# Smart City strategies: management of resources and qualities.

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January 16, 2019

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**Abstract.**
The objective of this work is to analyze the structure, organization and attribution that characterize the smart cities and their resources. This is a complex path, developed taking into account the considerable differences between the historical experiences, the institutional structures and the economic-social conditions that have characterized the various forms in which the metropolitan experience was "built" in the various national contexts. In this research work we present the results of an analysis that took care of the city and of the relationships between the urban transformation paths and the processes of socio-economic development at the local level, the expansion of the same and the strategies of development. First of all we tried to analyze contemporary trends dominating the urban development and the real dynamics that underlie the changes occurred in urban planning especially in recent years. Economic and social changes at the international level, have heavily influenced the evolution and unfolding of the urban dimension and this work, first proposes a theoretical and interpretative framework of urban reality that changes and subsequently it focuses on Europe and on Italy, in order to investigate institutional aspects, normative indications, settlement models, public policies adopted and examples of realized practices, which have intervened on urban transformations and related processes of development. The aim is to offer a reasoned contribution to the possible and significant models of smart city organization and governance of areas in Europe, with ideas or solutions to outline our model.

# 1    Basic concepts for development.
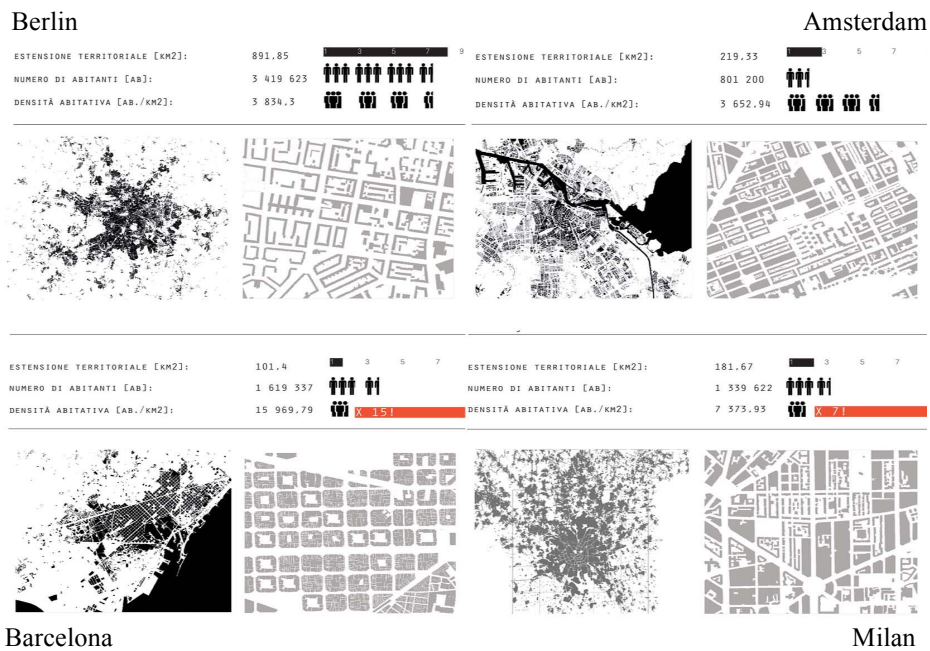
## 1.1    The idea of city resources.

The present work is based on theoretical points of view on the themes of urban transformation and local development, such as: the growth of the factors of competition between cities at the international level and the imposition of attractive and marketing-oriented urban policies; the city and the land project in the light of local development theories; the definition of sustainable urban development models within the contradictions posed by global economic and financial globalization; the concept of fragmentation and fear within the contemporary metropolitan city; the new strategic guidelines linked to the dimension of urban governance [1].

The guidelines, directives and financial instruments adopted by the European Union have significantly influenced both the cultural and scientific debate on the subject and the concrete adoption of urban policies at the local level throughout the continent. experiences of urban regeneration are told in four European cities such as Paris, Berlin, Barcelona, Amsterdam, London and Milan (see Pic. 1).

The urban transformation processes that have invested these northern European cities have been investigated as emblematic examples of projects for the consolidation of models of competitive and sustainable cities, supported by innovative urban governance practices. The story of these experiences represents an empirical reference for the research work to understand how the principles of competitiveness and sustainability have been applied in the most efficient European urban realities and therefore to compare them with what happened in the Italian and Southern Italy in particular. . In this context of urban instrumentation, urban planning cases are multiplying closely with the environmental and landscape context, whether it is the proposal for new settlements, or the redevelopment and upgrading of existing sites. The need therefore arises to identify the actual contributions that this direction can offer to the operational tools of the urban planning project, through which theoretical and cultural assumptions, which are the directions that this attitude has taken up to now in the European panorama and with which modalities this happens [2-3]. In particular, it aims to investigate the potential of operational methods capable of retaining the complexity and the thickness of the places and materials of the new suburban areas as an alternative to the logic of exogenous programs and projects.

The identification and the delimitation of the "metropolitan areas" are, in fact, extremely issues complex. In general, used for this operation can be grouped into three large categories: a) homogeneity criteria, on the basis of which entities or areas can be combined similar characteristics according to various parameters (demographic dimension, density, economic characteristics and sociological and so on); b) criteria of interdependence, on the basis of which they can be grouped together entities or areas in which exchanges of people, goods or communication flows occur (commuting, areas of commercial gravitation, telephone exchanges or other); c) morphological criteria, such as contiguity spatial or belonging to the same orographic or geographical configuration systems in a broad sense. These agglomerations are located at various levels of the urban hierarchy: so, at the highest level we find the so-called. "global" cities, char-

acterized by the concentration of command and control structures of the system economic, industrial and financial world-wide, from the presence of infrastructures and infrastructures research training centers at a higher level.

Berlin                                                                      Amsterdam



Barcelona                                                                      Milan

Pic.1 - Illustration of some cases of Metropolitan areas. (Source: Thesis Laurea Magistrale by Alessandra Parise).

## 2    The matrix of the Smart City.

### 2.1    Strategies and growth of the city.

The smart city has become an increasingly complex and evasive place, of which definition passes through the contribution of different disciplines and sometimes a lot sophisticated conceptualizations. This variety of contributions, in the absence of a process of the convergence towards the construction of clear and above all useful paradigms, certainly not benefit from the unequivocal definition of the city, a definition from which further on elements could then emerge to attempt a delimitation[4]. The definition of the concept of "smart city" can refer to different concepts that arise from many different philosophies of approach to the problem but, for a correct delimitation of the metropolitan area, it is not sufficient to refer to one or the other concept as it is it is necessary

to look for a delimitation that takes into account at the same time all the approaches that arise from the synergistic integration of the concepts of the city:

"Political city" or government;

"Physical city", the city seen as a building continuum;

"System city", the city seen as a system of production, distribution and continuity;

"Functional city", the city seen as a place of exchange and as a center of flows of goods, people and information.

In urban planning, the term "intelligent city" refers to a set of city governance strategies aimed at optimizing and innovating service public materials of cities (called "Physical capital") with the human, intellectual and social capital of those who live there ("capital intellectual "and" social capital"), which, thanks to the widespread use of new technologies ICT (information and communication technologies) for communication, mobility, energy and environmental efficiency, determine urban performance and urban competitiveness of contemporary cities. The study is of particular interest because it identifies and compares the most important in being of 'Smart City', codifying a definition "Operative" of the term, valid for conducting a series of analyzes and collection of examples virtuous smart cities in Europe. Below is an excerpt from the article" Smart Cities in Europe "presented, in 2009, on the occasion of the 3rd Central European Conference on Regional Sciences:

"We believe that a city is intelligent when it invests in human and social capital and traditional (transport) and modern (ICT) fuel communication infrastructure economic growth and high quality of life, with prudent management of natural resources, through participatory governance".

Talk about European city and then propose general statements that are valid for all cities it seems difficult. And on the other hand, European cities today are just as profoundly transformed from the dynamics of globalization - economic, political and cultural - enough to make them similar to the cities of many other parts of the world.

In this context the category European city seems to have lost its meaning; yet when we look to the American city we discover diversities that strike us precisely because we compare them with them experiences and images of cities closer to us and familiar to us[5]. A Smart Sustainable City is a city that leverages the ICT infrastructure in an adaptable, reliable, scalable, accessible, secure, safe and resilient manner in order to:

– Improve the Quality of Life of its Citizens

– Ensure tangible economic growth such as higher standards of living and employment opportunities for its citizens.

– Improve the well-being of its citizens including medical care, welfare, physical safety and education.

– Establish an environmentally responsible and sustainable approach which "meets the needs of today without sacrificing the needs of future generations".

– Streamline physical infrastructure based services such as transportation (mobility), water, utilities (energy), telecommunications and manufacturing sectors.

– Reinforce prevention and handling functionality for natural and man-made disasters including the ability to address the impacts of climate change.

– Provide an effective and well balanced regulatory, compliance and governance mechanisms with appropriate and equitable policies and processes in a standardized the context of Smart Cities.

## 3 Urbanization and awareness of sustainability iusses.

### 3.1 Businesses and governments.

Increasing urbanization and awareness of sustainability issues are setting off a wave of investments in revitalization of existing cities and development of new ones. However, given the scale of the challenge, simply throwing more money at the problem is not a solution — the world needs a new operating paradigm that provides for the needs of urban residents in an economically viable, socially inclusive, and environmentally sustainable way. Businesses and governments are starting to recognize the role of technology in meeting these objectives[6]. City investments that include a large ICT (information and communications technology) component can enable the designing of smarter cities that offer a better quality of life for their residents while being more sustainable and cost efficient. It is not only the residents that stand to benefit from this trend; governments can meet their objectives faster and more cheaply, while ICT players find themselves at the cusp of a whole new market. If these stakeholders hope to play and win in this uncharted territory, they will need to adopt a new operating paradigm.

Urban populations are growing at a faster rate than their cities can support. Cities are stretched to the limit, struggling to provide basic urban services at unprecedented scales. The drought of 2006 in London, the worst in a century, will be remembered for the dirty little secret it exposed. Hundreds of thousands of liters of water — enough to fill 10 million bathtubs — was leaking every day from the city's old and rotting pipes, some of which dated back to the Victorian era. All over the world, major cities — Cairo, Los Angeles, Beijing, Paris, Moscow, Mumbai, Tokyo, Washington, São Paulo — have stories to tell of electricity, transportation, or water systems in crisis. Traffic congestion and pollution continue to increase as overcrowding has become endemic. Urban poverty, associated with unemployment and inadequate housing and services, is a serious socioeconomic challenge. Although the exact circumstances vary from one city to the next, all urban areas have one thing in common — critical infrastructure is technologically outdated, woefully inadequate, increasingly fragile, and incapable of meeting even the current needs of all its residents. Urbanization is an inevitable progression. It can go well, it can happen badly, but progress it will. To make urbanization a positive and productive transformation that will deliver long-term gains to citizens, three goals need to be achieved — social equitability, economic viability, and environmental sustainability. Social equitability is based on the principle of inclusion; there is no discrimination in access to benefits across population segments. Economically viable solutions are those that are financially self-sustaining. Environmental sustainability ensures

the preservation of the environment for future generations. Businesses and governments are starting to recognize the role of technology in meeting the goals of urban infrastructure provisioning both today and in the long term. Previous centuries saw industrial infrastructure such as railways, roads, and telephone lines preparing the way for new cities and new connections. This century's urbanization is based on the integrated management of the economic, social, and infrastructure aspects of urbanization via the use of networked information. An intelligent solution ensures more equitable access to services — an aspect in which several one-off urban development projects today are found wanting[7].

## 3.3    The underlying technology.

The vision of a modern smart city is that of an urban center that is safe, green, and efficient because all structures — whether used for power, water, waste management, or transportation — are designed, constructed, and maintained with the use of advanced, integrated materials, sensors, electronics, and integrated networks. This vision is made possible by a host of underlying technology components. The use of smart grids/meters for water and power transmission provides a technology-enabled solution to reduce leakage and waste and increase transparency and reliability. Smart grids deliver electricity from suppliers to consumers using twoway digital technology and can integrate alternative sources of electricity such as solar and wind energy. A study by the United States Department of Energy calculated that internal modernization of U.S. grids with smart grid capabilities would save between US$46 billion and $117 billion over the next 20 years.8 Tele-health services, which connect hospitals to remote facilities for consultation, diagnosis, and sometimes training, are increasingly finding acceptance as a means of increasing accessibility and reducing cost of delivery. In Chongqing, southwest China, two hospitals in the Shapingba district, South Western and Xinqiao, have implemented tele-medicine solutions, connecting with other participating hospitals. Intelligent transportation solutions help in improving efficiency and resource utilization across air, road, rail, and sea. The cities of Stockholm and London have implemented intelligent traffic management and congestion charging solutions. The city of Ahmedabad in Gujarat, India, has deployed a GPS-enabled Bus Rapid Transit System (BRTS) solution to meet its transportation needs in a sustainable fashion. Ahmedabad BRTS is modeled on the hugely successful Transmilenio of Bogota and the BRTS of Curitiba, Brazil[8-9]. These solutions aim not only to reduce congestion, but also to improve public transport and minimize environmental impact.
ICT can play an important enabling role in the avoidance of highemissions infrastructures. It supports the construction of smart/green buildings with features such as leverage sensors and controls designed to improve efficiency and tailor energy use to demand. Public safety and security solutions help prevent, detect, and respond to security requirements. Real Time Crime Centers (RTCCs) and integrated emergency response solutions are technology-enabled solutions that have been used successfully worldwide to increase efficiency and reduce response time. The New York Police Department RTCC has reduced the crime rate by 27 percent; the police use analytics and visualization tools to decipher crime patterns as they are forming. Cities like Songdo are building

public safety and security solutions based on citywide surveillance systems that are centrally monitored and integrated with emergency response capabilities.

## 3.2    The polycentric city network.

The network of cities becomes a potentially powerful tool for marketing strategies urban, contributing on a European scale to building and maintaining a role of cities in the national scenario and international, thus drawing up new inter-institutional relations at national level, and consolidating relations between cities, both Italian and European, that seek solutions to territorial problems with innovative approaches and tools (such as strategic planning). The network, therefore, moves within the promotion and support of local governance and aims to affirm and develop effective governance models for the definition of urban strategies and their implemented through the comparison between working tools and procedures and identification and experimentation of possible new models[10]. The success of a city, inserted in global flows, therefore, is determined thanks above all to territorial factors and to the relative strategies used to enhance these factors. Specifically, the attractiveness of a city to the outside (new residents, new visitors, new investors, new location of companies) increasingly depends on high levels of quality of the life. Indeed, in 1998, he wrote: "In a globalized world, cities compete openly with each other tract tourists, to attract businesses, to attract residents. Quality of life, whether measured mundanely by the safety of the streets or the efficiency of the public transport system or more exaltedly by opera or concerts performances, becomes crucial ".

# 4    Grow of smart city.

## 4.1    The model of the "intelligent city" for the construction of the "Better city".

In urban planning, the term "intelligent city" refers to a set of city governance strategies aimed at optimizing and innovating service public materials of cities (called "Physical capital") with the human, intellectual and social capital of those who live there ("capital intellectual "and" social capital "), which, thanks to the widespread use of new technologies ICT (information and communication technologies) for communication, mobility, energy and environmental efficiency, determine urban performance and urban competitiveness of contemporary cities.Any definition of useful work for a Smart City needs to incorporate everyone these factors, to allow the development of good practices and relevant policy frameworks without losing the potential of scale.
Despite this, the 'smart city' model seems to be what, according to an approach holistic and inclusive, it manages to contain all the meanings that the various concepts present in literature are able to express. Economic and social changes at the international level have strongly influenced the evolution and development of the urban dimension and this work, first of all, proposes a theoretical and interpretative framework of the urban reality that changes and then focuses on Europe and Italy, in order to investigate institutional aspects, normative indications, settlement models, public policies adopted

and examples of implemented practices, which have intervened on urban transformations and related development processes. In urban planning, the term "intelligent city" refers to a set of characters of the city and strategies aimed at optimizing and innovating the public service of materials in cities (called Physical capital) with the human, intellectual and social capital of those who live there (intellectual capital and social capital), which, thanks to the widespread use of new ICT technologies (information and communication technologies) for communication, mobility, energy and the environment, determines urban performance and competitiveness of the contemporary city [11]. Any definition of useful work for a Smart City must incorporate all these factors, to allow the development of good practices and relevant policy frameworks without losing the potential of scale. The study is of particular interest because it identifies and compares the most important in being of 'Smart City', codifying an "operational" definition of the term, valid for conducting a series of analysis and collection of virtuous examples in Europe.
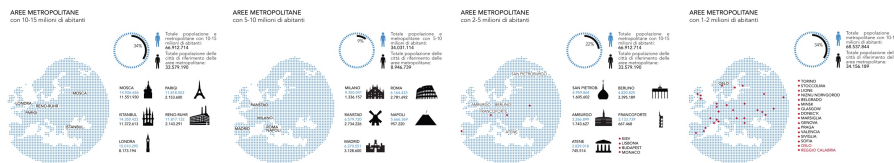


## 4.2 Better city Better life.

In 2010 the theme of the Shanghai World Expo "Better city Better Life" has stressed the need to implement the transition, from a development economic "quantity" (disruptive as uncontrolled) to a development "of the "urban" quality, attributing to the overall scale of the City the dimension of space action to ensure the raising of quality of life. The evolution, both temporal and conceptual, of issues related to social welfare e the raising of the quality of life in the cities that passes through the project of the sustainability (the elements underlying the theory that makes explicit the model of green cities) defines the current paradigm of the "intelligent city" or Smart city.

The Smart City is a point of arrival of a ten-year journey that ideally combines New end-of-the-century economy with today's Green economy. An idea of a city as a "product of a process", which demonstrates the constant effort of the discipline in the search for interpretative paradigms that define new urban visions, driving the process and the constant commitment towards the construction of new urban identities. A model of a city that aspires to pursue sustainable development through one plurality of policies and strategies, and which defines the city as the "intelligent node e propulsive ", capable of triggering the transition mechanism from a dissipative system, into terms of natural resources, towards a dynamic, efficient, circular, knowledge and system of new articulations, capable of pursuing the development and welfare of citizens. The interdependence between nature and human development has been imported into the

paradigms of the Smart city is giving rise to new cultures, new urban design and new ones social relations in the city[12-13]. Urban environmental quality must complement global issues, most of all change climate, to local characteristics such as air quality, urban sprawling, management water and recycling-waste disposal, urban green, building quality, the problem of short supply chains in food supply, quality and conservation of coastal frontlines, the preservation of natural parks and forests.

"a city may be called 'Smart' 'when investments in human and social capital and traditional and modern communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance"

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Innovation in terms of sustainability aims to increase environmental quality and ecology in heavily anthropized ecosystems such as cities. Moreover, it considers that cities tend to export their own entropy and their own unsustainability. The awareness of the importance of protecting the urban environment, together with the awareness that the quality of the urban environment has proved to be fundamental for the quality of life and the wellbeing of citizens, has created a synergy between the issues of Smart City and the sustainable urban development. The traditional city was characterized by a substantial coincidence between the population that lived there and the one that worked there. During the day, the presence of people living outside the city was completely marginal. The metropolis manifests itself initially when this coincidence begins to fail. This happens at a time when cities, especially the largest ones, due to their economic strength linked to industrialization and the development of means of transport, are beginning to exert an influence on such extensive areas of land as to generate the phenomenon of commuting, for which quotas the important populations enter daily in the city-metropolis to work there but live elsewhere. In this sense, the transformation of large cities in the metropolis began during the first decades of the twentieth century in the United States and then spread to Europe, reaching maturity in the decades immediately following the second post-war period [14]. The smart city question is a very current topic.

Smart cities offer the promise of a better, more sustainable lifestyle to their consti-tuents in the following ways:

• Efficient usage: Technology solutions across the fields of energy, transport, and waste lead to direct economic and environmental benefits. Examples include customized energy consumption through smart metering, micro-grids, and dynamic pricing.

• Connected and transparent public services: Efficiency in public and citizen services was driven by siloed e-governance initiatives in the early days. Over time, the focus has shifted to connected delivery of government services, which allows for a better citizen experience. An example is one-stop updating of location records that feed seamlessly to post offices, police records, banks, schools, and taxation databases. Integrated record management also allows for holistic health services across locations. Ready access to services and those services' performance standards for all individuals serves the cause of transparency and equity in city governance.

• Increased safety and security: Smart cities tend to deploy integrated public safety and security solutions (remote monitoring, smart cameras, pattern recognition, and red flagging through heuristic platforms), resulting in safe and secure settings for their citizens.

• A better lifestyle: These next-generation cities combine and broaden their objectives to create stronger links between government, education, and industry by leveraging ICT. In order to attract and retain talent, these cities also provide worldclass amenities in terms of schools, housing, landscaping, and retail and entertainment outlets.

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