; Colarossi e Latini 2008; Rotondo e Selicato 2010), questo articolo intende sostenere la tesi secondo cui *ritrovare la giusta misura* in urbanistica aiuterebbe a migliorare la fruibilità degli spazi da parte delle categorie di utenti più indifese, con un beneficio per tutti, anche per chi debole non è. E forse la giusta misura potrebbe essere proprio data dai bambini: una città a misura di bambino, in cui i più piccoli possano muoversi da soli, è una città che riscopre gli spazi di prossimità, la qualità dello spazio pubblico, la mobilità sostenibile, gli spazi verdi e di gioco, la pedonalità...

Una città "*amica*", insomma, che mette al centro le esigenze di mobilità di tutti, una città grazie a questo più attraente e competitiva sul territorio in cui si colloca.

2 L'UOMO: MISURA E MODELLO DEL COSTRUITO?

Un intervento che voglia portare, all'interno del dibattito sulla società contemporanea, un qualche stimolo alla riflessione sull'attrattività e competitività della città e dei suoi spazi, deve forse prendere le mosse proprio dal concetto stesso di città. Città che può essere distinta in città "della pietra", l'*urbs* intesa come l'insieme dei manufatti che ne costituiscono la fisicità, e città "dei cittadini", della comunità sociale ivi insediata (la *civitas*). I due termini della lingua latina permettono di distinguere senza possibilità di equivoco le due componenti costituenti nel loro insieme la complessità del fenomeno urbano: quella fisica e quella sociale (Busi 2005). Tale distinzione è innanzitutto motivata dalla realtà delle cose: è infatti la città dei cittadini a realizzare la città della pietra; che però a sua volta influisce pesantemente sull'essere e sull'evolvere del tessuto sociale; da cui ancora discendono conseguenze sulla costituzione fisica della città.

Distinguere tra *urbs* e *civitas* ci porta anche a riflettere sul ruolo dell'urbanistica che opera sulla città della pietra per conseguire fini sociali. L'approccio dell'urbanistica contemporanea può essere dunque così

sintetizzabile: il fine è sostanzialmente riconducibile al miglioramento della società; lo strumento è l'intervento materico sulla struttura fisica della città (Busi 2003).

Ma cosa significa oggi progettare la città? Forse non tanto progettare spazi urbani nuovi quanto piuttosto riqualificare lo spazio urbano esistente, e non solo quello della città storica, che da tempo è stata interessata da interventi tesi a consentirne il recupero e il riuso sia in termini di manufatti che di funzioni, ma anche della città contemporanea, che proprio nella dimensione della città pubblica ha mostrato in molti casi i suoi punti di debolezza.

Affrontare il tema della prossimità e della qualità dello spazio pubblico presuppone dunque che ci si interroghi su chi è il fruitore dell'opera del pianificatore e del progettista della città e dei suoi spazi. Tema questo che fin dall'antichità ha trovato ampio spazio nel dibattito in architettura e in urbanistica (si veda al riguardo anche il tema delle piazze storiche, affrontato tra gli altri da Pellegrini 2005; Tiboni 2006; Carmona et alii 2010).

Già nel *De architettura* di Vitruvio, l'unico testo sull'architettura nel mondo antico giuntoci integro e divenuto fondamento teorico dell'architettura occidentale, dal Rinascimento fino alla fine del XIX secolo, viene sottolineata l'importanza delle proporzioni umane come base su cui impostare il progetto architettonico. Nel terzo libro Vitruvio afferma che «*Nessun tempio potrebbe avere una razionale progettazione senza simmetria e senza proporzione, senza cioè avere un esatto rapporto proporzionale con le membra di un ben formato corpo umano*»¹.

In tempi più recenti Le Corbusier riprende, in *Le Modulor*, questo tema, come già aveva fatto Leonardo da Vinci, considerando l'uomo come "*misura*" del creato e come "*metro*" dell'ambiente costruito.

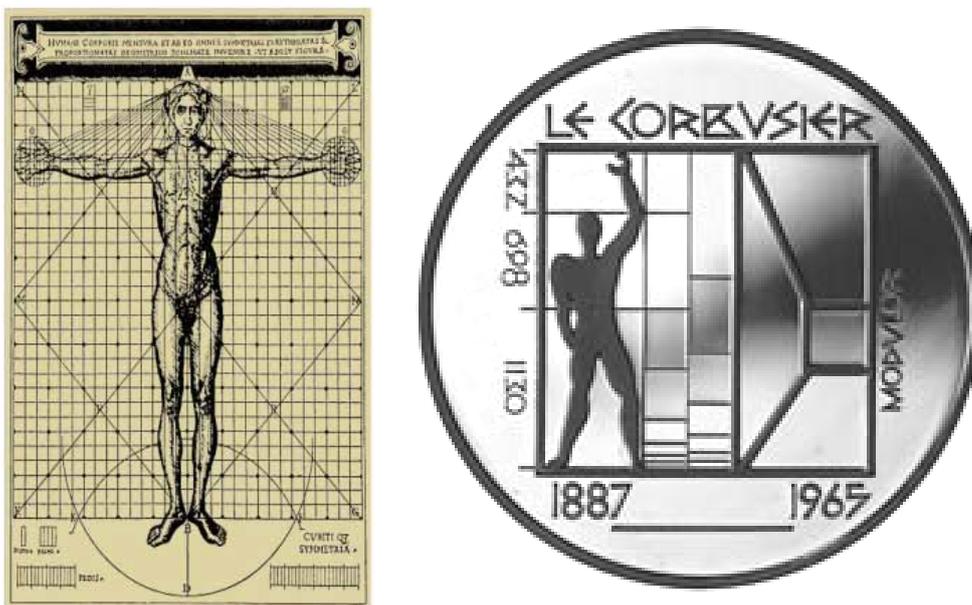


Fig. 1 L'uomo vitruviano nell'edizione illustrata da Cesare Cesariano, 1521 e Le Modulor di Le Corbusier (moneta svizzera, 1987)

1 "La progettazione dei templi si basa sulla simmetria, il cui metodo deve essere scrupolosamente osservato dagli architetti. La simmetria nasce dalla proporzione, che in greco viene definita analoghia. La proporzione consiste nella commensurabilità delle singole parti di tutta l'opera, sia fra loro sia con l'insieme. Questa commensurabilità si basa sull'adozione di un modulo fisso e consente di applicare il metodo della simmetria. Nessun tempio potrebbe avere una razionale progettazione senza simmetria e senza proporzione, senza cioè avere un esatto rapporto proporzionale con le membra di un ben formato corpo umano". Dal Libro III del *DeArchitectura* di Vitruvio.

Sicuramente l'idea di costruire abitazioni, edifici, oggetti come fatti per l'uomo e a misura d'uomo ha assunto forza, nel mondo industrializzato, volendo soddisfare le esigenze di molti con le poche risorse disponibili. Ciò ha portato ad unificare i bisogni e ad elaborare il concetto di standard urbanistico.

L'idea di standard ha però finito con il legarsi al concetto di *uomo standard*, cioè ad un'entità astratta al di fuori del tempo e dello spazio. Illuminante a questo proposito Giancarlo de Carlo quando osserva:

«L'uomo tipo non ha né società né storia: il suo perimetro non va al di là della rotazione delle sue membra. I suoi comportamenti sono descrizioni astratte e non hanno nulla a che fare con la realtà: non risentono né di contraddizioni né di conflitti, poiché il cerchio, in cui accadono i comportamenti dell'uomo tipo, è vuoto».

Progettare uno spazio, sia esso alloggio, organismo abitativo, complesso insediativo e così via fino all'intera città, all'intero territorio, assumendo come riferimento un'unica dimensione uguale per tutti sicuramente costa meno, a parità di risorse, che progettare uno spazio in grado di contemplare al suo interno più dimensioni essenziali (Guazzo 1994).

Queste riflessioni dovrebbero portarci a considerare la necessità di ri-pensare la "misura" con cui progettare la città, perché il ben formato corpo umano di cui parla Vitruvio forse non rappresenta la maggioranza a cui fare riferimento nel momento in cui si progetta lo spazio pubblico.

Lauria, nel suo libro *"La pedonalità urbana. Percezione extra-visiva, orientamento, mobilità"* (Lauria, 1994), afferma che la "maggioranza sana" è un'astrazione concettuale e si chiede da chi sia composta questa maggioranza. Non, come potrebbe sembrare, da soggetti genericamente privi di un qualsiasi handicap, ma da una unità antropologica specifica: l'adulto sano, ovvero un individuo non più bambino e non ancora anziano, senza menomazioni fisiche o deficit mentali. L'adulto sano suggerisce i parametri antropometrici ed ergonomici di riferimento progettuale. Bambini e anziani non appartengono alla "maggioranza sana" e questo ci fa pensare che tutti siamo stati portatori di handicap e tutti siamo degli "handicappati in potenza" poiché tutti, con il tempo, invecchiamo. Ma nell'entità di riferimento non si entra o si esce solo per ragioni anagrafiche: ci si può infortunare a causa di un incidente e così, per un certo periodo, non si è più in grado di esplicitare, con le stesse modalità, le attività che si effettuavano prima dell'incidente. Difficoltà nello svolgimento dell'attività deambulatoria riguardano ancora le persone obese o con proporzioni fisiche estreme, le gestanti, i cardiopatici...e finanche le mamme con il passeggino o le persone che portano pacchi o bagagli. Le strade e le piazze delle nostre città, dunque, non sono percorse solo da pedoni appartenenti alla maggioranza sana e alla minoranza disabile, ma anche e soprattutto da un insieme eterogeneo di utenti deboli che, per il fatto di essere sospesi, esclusi o ancora non pronti per l'attività lavorativa rappresentano, in alcune ore del giorno, il gruppo di pedoni più numeroso (Lauria 1994).



Fig. 2 Esempi di utenti deboli che si muovono nello spazio pubblico

Lauria sviluppa ulteriormente questo concetto raggruppando i diversi utenti della città in una piramide a tre stadi: la base sarebbe costituita dalla "maggioranza sana"; lo stadio intermedio dagli "utenti deboli", l'ultimo dalla "minoranza handicappata" al cui apice troviamo i ciechi. Può essere definita "piramide delle tipologie di utenza". Ad essa possiamo aggiungerne un'altra, assolutamente simile alla precedente, ma capovolta, in cui, al posto dei soggetti, vi sono le loro esigenze: ad essa daremo il nome di "*piramide delle esigenze*". Riflettendo su tale schematizzazione ci si rende immediatamente conto del fatto che gli utenti sani sono sì la maggioranza, ma hanno anche meno bisogni; ogni soggetto fa parte del proprio stadio ma fa parte anche parte della piramide, come dire: il soddisfacimento di un bisogno per una categoria di utenti deve interessare ed incontrare il gradimento anche delle altre categorie di utenti.

Anche la Commissione Europea, nel libro verde "Verso una nuova cultura della mobilità urbana", ricorda come l'accessibilità urbana debba riguardare in primo luogo le persone fisiche e che un accesso agevole alle strutture urbane debba essere consentito alle persone disabili o a mobilità ridotta, agli anziani, agli adulti con bambini piccoli e ai bambini stessi (Commissione delle Comunità Europee 2007).

Ma allora, in estrema sintesi, potremmo dire che l'operato dell'urbanista dovrebbe prendere le mosse dal principio, che il cardinale Tettamanzi ha saputo rendere in maniera così semplice ed efficace, che *i diritti dei deboli non sono diritti deboli*.

Nel primo numero della rivista Urbanistica, nel 1945, Lewis Mumford parlava di *pianificazione per le diverse fasi della vita*, e affermava che l'urbanista non fosse ancora giunto a realizzare per intero la natura del suo compito, che è quello di provvedere un ambiente adatto ad ogni fase della vita, dall'infanzia alla senilità. Mumford riprende uno studio precedente, del Dr. Joseph K. Hart, pubblicato sul Survey Graphic nel maggio 1925, nel quale l'autore puntualizzava il fatto che la pianificazione urbana fosse essenzialmente concepita nei termini di una singola fase della vita: quella degli adulti privi di responsabilità familiari. Hart rilevava il significato dell'antico detto che la folla dei boulevard non invecchia mai, che il boulevard cioè, a cagione della sua funzione e della sua conformazione, attira a sé sempre lo stesso gruppo di età, che è mosso dagli stessi interessi e persegue gli stessi fini. Mumford scriveva poi: «*L'attività urbanistica finora è stata quasi esclusivamente concentrata intorno alla vita degli adulti e per di più intorno a certi aspetti soltanto della vita degli adulti, quali gli affari, l'industria, l'amministrazione, il traffico, i trasporti. Anche occupandosi degli adulti l'urbanistica omette importanti sfere di attività*».

È questo un concetto che ritroviamo nell'organica urbanistica di Columbo, che vede la città organizzata in vicinati e quartieri (Columbo 1965). Il concetto di vicinato si basa sull'attenzione a quella cellula di città costituita dall'abitazione e dai servizi sociali fondamentali, quali i negozi di prima necessità, la scuola dell'infanzia, il verde pubblico capillare, etc., ai quali si dovrebbero poter accedere a piedi. Il quartiere, composto da uno o più vicinati, si caratterizza per la presenza di funzioni sociali (scuole, negozi, servizi sociologici, ecc.) superiori rispetto a quelle del vicinato. È caratterizzato in particolare dal cosiddetto "asse di vita", dove si svolgono le funzioni sociali di convegno del quartiere (Busi 2005). La maggior parte delle città, soprattutto con impianti più recenti, non ha differenziazione nelle proprie funzioni e tale omogeneità si riscontra anche nella forma delle strade, una omologa all'altra.

Per aumentare la qualità, oltre che la sicurezza, degli spazi urbani, per permettere ai bambini di muoversi da soli a piedi, sarebbe dunque importante ridare carattere agli spazi urbani, partendo dal presupposto che la città è tale se accanto alle abitazioni ci sono scuole, uffici pubblici, negozi, luoghi di incontro, organizzati in modo tale da formare quelle unità urbanistiche che sono i vicinati e i quartieri.

Questo concetto per certi versi si contrappone a quella separazione e specializzazione degli spazi e delle funzioni che caratterizzano molte parti della città contemporanea. Posti diversi per persone diverse, posti

diversi per funzioni diverse, hanno finito con il far perdere alla città la sua funzione di luogo di incontro e di scambio, tipico invece della città storica.

2 IL BAMBINO: PARAMETRO DI PROGETTAZIONE DELLO SPAZIO URBANO

Frequentemente nelle nostre città il pedone, bambino ed anziano in particolare, si trova ad essere emarginato in uno spazio pubblico progettato e costruito quasi interamente a misura dell'automobile. Ma ciò non vale solo per loro: come già sottolineato, ciascuno di noi può essere un utente debole in determinati periodi della sua esistenza e per motivi diversi. Inoltre in condizioni particolari, quali ad esempio si presentano in un ambiente urbano congestionato, ogni utente della città si trova in condizioni di debolezza, intendendo con ciò uno stato generale di disagio e di inadeguatezza.

La constatazione che dietro l'espressione "maggioranza sana" non si cela alcuna entità assoluta ma semplicemente una componente parziale ed instabile dell'intera popolazione, fa vacillare in noi l'idea che lo standard di riferimento progettuale debba corrispondere ad essere ispirato esclusivamente alle esigenze dell'adulto sano.

Ne scaturisce l'importanza, in sede di pianificazione e progettazione urbana, di azioni integrate che tengano conto delle esigenze di fruibilità degli spazi da parte di tutte le categorie di utenza, ma soprattutto da parte delle categorie di utenti più indifese e più esposte ai rischi dell'ambiente urbano (si vedano tra gli altri Busi, 2003; Tira, Ventura, 2000 e Tiboni, Rossetti, 2011). Ed è stata proprio la volontà di occuparsi degli utenti più vulnerabili della strada e dello spazio urbano in generale che ha fatto nascere, a metà degli anni '90, presso la Facoltà di Ingegneria dell'Università degli Studi di Brescia, il Centro Studi Città Amica (CeSCAm)², nella convinzione che l'aver come riferimento l'utente debole è, da un lato, obiettivo di particolare significato sociale, e dall'altro fattore di garanzia per l'applicabilità del risultato anche a chi debole non è (Busi, 2005).

Una progettazione volta a favorire le categorie più deboli è infatti un'importante occasione di incremento di sicurezza globale dell'ambiente urbano e quindi di prestazione di validità generale (Tira, 1999).

Ecco allora che la "*misura*" con cui progettare la città potrebbe essere individuata nei più piccoli, guardando alla città e allo spazio pubblico con un'attenzione particolare proprio nei confronti dei bambini.

Numerose esperienze portate avanti negli ultimi vent'anni da molte città italiane ed europee ci spingono a riflettere sul fatto che forse la misura giusta in urbanistica potrebbe essere quella del bambino: città a misura di bambini e bambine sono città che riscoprono gli spazi di prossimità, la qualità dello spazio pubblico, la mobilità sostenibile, la città fatta anche di spazi verdi e di gioco, la città per il pedone...

In Italia il progetto "la città dei bambini" nasce a Fano nel 1991, con la finalità di operare per una nuova filosofia di governo della città, assumendo i bambini come parametro delle necessità di tutti i cittadini³. Non quindi un maggior impegno per aumentare le risorse e i servizi a favore dell'infanzia, ma per una città diversa e migliore per tutti, in modo che anche i bambini possano vivere un'esperienza da cittadini, autonomi e partecipanti.

La Convenzione ONU dei diritti del fanciullo del 1989, ratificata con la legge nazionale n.176/1991, all'articolo 12 sancisce il diritto dei bambini ad essere consultati ogni volta che si prendono decisioni che li riguardano, e questo riguarda anche le città. Naturalmente i bambini non sono in grado di rivendicare questo ruolo e questo diritto: sono gli adulti, e in particolare gli amministratori degli enti locali, che devono chiedere il loro aiuto e saperne tenere conto. A livello internazionale, i maggiori documenti che hanno ispirato la strategia

² Tra le attività portate avanti in seno al CeSCAm in questi vent'anni si ricordano in particolare le Conferenze Internazionali "Living and Walking in Cities".

³ Per una trattazione esaustiva dell'argomento si rimanda all'opera di Francesco Tonucci, ed in particolare al volume "La città dei bambini. Un modo nuovo di pensare la città", Editori Laterza, 1996.

delle città sostenibili amiche delle bambine e dei bambini, e che fanno da sfondo alle iniziative locali, nazionali e internazionali delle associazioni e dei governi per promuovere un ambiente a misura dell'infanzia, sono molteplici: la Convenzione dei Diritti dell'Infanzia, (ONU - New York, 20.11.1989); l'Agenda 21 (ONU, Rio de Janeiro 1992); l'Agenda di Habitat II (ONU, Istanbul, 1996). Nel Rapporto del Consiglio d'Europa "Strategia Europea per l'Infanzia" (Strasburgo 1996) si raccomanda che in tutte le decisioni politiche gli interessi e le decisioni dei bambini siano sempre considerati.



Fig. 3 Bambini che vivono lo spazio pubblico

Negli anni si sono poi aggiunte numerose esperienze, sia di grandi città che di piccoli comuni, che hanno contribuito con iniziative, campagne, percorsi educativi e sperimentali, alla realizzazione di un nuovo approccio all'infanzia e alla città (Busi e Ventura 1998; Pezzagno e Docchio 2010).

E per verificare l'efficacia dell'applicazione di questa nuova filosofia di governo della città, si va a monitorare il raggiungimento di un obiettivo concreto, apparentemente piccolo e semplice: che i bambini possano muoversi nello spazio urbano da soli. Il numero di spostamenti a piedi casa-scuola dei bambini è infatti uno dei dieci Indicatori Comuni Europei per un profilo di sostenibilità locale adottati dal 2002 da numerosi enti locali europei.

Uscire di casa, percorrere le strade da solo, conoscere il suo ambiente è un'esigenza importante nella crescita non solo sociale, ma anche cognitiva, del bambino. Il guaio è che la possibilità di uscire dei bambini, la loro autonomia, è inversamente proporzionale alla nostra: più noi adulti ci muoviamo in macchina, più allarghiamo il nostro raggio di movimento e più creiamo pericolo, intasiamo spazi, inquiniamo l'aria, aumentando le difficoltà di autonomia dei nostri figli (Tonucci 1996).

Molte esperienze in questo campo sono state proprio finalizzate a favorire l'andare a scuola a piedi, con l'organizzazione di linee di pedibus (Brolli e Tiboni 2008).

Affinchè sia possibile ai bambini uscire da soli di casa occorre però cambiare la città, renderla più sicura. Farla diventare una città amica.



Fig. 4 Il pedibus, nato per favorire l'andare a scuola a piedi

3 LA QUALITÀ DEGLI SPAZI PUBBLICI NEL PROGETTO URBANO

Come già affermato in precedenza, questo lavoro non ha certo la pretesa di affrontare il tema della pianificazione, progettazione e gestione degli spazi pubblici urbani; un tema questo che trova ampia trattazione nella manualistica italiana e straniera, all'interno della quale si richiamano, tra i più recenti ed esaustivi, i lavori di Carmona et alii, 2010; Colarossi e Latini 2008; Rotondo e Selicato 2010. I caratteri di uno spazio urbano di qualità sono stati ampiamente declinati anche dall'architetto danese Jan Gehl nel suo libro *"New City Life"*, che ha preso forma all'interno del Center for Public Space Research di Copenhagen. Secondo Gehl i caratteri principali, che garantiscono qualità allo spazio cittadino, possono essere raggruppati in tre categorie: *Protection*, *Comfort* ed *Enjoyment* (Gehl et alii 2006).

In questo scritto ci si è voluti invece interrogare sull'importanza che dovrebbe avere, nel dibattito urbanistico, il tema della città a "misura" delle utenze più deboli.

E allora ci si chiede in che modo è possibile intervenire sulla città per renderla più sicura, e dunque più attraente, e più a misura di bambino?

Per cercare di rispondere a questa domanda è necessario fare riferimento ancora una volta al dualismo tra città del costruito e città delle relazioni. Da un lato infatti bisognerà intervenire sulla città della pietra (la città del costruito) con azioni finalizzate ad aumentare la sicurezza del pedone che si muove nello spazio urbano, andando così ad incidere sulla conformazione dei luoghi; dall'altro è necessario tendere a pianificare opportunamente il tessuto funzionale e relazionale (la città delle relazioni).

Per quanto riguarda la prima dimensione di intervento, le attività di ricerca e sperimentazione, portate avanti anche dalla scuola di urbanistica bresciana, hanno permesso di confrontare tra loro due diversi approcci di sicurezza stradale in città, che portano con sé altrettante strategie di intervento.

Il primo approccio consiste nell'eliminare i conflitti e i pericoli impedendo gli incontri tra le diverse categorie di utenti. Tale soluzione fu inizialmente privilegiata dagli urbanisti, che tentarono di attuarla attraverso la nozione di segregazione, che consiste nel creare reti differenziate per le differenti categorie di utenti. Alla fine degli anni '60 si credeva fermamente che la soluzione ai crescenti problemi di traffico dei paesi industrializzati consistesse nella separazione degli utenti, attraverso la classificazione della rete stradale in termini di funzione e capacità. L'idea di base era quella di eliminare i conflitti tra automobili e utenti deboli. Queste modalità di pianificazione del traffico erano applicate in modo efficace laddove nuovi quartieri residenziali prendevano il posto di aree agricole inedificate. Tuttavia l'applicazione di questo principio di separazione dei flussi di traffico creava problemi nelle aree urbane già esistenti, non essendo sempre

applicabile. In particolare le strette strade dei centri storici non permettevano di disporre di spazio sufficiente per applicare questo modello di separazione (Tiboni 2010).

Prese così piede, a poco a poco, un secondo approccio, che consiste invece nel puntare il più possibile sull'integrazione tra i diversi utenti della strada, evidenziando i rischi del muoversi, in modo da far sì che gli utenti regolino autonomamente i conflitti, consci delle possibili conseguenze.

In Olanda, nella città di Delft, verso la fine degli anni '60, nacque un movimento di cittadini, spazientiti a causa del traffico che interessava le strade residenziali, intenzionati a riappropriarsi del loro spazio urbano. Le strette vie lungo i canali vennero ricostruite applicando un modello di integrazione del traffico: ampie aree urbane vennero ridisegnate e organizzate per renderle più piacevoli, inserendo panchine, alberi, spazi per il gioco dei bambini, ma lasciando la possibilità alle auto di passare, muovendosi a passo d'uomo. La velocità venne ridotta utilizzando dispositivi fisici come restringimenti, dossi, chicane che fungevano da veri e propri ostacoli per gli automobilisti. L'effetto fu quello di rendere lo spazio pubblico più vivibile e una sorta di estensione nella strada dello spazio privato a disposizione dei residenti. Questa soluzione, nota come "*woonerf design*", è considerata l'emblema delle tecniche di traffic calming (Kiemtrup e Herrsted 1992).

Ma, come detto in precedenza, per rendere le città sicure non è sufficiente intervenire solo sulla città del costruito, è necessario agire anche sulla città delle relazioni, pianificando opportunamente le funzioni che le varie parti della città vengono ad assumere, e il modo con cui tali funzioni sono tra loro opportunamente connesse.

L'importanza di una visione integrata della città del costruito e della città delle relazioni emerge chiaramente anche dagli studi condotti da un centro di studi e ricerche sui quartieri e sullo spazio pubblico, il Centro Abitare la Città, nato all'interno del Dipartimento di Architettura e Urbanistica per l'ingegneria dell'Università "La Sapienza" di Roma, che ha sviluppato l'idea di un'*urbanistica nella piccola dimensione* (Colarossi, 2007), che ha sicuramente punti in comune con la città amica del CeSCAm, primo fra tutti il principio secondo cui lo spazio pubblico è una componente della città necessaria a dare vita alla città stessa, perchè è generatore di qualità urbane, necessarie all'abitare. Esso genera qualità urbane quando possiede a sua volta le qualità di *urbanità*, di *accoglienza* e di *bellezza*.

Urbanità è la qualità propria della città dove lo spazio pubblico è il luogo lungo il quale o attorno al quale si dispongono le attrezzature urbane. Perchè la città è tale se contiene scuole, ospedali, chiese, uffici pubblici, negozi, luoghi di divertimento...Questo concetto per certi versi si contrappone a quella separazione e specializzazione degli spazi e delle funzioni che caratterizzano molte parti della città contemporanea.

Accoglienza è la qualità di base dello spazio pubblico, che, in quanto pubblico, deve essere di tutti, a tutti accessibile, da tutti utilizzabile, ma anche da tutti godibile.

E quindi lo spazio pubblico deve poter essere anche godibile, perché la qualità dell'accoglienza dovrebbe essere la qualità di uno spazio dove ci si senta a proprio agio e sicuri, e dove sia possibile godere del contatto diretto con il mondo fisico, godere della luce, del clima, dello stare, del camminare, uno spazio pubblico che sia anche pedonale, che è condizione necessaria per godere con tranquillità e comodità del paesaggio urbano. Dunque anche godere della qualità della bellezza di quel paesaggio: bellezza, nella città, che è una qualità necessaria, in quanto da sempre esigenza profonda di tutti; bellezza che è non solo sublime o artistica, ma anche piacevolezza, gradevolezza, il sentirsi bene e bene accolti nello spazio urbano (Colarossi 2007).

Ma nella città contemporanea sono assai poche le aree urbane nelle quali si possano riscontrare le qualità dello spazio pubblico appena descritte. Spesso mancano spazi pubblici con queste qualità, e quando presenti, sono isolati dallo spazio pubblico tradizionale (le strade, le piazze, i parchi e i giardini), perchè sono recintati, o racchiusi all'interno di strutture private. E così la strada commerciale viene nascosta all'interno dei

centri commerciali, riducendo lo spazio pubblico a una strada trafficata o ad un parcheggio (per approfondimenti si veda tra gli altri Maternini 2009 e Tiboni 2010).

Camminare, in questa città, è difficoltoso e anche pericoloso. Le strade e le piazze sono occupate dai veicoli, in movimento o fermi, i marciapiedi sono di larghezza appena sufficiente a un pedone, oppure occupati dai veicoli in sosta, dai cassonetti per i rifiuti, da cartelli di segnaletica stradale o da cartelloni pubblicitari. In queste condizioni anche gli alberi piantati lungo i marciapiedi o le fontanelle pubbliche diventano una difficoltà per i pedoni.

Gli edifici sono disposti senza relazione con lo spazio pubblico, spesso senza leggibili relazioni tra loro, con intervalli troppo ampi tra edificio e edificio.

Ne risulta un paesaggio urbano povero di qualità estetiche e ne risulta una città povera delle qualità di urbanità, di accoglienza e di bellezza dello spazio pubblico. Una città povera di vita, una città da ri-generare per poter dare ai suoi abitanti le indispensabili qualità dell'abitare (Colarossi 2007).

E' proprio, e soprattutto, in questa attività di rigenerazione dello spazio urbano che l'attenzione andrebbe rivolta ai più deboli, nella convinzione di raggiungere così un livello di qualità dello spazio di cui tutti possano beneficiare.

4 LA CITTÀ DEL FUTURO SARÀ UNA CITTÀ AMICA?

Sono passati vent'anni dall'inizio dell'esperienza della città dei bambini di Fano e oggi forse sembra essere un po' passata di moda, con esperienze come il Pedibus, nato per favorire l'andare a scuola a piedi, che finiscono con l'essere trattate alla stregua di un qualsiasi servizio, che deve fare i conti con i bilanci degli enti locali.

E la città dei bambini ha ceduto forse il passo alle più moderne esperienze di smart cities: città intelligenti, dove l'obiettivo prioritario è la gestione ottimizzata delle risorse energetiche e del trasporto, per rendere le aree urbane massimamente efficienti, riducendo le emissioni di carbonio, i rifiuti, l'inquinamento e la congestione. Puntare sulle nuove tecnologie sembra essere il passo da compiere per migliorare la gestione dei processi urbani e la qualità della vita dei cittadini, che per vivere bene pare debbano essere dotati di strumenti di connessione e comunicazione 24 ore su 24.

Così facendo si potrebbe però correre il rischio di cadere in una nuova standardizzazione del cittadino-tipo e dei suoi bisogni?

Forse vale la pena di fermarsi a riflettere se sia sufficiente una città che massimizza le "relazioni telematiche" o non sia comunque da privilegiare una città fatta di spazi godibili, accessibili a tutti, con automobili che si muovono a velocità ridotte, con spazi pubblici in cui i bambini non solo possano muoversi a piedi in sicurezza, ma dove possano anche giocare, e gli adulti incontrarsi, con vicinati e quartieri accoglienti che diventano spazio di prossimità in cui si può almeno in parte recuperare una dimensione di relazione, che ci spinge ad essere l'uno responsabile dell'altro.

Negli ultimi anni la consapevolezza della necessità di un ambiente urbano di qualità ha spinto diverse città a promuovere la rinascita degli spazi pubblici, per raggiungere migliori condizioni di sostenibilità sociale, ambientale ed economica: una città più piacevole e vitale invita la gente a trascorrervi del tempo, viverla e visitarla. Il rinnovato interesse per gli spazi pubblici urbani può essere interpretato come un tentativo di riconnessione del tessuto urbano della città frammentata, ma anche come uno strumento di marketing sociale: se la città e le regioni competono nell'economia mondiale per attrarre capitale è necessario creare un ambiente attrattivo e sicuro (Hall, 1995), dove la presenza dei bambini, che si muovono e vivono lo spazio pubblico può diventare un indicatore della qualità nella pianificazione e progettazione urbana, ma anche indicatore per monitorarne nel tempo la corretta gestione.

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IMAGES SOURCES

Fig. 1a: Cesare Cesariano, 1521

Fig. 1b: Confederazione svizzera, *Abbildungen der schweizer Gedenkmünzen aus Kupfernickel*, 2009

Fig. 2: Michela Tiboni, 2011

Fig. 3: Michela Tiboni, 2008

Fig. 4: Michela Tiboni, 2006

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HOW TO IMPROVE URBAN RESILIENCE?

INSIGHTS INTO THE ROLE OF CRITICAL INFRASTRUCTURES
DISASTER MITIGATION STRATEGIES

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ABSTRACT

Critical infrastructures (CI) systems provide essential services “for the maintenance of critical societal functions, including the supply chain, health, safety, security and economic or social well-being of the people” (European Commission, 2008). These systems are exposed to a great number of hazards and threats, which may result in severe consequences for the population, the socio-economic system, and the environment. The issue is particularly relevant at urban level, where the disruption of one CI system can propagate to the other systems and paralyze the entire area. It is therefore necessary, not only to protect CIs through Critical Infrastructure Protection (CIP) strategies, but also to enhance the resilience of these areas. This article aims thus at providing some insights related to the evolution of the critical infrastructures disaster mitigation strategies from the sole protection towards resilience: what kind of strategies based on resilience can be developed to address CIs disruption at local or regional level? To what extent do these strategies contribute to increase the resilience level of the entire urban or metropolitan area?

The first section focuses on the urban critical infrastructures systems as well as on the way their disruption can impact urban areas. The second section provides with some examples of key measures to operationalize resilience in the field of critical infrastructure disaster mitigation strategies. The last section highlights how the key measures developed to enhance the resilience against CI disruptions can benefit also to broader urban resilience.

KEYWORDS:

Critical infrastructures, metropolitan and urban areas, resilience, essential services

1 DEFINITIONS, BACKGROUND AND KEY ISSUES

Milan, Lombardy (Italy), 21st of December 2009: due to a heavy snowfall and to very low temperatures, major transportation and energy infrastructures of the urban area suffer disruptions (Figure 1), that will result in high socio-economic consequences. Cities are vulnerable to natural events and this vulnerability is aggravated by the impacts such events can have on so-called critical infrastructures. Critical infrastructure (CI) refers to “those assets or parts thereof, which are essential for the maintenance of critical societal functions, including the supply chain, health, safety, security and economic or social well-being of the people” (European Commission, 2008). The disruption or destruction of some of these infrastructures can be debilitating to the needs of society and individual citizens. The issue is particularly relevant at urban level, where the disruption of one critical infrastructure system can propagate to other systems and paralyze the entire area. An urban area is defined here as “a human settlement characterized by a significant infrastructure base – economically, politically and culturally – a high density of population” (Metropolis, 2011). Hence, the disruption of critical infrastructure systems in such areas can trigger catastrophic consequences. It is therefore necessary, not only to protect critical infrastructures through Critical Infrastructure Protection (CIP) strategies, but also to enhance their disaster resilience, i.e. “the capability to prevent or protect against significant multi-hazard threats and incidents, including terrorist attacks, and to expeditiously recover and reconstitute critical services with minimum damage to public safety and health, the economy, and national security” (TISP, 2006). Resilient critical infrastructures systems contribute to build resilient cities, which “create, enable, and sustain the services and institutions required for basic on-going survival [...]. They avoid relying on solutions that depend on anticipating specific hazards, and instead take a broader, integrated approach” (Metropolis, 2011).

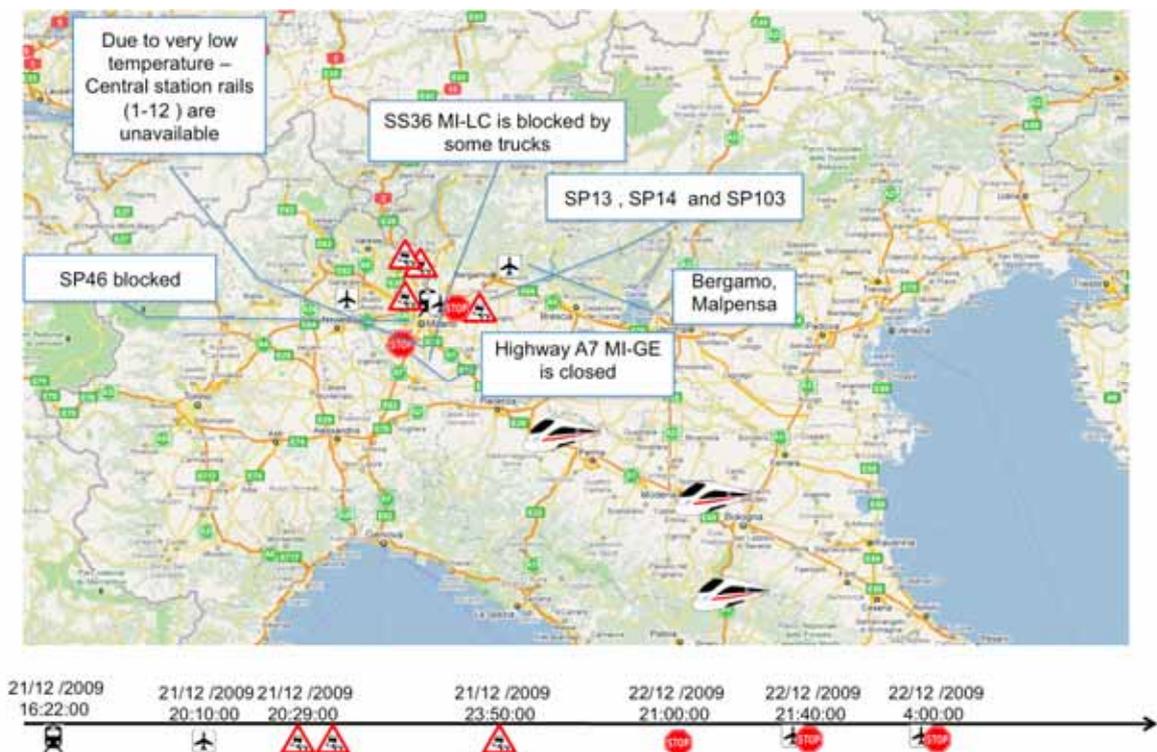


Fig. 1 Impacts on transportation systems of the severe snowfall in the Lombardy Region, 21st of December 2009

In the literature and in practice, critical infrastructures disaster mitigation strategies are mostly addressed by approaches related to the risk and emergency management. The focus is most often laid on the immediate coping capacities to respond to a crisis due to critical infrastructure disruption, while the factors related to the broader resilience of societies to stand and face these events are often underestimated (Petrenj et al., 2011). The resilience literature is characterised by numerous fields of applications, e.g. in ecology (Holling, 1973), in psychology (Richardson, 2002) or in climate change research (Pandolfi, 2003). Because of this fragmented vision, the way critical infrastructure disaster mitigation strategies contribute to urban resilience, as well as the importance of addressing critical infrastructure disruptions on the basis of the resilience principles is too seldom analysed. There is still a lack in understanding how both concepts interact: what kind of strategies based on resilience can be developed to address critical infrastructure disruption at local or regional level? To what extent do these strategies contribute to increase the resilience level of the entire urban or metropolitan area?

This article aims therefore at addressing this conceptual gap, proposing some insights on how local or regional critical infrastructure disaster mitigation strategies can participate to building broader urban resilience. Our reflection is based on the experience of the authors in supporting different Authorities to develop and implement policies focusing on Critical Infrastructures (e.g. Regione Lombardia, 2012), as well as on the results of two international Workshops reviewing the main on-going experiences related to regional and local critical infrastructure protection and resilience strategies¹.

The first section demonstrates to which extent critical infrastructure disruptions make urban areas more vulnerable and how the strategies adopted need to shift from the sole protection policies towards approaches based on resilience. The second section aims at understanding the most relevant characteristics of the emergent critical infrastructure disaster mitigation strategies based on some resilience principles at local level. The last section highlights the main links between critical infrastructure disaster mitigation strategies and urban resilience with the view to propose some preliminary recommendations to the decision-makers involved in enhancing the capacities of our society to face major disruptive events.

2 CRITICAL INFRASTRUCTURES DISRUPTIONS INCREASE URBAN VULNERABILITIES

This section focuses on the urban critical infrastructures systems as well as on the way their disruption can impact urban and metropolitan areas. Addressing the issue of critical infrastructure disruption can thus be seen as a key to read urban vulnerabilities. As a consequence, we argue that critical infrastructure disaster mitigation strategies are not only a matter of risk and emergency management, but are also strongly related to the question of resilience.

2.1 CRITICAL INFRASTRUCTURES DISRUPTION AS A KEY TO READ URBAN VULNERABILITIES

Some infrastructures systems, as means towards ensuring the delivery of goods and service, play a critical role in metropolitan and urban areas because they provide an essential foundation for social and economic interactions. In particular, critical infrastructures contribute to:

- Delivering the vital services to the high densities of population concentrated in urban areas, e.g. water, energy for domestic use, health and emergency services, etc.;

¹ 1st International workshop on Regional Critical Infrastructure Protection organised by Risk Governance Solutions S.r.l. for the Lombardy Region in Milan, 16-17-nov 2011 and the 2nd International Workshop on Regional Critical Infrastructure Resilience organised by Risk Governance Solutions S.r.l. and the Scottish Government in Edinburgh, 15-16th november 2012. For more information, see www.recipre.org

- Supporting and developing the economic system, through telecommunication, energy supply, financial, banking and insurance services, transportation, etc.;
- Supporting the socio-political functions, as for instance administrative, governmental services;
- Connecting the urban area with the rest of their region, country or other countries, thanks to transportation systems and telecommunications.

Within a urban area, critical infrastructures do not exist in isolation of one another and are increasingly interdependent: airports and railways depend on electricity and communications, the power grid depends on communication among power plants and distribution nodes, telecommunications networks depend on power supply for the transmission links and the exchange nodes, etc. (Gheorghe, Schlaepfer, 2004).

These interdependent systems of critical infrastructures are exposed to external sources of hazards and threats (e.g. floods, storms, landslides, seism, etc.) or to internal events like technological failures of the system components or assets (Table 1).

TRIGGERING EVENTS	CATEGORY	INTERNAL	EXTERNAL
Natural	Non-intentional		E.g. Floods, earthquake, landslides, etc.
Technological	Non-intentional	E.g. Technical failure	E.g. Industrial explosion, failure of other CI systems
Human	Non-intentional	E.g. Human error	E.g. Human error
	Intentional	E.g. Sabotage	E.g. Terrorist attack

Tab. 1 types of triggering events causing Critical Infrastructures disruption

These hazards and threats can trigger three levels of impacts:

- 1. The direct impact refers to the technical vulnerability of the infrastructure and is located where the triggering event happens, e.g. a technical failure within a power production plant.
- 2. The indirect impacts are due to the cascading or domino effects. The initial failure can propagate inside the infrastructure system or from one system to another (e.g. because of the blackout, trains have to stop). Table 2 shows the cascading effects of a power disruption on other urban critical systems.
- 3. The final consequences at urban or metropolitan level are the result of the service disruption. They refer to the vulnerability of an area against essential services disruption. They affect the population (e.g. people who could not heat and cook in Bulgaria because of the Ukraine-Russia crisis during winter 2006 and 2009 (BBC News, 2009), the economic life, (e.g. the interruption of the US economic activities after the World Trade Center attacks amounted at 517 billions Euros (Bouchon et al., 2008), the public confidence (e.g. the decrease of confidence in the authorities and in the food production industry after the mad cow disease in UK (Cleeland, 2009), or the environment.

Infrastructure	0-2 hours	2-8 hours	8-24 hours	24 hours >>
Transport	Depends on characteristics of area and nature of train-system. Electricity dependent: no traffic, non- dependent on electricity: traffic with delays. Urban systems stop, road traffic in chaos	Delays increase and ripple through to unaffected parts of the system. No traffic at all on affected parts	No traffic at all, fuel supply problems	No public transport
Communication	Difficult to supply information, outages of transmission poles	Information back set, more personnel needed		Availability of personnel decreases
Waste disposal	Difficult due to traffic congestions, delay in disposal of waste		Collection is difficult, possible un-hygienic circumstances	
Electricity			Difficult to keep communication up	Possible problems with fuel supply for generators
Drink water	Production: control of remote stations Distribution: local pressure drops on stations without generators, in case of loss of pressure devices: nor water on higher floors			Water is guaranteed
Sewage management	Low lying areas, with rainfall: flooding of sewer water after 2 hours	Flooding in higher areas as well	Also flooding in case of no rain	Flooding
Gas	Generally no problems, receivers will endure problems in energy dependent systems; climate control, watersupply.			In case of pressure loss: temperature drops
Telecommunication	Telephone is assured, possible problems with GSM systems, internal operators outage. No fax, congestion in telephon network			Telephone system assured. Possible problems with generators due to fuel supply problems

Tab. 2 cascading effects in time after electric power supply failure

Because of the potential severity of their consequences, critical infrastructures disruptions are a key to read the vulnerability of urban societies that strongly rely on essential services. The example of the damages encountered by the Taiheiyo Belt of Japan during the tsunami and the earthquake in March 2011 is quite representative: major critical means of transportation of the country are concentrated in this highly industrialized and populated region. During the earthquake and the tsunami, these infrastructures were severely impacted: five stations of the Shinkansen system were destroyed, the railway network suffered damages in 1,100 locations, and 347 km out of 675 km of the Tohoku Expressway needed rebuilding works. The widespread blackout caused by the earthquake caused loss of traffic control, shutdown of elevators, loss of access to media, disruption to mobile phones, etc. The sole damages to infrastructures amount to 3, 5 trillion yen (Kitamura, 2011). In order to mitigate the potential damages due to critical infrastructure disruptions and to reduce these vulnerabilities, the first Critical Infrastructure Protection (CIP) policies appeared in the mid 1990's in the USA and around 2000 in Europe (Ritter et al., 2004). Though the focus laid on protective strategies is now questioned (Kroger, 2008).

2.2. FROM PROTECTION TO RESILIENCE STRATEGIES TO ADDRESS CI DISRUPTIONS

On the basis of the first results reached by the first Critical Infrastructure Protection policies, we argue that critical infrastructure disaster mitigation strategies are not only a matter of risk and emergency management, but are also strongly related to the question of resilience of local or regional territories. The objective of protection is to make the infrastructure invulnerable to any kind of disruption or attack. This can be achieved through protection measures aiming at enhancing the robustness of the infrastructure. Though

these measures have a high cost, often supported by the critical infrastructure operators directly and their efficiency is not proved yet: it appears very difficult to make an infrastructure system reliable at 100%. This is the reason why resilience strategies can be seen as complementary to protection measures. Resilience is the “system’s ability to rebound, return, or recover its original state” (Holling 1973) or the capacity of a system “to utilize or even benefit from perturbations and changes that attain it, and so to persist without a qualitative change in the system’s structure” (Van der Leeuw et al., 2001). The resilience can be the resilience of the infrastructure system (e.g. through redundancy, backups, geographical isolation) or the resilience of the society depending on the services provided by the infrastructure system (e.g. through a better preparation of the authorities, of the population and of the economic world (e.g. business continuity, etc.)). The resilience approach takes then more sense when applied at local or regional level, because this is where the direct and indirect impacts of critical infrastructure disruptions are felt in a first place. Critical Infrastructure Protection strategies have traditionally been driven from a National Security and Counter Terrorism perspective. Though, these strategies have shown some limits (Scalingi, 2011). Regional and local policies are based on the assumption that critical infrastructure systems, which mostly operate at local or regional levels need to be analysed in their context, i.e. in the territory where they are embedded.

An approach based on resilience allows therefore shifting from a focus set on the infrastructure as technical system to capture the complexity of the critical infrastructures as socio-technical systems. This evolution is close to the emergence and development of the urban resilience, which has become much stronger in urban growth management, not only as a buffer against natural disasters, conflicts and involuntary migration, but as “means of enabling economic development and civil society to adapt in circumstances too complex to be incorporated into urban services and infrastructure plans” (Metropolis, 2011).

One of the main results of the 2nd International Workshop on Regional Critical Infrastructures Resilience (Edinburgh, 2012) is to have acknowledged the importance of shifting from protection issues towards resilience issues. Though one of the main challenges is to understand how to operationalize resilience so that it does not stay as a concept but is translated into concrete measures. In the following section, some key measures of CI disaster mitigation strategies at local level are given to illustrate the implementation of resilience principles.

3 KEY MEASURES TO OPERATIONALIZE RESILIENCE IN THE FIELD OF CRITICAL INFRASTRUCTURE DISASTER MITIGATION STRATEGIES

Based on the results of the two workshops organized in Milan (2011) and Edinburgh (2012), it is possible to highlight some key measures that allow operationalizing the concept of resilience in the field of disaster mitigation strategies. These key measures are described and illustrated with relevant examples, but the limits of difficulties for their implementation are also emphasized.

3.1. EXPANDING THE KNOWLEDGE ON INTERDEPENDENT CRITICAL INFRASTRUCTURE SYSTEMS

In a first place, a resilient approach to critical infrastructure disaster mitigation should build on a good understanding of how the critical infrastructure systems are organized and of the kind of failures they could suffer. The main assumption is here that building resilience is a matter of knowing better the potential scenarios that could trigger disastrous consequences for the local communities. This is quite a challenge with respect to critical infrastructures systems which complexity is very difficult to model (Cagno et al., 2011). In particular the focus on the interdependencies and on the identification of all the potential cascading effects is

challenging. This why the research projects or strategies aiming at expanding the available knowledge on local or regional systems can be seen as a key measure to operationalize resilience.

Examples of this are given for instance by the research carried out by the Ecole Polytechnique de Montréal on modelling the interdependencies and domino effects for critical infrastructure systems in Quebec City, Canada (Cloutier, 2011; Robert et al., 2010). The research was developed to support the development of the Quebec governmental policy for the resiliency of its critical systems, in collaboration with 15 government departments and other critical infrastructure operators and industrial partners. Based on the resources exchanged by these operators, the model allows the visualization and the anticipation of domino effects in time and space, enabling the operators to set up convenient mitigation measures to avoid their propagation. Results are gathered into a GIS system to analyse domino effects and their propagation in time, based on the geographical information collected among operators and organizations. This tool allows critical infrastructure operators and public safety managers to visualize interdependencies and potential cascading effects and implement mitigation measures. In Italy, the University Polytechnics of Milan has developed for the metropolitan area of Milan (Lombardy Region) a functional model of vulnerability and interoperability, based on a Service Oriented Architecture (SOA). Threats, vulnerable nodes of interdependent infrastructures are modeled, which makes it possible to assess the propagation of inoperability and demand variations throughout the nodes of the same critical infrastructure and between inter-dependent systems (Trucco et al., 2011).

The added value of this type of research works for resilience is that they provide results that are directly useful for the various stakeholders involved in critical infrastructure disaster mitigation activities. In particular, mapping technologies are essential to gain and maintain the stakeholders' interest, as dynamic maps of potential domino effects constitute a concrete, visible output of a scientific research project made operational. Although the importance of the research activities aiming at characterising, understanding, and modelling urban or metropolitan interdependent critical infrastructures systems is acknowledged, they are still limited by difficulties due to the collection and update of relevant data and information, as well as by the necessity to benchmark different modelling strategies and formalisms. Main challenges are still about creating a trustable and secure environment to exchange data and other information among different operators, modelling the complexity of such systems and about providing valid results that meet the needs of both the operators and policy-makers.

3.2. IMPLEMENTING PUBLIC-PRIVATE PARTNERSHIP BETWEEN AUTHORITIES AND CRITICAL INFRASTRUCTURE OPERATORS

Another key measure to implement resilience in the field of critical infrastructure disaster mitigation strategy is related to the development of collaboration schemes between public and private stakeholders. Resilience is a matter of the whole community and not only of the Public Authorities. This why main governance models are seen as a fundamental pillar to enhance resilience (Provan et al., 2008). The development of critical infrastructure disaster mitigation policies at local or regional level can be seen as a field of application of the concept of network governance (Sutter, 2011). The core argument of this approach is that complex problems can no longer be resolved by traditional, centralized and hierarchical forms of governance, but need to be addressed by decentralized and highly specialized networks of actors with specific skills and resources. In the field of critical infrastructures disruptions, there is a need for collaboration because of the systems' interdependencies and the complexity of the risks that individual organizations cannot address on their own. Information is therefore the critical resource (on threats, risks, countermeasures, goals and means of attackers, interdependencies) as well as the related networks of information sharing. Access to this

kind of information is though a major difficulty because it is confidential and operators are not willing to share it. For any organization, protecting its critical information is primarily a question of security since disclosing confidential information can make this system extremely vulnerable. Cross sector and public/private information sharing requires the creation of an environment of trust where stakeholders feel safe to share their concerns and vulnerabilities.

This is why Public-Private Partnerships (PPP) play an important role in building resilience to support shared critical infrastructure disaster mitigation strategies. Such PPP are already operational for instance in Scotland, where the regional Critical Infrastructure Strategy “Secure and Resilient” is based a Critical Infrastructure Partnership Framework between Government and those responsible for the critical assets, with the view “to minimise disruption to any part of that infrastructure or to any of our communities living and working across Scotland” (The Scottish Government, 2011). In the Lombardy Region, Italy, the Civil protection Authorities have developed a collaborative approach with the key regional energy and transport operators, in order to improve the existing emergency management practices (Regione Lombardia, 2012). Their work focused in particular on identifying the relevant flows of communication during a critical infrastructure disruption event (the scenarios focused on a severe snowfall event and a blackout) and on the development of a web-sharing platform for the communications. The operators could state the kind of information they needed (e.g. very precise meteorological predictions), the information they could provide (in particular if this information could have an impact for the other operators), the role they expected the regional crisis management center could play (e.g. to communicate with the public). A dedicated information and communication system was created and tested during an exercise (Figure 2).

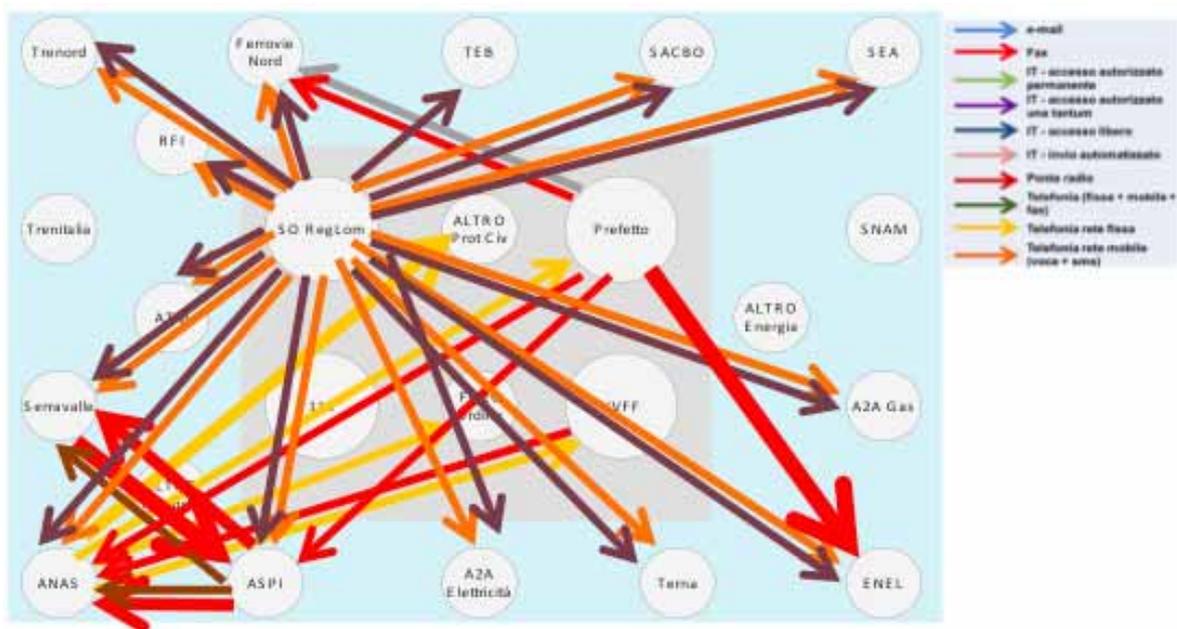


Fig. 2 Communications map among Lombardy Region Civil Protection authorities and CI operators during an emergency

Main challenges towards the development of sustainable governance scheme in the field of critical infrastructure strategies remain among others the identification of the stakeholders (not too few, not too many), the types of collaboration process to be developed (e.g. protocols, informal discussions, exercises, etc.). The long-term sustainability of these processes is also a key issue: it is fundamental to maintain the interest of involved stakeholders by looking and taking into account their needs and perspectives. The

adoption and the development of adequate technologies and communication systems is also particularly relevant to support local/regional collaboration processes. Finally sustainability is also a matter of funding: if collaboration processes create lots of excitement at the beginning, funds are necessary to maintain them active in the long range. New forms of synergies and innovative co-financing strategies of PPP, involving the participation of both public and private actors need to be explored.

3.3. SETTING UP ACTION PLANS TO ADDRESS PREPAREDNESS AND SECURITY GAPS

Current emergency management practices are questioned by the possibility to face major critical infrastructure disruptions. Main issues are related to the need to address new types of scenarios emphasizing the complexity of the potential emergency situations, to the need to work directly with the operators, and to the necessity to develop efficient coordination strategies supported by adequate tools, such as GIS systems. Notwithstanding these difficulties, improving the emergency management capacities is a key element to increase the resilience level of a territory. This is even more relevant in the case of critical infrastructures, which constitute potential targets for terrorist attacks. Terrorist threats are difficult to predict and this is the reason why emergency management systems need to be designed to mitigate also unexpected events.

Key measures in that regard are related to the integration of “critical infrastructure interdependencies and cascading effects mitigation into planning and preparedness activities” (Peters, 2011). In practice, this means setting up efficient coordination schemes, defining in a coherent way the distribution of resources, responsibilities and roles, enhancing the capacity planning, supporting the use of digital maps for the strategic management level, to avoid fragmented views and to share relevant information. To operationalize resilience, it is also important to set up action plans to address preparedness and security gaps. In the United States, the FEMA has developed the “whole community” approach where regional, local, state and national government agencies, utilities and other essential service providers, businesses, non-profit organizations and social service groups, academia, faith-based and ethnic groups are mobilized (FEMA, 2011). This approach aims at bringing cross-sector and multi-jurisdiction representatives together with experts from diverse disciplines to examine vulnerabilities, consequences, and preparedness gaps for all-hazards incidents and disasters (Figure 3). This enables stakeholders to develop a baseline needs assessment to collectively determine areas of improvement and cost-effective solution options. The biggest benefit of this approach is to build trust among heterogeneous groups (multicultural, interdisciplinary, cross-sector, etc.), in order to operationalize resilience and to build a sustainable, on-going resilience process based on public-private collaboration. This process has been driven in the United States for the Pacific NorthWest Economic Region (PNWER)² and the Bay Area Regional Disaster Resilience Action Plan Initiative³ (Scalingi, 2012).

² <http://www.pnwer.org/>

³ <http://quake.abag.ca.gov/resilience/>

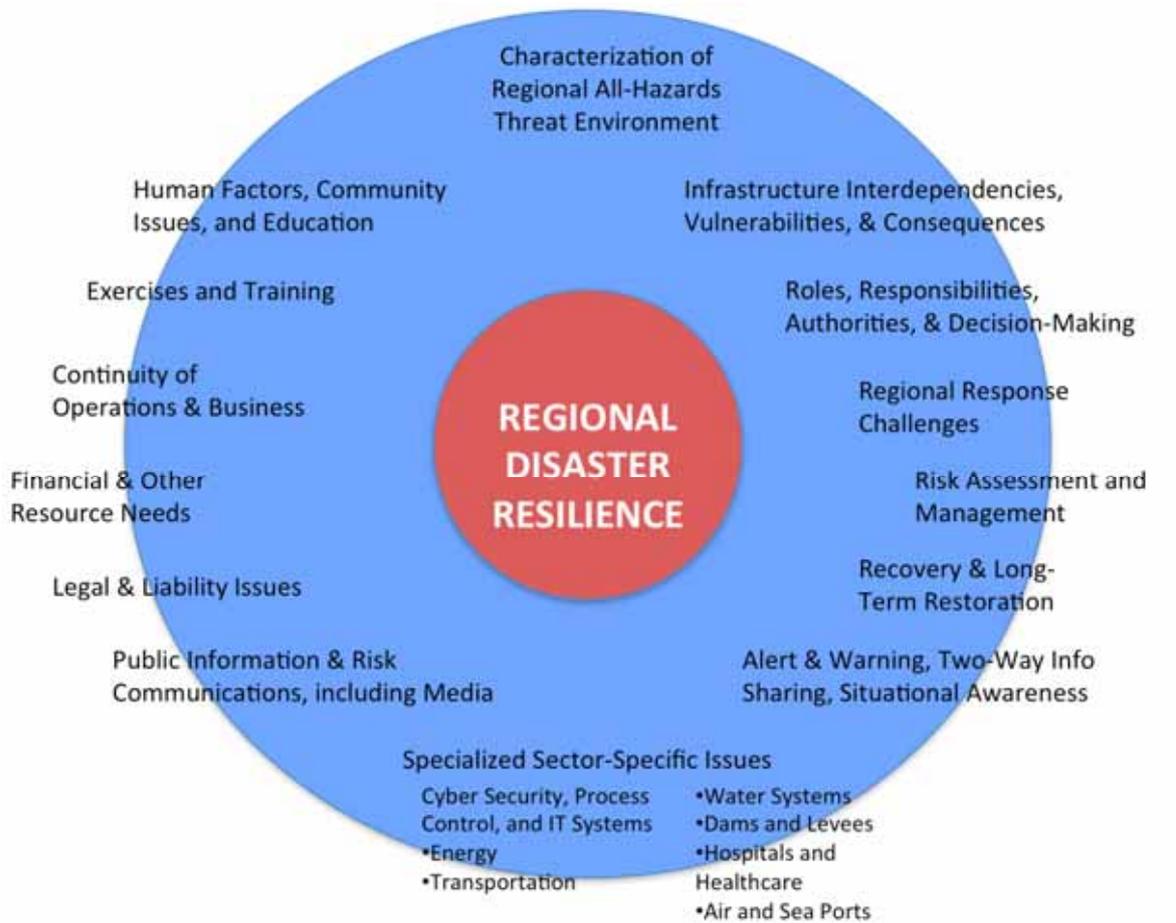


Fig. 3 The regional disaster resilience model

Critical infrastructure disaster mitigation strategies are only emerging and the examples given above do not cover all the possible ways to operationalize resilience. Though these key measures express the need to develop actions that are directed towards reducing the potential consequences of critical services interruption of supply, taking into account the fact that critical infrastructures are systems which require protection but that they are also embedded within territories which resilience need to be increased. Since critical infrastructures systems are embedded within the urban territories and support the urban activities and functions, it is possible to ask how critical infrastructures mitigation strategies can contribute to increase the resilience level, not only of the critical infrastructure systems but also of the urban territories.

4 FROM CRITICAL INFRASTRUCTURE RESILIENCE TO URBAN RESILIENCE: SOME PERSPECTIVES

This section aims at answering the following question: what can we learn from the experience developed in the field of critical infrastructure resilience, which would be also relevant to enhance urban resilience? To which extent the key measures taken to mitigate critical infrastructure disruptions consequences could contribute to increase the overall resilience of the communities? Keeping in mind that a resilient city is able “to withstand a variety of challenges if the following elements [redundancy, flexibility, capacity to learn, capacity to reorganise] are incorporated into urban systems and the ways in which people construct and

maintain those systems” (Resilience Alliance, 2007), we propose here some insights provided in the form of recommendations addressed to local or regional decision-makers aiming at increasing their resilience level.

Develop the knowledge and increase the understanding of how our societies work: The activities related to increasing the knowledge and understanding of the interdependent critical infrastructures systems are of key importance to build resilience against critical infrastructure disruptions. We believe here that building a knowledge basis of the territory seen as a complex system where social, technical, natural, economic, and political aspects are interacting is extremely relevant to build urban resilience. For instance the information related to how interdependent critical infrastructures systems are organized are relevant for critical infrastructure disaster mitigation activities but also to understand where the bottlenecks of these systems are and which future modifications or extensions of these systems could be planned. Better analysis of the supply chain of essential services, as well as their visualization on a GIS tool provide a sound support to the decision-making process to address critical infrastructure disruptions but also to elaborate strategies for future infrastructures development, ensuring an equal accessibility of all inhabitants to the essential services, etc. It contributes then to the identification of the main challenges faced by some urban areas as well as it enables those challenges to be responded more directly and effectively.

Draw lessons learnt from the past events: Developing a sound knowledge basis also includes a good capacity to learn. Capacity to learn encompasses the “ability to internalise past experience, respond to them, and avoid repeating mistakes to ensure that future decisions are made with appropriate caution and forethought” (Metropolis, 2011). For instance, in Japan, the Tohoku northeast area of mainland Japan expected an earthquake of magnitude 7 or higher based on historical records; the Japan railway company expected a possibility of derailment, so they had introduced an early earthquake warning system. The quake measurement equipment has been improved and increased and the time from early tremor detection to electric supply cut has been reduced from 3 to 2 seconds. In March 2011, all 27 trains stopped without derailment injuries or fatalities. Notwithstanding these measures, what was not well anticipated was the combination of hazards, in particular the magnitude of individual earthquakes and tsunami, nor evaluated their combined effects (Kitamura, 2012).

Be prepared to face disastrous situations: since not all disastrous situations can be anticipated, a factor of resilient societies is to be ready to face unexpected events. This includes measures such as improving the redundancy, the flexibility and the preparation of the communities. Redundancy is featured when several urban systems serve similar functions and provide substitutable services when another system is disrupted, such as using multiple energy sources with a variety of pathways distributing power to all parts of the city, or installing generators into hospitals and major health infrastructures. Redundancy has a cost but if planned in an efficient way, it can contribute to reduce a city's vulnerability. Flexibility is important for resilient cities to have the ability to absorb shocks and slow-onset challenges in ways that avoid catastrophic failure if thresholds are exceeded. In the field of critical infrastructure disruptions, flexibility is for instance the fact that energy suppliers have identified priority consumers and other customers that can switch to another source of energy in case of disruption. The preparation of the communities means that the territorial vulnerabilities against critical infrastructure disruption are questioned, which can also serve as a starting point to think and take actions to increase the resilience of the area against other events. This implies actions to create awareness within the population, the authorities and the other stakeholders about potential crisis situations.

Be prepared to recover from disastrous situations: The recovery phase after a crisis is of major importance to restore an equilibrium and go back to the normal conditions. Actions taken to mitigate the potential

consequences of CI disruptions contribute to reduce the crisis phase: for the critical infrastructure operators the business continuity plans are essential to reduce the economic consequences of a disastrous events while for the civil protection authorities the political issues at stake during the recovery phase are related to helping the people to recover normal living conditions. The capacity to reorganise also covers the ability to change and evolve in response to changing conditions. This can include, for example, the existence of business continuity plans for the companies, not only to recover after an emergency but also to adapt their management to evolving conditions (e.g. higher fuel supply prices, increased traffic congestion, etc.).

Create trust among stakeholders: To build resilience, it is essential to provide for dialogue between stakeholders and help develop consensus-based solutions. The governance models applied in the field of critical infrastructure resilience can be used as models in the field of urban governance. Existing experiences of critical infrastructures collaboration schemes show that important factors are the voluntary dimension of the collaboration, the creation of win-win situations in which all stakeholders see an advantage in collaborating, the need to take time to build a real trust environment with the view to discuss and exchange sensitive information. The sharing of powers and responsibilities is also a key aspect of a sustainable governance model.

Optimize the distribution of resources: in a period of limited resources, in particular for governmental institutions, there is a need to reprioritize the agenda at different institutional levels, according to the expected effectiveness of possible actions, and reallocate funds and resources accordingly. As a matter of example, when the urban critical infrastructure strategy, based on a well established PPP, assures reduced inoperability and faster recovery process for an essential service - e.g. thanks to collaborative management in the urban transportation system - this means higher service level to citizens and lots of money saved both for public and private sectors. Such a societal and economic argument can turn into a political argument for policy-makers, in order to build on existing security and resilience capabilities.

5 CONCLUSIONS

With the view to investigate how strategies addressing critical infrastructure disruptions at local or regional level could participate to building broader urban resilience, some examples were developed to show that critical infrastructure disruption increase urban vulnerabilities and require therefore to be addressed not only from a security standpoint (i.e. protection measure) but also within a resilience approach. Developing strategies based on resilience to address critical infrastructure disruptions at local or regional level include increasing the knowledge on critical infrastructure systems and their disruption, working in straight collaboration with all stakeholders, in particular private operators of infrastructures and in setting up action plans not limited to critical infrastructure disruptions but considering the multiple aspects of local and regional resilience against all hazards. These strategies appear to be adequate also for urban and metropolitan areas since they are based on tailored approaches to be adapted to the different geographical contexts and the different types of stakeholders to be involved. While taking actions to enhance urban resilience, not limited to issues related to critical infrastructure disruption, appear to be a way to exploit limited resources dedicated to urban management and critical infrastructure resilience, there are still a great number of challenges to address, among others creating and raising awareness of urban and metropolitan authorities about the necessity to address critical infrastructure disruption at local level and, of the added value this can have for a better urban management, but also to show the benefits of urban/metropolitan critical infrastructure approaches to national authorities. Many practitioners and political leaders see the successful management of infrastructure and services – their planning, procurement and operation – as the

heart of good urban management. Hence, it is necessary to link better the strategies developed in the field of critical infrastructure disaster mitigation strategies, and of emergency management with more comprehensive urban management strategies: this would allow finding synergies, mutualizing the efforts, cross-fertilizing and as a consequence, result in setting up a more coherent development and management strategies for cities and metropolitan areas.

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IMAGES SOURCES

Pic. Pg. 1: Bouchon, 2012

Fig. 1: Dimauro, C. for the Regione Lombardia (2011) "PReSIC - Programma Regionale per la Collaborazione ed il Coordinamento nella Sicurezza delle Infrastrutture Critiche" <http://www.protezionecivile.regione.lombardia.it/Regione Lombardia>

Fig. 2: Trucco P., for the Regione Lombardia "PReSIC - Programma Regionale per la Collaborazione ed il Coordinamento nella Sicurezza delle Infrastrutture Critiche" <http://www.protezionecivile.regione.lombardia.it/Regione Lombardia> (2011)

Fig. 3: Scalingi, 2011

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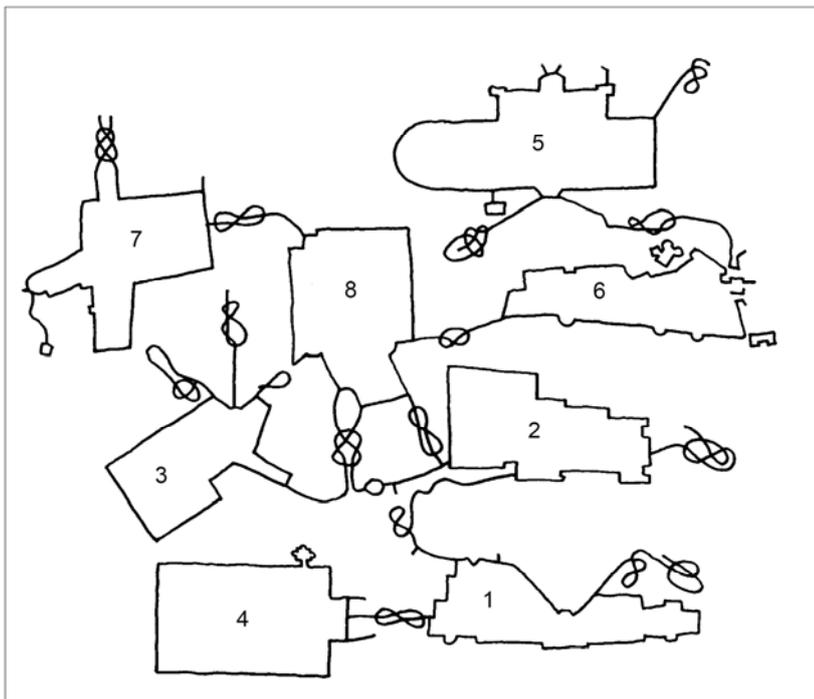
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URBAN SPACES AND SAFETY

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ABSTRACT

The concept of vulnerability understood in the traditional sense as a “single manufactured good” is insufficient when it comes to describing the real conditions of an urban system’s vulnerability within which an indefinite variable of factors interact with one another thereby determining the damage caused by an earthquake. These interacting factors constitute so-called “urban vulnerability” which town planners use in order to contribute to the field in the form of analysis definition and interventions in the mitigation of seismic risk on an urban scale.

The research paper “Relational Spaces as Safe Places” positions itself firmly in the vein of town planning research which focuses on the mitigation of seismic risk, and which intends to blaze a new methodological trail that aims to identify safety traits in urban spaces. The research paper’s starting point is the assumption that empty urban spaces, given the indications provided by the principal organs for Civic Protection, have come to be seen as the spaces designed to accommodate the public in cases of emergency. This can generate new thought regarding town planning by reviewing early post-earthquake urban designs where the rules were laid out for earthquake-proof cities: a “chessboard” plan with wide streets, both straight and perpendicular, empty spaces like squares and markets positioned along the longitudinal streets, and buildings with regular layouts all at right-angles. These simple guidelines, which are often disregarded and distorted in modern towns, are extraordinarily relevant and oriented towards new definitions of the urban traits of quality and security.

KEYWORDS:

Vulnerability, relational spaces, safety

1 SEISMIC RISK AND PLANNING: FROM SECTORALITY TO INTEGRATION

The need to look at land systematically so as to be able to suggest criteria for environmentally sustainable planning has been expressed since the Sixties in the United States by Jan McHarg who is recognised, today, as one of the founding fathers of the environmental method. McHarg was undoubtedly a forerunner in the sense that he was one of the first to have realised that the process of planning, on any given scale, must necessarily proceed from an understanding of an area's 'natural facts', whether one is referring to a previously urbanised space or to a space which needs urbanising. McHarg placed emphasis on the topic of risk reduction which had been neglected by earlier planning strategies and which, instead, needed to be dealt with by examining the compatibility of the land's characteristics and their possible uses.

In the United States, as is also the case in Italy, McHarg's philosophy and environmental method did not immediately have a revitalising effect on the field due to a historical lack of interest on the part of both institutions and the sciences regarding the environment. It is no coincidence that McHarg's text, which has now achieved cult status, was published in Italy twenty years after it was first drafted, meaning that the environmental method suggested by McHarg remained 'exclusively his' for too long (McHarg 1969). Indeed, only today has it been recognised that the understanding of natural processes and the improvement of monitoring and predicting techniques is fundamental if the consequences of natural disasters are to be minimised and if localised choices and regional vocations are to be rendered more compatible.

Of course, a sector-based vision of the subject will provide norms and regulations which are equally as sector-centred¹; in fact, the topic of security against risks, in particular seismic security, in the normative Italian framework was dealt with for many years by following an approach geared towards either the securing of individual buildings or checking the compatibility of the predictions made by urban planning strategies and the actual geomorphic conditions of the area. Consequently, seismic risk calculation analyses had little effect on town planning choices inasmuch as no planning strategies emerged which were capable of managing the processes of urban transformation in order to reduce seismic risk.

On the topic of seismic risk, the first references made in national legislation to town planning and spatial planning can be found in the anti-earthquake law of '74 in which an attempt was made to deal with the implementation of safety measures for buildings from a point of the view of the dangers of the area in question². Article 13, in fact, requires that townships obtain, during the development stage of town-planning strategies, an opinion from the Public Works Office regarding the compatibility of the town-planning predictions and the area's geomorphic conditions. However, this regulation is absolutely generic and gives no indications whatsoever regarding how such compatibility should be gauged and, in any case, it limits testing *exclusively* to geomorphic elements, without any reference to the dynamic characteristics of the region (Fera 1991).

From this date onwards, the idea developed that the full restitution of the implications associated with seismic risk, in terms of mitigation strategies, needed to be dealt with by the fields of land and town planning. One could say, in fact, that the topic of risk in general, but in particular seismic risk – seeing as

¹ The need for a more effective way of controlling territorial transformations which is able to limit damage to the environment has fostered, over the past decade, the birth of large production of regulations regarding diverse environmental sectors (air, water, sound, industrial risk etc.) which has also introduced new respective strategies to the sector (traffic planning within towns, programmes regarding the quality of air and water, sound plans, waste disposal plans, etc.). From this there has developed a framework of plans and sector-based competencies which are so well articulated that they actually risk weighing down and rendering increasingly complex the management of land and the environment; as a consequence, the need has arisen for a general planning framework capable of integrating into its competencies these diverse environmental sectors through comprehensive strategies for both spatial and urban transformation.

² I refer to the law of the 2nd February 1974 n. 64 "Measures for constructions with specific regulations for seismic zones".

they do not fall directly into the traditional “categories” of town planning – delayed in adopting the necessary multi-sectorial traits that only town planning could give back to it.

With regards to seismic risk, town planners’ interest was piqued in the ‘80s in the aftermath of the Irpinia earthquake when it was observed that the principal cause for buildings collapsing was the badly chosen positioning of the settlements (on slopes or ridges); this brought to light the need to “reason” in terms of prevention, looking at both geomorphic aspects, linked mostly to the specific dangers of the area, and those urban elements which we will analyse after a preliminary discussion on “urban vulnerability”.

Of course, since Imbesi wrote that town planners’ interest regarding the challenges posed by risk had not developed at all, only ten years have passed and we have witnessed a profound change, particularly with respect to the spatial aspects of seismic risk reduction³.

Imbesi traced town planners’ lack of attention back to a planning system which, at the time, was very inflexible and linked to rigid forms of control and legal constraints which, despite being imposed on urban planning models, were rarely actually implemented on the land itself. In fact, until the second half of the ‘70s, only a very partial vision of seismic risk had been achieved; a vision which considered seismic risk only in terms of an emergency which “came into play” immediately after the event itself. Even earthquake engineering, to which the most part of the responsibility for the setting of criteria for seismic risk mitigation was assigned, restricted its studies to the structural behaviour of individual buildings in cases of earthquakes and neglected the study of the implications of the interactions between buildings found in determined urban contexts (Imbesi 1991).

However, town planners’ interest in bringing innovations and developments to the discipline soon came across two difficulties:

- one linked to the presence of technical regulations which are exclusively dedicated to the “structural” problems of buildings and which do not “regulate” suggestions from the town planning discipline;
- one linked, on the other hand, to the town planning regulations which were then in force that were difficult to actually implement on the land, resulting in efforts being made in the field to innovate so as to regulate the themes of spatial defence and the implementation of safety measures in settlements.

Regarding the protection of land, the institution of liability is certainly the concept with which large-scale planning was identified in the ‘80s due to the landscape planning introduced by laws 431/85 and 183 on land protection. Today, the direction of large-scale environmental planning is turning towards strategies which are more flexible than the imposition of liability. For example, by defining compatibility frameworks which are suitable to the region’s vocations with respect to the uses of the land as taught by McHarg, or by integrating into the planning process environmental considerations when establishing the possible uses of the land (Strategic Environmental Assessment). Interventions in the field of land protection, as has already been mentioned, deal with the distribution of competencies that not even the transferral of operational tasks to the land use bodies set in place by ordinance 112/98 managed to create a definitive structure, thereby risking prolonging the delays and the inefficiencies which have typified recent years. Even with respect to both natural and man-made risk reduction, notwithstanding the urban drift and industrialisation of the post-World War II period – which entailed a notable increase in the vulnerability of land – environmental planning has at its disposal tools which do not follow a uniform framework of reference, but which are fragmented in their competencies and are prevalently linked to the managing of emergencies.

Only recently has the discipline of town planning been provided with a renewed legislative framework and with more suitable instruments which are capable of dealing with environmental issues. In particular, the

³ Imbesi was probably one of the first town planners to have confronted, since the ‘80s, the topic of the mitigation of seismic risk applied to town planning.

theme of seismic risk has become fully part of town planning regulations and of those planning tools which, finally, are directly assigned to mitigation.

2 URBAN VULNERABILITY

Town planners' interest regarding the reduction of the damage caused by seismic events has focused attention on the methods employed to assess seismic risk and, consequently, on the parameters which contribute to reducing it.

Town planners have mainly paused to focus on vulnerability in order to bring innovations to both analysis methodology and to suggestions regarding mitigation.

In the research paper "Exposure, vulnerability and seismic risk in Messina", Fera (1991) synthesises the parameters of vulnerability in an urban system – which are not far from those identified by Benerjee (1981) – into three macro-categories:

- *physical vulnerability of spatial systems and grid systems*, assessable mostly via the physical vulnerability of single elements;
- *functional vulnerability*, or a system's incapacity to exercise its function fully and correctly even in the absence of damage to one or more of its elements;
- *economic and social vulnerability*, or the resident population's ability to deal with an emergency in social, psychological and financial terms⁴.

Certainly, embarking on vulnerability assessments as detailed as this in the heart of an urban system is not always feasible, not only because of obvious economic difficulties, but also because of the unavailability or lack of the necessary facts (Cremonini 1994). Undertaking surveys on the vulnerability of the "strategic" elements of an urban system and identifying from amongst them a "minimum" system onto which to concentrate security measures, renders the implementation of safety measures in urban centres easier and quicker.

A recent town-planning approach to the topic of urban vulnerability sees in the Minimum Urban Structure a method that is capable of giving a twofold answer to both the need to recover an urban centre and to render it strong enough to manage a seismic event, for the purposes of an emergency (Fabiatti 1999)⁵.

The definition of the Minimum Urban Structure was born from a dual consideration:

- there are not enough resources to safeguard the entire public or private building heritage and, yet, as risk mitigation plans and programmes are readied, it is necessary to fix adequate priority criteria for a more efficient allocation of the available resources;
- public authorities' capacity for action and intervention in the field of town planning policies are greater and more efficient when they involve interventions on behalf of real estate and relational spaces; on the other hand, interventions involving private building heritage can be incentivised, guided and oriented (only rarely are they made prescriptive), but they are still subordinated to the will and convenience of the intervening private client (Fera 2002).

The Minimum Urban Structure's method does not consist, then, of an ulterior criterion of urban vulnerability assessment, but it comes beforehand, identifying those elements to which to direct surveys and

⁴ Benerjee identified ten indicators of urban vulnerability: the redundancy of engineering systems, the possibility of recovery according to the form of the features and the age of buildings, accessibility according to the layout and the technical features of the area's driveability, the possibility for evacuation, dangerousness induced by natural or man-made elements, the vulnerability of the buildings, the spatial and temporal distribution of the systems of urban activity, socio-economic recovery capabilities, the quota of at risk residents, levels of social preparation for emergencies.

⁵ The definition of the Minimum Urban Structure prompted the anti-seismic recovery plan for the historic centre of the Township of Rosarno (Province of Reggio Calabria), an experimental initiative from the National Seismic Service and the National Institute for Town Planning which was carried out in 2000 thanks to the European Community's Funds for Regional Development.

interventions for the implementation of safety measures. The need to focus surveys and interventions on just a few structuring elements in an urban centre responds to both the requirements linked to questions of emergency required by the Plans for Civil Protection prescribed by law n. 225/92 – regarding the need to identify under “normal” conditions those urban parts and elements necessary in order to manage a seismic event (secure road systems, strategic buildings, empty areas) – and to the requirements set out by the Recovery Plans (law n. 457/78), which are, however, altered so as to be suitable for new anti-seismic purposes. The Minimum Urban Structure constitutes the essential structure of an inhabited centre (the vital functions of a centre are all part of it) that must subsist regardless or whether an event occurs or not.

The act of identifying the Minimum Urban Structure allows, therefore, one to direct vulnerability surveys and the consequent mitigation interventions to all those elements which constitute it, neglecting, at least in the first stages, all the rest. Moreover, the Minimum Urban Structure is not a definite and rigid structure; it is flexible and guarantees large margins of urban safety, which entails the pre-definition of those elements of it which could feasibly be replaced. In fact, in the process of configuring the Minimum Urban Structure elements which are potentially replaceable are identified and registered by choosing those redundant elements which guarantee that the urban system functions in emergency situations (De Paoli 2001).

In general, it can be said that the Minimum Urban Structure aims to achieve the following goals:

- the conservation of historical memory, through conservation and the implementation of safety measures in those places, public spaces and buildings which represent the history of an urban centre’s “life”;
- the requalification of public heritage, that is to say of the spaces and buildings with which the townspeople relate due to the roles and functions that they serve;
- the establishment of an emergency system which is capable of maintaining a certain level of functionality even in the aftermath of a seismic event and which, afterwards, helps the urban centre to regain functionality.

Relational spaces are part of this Whole, and are understood as those elements of the urban structure to which the local community relates and in which integration processes are activated. Relational spaces are, therefore, places where socialisation takes place which are usually situated in the historic part of the town and which represent its “historical memory”. The implementation of safety measures in these relational spaces responds to a dual objective: it helps to conserve the identity of a place and to improve its emergency system, thereby helping the urban centre to recover full functionality.

3 RELATIONAL SPACES, EMERGENCY AND VULNERABILITY

Ever since ancient times, roads and, above all, squares have represented those elements which best characterise a town in their role as places where civic life and social relations take place. After the earthquake of 1783 which hit Southern Italy, these spaces were used so as to “escape from earthquakes” (Vivenzio, 1783) and, therefore, ever since then they have been considered safe places in the context of earthquake prevention. Meeting points are, then, those urban spaces with optimum liveability potential in which the most part of an urban centre’s social and economic activity takes place. Such an observation solicits new considerations regarding the redevelopment of urban centres in seismic areas.

Today in Italy, the Augustus Method⁶ sets out the following areas dedicated to emergency situations:

- grouping areas;
- homeless or emergency camps;

⁶ The Augustus Method was fine-tuned by the National Civil Protection Department which acts as a guide at all stages of managing an emergency.

- meeting points.

Meeting points are identified in the Civil Protection Plans and are “tested” through exercises under “normal” conditions when a previously designated segment of the resident population leave immediately along safe paths, followed by the rescue staff. To this end, meeting points are identified – including squares, wide points in roads, car parks, public and private courtyards – according to both their ease of access and their lack of potential risks (landslides, overflows, fires, collapses, etc.).

Empty urban areas, according to the indications provided by the Italian Civil Protection Service, are those spaces where the resident population should be accommodated in emergencies. This suggests that new planning ideas should be launched much along the same lines as those suggested in early post-earthquake, urban designs where the rules were laid out for anti-earthquake town planning: a “chessboard” plan with wide streets, both straight and perpendicular, open spaces like squares and markets positioned along the longitudinal streets, and buildings with regular layouts all at right-angles (Vivenzio 1783). These simple rules, which are often disregarded and contorted in modern towns, are extraordinarily current and oriented towards new definitions of the urban traits of quality and security.

The need to deepen research into the vulnerability of relational spaces, understood as strategic places with which to deal with emergencies, arose from the need to define the minimum requirements of “meeting points” as safety standards. The identification of “emergency camps”, however, already responds to the parameters set out by the Italian Civil Protection Service which uses purpose-made evaluation frameworks to judge minimum security conditions (geometric, town and environment related, functional, danger and risk related). With relation to the meeting points, they must be identified within the urban centre in safe places, but without specifying suitable features; due to this, research⁷ focuses on identifying minimum security and performance-based measures so as to foster optimum usefulness in times of emergency and under normal conditions. Research aims at identifying from amongst relational spaces criteria for good advance planning which derive from:

- the urban nature of the area;
- the surrounding security conditions.

This allows for the achievement of a twofold objective, the improvement of functionality in times of crisis and of the urban nature of the area. So as to be able to achieve this goal the document “Suitability requirements of safe places” was drawn up; it is useful in setting out the functional characteristics of regions (structural design, morphology, accessibility and usability, the way it reacts to construction, presence of vulnerable elements) and in marking out vulnerability indicators which, arranged according to indications regarding their levels of influence, define, in short, an area’s propensity to exposure to damage caused by seismic events.

3.1 SAFE PLACES AND URBAN STRUCTURE. THE CASE OF REGGIO CALABRIA

The history of Calabria has been deeply influenced by the succession of catastrophic earthquakes which have razed to the ground entire inhabited centres and which have completely changed the settlement structure. The seismic events which have most interested the region are the earthquakes of 1783 and 1908 which, respectively, were of an intensity equal to 8.5 and 11 on the Mercalli intensity scale (AA. VV. 1990) which affected thousands of victims as well causing the total destruction of the majority of inhabited centres.

⁷ By ‘research’ I refer to the study undertaken by the architect A. De Paola “Relational Spaces as Safe Places”, supervised by architect Rosa De Paoli, in the context of the Advanced Post-university Training Course for Experts in the Promotion of the Cultural and Environmental values of the region, *ProMoTer*, financed by Calabria’s Regional Operational Programme 2000-2006.

The 1783 earthquake is undoubtedly the most well-documented and analysed seismic event due to the interest that the Bourbon government demonstrated for both the planning and the implementation of reconstruction work, and also because of the backwardness of the Calabrian provinces at the time. The consequent reconstruction work was one of the first ever examples of anti-seismic, spatial planning projects and economic planning. Indeed, the 1783 earthquake marked a different understanding of town planning, more geared towards a classical, late eighteenth century approach which was more attentive to the positioning of new sites according to the dangerousness of the region, of military protection and of sanitation regulations. As a consequence, a clear difference formed in the settlement-spatial typology and, above all, in the urban-morphological typology.

For the first time, use was made of spatial planning and urban design as defensive measures against earthquakes and the rules of the “anti-seismic town” were defined via:

- suitable choices for the positioning of settlements. The abandonment of unstable places and a movement towards more geologically stable and level areas;
- designs and urban forms appropriate for the task of rendering a town more resistant via the demarcating of regular and orthogonal roads and the formulation of Construction Regulations⁸. Wide roads, straight and perpendicular, so that even buildings were regular and at right angles (a chessboard-like pattern); with large squares, markets and main buildings positioned along the longitudinal roads.

The reconstruction plans for those urban centres destroyed by the 1783 earthquake are examples of great cultural prominence in which elegance and monumentality were harmoniously combined, as typified XVIII century town planning, with their requirements being dictated by anti-seismic safety concerns (Figure 1).

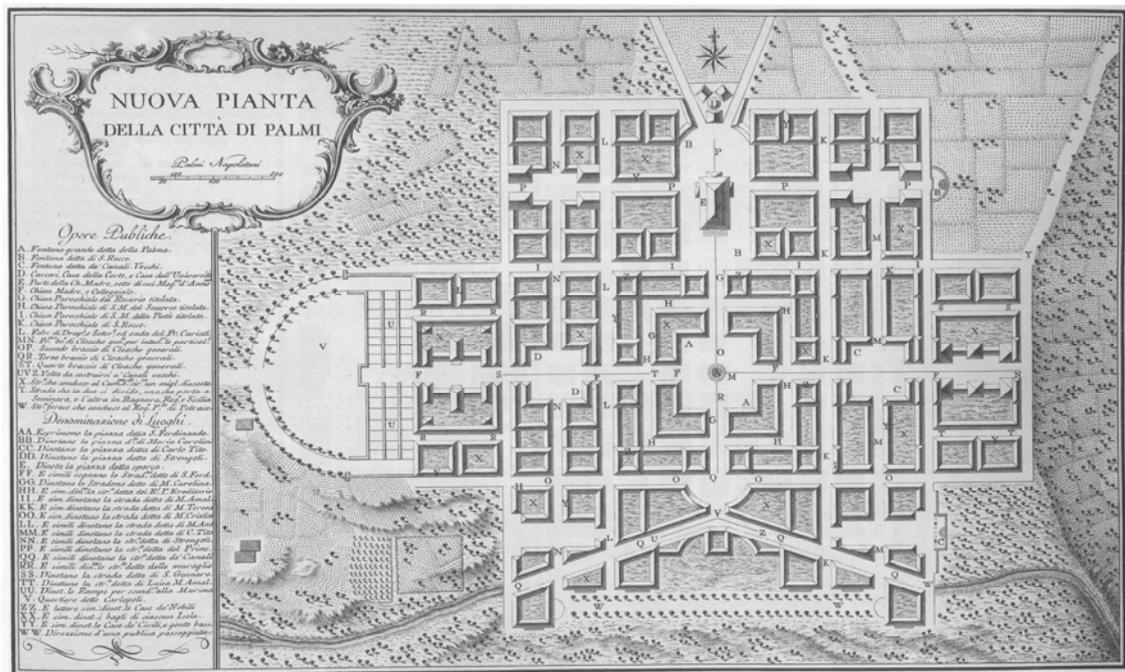


Fig. 1 A case of reconstruction after the earthquake of 1783 (Palmi, RC)

⁸ The *Construction Regulations* were formulated so as to regulate the rebuilding of urban centres by setting criteria according to: the height of the buildings in accordance with the road surfaces; the number of floors proportionate to the number of inhabitants; the sides of buildings on to which the construction of large balconies is banned, but on to which small, light balconies can be built if they are as far as possible from the building's corners; the application of construction systems which use wood-based structures; the cladding of buildings in brickwork and mortar in order to improve their resistance (a construction system introduced by engineers from Lisbon during the reconstruction following the earthquake of 1755).

Post-earthquake reconstruction marked the beginning of the transferral of populations from the mountainous internal region of Calabria towards the coastal strip where the new urban settlements were positioned. This was to be a momentous change in Calabria's history which would continue into the next century as a consequence of the construction of the first railway.

The earthquake and seaquake of December 28th 1908 represent the most destructive events (Baratta 1910), in terms of both destruction and lost human life. Messina and Reggio Calabria were, in fact, razed to the ground, obliterating all traces of the city's buildings, alongside approximately 90,000 victims.

As a consequence of the event, the first ever anti-seismic regulations were promulgated (Royal Decree, 18th April, 1909) amongst which was the first example of territorial macro-zoning, in which the settlements damaged by the seism were listed and in which technical and hygiene-related norms for reconstruction were declared. These norms regulated the building process by placing restrictions on the height of buildings (maximum two floors, no more than 10 metres high) which depended, in turn, on the width of the central road (minimum of 10 metres). Norms for protection against seaquakes were also declared which did not allow for any development up hill from the railroad by a distance varying from 30 to 50 metres. The two cities, entirely reconstructed after the seism, today have very few examples of buildings from their past, the loss of which is truly incommensurable in terms of cultural heritage.

Reggio's Reconstruction Plan was entrusted to the engineer Pietro De Nava, assessor of the town's public works, who collaborated with the town's engineers and civil servants from the Public Works Office. At the heart of the plan there was a new set of regulations which referred to "Obligatory technical and hygiene-related rules for restoring, rebuilding and building from scratch public and private buildings in the towns hit by the earthquake of December 28th 1908 and others which preceded it". The Reconstruction Plan proposed overruling the limits imposed on the old built-up area of the town for new safety reasons which induced horizontal rather than a vertical expansion. De Nava's project amplified the "chessboard" layout, using it as a base from which to both redesign the new building network and to re-position settlements by modifying the interaction between "empty and full" spaces.

The Plan anticipated various functional specialisations for the different zones within the city:

- Bureaucratic – administrative, as well as residential, for the centre;
- Commercial – industrial for the new neighbourhood scheduled to be built adjacent to the port;
- Residential – intensive for the other areas in the centre;
- Residential – extensive in the areas adjacent to the extension of the central axis of the main street.

More recently, seeing as the areas covered by the De Nava Plan have been saturated, the urban centre has adapted to the new and permissive anti-seismic legislation and has chaotically thrown itself into peripheral areas which do not have norms set by a town-planning strategy⁹. Therefore, research has been focused on the safety of the spaces included in the De Nava Plan which is, today, distorted in both its contents and form.

The role and social value of public space in the city of Reggio Calabria takes on the same particular significance of all Southern Italian towns where the climate and cultural traditions mean that public space is truly lived in. A recent study¹⁰ classifies Reggio Calabria's public spaces, including "potential spaces"¹¹, into

⁹ The De Nava Plan would remain the favoured urban planning method until 1969. Several changes were made to it over the years.

¹⁰ This refers to the "Survey on the condition of public spaces and green areas in Reggio Calabria" by the Department of Landscape, Territory and City (OASI) at the Mediterranean University of Reggio Calabria, Architecture Faculty, responsible scientist Prof. Fera G.. Township of Reggio Calabria, 2006.

¹¹ "Potential Spaces" are public spaces defined by certain formal and qualitative traits of a particular value which, however, are underused for several reasons (e.g. because they are in undeveloped areas or are used as parking spaces etc.).

350 groups from green areas to public spaces for a total of 950,000 square metres of land, of which approximately a third are concentrated between the urban centre and the suburbs.

The attraction cultivated by such spaces highlights a prevalence of neighbourhood areas (211), then district areas (97) and, finally, there are the communal spaces (42).

The methodology used in order to identify the suitability requirements of safe places was applied to certain sample areas in the urban centre, using the assessment template “Suitability Requirements for Safe Places” (Fig. 2) which reconfigures safety parameters and indicators (Tab. 1).

The selection of the areas concerned two areas in particular which are representative of the conditions of settlements in the city of Reggio Calabria:

- the city centre, chosen for its cultural merit and because the majority of relational spaces are to be found in it (Piano De Nava);
- the consolidated periphery (Sbarre) in which slum-like areas and commercial areas with developmental potential coexist.

PARAMETERS	INDICATORS
Size of the areas and the resident populations	– ratio of metres squared/ inhabitants
Accessibility and usability	– n° driveable entry points (width > 6.6 metres) – n° pedestrian entry points – n° physical barriers
Relation to building work	– distribution grid – buildings with sides facing open spaces
Elements which increase vulnerability	– width of road < H buildings – vulnerability of the buildings – critical elements

Tab. 1 Parameters and Indicators for open spaces vulnerability

The results underscored a higher level of vulnerability in the suburbs, due to their worse accessibility and greater density of construction work. The majority of the suburban areas lack, moreover, an urban nature and therefore are rarely used as relational spaces by the residents or the township’s administration who tend to prefer to be in the historic centre so as to be able to launch various initiatives, increasing problems linked to mobility and congestion. Urban areas situated in the historic centre, however, as well as being of a highly urban nature, reveal contained levels of vulnerability because they are adequately accessible, even if in certain cases buildings’ sides are moderately vulnerable.

The topic of implementing safety measures in public spaces requires a more in-depth analysis of two subjects:

- the safeguarding of the historic identity of those spaces which are considered representative of the cultural and social memory of a town, mainly squares, but also spaces of an unusual morphological nature which were inherited from the past with physical and limited dimensions, architectural emergencies, and recent damage to buildings;
- the “cleaning” of newly urbanised public spaces, arising from the planning of the expansionary process of a town, often with no spatial definition, architectural quality, or balance with relation to the urban scale.

During the process of integrating old with new and quality with safety, some mediation must be sought between the need to conserve the “memory” of a place and the need to enact “modern” functions such as preparations for emergencies. The safety criteria dictated by the need for reconstruction in the wake of the 1783 earthquake in Calabria, contributed to the creation of “clean” spaces, the regularity and balance of which is unheeded by the impersonal urbanisation of the modern age. Moreover, the far-sightedness of the planners of the time makes one reflect on the extent to which the “evolution” of town planning has not

prevented, over the course of time, the avoidance of simple rules which would have rendered the urban project in-keeping with both safety and aesthetic criteria.

4. A "HISTORIC" SPACE

Amongst the examples examined in this paper, Piazza Italia is the most representative of the "historic" relational spaces situated in the political-administrative heart of Reggio Calabria (Corso G. Garibaldi), in the centre of the urban "chessboard" structure of the Mori Plan it was conceived very much according to the late eighteenth century vision, in which the central square arose from a planned urban design. The Piazza is an open space of a geometrically regular form and it is inserted into the centre of an urban context of particular architectural prestige; in the "wings" of the construction a homogeneous architectural style, "Liberty", can be identified which can be traced back to the 900s. The "wings" are separated by roads of which three can be driven on (Via Cattolica dei Greci, Via San Francesco di Sales e Via Miraglia) and of which one is pedestrianized (Corso G. Garibaldi). The buildings which demarcate the space usually have ground floor rooms which are used as public offices or as shops.

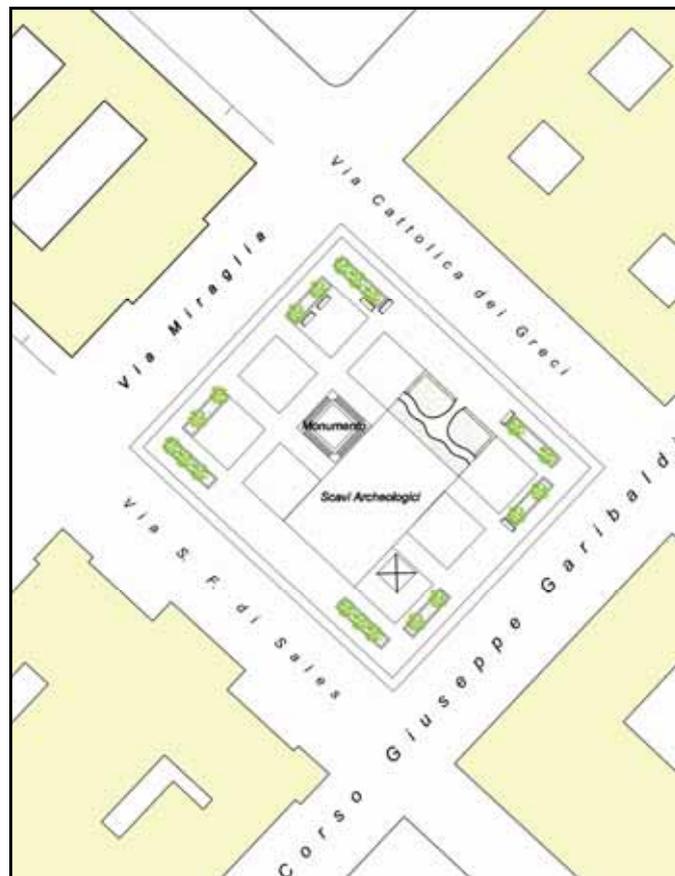


Fig. 2 Reggio Calabria, Piazza Italia

The Piazza is characterised by the presence of a monument dedicated to Italy (1868), or an archaeological area which is an integral part of the piazza, and by various furnishing elements. Lamppost illumination guarantees good lighting in all parts of the square. The ground, made of stone, covers most of the piazza's surface and is interrupted by flowerbeds with a formal arrangement of trees with plentiful foliage and low-lying plants.

It is used by all ages as a place for rest, walking and, occasionally, for demonstrations of various kinds. Piazza Italia is above all crossed by a large number of users who go, on a daily basis, to the Town Hall, the Prefecture and the Provincial Administration which surround the square itself. The image that is created by this is one of a very aesthetically pleasing space of high quality and which has a historic symbolic value for the context in which it is found.

The space is, thus, safe with a medium level of noise pollution and a good level of comfort for its users who are guaranteed respite by the square's intimacy and by the presence of trees which provide some partial shade.

The dimensions of the space in comparison with the resident population is more than sufficient seeing as the ratio of square metres/inhabitants is $\leq a$, despite the fact that the population rises by 30% due to the high functional vocation of the area. Its accessibility is very good and its usefulness too due to the suitable levels of pedestrian and vehicular access in case of eventual rescue operations (roads which are wider than 6.6 metres). The level of synthesis vulnerability deriving from a reading of the framework of the "Suitability Requirements of Safe Places" is low, therefore it can be considered suitable for emergency cases.

		REQUISITI DI IDONEITA' DEI LUOGHI SICURI									
Dati generali	N° Scheda	Data	Squadra	Regione		Provincia	Codice Istat Provincia				
	Comune	Codice Istat Comune		Frazione	Circoscrizione n°		Zona Censuaria n°				
	Denominazione dello spazio aperto			Indirizzo: Via/Piazza/altro							
	Dati dimensionali: Lunghezza mt.		Larghezza mt.	Superficie totale mq.			Superficie calpestabile mq.				
Dimensionamento delle aree rispetto alla popolazione edifica	INDICATORE DI VULNERABILITA'	PARAMETRI DI VALUTAZIONE E INDICI DI INFLUENZA					Dato rilevato	Prova %	Valore ponderato		
	Rapporto mq/abitanti	≥ 1	$\geq 0,5 < 1$		$< 0,5$			8			
Caratteristiche morfologiche	Pendenza del terreno	0-9%	10-29%		30-50% a presenza di salti di quota di media entità	Maggiore del 50% a presenza di forti salti di quota			10		
		0	6		8	10					
Accessibilità fruibilità	N° Accessi carribili all'area con larghezza superiore a 6,6mt.	> di 3	3	2	1	0		10			
		0	3	5	7	10					
	N° Accessi pedonali all'area	> di 4	4	3	2	1		10			
		0	3	5	7	10					
Barriere fisiche	Assenza di barriere	Con barriere						6			
		0	10								
Presenza di reti di distribuzione (elettrica - idrica)	Presenti	In parte			Assenti			5			
		0	5			10					
Rapporto con l'edilizia	Fruiti edificati sullo spazio	Senza fronti edificati	Fronti parzialmente edificati			Edificato su tutti i fronti			10		
		0	5			10					
	Strade con larghezza inferiore all'altezza dei fabbricati prospicienti (Rapporto h/l)	Nessuna	1 strada con h/l = 1	2 strade con h/l = 1	3 strade con h/l = 1	4 o più strade con h/l = 1			10		
	0	3	5	7	10			10			
Vulnerabilità degli edifici prospicienti	Bassa	Media			Alta			25			
	1	6			10						
Elementi di identificazione della vulnerabilità	Presenza di elementi di criticità	Bassa	Media			Alta			8		
		2	6			10					
LIVELLO DI VULNERABILITA'											

Fig. 3 The assessment template "Suitability Requirements of Safe Places"

5. INDICATORS OF VULNERABILITY FOR OPEN SPACES

Ratio of square metres/inhabitants

The indicator refers to the resident population of a 70 metre space (Galderisi 2004), whose span of influence is smaller than the area in question. The 70 metres represent the immediate surroundings of a urban, built up space, therefore a meeting point will have to be set up in such a way that it can accommodate the population that lives in the area. In those areas which have a highly functional as well as residential

vocation, the value of the resident population has increased by 30% since it has to be considered that a seismic event could occur in working hours when the area is frequented by the highest number of people.

Incline of the terrain

The morphology of the terrain on which urban areas stand can significantly increase the seismic effects of an earthquake, placing strain on the overall levels of vulnerability of the urban area. In particular, the incline of the terrain can prompt additional collapsing.

The levels of inclines considered here are:

- > 50% or the presence of sharp inclines;
- from 30 to 50% presence of medium inclines;
- from 10 to 29%;
- from 0 to 9% maximum permitted incline (Ministerial Decree n° 246/1987).

Driveable entry points wider than 6.6 metres.

Accessibility is the most important indicator of an urban area's vulnerability.

Its road network must be able to respond to exacting requirements as it must be able to guarantee:

- safe connections from the urban centre to the outside;
- connections between public spaces and strategic buildings in order to accommodate and let the population stream out of the area in cases of emergency.

The vulnerability indicator refers to the quantity of driveable entry-points into the area which are wider or equal to 6.60 metres (dual carriageways) and which, thus, guarantee that the emergency services can enter the area. The influence index for the greatest vulnerability was assigned to those areas without access roads of the minimum size required.

Pedestrian access points

The possibility of accessing an area by foot changes the levels of the area's vulnerability; more access points, of course, indicate that an area is better equipped for emergencies.

Physical barriers

'Physical barriers' refer to all those obstacles (fences, for example) that prevent easy access to the area both in the daytime and at night.

The presence of distribution networks, above all those for electricity and water, in the area obviously render it more useable and functional.

Rows of buildings

Interaction with building sites and construction on the whole is one of the factors which most influences the evaluation of vulnerability. "Rows of buildings" refer to those buildings in a line on the edge of a space. Building works in these areas are, on the whole, the most dangerous and vulnerable factor for emergencies, whereas totally open spaces are not vulnerable at all.

Roads which are narrower than the height of the buildings which overlook them

It is useful to analyse the relation between the width of the road surface and the height of the buildings which overlook it, using as a safety guideline that which is indicated in the Ministerial Decree 16/1996, paragraph 3, so as to identify the parts of the road which could be entirely blocked by the collapse of certain buildings. Of course, the sections of road which are most vulnerable are those where the height of buildings/width of road ratio is ≥ 1 .

Vulnerability of buildings

The vulnerability of buildings is dealt with in frameworks level 1° and 2° of the National Group for Earthquake Defence for those buildings made of brick and of reinforced concrete.

Presence of critical elements

Here are considered all those potential factors which could jeopardise safety, and, therefore, those “elements” which could induce an increase in the vulnerability of spaces:

- vertical connections (staircases);
- thin elements (civic towers, small towers/domes, monuments, water tanks), which due to their enhanced height could lead to greater vulnerability in the system;
- urban fittings higher than one metre;
- retaining walls;
- small bridges and/or underpasses.

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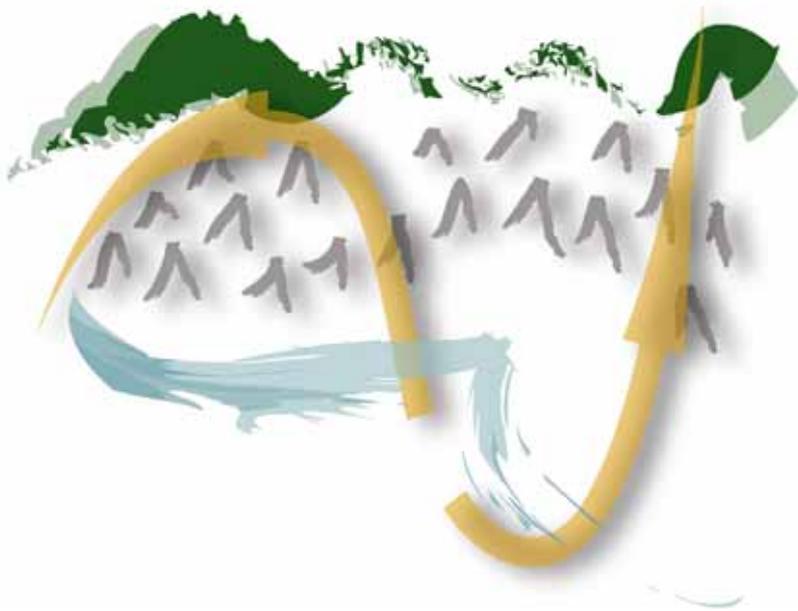
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FRUIZIONI IMMATERIALI PER LA PROMOZIONE TERRITORIALE

INTANGIBLE FRUITIONS - VIRTUALIZATION OF CULTURAL
HERITAGE FOR THE TERRITORIAL PROMOTION

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ABSTRACT

The topic of smart cities and communities now plays an important role in the European and national policy planning, finding direct feedback in various national and international research programs, including the one under consideration.

Specifically, as indicated by the Ministry of Instruction, University and Research, "a territory can be defined as "smart" when it focuses its development efforts in the human and social capital, in transport and information and communication technologies, in the careful management of natural resources and promotion of participatory governance". With this in mind we felt the need to launch a research program whose objective is embodied in the virtualization of the territorial heritage in general and, in particular, of the cultural heritage in order to restore it in network as a "common good" for citizens and visitors, also allowing local governments to internationalize the knowledge of that asset.

It has been used an integrated approach in which play a key role not only local environment but also some advanced techniques that can ensure easy access to the network of services in line with the needs of residents and tourists, simultaneously allowing the same to interact and integrate information directly.

KEYWORDS:

Smart cities and communities, Intangible fruitions,
Territorial promotion

1 LA VISION DI PARTENZA

La vision di partenza del progetto di ricerca in esame si sostanzia nella necessità di promuovere l'immagine territoriale mediante fruizioni immateriali differenziate supportate da tecnologie originali, flessibili, intelligenti (smart), in grado di migliorare lo stato dell'arte in termini sia di ricaduta scientifica sia di riverberazioni territoriali effettive e innovative.

In linee generali si è ritenuto necessario avviare attività di ricerca integrate, mediante il ricorso a tecniche avanzate in grado di definire adeguati modelli di indicizzazione e identificazione univoca (quali i SIT interattivi) utili a produrre altresì percorsi (anche 3D) e "mappature" tematiche.

Inoltre, un'attenzione particolare è stata rivolta alle possibili riverberazioni che si potrebbero generare in fase di gestione anche in termini di miglioramento dei rapporti intercorrenti tra città-campagna e tra aree interne-costa, nonché di ottimizzazione dei bilanci energetici e ambientali dei territori e la gestione delle risorse naturalistiche e socio-culturali, secondo principi di equità e sostenibilità.

Nello specifico, la vision di partenza focalizza l'attenzione sulla realizzazione di un framework evoluto, basato su una piattaforma fruibile in ambiente "cloud", sulla quale sviluppare servizi "Smart" in grado di creare valore per la pubblica amministrazione, nonché di agevolare e stimolare l'economia locale.

In sintesi, la vision è caratterizzata da due aspetti preminenti:

1. la creazione di una piattaforma aperta e interoperabile che abiliti lo sviluppo efficiente di applicazioni e servizi al cittadino/turista, agli Enti Pubblici e alle PMI responsabili dello sviluppo territoriale;
2. un insieme di applicazioni per la fornitura degli "*Smart Services*" riguardanti, in particolare, i seguenti contesti tematici:
 - *Smart Tourism* - Innovazione dell'offerta turistica territoriale per garantire a turisti/residenti un facile accesso a servizi in linea con le loro esigenze, permettendo agli stessi di interagire ed integrare informazioni;
 - *Smart Mobility* - Razionalizzazione del sistema di trasporto pubblico territoriale, capitalizzando su economie di costo indotte da una gestione omogenea del servizio e nel contempo contribuendo ad un incremento della qualità percepita del servizio;
 - *Smart Energy* - Servizi di ottimizzazione, monitoraggio e regolazione remota di produzione/consumi energetici anche mediante filiere di servizio che coinvolgono manufacturer e service provider.

1.2 SMART SERVICES: L'INTEGRAZIONE DI TECNOLOGIE FLESSIBILI E INTELLIGENTI

Gli obiettivi specifici inerenti l'ambito tematico *Smart Tourism* fanno riferimento a diversi aspetti, primo fra tutti la necessità di promuovere il miglioramento dell'offerta turistica territoriale ed una fruizione integrata della stessa attraverso: servizi di valore per il turista e per gli operatori; un "database territorio" (user generated), supportato da modelli di indicizzazione e identificazione univoca; interoperabile e interattivo; marketing territoriale in chiave "many-to-one"; un sistema integrato di modellistica atmosferica per previsioni meteorologiche in punti localizzati e di particolare interesse o lungo i percorsi di raggiungimento di mete attrattive; l'integrazione con i servizi di smart mobility.

Al fine di supportare la gestione di tale sistema, ponendo particolare attenzione agli elementi che maggiormente caratterizzano la fruizione turistica, ovvero i beni archeologici ed ambientali, si è reso necessario integrare lo stesso, attraverso lo sviluppo di metodologie finalizzate alla difesa di tali beni in relazione alla fragilità idrogeologica del territorio e alla salvaguardia della biodiversità, attraverso l'analisi e la valutazione delle attività antropiche in ambienti ad elevato pregio naturalistico, nonché all'implementazione

di informazioni trasversali riguardanti diagnostica e restauro/conservazione dei beni utili alle Amministrazioni locali per programmare gli interventi.

L'obiettivo specifico inerente l'ambito tematico *Smart Mobility*, invece, si riferisce alla necessità di sostenere l'attrattività territoriale attraverso la razionalizzazione ed il miglioramento dell'offerta di servizi di mobilità, fornendo ai territori strumenti avanzati di Simulation-Optimization per supportare modelli di trasporto e fleet management che abilitino un sistema di mobilità eco-sostenibile, più sicuro e a basso costo. L'elemento chiave risiede nella convergenza su un modello unico di differenti componenti del trasporto e dei servizi/piattaforme logistiche, nonché dei diversi modelli di fabbisogno e consumo per una gestione integrata ed ottimizzata di tutti gli attori della filiera. Il modello, dunque, fa leva su modi di trasporto di nuova generazione (EV) e sui relativi paradigmi di fruizione.

Infine, poiché l'ambito tematico *Smart Energy* si concentra su modelli operativi per individuare ed ottimizzare l'utilizzo delle risorse energetiche rinnovabili, nonché su modelli tecnico/funzionali per attività di ottimizzazione dell'utilizzo dell'energia, monitoraggio/regolazione dei consumi, gli obiettivi specifici di tale ambito tematico si sostanziano in:

- diffusione di energie alternative a basso impatto ambientale (anche in siti di elevato pregio naturalistico, archeologico, etc.), supportando la creazione di un indotto su applicazioni attualmente scarsamente diffuse;
- efficientamento energetico (riduzione di emissioni e spesa) attraverso un utilizzo intelligente delle risorse (gas, power, local generation);
- gestione "smart" della rete elettrica, mediante un modello snello di Virtual power plant che aggrega e gestisce produzioni distribuite abilitando economie di mercato e modelli di gestione e consumo innovativi e contribuendo al bilanciamento della rete;
- gestione integrata ed ottimizzazione dell'utilizzo dell'energia da fonti rinnovabili, attraverso modelli efficaci di planning ed una loro integrazione con modelli di consumo territoriale ed elementi socio-comportamentali per massimizzare il valore dell'asset;
- schedulazione delle attività di consumo e di generazione di edifici mediante algoritmi distribuiti e scalabili che siano in grado di regolare in modo integrato e dinamico tutti i dispositivi di un edificio (smart appliances, fotovoltaico, pompe di calore, etc.) considerando - sia in fase di pianificazione che di controllo - l'incertezza connessa alle condizioni meteorologiche e al comportamento degli abitanti/visitatori dell'edificio.

2 LA COERENZA PROGRAMMATICA

Al fine di perseguire la vision definita nella elaborazione della fase concettuale, si è reso necessario non solo garantire le recentissime normative nazionali ed europee in termini di rappresentazione standardizzata dell'informazione territoriale e sua piena interoperabilità tra committenti, produttori e fruitori della stessa, ma anche verificare la coerenza degli intenti di ricerca con quanto previsto dalle attuali politiche programmatiche europee.

Da un punto di vista prospettico, infatti, non si è potuto non tenere conto delle indicazioni di *Horizon 2020* che in termini di nuove sfide per l'UE prevede un focus specifico alle tematiche trattate.

In particolare, la strategia *Europa 2020 (Agenda Digitale)* sollecita l'avanzamento della ricerca in termini di miglioramento dell'economia sociale di mercato europea nel prossimo decennio, sulla base di tre settori prioritari strettamente connessi che si rafforzano a vicenda: crescita intelligente, attraverso lo sviluppo di un'economia basata sulla conoscenza e sull'innovazione; crescita sostenibile, attraverso la promozione di

un'economia efficiente sotto il profilo dell'impiego delle risorse e competitiva; crescita inclusiva, attraverso la promozione di un'economia con un alto tasso di occupazione che favorisca la coesione sociale e territoriale. La vision della ricerca, inoltre, trova riscontro con quanto indicato nel piano dell'Unione Europea *Strategic Energy Technology (SET)*, "Plan for the development of low carbon technologies", destinato alla definizione delle linee guida e dei traguardi delle politiche energetiche, con particolare riferimento allo sviluppo e alla circolazione delle informazioni sulle innovazioni tecnologiche. Tale programma ha, inoltre, avviato le diverse iniziative dell'Unione Europea a favore della diffusione nell'intero continente di un nuovo modello urbanistico-territoriale sostenibile: le Smart Cities.

Altra rispondenza è riscontrabile anche all'interno del programma *Energy Efficiency Plan 2011*, all'interno del quale la risoluzione del problema dell'efficienza nelle aree urbane si focalizza essenzialmente su politiche di efficienza energetica, promozione della diffusione di mezzi di trasporto pubblici e privati ecologici e innovazione tecnologica.

I piani sopra descritti trovano poi attuazione nei seguenti programmi comunitari, di cui si riportano alcuni degli obiettivi coerenti con i risultati conseguiti e conseguibili dalla ricerca in oggetto:

- *Seventh Framework Programme (FP7)*: Pervasive and Trusted Network and Service Infrastructures (Future Networks; Cloud Computing; Internet of Services and Advanced Software Engineering; Networked Media and Search Systems); ICT for a low carbon economy (Smart Energy Grids; Systems for energy efficiency; Low carbon multi-modal mobility and freight transport; Cooperative systems for energy efficient and sustainable Mobility); ICT for Learning and Access to Cultural Resources (Technologies for creating personalized and engaging digital cultural experiences; Open and extendable platforms for building services that support use of cultural resources; Technologies for the digitization of specialized forms of cultural resources, including tools for virtual reconstructions);
- *Intelligent Energy Europe Programme (IEE)*: develop more energy-efficient and cleaner transport;
- *European Energy Programme for Recovery*: Security and diversification of sources of energy and supplies; Optimization of the capacity of the energy network and the integration of the internal energy market; Connection of renewable energy sources; Safety, reliability and interoperability of interconnected energy networks;
- *Competitiveness and Innovation Framework Programme (CIP)*: ICT for improved public services.

3 L'IMPLEMENTAZIONE TERRITORIALE COME FONDAMENTO DI VERIFICA DEGLI ASSUNTI DI BASE

La metodologia del progetto di ricerca in esame fa leva su un utilizzo peculiare e profondo della tecnologia per proporre concrete evoluzioni nei modelli di business, operando su driver tangibili di valore: indirizzare fabbisogni reali sia in chiave di efficienza di costo (transformation e cost efficiency mobilità), sia in qualità di business enabler (growth ed enhance turismo e cultura); abilitare nuovi servizi ed operatori di mercato; introdurre fattori di crescita su mercati esistenti, contribuendo nel contempo alla efficienza economica complessiva di filiera; sostenere una crescita di competenze territoriali distintive ed a valore che possono trovare riscontro economico in chiave di continuous improvement dell'assetto business e tecnologico del sistema.

I risultati del lavoro, dunque, sono sia di carattere tecnologico, legati allo sviluppo della piattaforma cloud-based e dei *business context*, connessi ed integrati, ma anche di carattere socio-economico, pertanto, al fine di definire un modello/framework infrastrutturale ed applicativo che trovi effettivo riscontro con le diverse

realtà territoriali, occorre verificare gli assunti di base implementando il modello definito su un territorio campione, nonché su un campione di utenti.

La fase successiva alla strutturazione del modello, dunque, riguarda l'analisi, su un territorio campione, di alcuni elementi utili a garantire l'individuazione di ulteriori eventuali cluster abilitanti modelli di valore da integrare al modello definito in prima battuta, coniugando al meglio elementi energetici, turistici e riferiti al sistema della mobilità con il potenziale delle risorse ambientali, naturalistiche e culturali del territorio stesso.

Tali analisi riguardano, nello specifico, la verifica della sussistenza di alcuni adeguati strumenti, metodi e strategie di fruizione delle informazioni che si intende integrare, pertanto si riferiscono a:

- modalità innovative di fruizione e valorizzazione dell'offerta turistica;
- componenti caratterizzanti l'offerta turistica e costruzione delle interrelazioni (analisi dei prodotti mediante criteri di differenziabilità dei vantaggi);
- tecniche per la gestione ottimizzata delle informazioni riguardanti consistenza e conservazione del patrimonio edilizio (urbano e rurale);
- approfondimenti di dettaglio delle aree a rischio da frana e/o inondazione per tutti i siti di interesse archeologico e ambientale;
- modellazione dello stato di consistenza, studio di tecniche diagnostiche non distruttive e utilizzo di materiali innovativi;
- strategie innovative ed efficaci di censimento, catalogazione e diffusione delle informazioni di carattere turistico;
- metodologie per l'integrazione di contenuti informativi di tipo turistico con modelli/metodi di ottimizzazione dell'offerta di servizi territoriali;
- messa a punto di un sistema integrato di modellistica atmosferica;
- tecnologie e metodi per una raccolta evoluta ed automatica di informazioni di rilievo da elementi (attivi o statici) della rete;
- modelli e metodi di simulation/optimization per problemi di vehicle routing & dispatching, trasporto multimodale, trasporto a chiamata, real time fleet management; predittivi per il traffico stradale e di calcolo, real time, di tempi di viaggio e percorsi a tempi minimi di percorrenza; per la Bigliettazione Unica Integrata; per la gestione ottimizzata del life cycle del parco rotabile (Level of Repair Analysis e dimensionamento scorte);
- applicazioni utili ad aumentare la sicurezza stradale e facilitare la gestione del traffico in condizioni critiche.

Il territorio campione scelto per effettuare tali analisi è situato sulla costa tirrenica calabrese in provincia di Vibo Valentia, ed è costituito dai Comuni di Tropea, Briatico, Drapia, Joppolo, Limbadi, Nicotera, Parghelia, Ricadi, Rombiolo, Spilinga, Zaccanopoli e Zambrone. A tali Comuni si affiancano, inoltre, in qualità di partenariato locale, altri soggetti istituzionali e operatori economici portatori di interessi locali.

Le risorse caratterizzanti il contesto territoriale di riferimento sono costituite dalla presenza di emergenze storico-architettoniche di pregio, da rilevanti tradizioni enogastronomiche e popolari, nonché da un notevole patrimonio naturalistico. A tutto ciò si aggiunge un'offerta ricettiva consistente e di ottima qualità. Non è un caso, quindi, se la Costa degli Dei, di cui Tropea costituisce l'espressione più significativa, rappresenta una delle poche realtà calabresi in cui l'offerta turistica, seppure concentrata sul turismo balneare estivo, arriva a coprire quasi sei mesi dell'anno, interessando un bacino di circa 1,5 milioni di presenze annuali, provenienti soprattutto dal mercato europeo.

Nello specifico, le *problematiche esistenti* si differenziano per caratterizzazioni territoriali, ovvero quelle connesse alla costa e quelle connesse alle aree interne, che trovano un punto di contatto nel mancato dialogo che nel tempo non ha permesso alle aree costiere di ampliare i flussi turistici e alle aree interne di evolvere.

In particolare le problematiche connesse anche ai *limiti strutturali* delle aree in oggetto sono: forte degrado del sistema insediativo, sia dal punto di vista urbanistico che per quanto concerne la scarsa qualità strutturale del patrimonio edilizio esistente; stagionalità del turismo nell'area; basso livello di fruibilità delle risorse turistiche e dell'immagine dell'area sul mercato interno e estero; elevata presenza di "turismo sommerso"; mancanza di un sistema di offerta che consenta la fruizione turistica delle risorse e sia in grado di valorizzare e accrescere il potenziale di attrazione dell'area, con particolare riferimento al livello qualitativo insufficiente dell'offerta ricettiva alberghiera nelle aree costiere e alla bassa e inadeguata qualità dei servizi e del sistema dei trasporti; inesistenza, quasi totale, di offerta ricettiva nei comuni interni; insufficienti attività promozionali e cattiva gestione dell'offerta turistica, legata alla sola stagione estiva e quindi alla balneazione, da parte degli operatori locali; progressivo spopolamento, soprattutto nei comuni collinari e montani, e relativo invecchiamento della popolazione, con aggravio delle problematiche di carattere sociale; elevato tasso di disoccupazione; elevati rischi naturali; sistemi di depurazione inadeguati; mancata attivazione di reti di comunicazione e integrazione fra istituzioni e poli di attrazione del contesto territoriale.

Le *potenzialità da qualificare*, invece, si riferiscono alla vicinanza territoriale degli ambiti con vocazioni prevalenti differenti, che solo se integrate possono evolvere in termini di ampliamento e integrazione dell'offerta turistica, mediante il potenziamento di elementi già maturi, quali le infrastrutture prossime al waterfront, e la riqualificazione degli elementi di pregio presenti nelle aree più interne.

Oltre alle suddette preminenti potenzialità, sintetizzabili nella coesistenza nell'area di due distretti turistici "latenti" con connotazioni sociali, culturali, storiche e naturali integrabili in un'ottica di destinazione turistica e con la presenza di numerose tipologie di turismo sostenibili, altre sono le potenzialità da valorizzare non direttamente connesse alle caratterizzazioni territoriali, ovvero: mutamenti strutturali in atto sul versante della domanda turistica che portano verso una segmentazione sempre più spinta (con notevoli differenziazioni tra un segmento e l'altro), tale da imporre all'offerta una gestione economica centrata non più solo sulla singola impresa, ma su una "area sistemica"; spinta al decentramento delle funzioni alla quale si associa un generale riconoscimento del turismo e delle risorse turistiche - beni naturali e culturali in primis - quali fattori essenziali di sviluppo; possibilità di destagionalizzare il flusso turistico, intercettando i flussi turistici generati dall'accresciuto interesse verso il turismo culturale, naturalistico ed enogastronomico; possibilità di definire nuovi strumenti programmatici utili alla realizzazione di politiche integrate di sviluppo, nonché al recupero e al rafforzamento di legami socio-economici.

Il risultato delle analisi territoriali, sopra indicate sinteticamente, ha permesso di definire due criteri generali di perimetrazione connessi alle intersezioni del policentrismo sub-provinciale in oggetto.

Il primo criterio si riferisce alla presenza su un tessuto tendenzialmente diffuso di più polarità di sviluppo; il secondo considera la presenza di significative relazioni e interdipendenze tra i centri.

Da questi presupposti è emersa la possibile configurazione di un sub-ambito provinciale a *policentrismo reticolare*, ovvero un policentrismo riferito non solo alla caratterizzazione territoriale, ma anche alla reale presenza di tematiche significative da mettere in connessione per determinare uno sviluppo territoriale locale auto-sostenibile.

Trasversali ai suddetti criteri generali sono i criteri operativi utilizzati con l'intento di definire le diverse operazioni di competitività e interrelazione: *criterio di qualità, criterio di vulnerabilità, criterio di riproducibilità*.

Il *criterio di qualità* è stato interpretato in funzione della irripetibilità e dell'unicità dei beni, delle tensioni creative, dell'attitudine ad influenzare comportamenti e ad offrire riferimenti per uno sviluppo ecologicamente e culturalmente compatibile.

Il *criterio di vulnerabilità* è stato definito come dipendente dal rischio, dalla pericolosità e dalla suscettibilità, essa stessa subordinata sia a fattori passivi e invariabili (quali, ad esempio, la configurazione morfologica) che a fattori attivi e variabili (quali, ad esempio, i fattori antropici).

Il *criterio di riproducibilità*, infine, è stato letto come la capacità che hanno le risorse di rigenerarsi nel tempo e in riferimento all'uso del suolo in cui consistono le stesse, per cui ne risultano essere direttamente proporzionali: la salvaguardia, l'integrità e la qualità degli interventi di ripristino.

Nell'ottica di qualificare l'offerta territoriale in generale, e turistica in particolare, le amministrazioni hanno mostrato un particolare interesse al fine di far fronte in via prioritaria ai seguenti fabbisogni, connessi alla necessità generale di innovazione dei servizi pubblici:

internazionalizzare la conoscenza del territorio;

favorire connessioni materiali ed immateriali utili a qualificare l'offerta territoriale;

ridurre i costi di gestione dell'offerta;

incrementare investimenti economici sul territorio locale.

La scelta di questo particolare ambito territoriale è, altresì, determinata dal fatto che il Dipartimento di Pianificazione Territoriale dell'Università della Calabria ha già implementato su questi Comuni una proposta progettuale, trasversale alla ricerca in oggetto, inserita nella programmazione POR Calabria FESR 2007/2013, nella quale è stata elaborata una strategia volta a definire una gestione economica dell'offerta turistica decentrata in termini di funzioni, riconoscendo il turismo e le risorse ad esso connesse - beni naturali e culturali in primis - quali fattori essenziali di sviluppo locale, anche al fine di avviare azioni di destagionalizzazione dei flussi e di qualificazione dell'offerta integrata.

In tale contesto, dunque, è risultata particolarmente interessante la presenza numerosa e sufficientemente continua (in relazione al panorama calabrese) di un fruitore turistico poliedrico e qualificato, accanto a un tessuto produttivo e sociale maturo, che insieme hanno costituito e costituiscono un ottimo campione su cui testare l'idea progettuale nella sua interezza.

Infatti, gli stessi Comuni, data la forte propensione al turismo e la capacità di attrarre un numero elevato di visitatori in determinati periodi dell'anno, registrano consumi energetici irregolari, caratterizzati da picchi circoscritti molto distanti dai consumi tipici (medi) e di difficile previsione, poiché fortemente dipendenti da fattori esogeni al territorio. Proprio perché in tali Comuni le problematiche di bilanciamento della rete sono di particolare rilevanza in determinati periodi dell'anno e la crescita e lo sfruttamento di generazione rinnovabile locale diventano un'arma fondamentale nell'indirizzare picchi di consumo nella maniera più sostenibile per il territorio, rappresentano il contesto ideale per la sperimentazione dei servizi di Smart Energy previsti in successione alle sperimentazioni già avviate e successivamente descritte in riferimento al servizio Smart Tourism.

4 RISULTATI CONSEGUITI E CONSEGUIBILI

Le analisi di verifica, precedentemente descritte, sul territorio campione hanno riguardato ad oggi la conoscenza dei beni culturali e di tutti gli elementi che caratterizzano l'intero insieme di servizi dedicati al turismo (vitto, alloggio, previsioni meteo, etc.), nonché le diverse declinazioni dello stesso tra cui quella che afferisce al patrimonio naturale.

Al tal fine, nell'intento di potenziare lo sviluppo di tecnologie per aumentare l'interattività nelle esperienze turistico/culturali ed estendere il rapporto con gli utenti finali e l'adozione di strumenti di tracciamento, geo-referenziazione e geo-localizzazione territoriale, nonché di arricchire l'esperienza percepita con sofisticate soluzioni multimediali ed interfacce avanzate con immediate ricadute nella valorizzazione delle risorse e nella qualità di vita della collettività, si è resa necessaria una precisa individuazione dei punti di interesse storico/artistico/paesaggistico, nonché degli accessi utili alla raggiungibilità dei siti attraverso itinerari di tipo escursionistico e non (mezzi pubblici, auto, treno, etc.).

L'obiettivo della suddetta analisi si è sostanziato nella necessità di verificare quali elementi fossero presenti sul territorio e quali potessero permettere al cittadino, sia viaggiatore che residente, di incrementare maggiormente servizi di informazione innovativi, erogabili da un portale web per mezzo di postazioni multimediali presenti sul territorio (totem point) oppure attraverso device di uso comune quali PC, laptop, smartphone, PDA e tablet in modo intuitivo e personalizzato, secondo le proprie preferenze.

Tali servizi contribuiscono a valorizzare il patrimonio culturale ed ambientale del territorio proponendo altresì soluzioni per il noleggio ed il parcheggio di mezzi di spostamento ecologici, mappe tematiche (per es. luoghi di culto e panoramici, edifici storici, parchi naturali ma anche agriturismi, luoghi di ristorazione, B&B, alberghi, uffici), all'interno delle quali gli oggetti mostrati possono essere selezionati e fornire informazioni specifiche attraverso un approccio multicanale (per es. informazioni audio/video e testuali, fotografie, clima, indirizzi, riferimenti telefonici). L'utente, inoltre, potrà condurre ricerche specifiche grazie ad un motore di ricerca ontologico.

All'interno di tali attività si è indirizzato, a favore dell'utente, uno sforzo di semplificazione e sintesi della pluralità di risorse informative disponibili attraverso convergenza ed ubiquità, non solo per accedere al sapere in modo diverso, ma per realizzare un tipo di interazione sociale dei media digitali attraverso internet. Pertanto, l'efficacia dell'informazione in rete dipende non solo dall'infrastruttura robusta e veloce, che rappresenta il "capitale fisico", ma anche dalla disponibilità in tempo reale di una piattaforma semantica per la condivisione delle conoscenze, che rappresenti il vero "capitale sociale ed intellettuale".

A tal riguardo si è reso, altresì, necessario sviluppare servizi web ed interfacce intelligenti, consentendo agli utenti di accedere a tale ambiente in modalità interattiva, attraverso ricerche semantiche e ontologiche.

I risultati, sottoposti al fruitore campione, pongono l'attenzione al contesto di destinazione, al profilo utente ed ai tipi di media, grazie a nuove metodologie quali conversione real-time di formato audio/video, narrazione (story-telling) e gioco (gaming).

Questo lavoro, dunque, ha combinato elementi chiave che, uniti alla capacità di trasmissione personalizzata, offrono una nuova forma di coinvolgimento interattivo multimediale che va oltre lo stato dell'arte e cambia radicalmente il modo di "consumare" le informazioni culturali.

In particolare, si è inteso estendere i confini delle tecnologie di streaming a ciò che viene definita "una coinvolgente esperienza interattiva" (IIE - Immersive Interactive Experience), dove non solo il contenuto, ma anche il contesto (ovvero l'argomentazione che lega un insieme di contenuti pertinenti) dell'utente può essere cambiato in modo interattivo attraverso dei collegamenti attivi (active links) creati dinamicamente a partire dal contenuto corrente. Gli active links vengono visualizzati a schermo in modo che l'utente possa richiamarli in ogni momento arricchendo la propria fruizione di informazioni. Ciò porta ad una rivisitazione nella distribuzione dei media in quanto gli utenti non rappresentano più solo dei fruitori passivi di informazioni in rete, ma guadagnano un ruolo attivo, personalizzato ed indipendente, raggiungendo un livello di condivisione dell'esperienza prima non possibile.

Una simile strutturazione del dato territoriale, rappresentata graficamente all'interno della *Figura 1*, in termini di indicazioni inerenti la fruizione materiale dei suddetti beni, inoltre, favorisce l'accessibilità esterna

ed interna al contesto di riferimento, consentendo, ad esempio, l'ottimizzazione delle connessioni tra il miglioramento dei bilanci energetici e ambientali dei territori e la gestione delle risorse naturalistiche e socio-culturali secondo i principi di equità e sostenibilità, ancora da indagare in termini di sperimentazione territoriale.

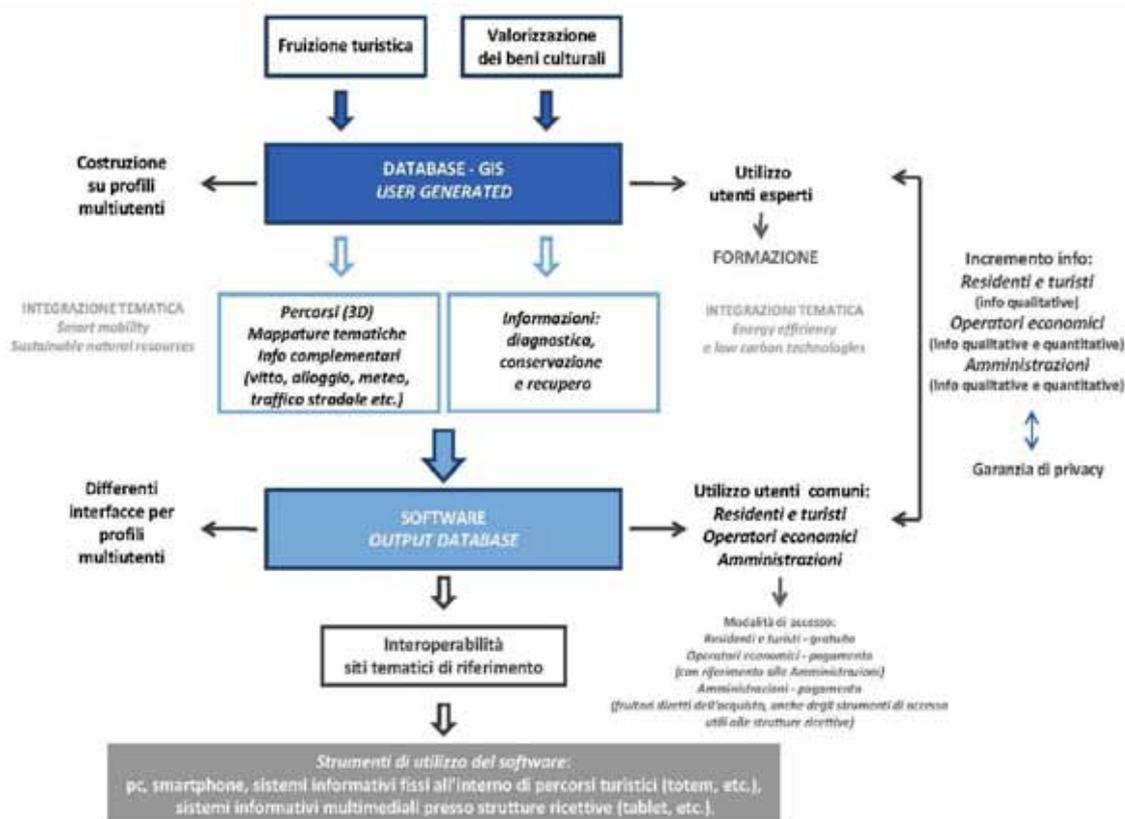


Fig. 1 Architettura di base del sistema

Si è verificato, dunque, che la base informativa così realizzata, al fine di rendere il prodotto integrato e integrabile, può essere estesa con informazioni trasversali, utili in particolare modo alle pubbliche amministrazioni locali per programmare gli interventi di vasta scala su domini tecnici di interesse collettivo, quali il patrimonio culturale e naturalistico, l'urbanistica, la prevenzione di eventi calamitosi legati al dissesto idrogeologico, etc.

Scendendo più nel dettaglio, ad esempio, tali informazioni possono riguardare la diagnostica relativa al rischio del patrimonio culturale e quindi le relative ipotesi di restauro e conservazione del patrimonio storico di interesse, da inserire successivamente nel percorso turistico virtuale, nonché le soluzioni volte al miglioramento delle performance energetiche e ambientali, mediante la riduzione dei consumi energetici, e all'utilizzo di risorse naturali ed ecologiche (mezzi di trasporto).

Il modello di rappresentazione dell'informazione, inoltre mira a garantire l'univocità del dato in modo che esso possa essere consultato ed aggiornato sia da utilizzatori amministrativi e/o tecnici sia da cittadini ad un livello di fruizione immateriale piacevolmente "light".

Ulteriori prospettive di sviluppo vertono, altresì, sulla definizione, per i servizi di ciascun ambito tematico, di un "modello operativo" (processi di sales, support, operations) e sulla identificazione del "modello di

commercializzazione". Questo aspetto, risulta essere di particolare rilevanza al fine di rendere i risultati della ricerca differenzianti non solo sotto l'aspetto tecnologico, ma anche sotto il profilo dei servizi supportati, che fanno leva su un utilizzo profondo della componente informatica per abilitare nuove modalità di erogazione, commercializzazione e fruizione del territorio e dei servizi ad esso connessi, nonché per introdurre nuovi operatori e agevolare lo sviluppo socio-economico.

L'estensione del cloud, in questa ottica, fa da contorno a tutto il sistema in quanto consente di introdurre modelli avanzati di Shared Services che integrano benefici di efficienza di costo, flessibilità e time to market, propri dei modelli cloud, con elementi di differenziazione di business model e gestione di aspetti caratterizzanti/locali.

Gli studi inerenti la definizione del suddetto "modello operativo" dei servizi connessi a ciascun ambito tematico ad oggi si riferiscono solo alla prefigurazione di preliminari concepts di base di seguito sintetizzati.

Per quanto attiene gli ambiti tematici Smart tourism e Smart mobility, le peculiarità del modello sono rappresentate dai seguenti elementi distintivi: modello integrato di mobilità basato sulla convergenza del modello di fruizione, a beneficio di un forte decomplexing della componente di servizio e dei relativi costi di gestione come abilitante di un modello efficace di info-mobilità; marketing multi-servizio, supportato da un modello unificato di customer segmentation, che armonizza i diversi profili di consumo e fabbisogno ed abilita politiche di offerta, integrando l'intera filiera del trasporto e bilanciando la dimensione livello di servizio con gli aspetti di ottimizzazione del modello di fruizione ed impatto territoriale, per cui risultano distintivi il fattore flessibilità nell'evoluzione dell'offerta e la relativa velocità di attuazione (abilitata dal modello di mobilità integrato); modello di clusterizzazione degli asset territoriali e commerciali secondo criteri di valore ai fini della fruizione turistica e della programmazione degli interventi sul patrimonio culturale di interesse collettivo, nonché della compatibilità con logiche di consumo e fabbisogno e di gestione delle risorse secondo i principi di equità e sostenibilità; integrazione di filiera trasporto-turismo a sostegno di uno sviluppo territoriale sostenibile sia in termini economici che ambientali e sociali, con l'integrazione di modelli di trasporto e asset territoriali, abilitando modelli di marketing avanzato a supporto di una efficace proposta turistica da parte di operatori locali/globali; modello di contribuzione basato su un coinvolgimento diretto della pubblica amministrazione (valorizzazione/gestione dei beni culturali), dei singoli operatori di mercato (catalogazione della propria offerta), dell'utente finale (contenuti e feedback) e di capacità e conoscenze territoriali generalizzate in chiave di sostenibilità economica del modello e valorizzazione del tessuto umano locale.

Per quanto attiene l'ambito tematico Smart Energy, invece, l'elemento distintivo consiste in un'evoluzione del modello di Utility Operator, abilitando nuovi modelli di business ed operatori di mercato che capitalizzano sull'aggregazione di produzione locale distribuita e su asset territoriali o sfruttano il potenziale di regolazione del consumo indirizzando modalità più efficienti di bilanciamento energetico. Le peculiarità del modello sono così sintetizzabili: modelli/strumenti di production planning che integrano le tradizionali tecniche con caratteristiche di consumo locale ed elementi ambientali abilitando la definizione di scenari che individuano l'ottimo di produzione in chiave di valorizzazione di risorse naturali ed impatto sulla griglia di distribuzione (integrando, quindi, il potenziale di produzione reale); modelli/strumenti di regolazione demand-response dei consumi in chiave di efficienza energetica e bilanciamento produzione-consumo a livello di micro griglia in logica di massimo sfruttamento del potenziale di produzione locale; abilitazione di nuovi modelli di operatore di mercato in logica di "Service Aggregator"; modelli integrati di Virtual Power Plant con capacità di aggregazione della produzione distribuita, monitoraggio e gestione della stessa ai fini di modelli di trading energetico real-time ed ottimizzazione dei processi di maintenance di impianto.

4 PROSPETTIVE DI SVILUPPO

Questo lavoro, in termini di contesto di riferimento, applicabilità diretta e misurabile degli ambiti di ricerca, potenziale di business e concretezza nell'utilizzo di modelli tecnologici e della componente innovazione, contiene numerose opportunità di valorizzazione nel medio e lungo periodo.

Ad esempio, a valle delle sperimentazioni da completare all'interno del contesto territoriale di riferimento sarà possibile avere un feedback efficace sulle tecnologie e sui servizi implementati e poter dare così avvio anche alla fase di trasferimento tecnologico, di ingegnerizzazione della soluzione e di avvio della "produzione", consentendo di offrire in tempi brevi soluzioni avanzate e altamente competitive in termini non solo di tecnologia, ma soprattutto in linea con i trend evolutivi seguiti dai principali attori del mercato.

In particolare, le soluzioni innovative studiate, realizzate e sperimentate consentiranno di disporre di nuove funzionalità prestazionali che contribuiranno in generale ad incrementare la quota di mercato delle società industriali partecipanti all'iniziativa.

Le nuove tecnologie ed i servizi, dunque, potranno essere fonte di elevate opportunità di business se rese facilmente accessibili agli utenti finali.

Inoltre, il nuovo sistema di middleware offrirà notevoli opportunità di sviluppo per ulteriori servizi avanzati di nuova generazione e per poter offrire al mercato piattaforme estremamente semplici e di basso costo, aspetti oggi imprescindibili nel portafoglio prodotti di tutti i maggiori service & technology provider.

In sintesi, la peculiarità del servizio, in qualità di abilitante tecnologica ed elemento di discontinuità/diversificazione, contribuirà allo sviluppo dei settori industriali/di servizio afferenti le aree oggetto dell'iniziativa: costituzione di centri servizi per il trasporto ed il turismo operanti a livello provinciale/regionale; costituzione di Energy Services Provider estendendo il tradizionale ruolo della utility con servizi di regolazione consumo, aggregazione di produzioni locali e distribuite.

Facendo ora specifico riferimento al settore turistico, nella declinazione culturale dello stesso, i risultati conseguibili nel medio e lungo periodo, da connettere con quelli già conseguiti nel breve periodo e precedentemente descritti, possono essere svariati, primo fra tutti la realizzazione di azioni di promozione dei luoghi, attraverso la creazione di una banca dati efficiente e interattiva, per la valorizzazione storico-culturale e turistica dei siti, che in accordo con le autorità locali sia in grado di: organizzare, aggregare e incrementare i contenuti informativi all'interno di una banca dati, più dettagliata ed esauriente possibile; esplorare nuove tecnologie legate alla geo-localizzazione e geo-referenziazione dei siti da adoperare quale strumento di conoscenza restituendolo alla società; sperimentare nuove soluzioni interattive per attrarre e stimolare la fruizione e condivisione delle informazioni sulle tradizioni, i monumenti, la storia, le eccellenze del luogo; formare un quadro conoscitivo per stabilire dei criteri di sviluppo mirati ad una razionale valorizzazione culturale e turistica del luogo; formare nuove figure professionali in grado di realizzare ed amministrare tali strumenti, portando un rilancio della competitività dei luoghi, nonché un sicuro sbocco occupazionale da parte dei destinatari che avranno l'onere di gestire ed erogare tali servizi. Altri risultati conseguibili, inoltre, risiedono, non solo nella già dichiarata capacità di definire e mettere a punto sofisticate tecniche di trattamento delle informazioni territoriali all'interno di geoDataBase, creando percorsi e mappe tematiche in grado di promuovere l'offerta turistica (intesa anche come servizi dedicati) disponibile al cittadino ed al viaggiatore, garantendo un facile accesso alla rete dei servizi, in linea con le loro esigenze e contestualmente permettendo agli stessi di interagire e di integrare direttamente le informazioni, ma anche nella capacità di favorire un incontro personale ed interattivo, dal forte impatto comunicativo, capace di invitare "sul momento" alla scoperta del luogo, proponendo una modalità alternativa e divertente di visita. Lo storytelling, frutto di una ricerca fortemente interdisciplinare, è stato concepito come volontario distanziamento dai canoni e dai registri stilistici e contenutistici delle classiche audio-guide per perseguire la forma del

racconto a più voci, destrutturato ed orientato a restituire suggestioni, frammenti di discorso che aprono a possibili letture e interpretazioni del territorio e dei personaggi chiave che l'hanno plasmato.

Attraverso la realizzazione di questa prima parte del lavoro e la relativa verifica dei risultati conseguiti, dunque, si vuole continuare il percorso di ricerca al fine di verificare nella sua totalità la capacità del sistema di assolvere a varie funzioni fortemente sentite e richieste dal territorio.

Quindi, oltre ad intercettare il visitatore casuale (e, in tale categoria, può essere compresa anche la popolazione residente), garantendo allo stesso un'adeguata offerta organizzata per la scoperta, l'interpretazione e la valorizzazione del territorio, il fine ultimo è quello di definire un'infrastruttura tecnologica in grado di erogare servizi e contenuti differenziati, per natura e contesto, per una domanda più ampia ed eterogenea.

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IMAGES SOURCES

Fig. prima pagina: Fruizioni territoriali immateriali – Elaborazione A. Palermo 2012. Fig. 1: Architettura di base del sistema – Elaborazione A. Palermo 2012

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REVIEWS PAGES

LANDSCAPES OF URBAN SPRAWL

The Reviews Pages keeps the readers up-to-date on developments in five reports: web, books, urban practices, law, news and events. Each report deals with the specific subject proposed in the TeMA issue. These reviews are specialist in nature but contain enough introductory material to make the main points intelligible to a non-specialist. The reader will not only be able to distinguish important developments and trends but will also find a sufficient number of references to the original literature, web and other resources .

01_WEB RESOURCES

The web report offer the readers interesting web pages which are directly connected with the issue theme.

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02_BOOKS

The books review suggests brand new publications related with the theme of the journal number.

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03_LAWS

The Law section proposes a critical synthesis of the normative aspect of the issue theme.

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04_URBAN PRACTICES

Urban practices describes the most innovative application in practice of the journal theme.

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05_NEWS AND EVENTS

News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

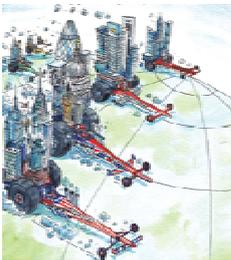
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MOBILITY AND COMPETITIVENESS

REVIEW PAGES: WEB RESOURCES

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In this number

FIGHT FOR COMPETITIVENESS

In this highly competitive world, given the fast growth and development of many urban systems, the success of a city is related to its ability to achieve high levels of quality of life in order to attract international investments, as well as human and financial resources (Gemmiti 2012). Quality of life depends on many different economic, demographic and social factors, which affect the city's overall competitiveness on the international scene. Plenty of research studies focused on urban competitiveness; they were developed to create a hierarchy of cities according to their demonstrated ability to appeal to capital, companies, skill and visitors, both in Europe and in a global context (Beaverstock et alia 1989, DATAR 2003, Taylor et alia 2004, Hall 2005, The Economist 2012). Each analysis used a different methodology to rank cities, examining specific indicators, and among these, the level of mobility and accessibility is one defining feature: an urban system that relies on the presence of an efficient infrastructure system, it is more competitive than an urban system hardly accessible (Mazzeo 2011). Ports, airports and railway lines have a significant impact on the level of attractiveness of cities and therefore represent an element in which to invest in order to improve the city's overall competitiveness.

In addition to the mobility, other factors that contribute to define the hierarchy of cities are, for example, economic factors such as the presence of multinational companies and GDP per capita, or socio-cultural factors such as population growth, events fairs and presence of museums.

Today, the interest of cities to improve their level of competitiveness, nationally and internationally, is growing, because it is becoming increasingly difficult to attract both businesses and human capital and preserve a role in the global context, competing not only against the cities in the developed world, but also against emerging market cities (The Economist 2012).



GLOBALIZATION AND WORLD CITY RESEARCH GROUP – GaWC
<http://www.lboro.ac.uk/gawc/group.html>

GaWC is a research group from the Department of Geography of the English University of Loughborough, which analyzes the external relationships between cities around the world. According to this research group, the available literature about world cities is failing to study relationships between cities because it focuses on their interior characteristics exclusively. Such effort to analyze the external relationships between cities is the main goal of GaWC in order to understand its socio-spatial meaning.

The website is a worldwide platform that assures the immediate spreading of data collected from the research group and achieves creating a network amongst researchers from all over the world intended for reciprocal swap of information.

The website is very easy to browse because every single section's content is briefly described and whenever symbols are used to distinguish the different kind of information, they are spelled out. It is possible to navigate through GaWC in two ways: either use the initial sections (*About GaWC, What's New, Projects, Publications, Data, Media*) to go straight to the content you are interested in, or use the *Gateways* menu to see a selection of resources appropriate to your own needs (*New Visitors, Researchers, Practitioners, Teaching Resource, Visualisation*).

The sections *Projects, Publications* and *Data* are worthy of note because they include remarkable information about GaWC work. The English research group is part of four different types of projects, which are listed in the *Projects* section: «there are pilot projects at Loughborough (A) where we explore research topics with a view to developing new research agendas. When successful the latter are converted into major projects based at Loughborough (B) which are funded by research councils and foundations. We also list collaborative projects, based elsewhere, with Loughborough participation (C), and report projects elsewhere in the GaWC network (D)».

Together with the *Projects* section, the *Publications* section can be a useful source of data and research progresses for those who want to know more about external relations between world cities, in fact, more than 400 papers are collected and available. Articles are distinguished by different letters which indicate the status of a paper: the letter A refers to a paper just now submitted; B, C and so on, indicate progressive revised versions of the initial article; Z designates the final paper, that will not be further edited.

The *Data* section completes the series of information produced by World cities researches to promote the interest in inter-city relations.

One more section of the GaWC website must be considered, because it constitutes a highly experimental idea of world representation: *Visualisation* includes new types of atlases, maps and cartograms, which are produced to reflect the data and theories formulated by GaWC.

In conclusion, the simple and immediate structure of the website contributes to make GaWC's work known worldwide, exploiting the two key characteristics of web: rapid publication and widespread access.



UN-HABITAT – FOR A BETTER URBAN FUTURE
<http://www.unhabitat.org/>

UN-HABITAT is the United Nations Human Settlements Programme, established «to promote socially and environmentally sustainable human settlements development and the achievement of adequate shelter for all». The agency was born in 1978 after a meeting in Vancouver known as Habitat I. Later on, in 1996, in Istanbul, the United Nations held a second conference on cities, Habitat II, where the document Habitat Agenda was signed; it contains over 100 commitments and 600 recommendations that should drive sustainable development.

From agency's foundation on, the increasingly fast planet's urbanization made UN-HABITAT's effort necessary to promote a better urban future, because the expansion of cities «generates economic growth and social and political advances, as well as technical and scientific progress, but when poorly managed, it can generate poverty, social exclusion, and environmental degradation».

The program *Best Practices and Local Leadership* is particularly interesting among activities promoted by the agency and it was intended to support the exchange of 'best practices', that is to say valuable examples of planning which contributed to improve quality of life where they were carried out and that can be taken such as a standard from other developed countries. A database was created to favor global diffusion of information and it collects over 4000 proven solutions to common social, economic and environmental problems from 140 countries. It is easily accessible in sections *Programmes* and *Our Work* in UN-HABITAT website, where the programmes that the agency handles altogether with other partners (central governments, charity associations, civil society, etc.) all over the world, are illustrated.

The agency's website includes 10 sections. The *About us* section is dedicated to show the goals of UN-HABITAT programme, its history, action strategy and funds delivering and collaborating partners (deepened in the section *Partners*). In the section *Governing Council* are listed programmes and documents about the latest seven governing councils, which are easily downloadable.

Information about UN-HABITAT activities, statistics, reports and publications concerning each single nation are accessible in the *Countries* section.

Complete collection of publications is downloadable in the *Publications* section, where it is possible to subscribe to, as well as viewing freely some documents and purchase the payable ones.

Meetings in different world countries are listed, in chronological order, in the section *Events*, that includes two different subsections, one referring to events that take place annually (World Habitat Day) and the other referring to events organized on every two years (World Urban Forum).

The section *Media center*, containing videos and pictures, and the *Resources* section, containing all the documents delivered by the UN-HABITAT agency (reports, guides, declarations, best practices, resolutions, general assembly resolutions), complete the website.



MOBILITY AND TRANSPORT – EUROPEAN COMMISSION
http://ec.europa.eu/transport/index_en.htm

The European Commission website on mobility and transport, wants «to promote a mobility that is efficient, safe, secure and environmentally friendly and to create the conditions for a competitive industry generating growth and jobs». The goal is to build a common European strategy, because no national government can efficiently work alone.

The website contains all the information related to the EU's policies for transport, organized into five different areas: *Transport modes*, *Transport themes*, *Media corner*, *Facts & funding* and *About us*.

In the *Transport modes* area, it is possible to find every kind of information about the five ways of transport (air, road, rail, maritime and inland waterways), starting with a brief description of the specific sector and ending up with the latest news, such as events or public consultations. If you are looking for a solution to a transport issue, you can find it in the *Transport themes* area, where the problems related to mobility are organized into nine topics: European strategies, passenger rights, security & safety, clean transport/urban transport, sustainable transport, transport infrastructures, intelligent transport systems, research, and innovation and international relations. As for the *Transport modes* area, each topic included in the *Transport themes* area is analyzed explaining what the EU wants to achieve in that specific sector and what the latest news about it are. The *Media corner* area turns out to be extremely interesting, especially for those who have little experience in the mobility and transport field, because they can find here different types of informative videos on issues such as road safety or sustainable mobility, that are really easy to understand and very impressive. In addition to the multimedia content, the *Media corner* area includes two lists that summarize all the news and events on transport issues, placed in chronological order.

The website represents a useful tool for the circulation of information about European Commission's effort to build a competitive strategy for mobility and transport, at continental level.

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IMAGE SOURCES

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MOBILITY AND COMPETITIVENESS

REVIEW PAGES: BOOKS

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In this number COMPETITIVENESS AND DEVELOPMENT FACTORS OF URBAN TERRITORIES

In the contest of global competition between markets, territorial competitiveness represents a fundamental element. The greater competitiveness of a territory depends on the ability to increase its technological, social and infrastructural equipment and «cities and regions compete, on the international market for goods and production factors, on the basis of an absolute advantage principle, and not of a comparative advantage principle» (Camagni 2002). The competitive advantages of cities and regions are influenced by a wide range of actors and processes and urban competitiveness is defined by an increasing complexity of aims, including economic growth, employment, internationalization, attractiveness, equity, stability and social cohesion, environmental sustainability (Rota, Vanolo 2006). This change of view leads to a broadening of the concept of territorial competitiveness associated more and more with its own specific features (human, cultural, creative, institutional capital). A competitive territory must be able to use its advantages to make trade gains, in order to support economic and employment growth. A local economy's competitive advantage is defined by the capacity for local firms to compete externally. Therefore in a global economy where most production factors are mobile, a local government can create the right conditions for competitive advantages based on unique local characteristics of capital and labour.

Starting from these considerations this section proposes a careful consideration about two important aspects: on the one hand the need for new and more flexible analysis and comparison instruments monitoring the level of competitiveness of the regions in order to strengthen development conditions through suitable policies. On the other hand the need to identify the issues related to development policies of a territory and how overcome them. The first document refers to a research project aimed at defining a model measuring the performance of Italian urban regions; the second one tries to understand both the key factors that determine economic growth and how measuring competitiveness; the third one finally aims at supporting local governments to improve Italian competitiveness through infrastructure investments.



Title: Il governo della competitività urbana: fattori, indicatori, benchmarking
Author/editor: AA VV
Publisher: AISLO
Download: www.isprambiente.it
Publication year: 2007
ISBN code: n.d.

AISLO (Italian Association Meetings and Local Development Studies) has coordinated since 2006 the research project "The Government of Urban Competitiveness: Factors, Indicators, Benchmarking"; a lot of universities, research institutes and local government together with the University Bucknell has been working at this project as well. The whole research aims at focusing a comparison model so that cities can choose other cities or territorial level they can compare with. Such comparison is based on shared indicators and they can be analysed referring to space and time.

This report starts from the description of the methodology used to study the issue of urban competitiveness in Italy. The report also aims at bringing out the most innovative aspects of the model, the critical issues faced and the scenarios of urban competitiveness.

The methodology integrates two different approaches, top-down and bottom-up, in order to define indicators of competitiveness. The top-down approach consists in reading, in terms of competitiveness, the priority for the development at Community level (Lisbon Strategy for 2010) and National level (National Strategic Framework 2007-2013).

The bottom-up approach is based on real experiences and needs of the actors involved in the process of local governance participating to the research project. This methodology allows to evaluate how each city sets itself when compared to the European prefixed targets. This method also helps understand the importance of the different levels of competitiveness for each city and its relative position. The definition of competitiveness indicators has been established by reworking the ten priorities of the NSF according to the requirements and observations made by the participants, through the correspondence between the dimension of competitiveness and the availability of data. The benchmarking has been built both on the system of dimension and on the indicators of competitiveness in order to compare the different situations, to identify critical issues and to improve performance.

To facilitate comparison and knowledge of different urban realities benchmarking has been associated with a process of benchlearning (shared learning) that allows the comparison among the different administrations.

The key issues that benchlearning process must investigate are several:

- the analysis of the factors that have determined a competitive position of a city compared to others;
- the comparison of the improving/worsening of its path during the time;
- the achievement or not of the strategic goals;
- the opportunity/possibility of transferring the best practices from other contexts.

This methodology not only can be used by governance through the definition of indicators of competitiveness among different cities, which permits the different stakeholders to compare the several points of view and the different intervention policy, but it wants also to enable comparison processes elaborated by professionals to strengthen the policy-learning among different territories.



Title: The global competitiveness report

Author/ed: Klaus Schwab

Publisher: World Economic Forum

Download: www.worldbank.org/eap/climatecities

Publication year: 2012

ISBN code: 978-0-8213-7766-6

The World Economic Forum collaborates with key experts and decision-makers through its Global Benchmarking Network to support Countries and regions in their efforts to increase competitiveness and economic performance. This Network contributes with over 150 Partner Institutes worldwide to spread the conclusions of its research on competitiveness at national and regional levels and in order to identify and measure the drivers of economic performance it prepares different reports annually. The annual Global Competitiveness Report has studied several different factors supporting national competitiveness in order to provide insight and stimulate the discussion among all stakeholders on the best strategies and policies for a sustainable growth. The competitiveness is defined as «the set of institutions, policies, and factors that determine the level of productivity of a country», and its analysis depend on the Global Competitiveness Index (GCI), that is «a comprehensive tool that measures the micro and macroeconomic foundations of national competitiveness». The GCI covers a weighted average of many different components that are grouped into 12 pillars of competitiveness (e.g. institution, infrastructures, labour market efficiency). Because all countries are in different stages of development and according to the economic theory of stages of development, the GCI is related to three different stages of development: in the first stage the economies are factor-driven that means they compete on their factor settlements (for instance, natural resources); in the second stage the economies are efficiency-driven, increasing more efficient production processes and improving product quality; in the third stage the economies are innovation-driven that means competitiveness concerns new technologies or business sophistication. In order to consider the specific stage of development for each Country, the importance of a pillar, and so the relative weight that the GCI attributes to it, depends on development phase of the Country as well as the three subindexes in which all the 12 pillars are structured. Most competitive hotspots are concentrated in Europe, North America, and some advanced economies in Asia and the Pacific, while Countries such as Africa and Latin America continue to be among the least-competitive economies. Italy operates well in some areas especially for the market size and the sophistication of its business but holds a low position in the world rankings for its labour market efficiency (127th) and for business development (111th). Within the first chapter the Report tries to integrate the concept of sustainability into competitiveness, aiming at defining a sustainable competitiveness: «a set of institutions, policies, and factors that make a nation remain productive over the longer term while ensuring social and environmental sustainability». In the sustainability perspective the GCI is redefined as an average of two sustainability indexes: the social pillar related to the population access to basic necessities, the social cohesion and the vulnerability to economic exclusion; the environmental pillar related to the environmental policy, the degradation of the environment and use of renewable resources. At the first place of the sustainability GCI there are Nordic Countries with Switzerland that has the highest scores in both dimensions.



Title: Rapporto infrastrutture e competitività 2012: 10 opere per la ripresa

Author/editor: AA.VV.

Publisher: italia decide

Download: <http://www.italiadecide.it/Documento/Detail.aspx?Id=20>

Publication year: 2012

ISBN code: n.d.

The report aims at analysing the link between the ability to compete of our Country and the existing infrastructures. It focuses on the issues related to the achievement of work that can be the driving force to boost growth. Infrastructure may be regarded as a precondition for the economic development of a Country, fostering a positive cycle of investment and productivity. The report begins starts from an overview of ten infrastructures have already been completed or not yet finished, in order to provide a current photo of our Country and its ability to implement a policy of infrastructure development. The analysis of these significant cases allows to understand the need to pay more attention to the stages leading to the achievement of infrastructures. In this way it is possible to prevent all the conflicts arising which might affect the viability of the work. Concerning this issue key aspects are: demand forecasting to resolve any critical issue; economic and financial feasibility especially if there is a public resource investment; and socio territorial compatibility giving voice to local communities and making them understand the value of the intervention.

In Italy the achievement of large infrastructures has become very difficult, also because of the long time involved. Comparing other European Countries it comes out that Italy is in the last place for infrastructure supply; referring to for regional and suburban rail network Italy is less than 50% of European average. The report draws up a list of measures resulting from European and international best practices to try to solve the main problems (procedures for implementation, priority interventions, leakage of public resources) related to the slowness of infrastructure development: streamlining of the legislative framework, improve the quality of engineering services for the design and supervision of works. Another aspect we need to work in order to start a real process of infrastructure growth is characterized by public resources. Investments in the public works sector has been characterized by a fluctuating trend for the last 20 years: they have seen a reduction of 44.5% between 2004 and 2012. However, CIPE (Comitato Interministeriale per la Programmazione Economica) in 2009 approved the Piano delle opere prioritarie to balance the enormous cuts to appropriations for new infrastructure. This Plan foresees public investment for over 11€ billion. The economic crisis broken out at the end of last year has determined the need to involve the private sector in the stages of financing, implementation and management infrastructures. Ultimately, the report highlights the need to adopt a systemic approach of an infrastructure culture in order: to inform punctually the community so avoiding any contrast; to better manage public resources for investments; and to connect transport infrastructure each other to avoid that people and goods might choose other Countries.

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MOBILITY AND COMPETITIVENESS

REVIEW PAGES: LAWS

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In this number

“DECRETO SVILUPPO” 2012: INFRASTRUCTURE, HOUSING AND TRANSPORTATION TO REVITALIZE THE ITALIAN ECONOMY

The “Decreto Interministeriale n. 83/2012” governing “Misure Urgenti per la Crescita del Paese”, more known as “Decreto Sviluppo” (D.L. No. 83, June 22, 2012, turning into the Law No. 134, August 7, 2012, published on the Italian Official Journal No. 210, September 8, 2012), points on the strategic sectors of infrastructure, housing and transport to boost the Italian economy on the international markets. In the attempt to read this decree-law in order to integrate land use, transport and environment, the issue of this Laws’ Review Pages focuses on the analysis of the “Titolo I - Misure urgenti per le infrastrutture, l’edilizia ed i trasporti” and examines the measures taken respectively in the “Capo I (Infrastrutture – Misure per l’attrazione dei capitali privati)”; in the “Capo III (Misure per l’edilizia)” and in the “Capo IV bis (Disposizioni per favorire lo sviluppo della mobilità mediante veicoli a basse emissioni complessive)”. The main topics concern: the new financial tools, the so-called “project bond”, aimed at facilitating bond issues by Italian companies which realize the project in the form of project financing operations; the introduction of a fund for the implementation of the “Piano nazionale per le città” (National Plan for the cities), addressed to the redevelopment of urban areas and the development of measures of sustainable mobility aimed at promoting the construction of an infrastructure network for electric vehicles. That said, this Review Page has been divided into the following sections, each related to a specific item of the decree:

- Infrastructure: project bond and tax advantages for the infrastructure development (articles 1 - 2);
- Housing: “Il piano città”: contents phases and funded projects (article 12);
- Energy: low emissions vehicles for the development of mobility (articles 17-bis – 17 decies).



INFRASTRUCTURE - PROJECT BOND AND TAX RELIEF FOR THE INFRASTRUCTURE DEVELOPMENT

The revival of the large infrastructure projects is entrusted by the Government to the new financial tools of the project bonds for which, at present, Italy has the most advanced legislation in Europe.

The proposal must be set in the broader European context which includes the development of financing methods for public infrastructure aimed at attracting private funds such as, for example, the recent initiative "Project bond 2020", promoted by the European Commission which provides a mechanism for sharing the financial risk from the BEI as a guarantee for the bonds issued by the "società di progetto" (project company) to finance infrastructure projects.

The tools of project bonds had already been introduced by the Legislative Decree No. 1, January 24, 2012 (converted into the Law No. 7, March 24, 2012), Article No. 41 "Emissioni di obbligazioni e di titoli di debito da parte delle società di progetto - project bond", where they are defined as "a private tool to finance infrastructure projects and to ensure the coverage of the construction risks. Unlike the existing financial instruments, where the bonds are repaid through the cash flows (tolls, fees, etc.) of the infrastructural project, with the new tool of project bonds it is possible to cover the time in which the project has not yet begun to generate a cash flow. It thereby facilitates the fund-raising by the private company to be used for the built up of the public project" (Explanatory Report, commentary on Article 41).

The Decree introduces four principal innovations which made operating the new financial tool:

- the introduction of tax relief consisting in assimilating project bond to government bonds with the consequence that, the withholding tax to be levied under certain conditions on interest and similar income will be lowered from 20% to 12.5%; the favorable tax regime works for bonds underwritten in the three years following the date of entry into force of the Decree;
- the extension of the scope of the tax advantages for all the infrastructure carried out in public-private partnership; the original version of the law limited this kind of benefits only to road infrastructure and only subsequently, the Law Decree No. 201, December 6, 2011, known as "Decreto Salva Italia", extended it in favor of the concessionaires of the construction of railway infrastructure and of the development and expansion of ports and road and rail links;
- the extension of the period for the issuance of the guarantees «corresponding to the period of construction and start-up of the management of the new infrastructure, until the expiry of the guaranteed project bonds» (Decree August 7, 2012, in Italian Official Journal No. 210, September 8, 2012). Project bonds allow then to finance the development of an infrastructure project since the construction phase, which is the most difficult moment for investors due to the absence of cash flows;
- the identification of the actors who may provide guarantees on the funded projects: first, there are important institutional bodies such as the European Investment Bank (EIB), the Deposits and Loans

Fund and the Sace, the Ministry of Economy and Finance (MEF), followed by insurance companies and authorized financial intermediaries.



HOUSING – “PIANO NAZIONALE PER LE CITTÀ”: CONTENTS, PHASES AND FUNDED PROJECTS

Within the area of interventions in urban areas the Ministry of Infrastructure and Transport established a new operational tool, called «Piano nazionale per le città» (National Plan for Cities), dedicated to the redevelopment of urban areas with particular reference to the dilapidated ones (art. 12).

For this purpose on September 7, 2012 it was instituted the “Cabina di regia” of the plan made up of 11 technicians each representing a ministry, a technical of the State Property Agency, one of the Deposits and Loans Fund, plus two technicians from the Regions and one on behalf of the Municipalities.

Through this organization, which is responsible for the selection of the projects to be implemented, it will be possible to put together different types of interventions, simplify procedures and involve the interested investors, especially private investors, assigning a central role to the public-private partnership.

The Plan also provided a new implementation mode, the “Contratto di valorizzazione urbana” (Urban Development Contract) promoted by the “Cabina di regia” in collaboration with the municipalities involved, which specifically regulates the commitments of the various public and private actors, in such a way as to simplify the realization of the interventions in certain times.

Those contracts of urban development constitute the National Plan for Cities. To contribute to the implementation of the interventions it has been set up a special fund called “Fund for the implementation of the National Plan for Cities,” that brings together the resources, belonging to some programs concerned with housing set up by the Ministry of Infrastructure and Transport. For this Plan, the Ministry of Infrastructure has earmarked funds for 224 million of Euros.

The procedure for the selection and allocation of funding for projects of the City Plan outlined in the Decree has three phases (Article 12, Paragraphs 2, 3 and 4):

- presentation by the Municipalities of the Urban Development Contracts to the “Cabina di Regia” by October 5, 2012; the proposals should contain, in addition to the description of the urban area, the description of the financial investments put in place by both public and private actors, and the time-line chart of interventions. The urban renewal projects submitted by municipalities to the “Cabina di Regia” are 425, for a total funding requests amounted to 1,001 million euro, compared with 224 million available; € 65 million for each city, down to 50 million by removing the data relating to the municipality of Florence (the mayor Renzi asks for his city 280 milioni) (Arona 2012);
- selection of the proposals by the “Cabina di Regia” based on specific criteria, such as: the feasibility of the operations, the conditions for involving public and private financing, the improvement of the urban quality and of the social and environmental fabric. The Decree, however, does not set a rigid grids of

parameters and scores, leaving wide discretion to the “Cabina di Regia”. It is in this phase that is currently the implementation process of the National Plan for Cities;

- signing of the Urban Development Contract, in the case of inertia in the realization of the interventions by the municipalities, the Decree provides for the withdrawal of funding.



ENERGY – LOW EMISSIONS VEHICLES FOR THE DEVELOPMENT OF MOBILITY

Chapter IV-bis of the Decree contains the “Disposizioni per favorire lo sviluppo della mobilità mediante veicoli a basse emissioni complessive” (Provisions for the development of mobility by the means of low-emission vehicles) aimed at promoting the development of infrastructure networks for charging electric vehicles and the experimentation and dissemination of public and private fleets of low emissions vehicles.

The provided measures concern:

- at the national level, the development of a “Piano nazionale infrastrutturale per la ricarica dei veicoli alimentati ad energia elettrica” (“Infrastructure National Plan for charging electric vehicles”) to ensure throughout the national territory minimum levels of accessibility to the service for charging electric vehicles. This Plan must be approved by February 2013 and will be updated on June 30 of each year. The plan provides for the execution of specific “accordi di programma” (program agreements) with the Ministry of Infrastructure and Transport, promoting and enhancing the participation of public and private entities.

To implement the plan, the Government has put in place funding for a total of € 50 million. The funding provided by the Ministry amounted to € 20 million for 2013 and to € 15 million for each of the years 2014 and 2015. For development actions set out in the program agreements, the Ministry of Transport will participate in up to 50% of the costs incurred for the purchase and installation of infrastructure.

- at the municipal level is provided the adaptation of the “Regolamento Edilizio Comunale” (Municipal Building Regulations) by 1 June 2014, for the part on the degree qualifying buildings; the release of the building licence by the municipalities will undergo to the implementation of electric vehicle charging stations «which facilitate the connection of a car from each parking space and from each box car».

This constraint regulates the new buildings for use other than residential with floor area exceeding 500 square meters and buildings undergoing refurbishment construction, excluding property owned by the government. But the infrastructure projects for sustainable mobility will come also for buildings to residential use. The same rule, in fact, allows for the possibility (not the obligation) to all buildings, to install the electric vehicles charging stations after a condominium meeting with a resolution passed with a number of votes representing a majority of the apartment’s owners and at least half of building’s value.

The Art. 17-sexies also stipulates that the infrastructure, including private, for the electric vehicles charging are primary infrastructure works and can be implemented in the entire municipality pursuant to an exemption from the contribution of construction.

In the Art. 17-decies, finally, the rule provides incentives for those who buy a new low emissions vehicle in Italy, and deliver to scrap a vehicle of which they are the owners. The contributions change according to the values of emissions of electric vehicles and the years in which these vehicles are purchased. For example, the contribution is 20% of the purchase price, in 2013 and 2014, up to a maximum of € 5,000 for low emissions vehicles that produce CO₂ emissions of less than 50 g/km; the contribution is 15% of the purchase price in 2015, up to a maximum of € 3,500 for low emissions vehicles that produce CO₂ emissions of less than 50 g/km.

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IMAGE SOURCES

The image of page 155 is taken from: online.stradeeautostrade.it; the image of page 156 is taken from: www.orion.re.it; the image of page 157 is taken from: www.e-station.it.

MOBILITY AND COMPETITIVENESS

REVIEW PAGES: URBAN PRACTICES

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In this number

INNOVATION DISTRICTS AND URBAN COMPETITIVENESS: TWO CASE STUDIES

The meaning of urban competitiveness and its related aspects have been widely debated over the last few decades. According to Storper (1997) competitiveness can be defined as «the ability of an economy to attract and maintain firms with stable or rising market shares in an activity while maintaining stable or increasing standards of living for those who participate in it».

In a more recent study the OCED (2006) stated that «cities compete directly with each other by providing the greatest quantity or optimal combination of location factors (such as green spaces, affordable housing, business support, quality of pre-university education for families, presence of headquarter functions, etc.) to lure skilled labour and investment». In the context of urban competition, local governments currently play a key role as proven by the rapidly increasing number of local policies developed to fuel job growth and attract new firms.

However, while isolated initiatives such as public founding programs, regulatory and permitting assistance, or tax incentives have been largely implemented, less common are integrated local policies that, by combining strategies of economic development and urban refurbishment, are comprehensively devoted to build or facilitate all the necessary components to attract in a concentrated area skilled jobs and investments.

Innovation districts can be considered as a successful example of place-based approach aimed to facilitate the strategic concentration of intensive knowledge-based activities. These initiatives are also projects of urban refurbishment and represent a new model of rethinking urban development by providing a response to the challenges posed by the knowledge-based society.

Innovation districts have been adopted by a variety of host cities.

In this article two well established case studies are analyzed: the22@Barcelona Innovation District (Spain) and the Boston Innovation District (US).

Cities are the main source of development of the economy of knowledge that has established itself as the true engine of global growth. They compete directly with each other to attract new companies, new ideas,

new ways to work, to create jobs and retain local talents. In order to provide a response to this challenge, new models of thinking urban development are required. The innovation district case studies analyzed in this article show how an integrated place-based approach can be a successful factor to achieve objectives of urban regeneration and economic competitiveness.



22@BARCELONA INNOVATION DISTRICT

According to the European Cities Monitor report elaborated by real estate services firm Cushman & Wakefield, the city of Barcelona reached in 2011 the 6th place in the ranking of the best European cities for business to potentially relocate to and is rated number 1 for quality of life for employees. The Catalan city is swiftly changing its manufacturing specialization in the network of metropolitan cities: almost two thirds of its exportations are of medium-high technology good. Therefore, the future of its competitiveness in the market will mostly depend on its capacity to intensify its industrial activities and services related to the new technologies sector.

Project Summary – In the year 2000 Barcelona's City Council launched an ambitious project which aimed to consolidate the Catalan city's position as one of the main innovation and knowledge-based economy platforms in the world.

Indeed, the project 22@Barcelona plans to transform the dilapidated industrial areas in the Poblenou neighborhood into an innovative district offering modern spaces for the strategic concentration of intensive knowledge-based activities, furnished with modern infrastructures and highly integrated in the surrounding urban texture. Moreover, the 22@Barcelona Project represents the most important project of urban transformation actually taking place in the Catalan city and is an integral part of a broader process of regeneration that, since the big infrastructural projects launched on the occasion of the Olympic Games of 1992, involves the whole oriental area of the city. The transformation of the disused productive settlements of Poblenou will allow the creation of 100,000 new jobs, the requalification of 4,600 lodgings and the construction of almost as many new subsidized residences, the realization of green spaces on 114,000 square meters and 145,000 square meters of facilities and public services, modifying the economic geography of the city. With the objective of improving the urban quality and the livability of the area, the city has also invested more than 180 millions of euros to provide the neighborhood with modern transport infrastructures and to implement a modern network of energy, telecommunications, district heating and pneumatic refuse and waste collection systems, inspired by energetic efficiency and the responsible use of natural resources. Particular emphasis has been put on sweet mobility by realizing 18 km of bicycle paths, the recovery of 37 km of streets that have been equipped with 10 m wide sidewalks in order to promote pedestrian mobility and to improve security for pedestrians.

Not only has the city of Barcelona had a strategic role in the planning of the district but it also started different initiatives in order to facilitate access to public funds (especially for small and medium enterprises)

and improve networking processes between enterprises, universities and research centers by organizing events and advertising campaigns.

Location – Situated in the northwestern sector of the city, the area of intervention took place in the historic industrial center of Catalonia that became a flourishing site of productive activities (especially in the textile industry) since the second half of the 19th century because of its strategic position between the harbor and the first Spanish railway network. For over a century the Poblenou neighborhood has been one of the main poles of production of the country to the point of receiving the nickname “the Manchester of Catalonia”, but, since the 1960's the mutated economic conditions and the emerging of the Zona Franca as the new regional productive center marked the beginning of a slow process of deindustrialization that would last for over thirty years during which more than 1300 enterprises left the neighborhood. The old factories were cleared out, triggering a gradual process of degradation that started by the disappearance of the productive system to later spread quickly to the social and economic context.

This new “functional void” of approximately 200 hectares englobed in the urban tissue offers an occasion to rethink the economic and social developments of the city and to bind the neighborhood historically known for its industrial revolution in the 19th century to nowadays' s technological revolution.



View of 22@Barcelona

Planning context – The document *Criterios, objetivos y soluciones generales de planeamiento de la renovación de las áreas industriales del Poblenou*, published by Barcelona's City Council in 1998 established the basis for the definitive changes to the provisions contained in the General Metropolitan Plan of 1976. This document contains the planning guidelines elaborated by a working group composed by experts in the fields of urban planning, technologies of information, urban ecology and proposes a compact urban development model inspired to the criteria of the functional mixité.

The Modification of the General Metropolitan Plan (MPGM), approved in 2000 reclassifies the district from the original 22a industrial zone to the new 22@Barcelona. The new zoning, rejecting the mono-functionality

expected by the previous Plan of 1976, allows for more construction including public spaces, green areas and subsidized housing, in addition to offices and business facilities.

The document establishes the nature of the new activities (called “activities @”) that shall take place and introduces an articulate system of obligations and incentives in order to guarantee the attractiveness of such activities on the territory.

The said Modification recognizes a scarcity of infrastructures in this area, clearly incompatible with the transformations expected and, proposes the redaction of a specific Special Infrastructures Plan (PEI) stating the necessity of a non sectoral approach. The Plan defines an integrated model for the organization of the underground and for managing the networks that shall incentivize the localization of the new activities.

Finally, the Modification of the Special Plan for Historical/Artistic Architectural Heritage, approved in 2000, adds 68 new elements of Poblenou’ s industrial heritage to the Barcelona Heritage Catalogue.

Results – Since the start of the project in December 2011, 139 plans of requalification have been launched and correspond up to the 70% of the intervention area. The real estate industry has decisively supported the project: 84 of the 139 plans approved have been promoted by the private sector. Estimates show that since the start of the project in December 2011, 4'500 enterprises have decided to localize their headquarters in the Poblenou neighborhood. Of those, 47,3% are new start-up businesses while the remaining part is constituted mostly by companies that decided to move to the district because of its new location-related advantages. As a result, the number of people working in Poblenou has augmented significantly: by December 2011 the district hosted more than 56'000 new workers, half of them having a university degree.



BOSTON INNOVATION DISTRICT

According to the Innovation City Analysis Report issued by the Australian consulting firm “2thinknow”, the city of Boston reached in 2011 the 1th place in the ranking of most innovative cities in the world. Boston’s metropolitan area is home to one of the largest populations of highly educated potential innovators, associated with its world-class academic institutions like Boston University, Harvard University, Tufts University and the Massachusetts Institute of Technology. This supply of young educated talents and the growing strength in life sciences and tech clusters represent the foundations on which the city intends to boost its competitiveness and to strengthen its position as a world leader for innovation and technology.

Project summary – In the year 2010, city’s Mayor Thomas Menino launched a new approach to spur economic development along Boston’s waterfront. The Mayor called for a strategy that was both more deliberate and more experimental to create jobs, housing opportunities, and to achieve a new level of metropolitan livability.

Boston Innovation District is a big economic initiative of marketing promotion and of business attraction aimed to transform 400 hectares of underdeveloped land on South Boston’s waterfront in a magnet for business, science, technology and cultural activities. The vision developed for the Innovation District is well summarized in the district’s motto “Work, Live, Play”. “Work” is founded on the idea that that proximity and

density are key contributors to business productivity. Thus the city aims to cluster both young start-up companies to generate ideas and larger firms who have access to capital and the ability to grow those ideas. The second theme "Live" is related to urban livability: the city aims to build flexible housing options that meet the budget and the lifestyle requirements of the young workforce. Finally the theme "Play" is about creating a stimulating social environment filled with recreational opportunities, cultural institutions and public spaces that facilitate networking processes. The city supports this vision by working on several fronts; first of all by promoting the area with an aggressive communication strategy aimed to brand the area as an "Innovation District". This strategy is carried out through hosting and attending events to spread the word about the status of the Innovation District and using blogs and other websites to communicate district' successful stories. The city also offers different forms of incentives for new development projects such as rent-free or below market value spaces in order to attract firms and company accelerators to the area. For example the city secured an office space free of charge to MassChallenge, a nonprofit organization and the world's largest start-up accelerator. GreenTown Labs is another example of an innovation-driven enterprise that was offered a very reasonable rate for space along the waterfront. Furthermore the city provides financial support programs to facilitate access to grants and loans and licensing and permitting assistance helping individuals or companies who wish to start, expand, or relocate a business in the district.



Boston Innovation District

Another key role in the success of the district is played by the Boston Redevelopment Authority (BRA), the city's planning and economic development agency, which negotiates and works with private-sector developers to ensure they will incorporate "innovative components" that will attract entrepreneurs and startups (Sharma 2010). Two such examples of how BRA shaped private development project «include residential floors designed for an InnoHousing concept, more compact units without luxury finishings, as well as a Public Innovation Center for organized groups to host free entrepreneurial events in the area» (Koven 2011).

Location – Positioned between downtown and Logan's airport and nearby several residential neighborhoods, the South Boston waterfront has developed in a spasmodic manner, and has been greatly impacted by Boston's volatile economic cycles (Chaghtzbanian *et alia* 2010). Site of iron and glass foundries during the early industrial era, it became first a center of wool trade and later the seat of a robust seafood processing industry. Till the first half of XX century the zone was also an important trade shipping and distribution center.

When the city developed its vision for the South Boston waterfront, the area was at a transitioning point: maritime commerce was declined and the area, which in the latter part of the XX century consisted mainly of parking lots and warehouses, was swiftly becoming the focal point of future city's development. Indeed, due to a huge amount of public investment aimed to made the area more accessible and thanks to its strategic position, business slowly began to move in to the area, particularly in the field of life science and biotech sector, showing the city its potential to develop into a strong economic district.

Planning context – The modern arc of planning and development for the Seaport District started in the beginning of 1997 when Mayor Tomas Menino charged the Boston Redevelopment Authority with leading one of the most substantial planning initiatives of the last twenty years. After two years of work and community meetings with community residents, planners, design professionals, environmentalists and concerned citizens, BRA issued in 1999 the South Boston Waterfront Public Realm Plan as a framework for future waterfront development.

The Plan was developed to ensure that this emerging district would provide not only a place for business expansion and job opportunities, but also an accessible waterfront and a new place to live, characterized by a strong urban design and a convenient system of public transit. The vision for the area was to create a 24-hour neighborhood with a mix of industrial, residential, commercial, civic and retail uses. The plan has been implemented in a number of ways, including the realization of the Municipal Harbor Plan, the development of new, permanent zoning regulations and the review of proposed development projects submitted to the BRA's development review procedures. However, 10 years later, in 2009, of the original 8,000 residential units planned for in the original plan only about 12% of the originally planned retail space had been built and occupied (Chaghtzbanian *et alia* 2010) A new strategy to fuel development proved necessary.

Results – The district has become an area bustling with startup companies and other notable firms. In 2013 the district will host the about 93,000 square meters global headquarters of Vertex Pharmaceuticals. This lease is the largest commercial lease in the history of Boston and with construction underway, it's also the largest privately-financed construction project in the country. The real estate sector has significantly supported the project: since January 2010 there has been a significant increase in private-financed development projects. Currently 45 privately-financed large development projects are under construction or have been approved by the BRA in the South Boston neighborhood. As Mayor Menino mentioned in the State of the City Address in January 2012, 100 companies and 3,000 jobs have come in two years in Boston Innovation District. Furthermore, Boston Subway's Silver Station, which runs by the Innovation District, has seen a significant increase in ridership: by 6% on weekdays, 14% on Sundays, and 61% on Saturdays, demonstrating how the area has become a place to "work, live and play".

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IMAGE SOURCES

The image of Barcelona is from avanguardia.com. The image of Boston is from innovationdistrict.org.

MOBILITY AND COMPETITIVENESS

REVIEW PAGES: NEWS AND EVENTS

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In this number

MOBILITY BETWEEN CRISIS AND COMPETITIVENESS

There are many variable factors that start the production engine of the territory, and that drive its competitiveness. Understanding these factors has been the subject of thoughts of economists for hundreds of years: from Adam Smith's ones, based on specialization and the division of labour, to ones of neoclassical economists who believe in investing in physical capital and in road infrastructure to increase productivity of the Country, and finally to the most recent that consider in addition to the above, other factors such as education and training, technological progress, macroeconomic stability, good governance, quality of life, sustainable living style, and market efficiency. In our era, the global crisis wanders between politics, economics and society and the most direct policies anti-crisis do not seem to follow, as priority basis goal, the development of competitiveness at a large scale and the consequent consolidation of local characters of the territory: the instability of the market does not allow to define effective long-term strategies to develop innovation and growth, or at least it limits its scope. Exceptions are two specific cases, two areas on different scales: on the one hand there are Countries in the developing world, which have a more clear role on the global scale and that provide, in the construction of their growing model, different possible scenarios related to sustainable development and innovation; on the other hand there are touristic areas of industrialized Countries, already characterized by an attractive potential and a strong competition recognized by the community, but that have to continue to encourage their vocation and increase their local specificity. The developing world is expected to grow, over the next two decades, of more than 1.3 billion of urban population in search of better job opportunities and a higher quality of life that can be expressed by efficient urban infrastructure and innovative solutions for social and environmental needs.

In touristic and known areas of industrialized Countries it is necessary to think about an innovation in terms of infrastructure that answers the variable needs of the market to ensure more and more the attraction of fluxes even in an economic crisis era. The constant flow of people and goods and its increasing, caused by a change of economic, cultural and social weights, will lead to a new equilibrium between Countries, and could become, in many cases, the way to go for addressing the crisis and make the territory more competitive on a global and local scale. Therefore mobility, only if ruled by policies based on environmental and economic sustainability, can be a real advantage in terms of economic and social productivity and can become a major factor in the competitiveness of a whole Country.

The unified market, basic concept of global policies, becomes an integrated market only through connections and networks between different territorial areas. The self-sustainability and the attractiveness of an area, promoted by local policies, become instrumental to the growth and development of the city and the territory through a proper management of the flow of people and goods inside and outside the territorial region.

In general, the quality and the extension of infrastructure networks significantly affect the impact on economic growth, social inequalities and the cultural development: a well-developed infrastructure for mobility and a good network of communication are important prerequisites for permitting the access to all communities (poor, rich, natives, and foreigners), the develop of economic activities and services.

India is one of the developing Countries that is investing on mobility, including the integration of environment and territory. This strategy could guarantee a strong global competitiveness and at the same time a fast local growth. The promotion and development of a tourist market can lead to an investment on mobility corresponding to real needs – variables, different and seasonal – of different users, and to the development of a network infrastructure that gives to territories the opportunity to increase the local potential. In this sense there are several European projects and scientific experiences in order to define strategic guidelines for the competitive development of mobility networks, and that considering innovation and development concepts, may be able to address the economic and social crisis of the Country.

	ACEA TRANSPORT POLICY EVENT WHERE: Brussels - Belgium WHEN: 6 December 2012
	SUSTAINABLE MOBILITY IN AUSTERITY TIMES: UNLOCK GROWTH OPPORTUNITIES FOR YOUR CITY WHERE: Nantes, France WHEN: 10-12 March 2013
	MONDISSIMO INTERNATIONAL MOBILITY CONFERENCE Where: Palais Brongniart, Paris - France When: 19-20 March 2013
	UITP WORLD CONGRESS AND MOBILITY & CITY TRANSPORT EXHIBITION. I-MOVE 2.0: THE BUSINESS MODEL FOR TOMORROW? Where: Geneva - Switzerland When: 26-30 May 2013
	EUROPEAN ITS CONGRESS DUBLIN 2013: DELIVERING FOR EUROPEAN COMPETITIVENESS THROUGH SUSTAINABLE MOBILITY. Where: Dublin - Ireland When: 04-07 June 2013



“DELHI-MUMBAI INDUSTRIAL CORRIDOR”: A GREEN INTERREGIONAL NET

With an exponentially growing of population, India is increasingly becoming a reference on the large-scale transport systems for urban and territorial development. The industrial corridor Delhi - Mumbai is the largest infrastructure project that India has ever invested of. The corridor goes across the whole Country connecting the capital city of the Nation Delhi and the financial capital Mumbai. The project involves an area for 320 million people and includes one high-speed rail for freight, a six-lane highway and a power plant of 4,000 MW. The long-term goal is to develop different centres of industrial production for the whole length of the corridor: nine industrial zones and twenty-four newly founded cities, with an estimated cost of 90 billion of dollars. It will develop a global competitiveness with a infrastructure that will facilitate both local trade that foreign investment.

Among the main goals, India hopes to double within five years the employment potential, triple the industrial output and quadruple exports from the region. From a logistical point of view, the project will pass through six states – Uttar Pradesh, Haryana, Rajasthan, Gujarat and Maharashtra – having as terminals Dadri and Jawaharlal Nehru Port near Mumbai. The project aims to be completely green, with new cities along the corridor as models of eco-city. The corridor will solve the biggest problem facing India, the lack of electricity and water. New green cities will use electricity in a sustainable way and they will have access to the water for 24 hours. They will also recycle waste and water. The preparatory work for seven of the twenty-four cities has already begun with Gujarat that will be the first state to undergo an eco-upgrade. The project is rather bold. A massive migration from the countryside to the city will change the image of the city. The long-term impact that a successful industrial corridor could have on the Country could be compared to that of the Interstate Highway System in the United States or the trans-European rail transport in Europe. Global connectivity means to facilitate trade and commerce, making this a vital project for India and its future.



“PROJECT MOBILITY LAKE”: BORDER MOBILITY TO PROMOTE SUSTAINABLE TOURISM

The project "Mobility Lake" is developed by the Institute of Sustainable Development (INE), Zurich University of Applied Sciences (Winterthur); the Institut für Dienstleistungsmanagement (IDM), HTWG Constance University of Applied Sciences; the Institut für Systemdynamik (ISD), HTWG Constance, University of Applied Sciences, and funded by the International Bodensee-Hochschule.

It aims to develop the sustainable mobility concept in a cross-border area in order to encourage tourism and recreation in the region of Lake Constance. This region is a place for a local tourism and for leisure activities, famous for the high value of natural resources and landscape. The region is situated among three Countries: the northern part is in Germany (170 km), the southern in Switzerland (70 km) and the eastern in Austria (30 km).

Each Country offers a varied and versatile landscape and is characterized by different cultural aspects. Anyway they have found it necessary to cooperate and make effective and efficient mobility services, adding value to the geographical location. Encourage mobility is a necessary action for the development of tourism and the attractiveness of the regional macro-area also in a global sense, but it can have a negative impact on the environment, on economic resources and on the quality of life of the inhabitants.



Lake Constance Region

Because of the incessant CO₂ emissions and resource scarcity, sustainable mobility is becoming a central issue in political and social debate in many European Countries. It is considered in fact the right solution for the negative effects of mobility because it can ensure accessibility to all groups of society. A tourist area in a particular geographical location, such as the region of Lake Constance, has to face new challenges and has to bring an added value that improve the quality of life of the locals and the tourist attraction. Also, the macro-area could have the possibility to establish itself as a model region for new mobility solutions, increasing its competitiveness and putting itself as the best in the global market of tourism.

The preliminary study of the project was developed for the first half of 2012. Following, the project will include insights in order to become the strategic guidance for new applications about sustainable mobility at local, regional and interregional scale. The study is based on a specific analysis of the infrastructural context associated to flows of mobility and tourism demand (local and foreign one) for the border area. It concludes with an analysis of the risks, weaknesses, strengths and opportunities of the cross-border mobility for a sustainable tourism.



“ATTIMO & SICUMSWAN”: TRAVEL MOBILITY AND WATER MOBILITY

There are two projects, coordinated by Agenda 21 Consulting, presented to the European Union and that deal with the mobility issue as an opportunity for development of competitiveness.

ATTIMO, research project on innovative and sustainable mobility in cities and tourist areas, involves ten European partners - Hungary, Slovenia, Austria, Great Britain, Germany, Finland, Greece, Spain and Turkey - and intends to investigate the possibility of merging needs of the transportation for tourism with a sustainable mobility underpinned by an efficient public transport network to meet the diverse needs of passengers. The project investigates the mobility issue in great tourist interest places; investigates general themes that take into account the supply and demand for mobility of users residing in the urban context and of tourists to / from some of the main tourist areas; tries to create synergies and points of contact between tourism and local mobility of European cities; it analyses the touristic destinations with a more difficult management because of the seasonality of tourist flows.

In order to have a tourist mobility that considers environmental sustainability and easy accessibility for all users, ATTIMO project creates models of alternative mobility. The project's aim is to develop a system of innovative, intelligent and sustainable mobility for tourists and residents by analysing first of all the attitudes and interests of the tourism market with paying attention to the quality of life of residents. Then, using an effective and innovative mobility system, on the one hand we can have a greater tourist attraction, on the other a growth of territorial competitiveness.

SICUMSWAN is a research project aimed to promote a competitive and innovative service of urban mobility, re-discovering the still existing network of navigable waterways. In fact, the project is for European cities with an historical tradition founded on a network of navigable waterways. In the past this waterways were considered valuable for the local transport, but over the years they have gone into disuse. SICUMSWAN involves nine European partners - Hungary, Holland, Belgium, Germany, Finland, Spain, Austria, Poland and Albania - and investigates the context of urban mobility, in particular the flows of people from urban center to the hinterland and vice versa; the project want restore activities based on urban and suburban waterways, mainly in order to increase intermodal public transport; want develop a new public transport service that can answer the highest expectations of the user for an easier accessibility especially for the weaker sections of the population. SICUMSWAN offers an innovative urban transport, a water mobility, that can work with the more traditional urban transport systems, compensating for the difficulties that they are facing. This project is aimed at supporting economic development, to reduce the environmental impact of transport networks, create new job opportunities and meet the needs of citizens and tourists.

IMAGE SOURCES

The image of Lake Constance Region is from www.isd.htwg-konstanz.de/moblake/.

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TeMA is the journal of the Land use, Mobility and Environment Laboratory of the Department of Urban and Regional Planning of the University of Naples Federico II. The journal offers researches, applications and contributions with a unified approach to planning and mobility. The Journal is articulated into three sections: FOCUS, LUME (Land use, Mobility and Environment) and Review Pages.