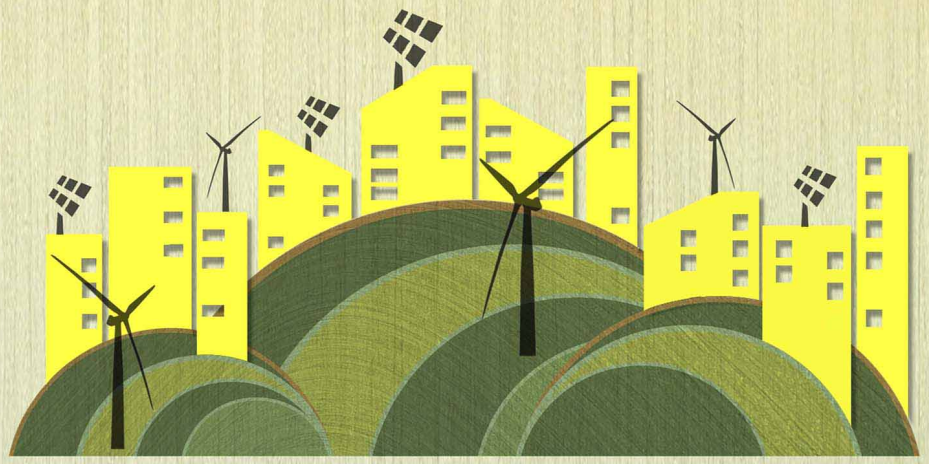
TeMA

Journal of Land Use, Mobility and Environment

The concept of “Smart City”, as a solution to make cities more efficient and sustainable, has been quite popular in the policy field in recent years. In the contemporary debate, the concept of smart city is related to the utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural and urban development.

TeMA Journal of Land Use, Mobility and Environment offers papers with a unified approach to planning and mobility. TeMA has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).



SMART CITIES

ENVIRONMENT, COMMUNITIES AND NEW URBAN CHALLENGES

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University of Naples Federico II

This book has been realized with the economic contribution of ONP Research and Competitiveness 2007-2013

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investiamo nel vostro futuro

This book has been realized with the contribution of ONP Research and Competitiveness 2007-2013. It reflects the views of the authors who are responsible for the information contained therein.

Questo volume è stato realizzato con il contributo del PON Ricerca e Competitività 2007 – 2013. Gli autori sono i soli responsabili delle informazioni contenute nella pubblicazione.

The *Project Smart Energy Master (SEM) for energy management of territory* has been co-financed by the National Operational Programme for Research and Competitiveness 2007- 2013 *Smart Cities and Communities* "Integrated Action for the sustainable development - Energy Efficiency and Low Carbon Technologies". According to the latest trends of the European and National research (Horizon 2020, Hit 2020), targeted to improve the research-innovation and production cycle and to increase the Italian and European competitiveness worldwide, this Project is supported by a big partnership which includes universities, firms, research institutions and public administrations. The SEM Project, started in November 2012 and expected to be concluded in May 2015, is divided into Research and Experimental Development and Training activities. The Research and Experimental Development activities aim at working out a model of *governance* for the territorial energy efficiency, with particular reference to the management of urban areas as well as of high "humanized" buildings (schools, offices, hospitals, museums, theatres, stations). The Post-Graduate High Training Course is addressed to train expert researchers, with competences in the field of the management of urban systems and mobility, energy control and efficiency, innovative technologies. The driving force of the project SEM is the overcoming of the sector-based and low-effective approach mainly referred to the building scale in order to propose a system approach addressed to integrated policies for the management of land, mobility and energy consumption control. Within the SEM project, the TeMA*Lab* team of the University of Naples Federico II plays a twofold role, since it is engaged in the research and experimentation activities as well as in the training ones. Among those activities, the dissemination and divulgation of approaches and project's developments play a major role. The publication of this volume can be framed into these activities and represents an integration to the deliverables of the project.

Il Progetto di ricerca *Smart Energy Master (SEM) per il governo energetico del territorio* è co-finanziato dal Programma Operativo Nazionale Ricerca e Competitività 2007-2013 Smart Cities and Communities, "Azione integrata per lo Sviluppo Sostenibile - Energy Efficiency and Low Carbon Technologies". In linea con i più recenti orientamenti della ricerca europea e nazionale (Horizon 2020, Hit 2020), questo progetto si avvale di un ampio partenariato che integra università, imprese, enti di ricerca e pubbliche amministrazioni. *SEM* si concluderà nel maggio 2015 e si articola in attività di Ricerca e Sviluppo Sperimentale ed attività di Formazione. Finalità del Progetto di Ricerca e Sviluppo Sperimentale è la messa a punto di un modello di *governance* dell'efficienza energetica del territorio, con riferimento alla gestione delle aree urbane e di edifici ad elevata "umanizzazione" (scuole, uffici amministrativi, ospedali, musei, teatri, stazioni). Obiettivo del Progetto di Alta Formazione post-universitaria è la Formazione di ricercatori esperti con specifiche competenze nel campo dei processi di governo dei sistemi urbani e della mobilità, del risparmio e dell'efficienza energetica, delle tecnologie innovative per il governo dei sistemi urbani. L'idea guida del progetto SEM è il superamento dell'approccio settoriale, che caratterizza gran parte delle ricerche in campo energetico, a favore dell'adozione di un approccio di sistema indirizzato verso politiche integrate di governo del territorio, della mobilità e di riduzione dei consumi energetici. Il gruppo TeMa*Lab* dell'Università degli Studi di Napoli Federico II è partner del progetto e riveste un duplice ruolo essendo impegnato sia nelle attività di ricerca e sperimentazione che nelle attività di formazione. All'interno di tali attività grande rilevanza viene data alla disseminazione e divulgazione degli approcci e degli avanzamenti del progetto. La pubblicazione del presente volume può essere inquadrata nel contesto di tali attività e rappresenta un elemento aggiuntivo ai *deliverables* del progetto.

PROJECT PARTNERS

University of Napoles Federico II
Department of Civil, Architectural and Environmental Engineering

Carmela Gargiulo – *Scientific Director*
Rosaria Battarra
Adriana Galderisi
Rosa Anna La Rocca
Giuseppe Mazzeo
Rocco Papa

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Laboratory of Land Use Mobility and Environment - DICEA
University of Naples Federico II
Piazzale Tecchio, 80
80125 Naples
web: www.tema.unina.it
e-mail: redazione.tema@unina.it

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Eden Project, tourist complex in Cornwell, one of the biggest biospheres in the world created in an abandoned quarry.

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EDITORIAL PREFACE:

SMART CITIES CHALLENGES
SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

ROCCO PAPA
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples Federico II
e-mail: rpapa@unina.it
URL: www.roccopapa.it

There are a number of different future-city visions being developed around the world at the moment: one of them is smart cities. Gary Graham, coordinator of the Future Transport and Smart Cities Network in University of Leeds, in one of his recent articles published on "The conservation", affirms that these visions of utopia need an urgent reality check and that smart cities ideas are in some cases too far away for people real needs and tries to give an answer to the provocative question: is anyone asking people what they want from the smart cities of the future?

This is one of the main challenges of smart or not smart cities should face in the near future, and this is one of the themes of this volume 7 of TeMA Journal of Land Use, Mobility and Environment. Volume 7 is in fact dedicated to the challenges of the Smart City and will focus during the three issues of the volume on three different challenges aspects. In this first issue the main theme is smart environment for sustainable resource management. The second issue will focus on the process of planning for smart cities, dealing with new urban challenges, while the third issue will be focusing on the smart communities between e-governance and social participation.

The first article of this issue is named "Considering Resilience: Steps Towards an Assessment Framework" by James Kallaos, Gaell Mainguy and Annemie Wyckmans, an international research group from France and Norway, identifies resilience characteristics in order to inform the eventual development of a resilience framework with which to assess architecture and infrastructure resilience. The aim of the work is to determine the conditions under which architecture and infrastructure resilience can be defined and measured, in order to guide the consideration of attributes and determine suitable criteria to select and elaborate indicators to help guide future actions and investments.

The second article titled "New Technologies for Sustainable Energy in the Smart City: the WET Theory" by Rosa Anna La Rocca and Romano Fistola develops a new approach to the sustainable planning for the smart

city based on the assumption that the relationship between new technologies and urban system could be developed in a new way considering the WET theory.

The third article by Adriana Galderisi is titled "Climate Change Adaptation. Challenges and Opportunities for a Smart Urban Growth" and explores strengths and weaknesses of current adaptation strategies in European cities. First the main suggestions of the European Community to improve urban adaptation to climate change are examined; then, some recent Adaptation Plans are analyzed, in order to highlight challenges and opportunities arising from the adaptation processes at urban level and to explore the potential of Adaptation Plans to promote a smart growth in the European cities.

The forth article titled "Limits to Ecological-based Planning in Zimbabwe. The Case of Harare" by Archimedes Muzenda and Innocent Chirisa, explores the feasibility of adopting ecological based planning in low-income residential development. In particular the case study of Hatcliffe residential area in Harare proposed in the article shows that there are many challenges to overcome uncoordinated planning approaches, ineffective policies and legislative frameworks, weak institutional settings, financial constraints, outdated planning standards and regulations, poverty, lack of environmental stewardship and lack of political will among others. The study findings call for robust environmental conservation strategies, strong environmental stewardship, responsive institutional and funding mechanism backed by realistic legislative frameworks and robust policy rectification.

The section Land-use, Mobility and Environment collects four general article of the theme of integration between mobility, urban planning and environment. The article "Urbanisation Pattern of Incipient Mega Region in India" by T. V. Ramachandra, Bharath H. Aithal, Barik Beas, focuses on the analysis of the spatial patterns of urbanization and sprawl in Pune city, India, using temporal remote sensing data. The analysis suggests that urbanization has caused fragmentation with adjacencies in buffer zones. Spatial metrics substantiate rampant sprawl at the peri-urban regions and infilling at city center. However, this value has reduced in 2013 indicating of reaching the threshold of urbanization. This research provides the details of land use and its development for guiding scientific-based decision support and policy making.

The article by Laura Russo, titled "The Effectiveness of Planning Regulation to Curb Urban Sprawl. The Case of Striano (NA)", aims to assess the ability of Campania's Planning regulations and tools in checking urban sprawl. The analysis was conducted in the town of Striano, within the complex urban conurbation of the Metropolitan Area of Naples. The case study results show a disconnection between the current legislation and the new planning tools which are pending approval, therefore, the paper suggests the need to update Campania's Planning legislation to the new guidelines, which are much more effective in terms of land protection.

In the same section, the article by Silvia Alam titled "Prediction of Mymensingh Town Future Expansion Using Space Syntax", aims to identify the influence spatial configuration exerts on the location of different types of commercial activity in terms of land use. The results of this study help to interpret and predict the future commercial land use related to its road network. In this paper the process was conducted through a field survey to collect data regarding locations of commercial activity, some land-use maps analysis and the application of Space syntax theory to simulate the data to analyze the relationship.

Finally the Review Pages define the general framework of the theme of Smart City Environmental Challenges with an updated focus of websites, publications, laws, urban practices and news and events on this subject.

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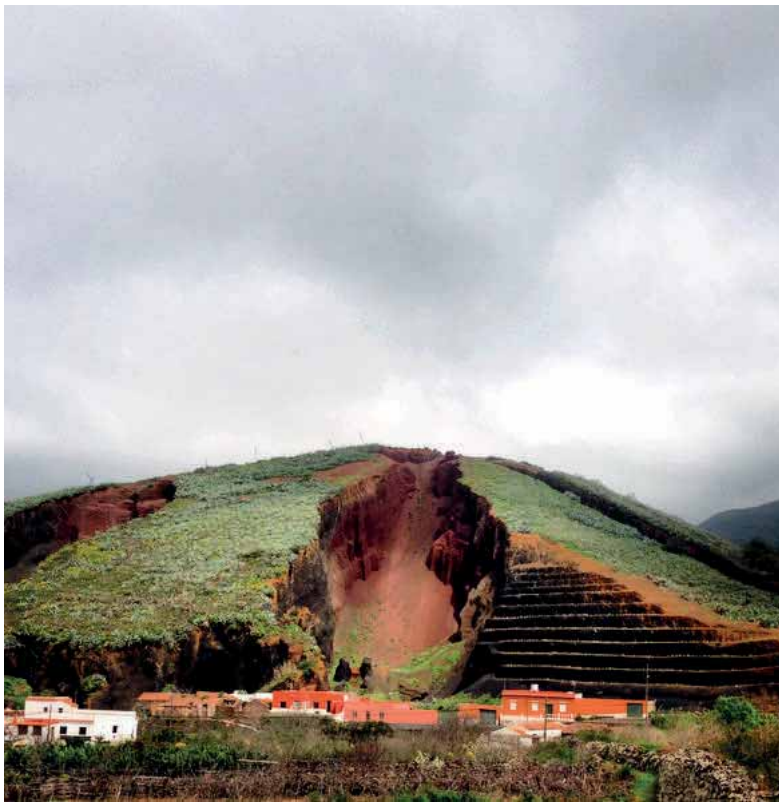

CONSIDERING RESILIENCE

STEPS TOWARDS AN ASSESSMENT FRAMEWORK

JAMES KALLAOS[a], GAËLL MAINGUY[b], ANNEMIE WYCKMANS[c]

[a,c] Norwegian University of Science & Technology (NTNU), Department of Architectural Design, History and Technology
e-mail: james.kallaos@ntnu.no
e-mail: annemie.wyckmans@ntnu.no
[b] Veolia Environment Institute (IVE); Paris, France
e-mail: gaell.mainguy@veolia.com

ABSTRACT

As threats from climate change related hazards increase in cities around the world, communities are faced with an urgent requirement for self-evaluation. It is essential to expose and assess potential hazards facing cities, as well as to consider potential impacts and responses. While the promotion of efficiency and promise of protection have been common approaches to hazards in the past, recent events have exposed weaknesses in existing tactics. It has also become more apparent that existing mitigation efforts will be insufficient to prevent some level of climate change, associated hazards, and impacts. Complete protection against all threats is not only impossible but potentially hazardous, as extreme or unanticipated events can exceed the capacity for defence, potentially resulting in catastrophic failures.
From this realization of the fallibility of the existing paradigm, resilience has emerged as a useful concept for framing the response of cities to an expanding collection of potential threats. The aim of this article is to consider resilience as it applies to cities, their architecture and infrastructure systems, subsystems, and components, as well as their inhabitants. Resilience characteristics are identified and considered in order to inform the eventual development of a resilience framework with which to assess architecture and infrastructure resilience. This state of the art is instrumental to determine the conditions under which architecture and infrastructure resilience can be defined and measured, in order to guide the consideration of attributes and determine suitable criteria to select and elaborate indicators to help guide future actions and investments.

KEYWORDS:
Resilience; Vulnerability; Adaptation; Climate Change; Cities; Adaptation.

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关于恢复性建筑和基础设施的指标

JAMES KALLAOS[a], GAËLL MAINGUY[b], ANNEMIE WYCKMANS[c]

[a,c] 科學技術的挪威大學建築設計系，歷史與科技
e-mail: james.kallaos@ntnu.no
e-mail: annemie.wyckmans@ntnu.no
[b] 環境研究所
e-mail: gaell.mainguy@veolia.com

摘要

本文旨在鉴别和分析目前可用于评估建筑和基础设施恢复力的恢复特性、框架和相应指标。 此最新的技术发展水平将有助于确定：对建筑和基础设施恢复力进行定义和测量的条件。能够为行动和投资提供指导的适当的指标属性。对这类指标进行选择和/或详细描述的适用标准。 在本文对城市建筑和基础设施的恢复力定义及框架和相应要求的鉴别和讨论过程中，重点参阅了科学、经济和规划等领域中的专家文献， 同时还涉及气候变化适应和成本核算。通过对文献的审阅、分析、 归类和仔细评估，总结出了各类恢复力特性。 在针对利益相关人和研究专家分别进行的两次研讨会中，将这些特性和主要信息提出并进行了讨论， 以找出目前恢复力定义和特性的缺漏之处、 在各类城市评估方法中比较优势和劣势、 并就城市建筑和基础设施的恢复力指标的优先顺序进行讨论。

关键词
气候变化；建筑环境；建筑；城市设计和规划；适应；恢复力.

1 CLIMATE CHANGE AND CITIES

Cities are urban agglomerations, consisting not only of clustered structural, physical and natural artefacts, but the resident population itself, as well as the social structures and governance which provide cohesion and organization. Physical artefacts include not only architectural elements such as residential and commercial buildings that provide homes for people and facilities for business and government activities, but the physical infrastructure networks connecting and servicing these buildings and facilities - with overhead, surface, and buried elements. People live, work, communicate, and travel, in, around and between these different architecture and infrastructure networks on a daily basis, while a generally less visible network of norms, rules, and regulations coordinates and maintains order and functionality.

Climate change is now considered unequivocal, and includes atmospheric and ocean warming, diminishing snow and ice, rising sea levels and increasing greenhouse gas (GHG) concentrations (IPCC, 2013). These changes in the basic elements of Earth's support systems are expected to alter many of the historical patterns that societies and communities have come to rely upon. In many cases, these changes and alterations will result in an increasing quantity and magnitude of hazards: changes in average climate variables, along with changes in the frequency and severity of extreme weather events, can be expected to have stark consequences for the built environment in the form of flooding, heatwaves, water scarcity and other impacts. The confluence of impacts and settlements leads to increasing numbers of "natural disasters" (UNISDR, 2012, p. 15).

Climate change related hazards threaten cities around the world, confronting communities with an urgent requirement for self-evaluation. In order to properly address these potential threats, cities will need to not only expose and assess potential hazards, but consider the exposure, sensitivity, and vulnerability of the different systems that comprise the urban fabric. Beyond vulnerability assessment, the reaction of these systems becomes important - resilience has emerged as a useful concept for framing the response of cities to an expanding collection of potential threats.

2 WORKING DEFINITIONS

The wide variety of actors involved in climate change bring with them different understandings, making it is essential to attempt to define the terminology surrounding climate change and find the proper role for resilience. The presentation of definitions for the different terms central to the climate change discourse is by no means intended to imply that there is complete agreement surrounding them. Many of the terms invoke different meanings within different fields, and the ensuing semantic battles within the different fields involved in climate change science have become a mainstay of academic journals worldwide. The definitions presented may be considered some of the more popular or best accepted definitions, though this claim is likely to bring criticism as well. These terms are presented to provide a central basis for the discussion that ensues, without implication that these represent the correct or final definition.

2.1 EXPOSURE

With regards to climate change, the external risk associated with the spatial arrangement of a system potentially at risk is referred to as exposure. The Intergovernmental Panel on Climate Change (IPCC) has defined exposure as "the presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected" (IPCC, 2012, p. 5).

2.2 ADAPTIVE CAPACITY

Adaptive capacity is defined in the IPCC Third Assessment Report (TAR) as "the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (IPCC, 2001, p. 6). A slightly different take is presented in the IPCC Fourth Assessment Report (AR4) "the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies"(Adger et al., 2007, p. 727).

2.3 SENSITIVITY

The IPCC TAR defines sensitivity as "the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli" (IPCC, 2001, p. 6).

2.4 CRITICALITY

Criticality is a relative concept related to how essential a component, system, or function is to the needs of society (Cabinet Office, 2012; Fisher and Norman, 2010; GAO, 2007; Luiijf et al., 2003). Infrastructure criticality has been defined as dependent on both the "level of contribution ... to society in maintaining a minimum level of ... law and order, public safety, economy, public health and environment" and the "impact level to citizens or to the government from ... loss or disruption" (Theoharidou et al., 2009, p. 40).

2.5 VULNERABILITY

A succinct definition of vulnerability as related to climate change is provided by the IPCC, where it is defined as "the propensity or predisposition to be adversely affected" (IPCC, 2012, p. 5). Adger defined vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt"(2006, p. 268). The European Climate Adaptation Platform (CLIMATE-ADAPT) defines vulnerability as "the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity"(EC and EEA, 2014).

2.6 ADAPTATION

Adaptation depends on adaptive capacity (Smit et al., 2001), and represents an "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation" (EC and EEA, 2014). The IPCC differentiates between adaptations in different systems: "In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate" (IPCC, 2012, p. 5).

2.7 RESILIENCE

Milman and Short refer to Folke (2006) when defining resilience as a system's ability to "maintain (or improve) upon its current state over time" and "adapt to stresses and changes and to transform into more desirable states" (2008, pp. 758, 759). In this context, resilience represents a system characteristic in the form of absorptive and adaptive capacity, a function of system stresses and accommodative responses. A more current and specific definition by the IPCC considers resilience to be "the ability of a system and its

component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions" (IPCC, 2012, p. 5). Extremely similar, but tailored to communities, the UNISDR and ICLEI definition is "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of the hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions (UNISDR). Resilience focuses investment on increasing a city area's overall ability to support a vibrant, healthy society and economy under a wide range of circumstances (ICLEI)" (UNISDR, 2012, p. 85).

3 FRAMING RESILIENCE

3.1 FEEDBACKS AND RELATIONSHIPS

Until recently, the system characteristics related to climate change existed as purely theoretical concepts with which stakeholders might better understand the issues. Attempts to further define and specifically relate the different system characteristics to climate change impacts have resulted in conceptual frameworks that attempt to elucidate connectivity and feedbacks. Füssel and Klein (2006), presented one of the initial conceptual frameworks for climate change vulnerability research, documenting the development of terminology related to vulnerability as well as the evolution of approaches to vulnerability assessment. The framework itself provides a visual linkage map between many of the terms and concepts within the climate change discourse. The framework has been utilized and expanded by other research groups (e.g. EEA, 2012; ESPON Climate, 2011; Lung et al., 2011). and presents a compelling image to describe the system in ways that help lead to quantifiable definitions and explanatory equations. (Figure 1).

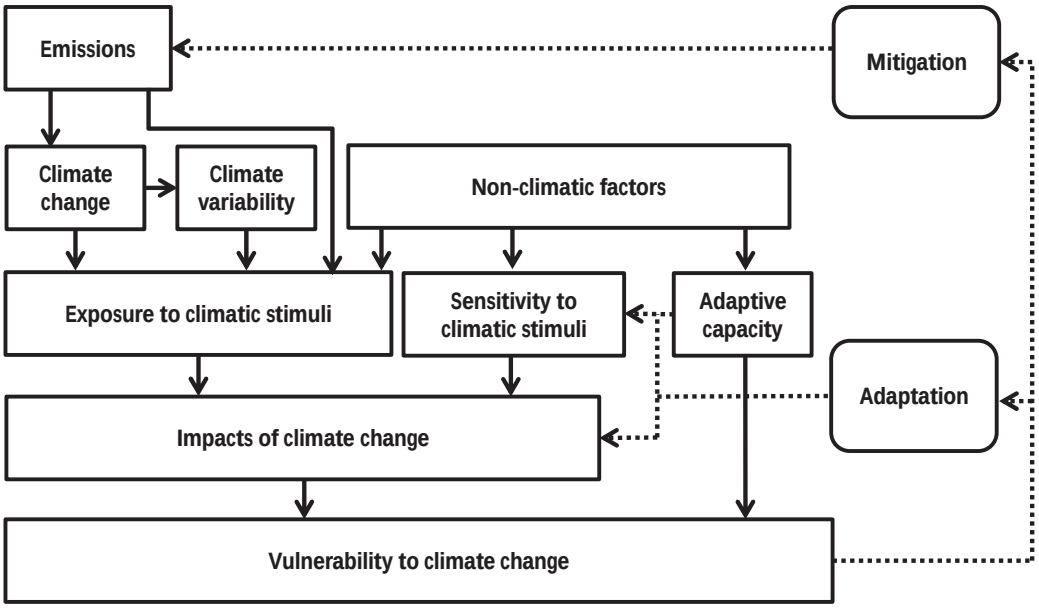

Fig. 1 Vulnerability assessment framework (ESPON Climate, 2011); adapted from (Füssel and Klein, 2006)

Much of the current research on climate change impacts, adaptation, and vulnerability (IAV) follows the conceptual framework above, and is rapidly progressing in specificity as well as quality. There remains a definite lack of quantitative indicator-based assessments specific to settlements, cities, buildings, and infrastructure. While many studies reference cities or infrastructure, they are often referring solely to the inhabitants, and not to the physical structures and networks themselves. The two aspects of settlements

need to be considered simultaneously, and the complexity of interactions between humans and the built environment disentangled, in order to assess potential impacts from climate change. In order to conceptualize this interaction and confluence between socioeconomic processes, climatic factors, and risk and impacts, the IPCC has presented an alternate conceptualization (Figure 2). Here exposure, vulnerability, and hazards are used to determine the risk of impacts from climate change.

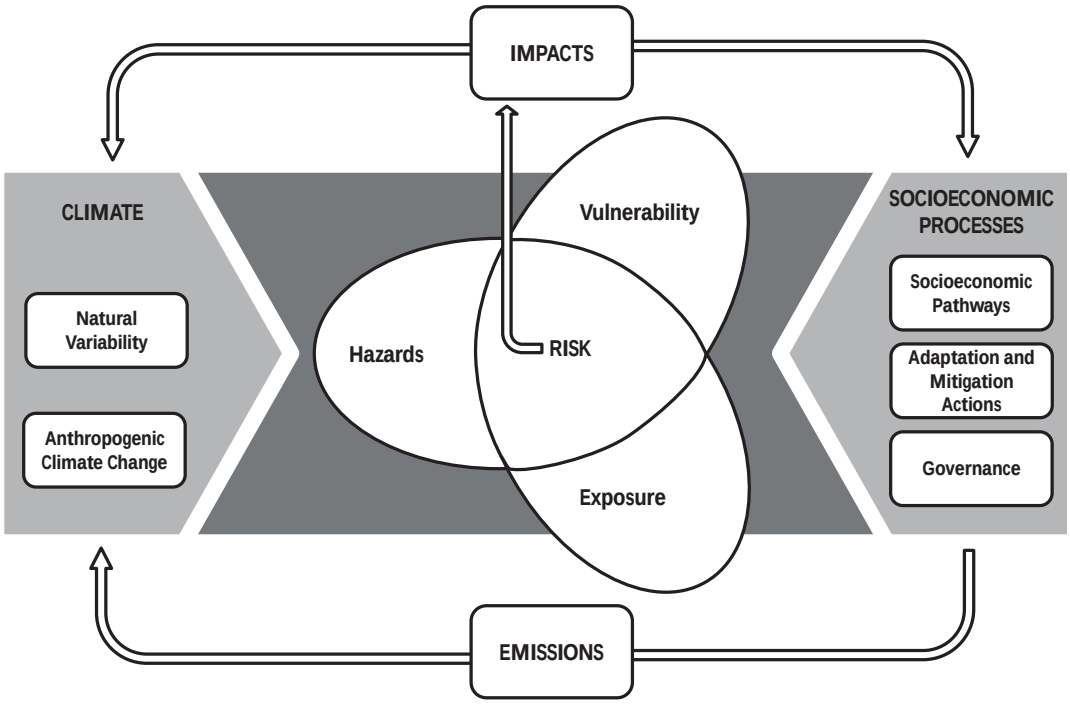

Fig. 2 Risk assessment framework (IPCC, 2014)

3.2 VULNERABILITY AND RESILIENCE

As noted above, climate change vulnerability is related to the exposure and sensitivity of an object or system to risk, moderated by its capacity for adaptation (EC and EEA, 2014). Vulnerability is generally considered as a relative concept, used in reference or in comparison with another system (Wolf et al., 2013). Vulnerability can be reduced through adaptation to reduce either exposure or sensitivity, or both together. In physical systems such as architecture and infrastructure, an example of exposure reduction would be through relocation of components, while sensitivity can be reduced through hardening and protection of components and subsystems (DOE, 2010). The goal of vulnerability reduction in the context of architecture and infrastructure is to reduce the risk of damage to components and subsystems in order to manage risk.

Resilience in the built environment, on the other hand, refers to the maintenance of function in spite of damage. While components themselves may be resilient, the resilience of the system does not depend on this, only that the desired function persists or is able to resume with minimal time and resources after a disruption. A resilient system can be comprised of resilient components and subsystems, or alternately individual components can be protected, distributed, redundant, or even expected to fail. As long as these lower level components are well understood and managed spatially and functionally, the resilience at a higher scale can be maintained. The goal of the system is persistence of provision of desired functions, regardless of the specific methodology used to attain this.

4 PROMOTING RESILIENCE

Resilience is not assumed or promoted here to be the only, or the best, approach to minimizing impacts from climate change hazards and threats. What the concept of resilience does provide, however, is a middle ground: a safe haven between two competing paradigms. On the one side, efficiency has been promoted as the best way to achieve sustainability, though it often works in opposite manner, increasing consumption through the rebound effect (Walker and Meyers, 2004; Walker and Salt, 2006). On the other side, defence and protection have been promoted in the past as ways to prevent potential threats from causing impacts (Garbin and Shortle, 2007). Efficiency and protection have their place, but both have been demonstrated to be fallible. The quest for efficiency can reduce options (i.e. removal of redundancies) and funnel resources into specific regimes, which are then prone to complete or sudden failure – the proverbial "all your eggs in one basket." Protection is never absolute, and efforts to provide protection can increase exponentially in response to linear threat increases (Garbin and Shortle, 2007). At a small enough scale, efficiency may provide cost and resource benefits, but when efficiency applied to components of a system or sector can results in critical susceptibilities where even isolated events can wreak havoc on provision of a necessary function.

As an example, district heat has been promoted as an efficient, environmentally friendly way to provide urban heat in a cold environment (Rosenthal, 2010; Tagliabue, 2013). In some cold communities district heat is relied upon as the sole method of heating residences. Reliance on this single point of provision can result in vulnerabilities in function provision; a single construction mistake in Oslo, Norway resulted in damage to the single protected (buried) pipe providing heat and hot water to downtown Oslo - a neighbourhood of 30000 inhabitants, resulting in a total loss of service for up to 3 days (Bakken et al., 2014; Sigurjonsdottir, 2014; Solberg, 2014). As this was an isolated incident, and electricity was still functional, vouchers were provided by the utility to refund the purchase of electric heaters (Hafslund, 2014). The result of this event is a loss of efficiency (redundant heating systems) but an increase in resilience (two separate systems providing the same functional capacity).

4.1 SCALES OF RESILIENCE

In keeping with the other terms in the climate change discourse, resilience is a common target for semantic debate. Much of the debate surrounding resilience centres on the different approaches to resilience by different fields. Engineering resilience is differentiated from social ecological resilience, as well as resilience in complex social ecological systems (SES), and systems of systems. Different fields employ slightly different understandings, with one essential difference being whether the system returns to its prior state (engineering resilience) or can move or transform to a different state (SES resilience), while maintaining provision of the desired function (Walker et al., 2004). It can be argued that these differing definitions consist simply of application of the same concept at different scales, and not a fundamental difference in understanding.

At smaller scales, engineering resilience may be the most relevant, whereby system components can reasonably be expected or hoped to return to their original state after a disturbance. As the scale increases, the resilience options may increase, if there are other methods available of providing the same service or function. At the city scale, resilience could presumably be assessed with a broad application to sectors, such as provision of clean water, shelter, and energy, regardless of the specific methodology of the provision.

While spatial scales may be the easiest to visualise and use as metaphors (Walker et al., 2004) derivation of the relationships both between resilience characteristics, and between characteristics and systemic resilience, is needed across multiple scales (i.e. spatial, temporal, and organizational) (UN-ESCAP, 2013).

4.2 MULTISCALE VULNERABILITY, RESILIENCE AND CRITICALITY

The relationship between vulnerability and resilience is often discussed and often confused – they are "different but complementary framings" (Turner II, 2010, p. 573), and are not subsets of each other, nor are they opposites – the absence of vulnerability does not equate with resilience (Manyena, 2006, p. 443). Vulnerability and resilience are related concepts, but vulnerability has "meaning only in relation to a specific hazard" while resilience is an intrinsic characteristic of complex systems (Manyena, 2006; Tyler and Moench, 2012, p. 317; Vugrin et al., 2010). Reduction in vulnerability and increase in resilience can be synergistic, however – both work to limit the extent of damage inflicted by a hazard. Reducing the vulnerability of system components can help prevent the resilience capacities of a system from being surpassed, and reduce the time and effort required for recovery. Vulnerability can be diminished by reducing potential impacts from a hazard, through location (reducing exposure) or protective design (reducing sensitivity).

Trees and forests provide an interesting and easily grasped outline of the interactions between vulnerability and resilience, showing how they are related and how they are not. In short, vulnerable systems need to exhibit resilience, and non-resilient systems need to limit their vulnerability.

The vascular system of a tree is comprised of a vast network of vessels and organs providing different functions. The leaves produce energy from sunlight through photosynthesis, and individually are relatively exposed and sensitive to injury. They are heavily networked and redundant however, allowing the system to tolerate a certain amount of peripheral damage while maintaining function at an acceptable level, and have a high capacity for recovery (healing); as a system they exhibit most if not all of the characteristics used to define resilience. Leaves are connected to stems and branches, which contain vessels for the transport of water to the leaves and the products of photosynthesis (photosynthate) from the leaves. As the scale increases from leaves and stems up to secondary and primary branches, both vulnerability and resilience decrease, while criticality increases. Failure of the smaller stems has lower consequences than failure of larger branches: they are less critical. The more critical larger branches have less redundancy and less capacity for recovery from damage yet they are less vulnerable: less exposed by being protected behind a thicker layer of bark, and less sensitive by being thicker and more fibrous (stronger). Branches terminate in the trunk, which provides structure to the tree, and provides a conduit for the vessels transporting water up from the roots, and photosynthate down from the leaves. While a tree has different systems providing critical functions, it is difficult to describe any individual element of a tree as "critical" to its survival. The trunk could be considered the single critical element, yet it exhibits reduced vulnerability: the important systems are less exposed by being protected behind the thickest bark layer, and less sensitive by being thicker and more fibrous (stronger). Though the trunk is a single element, the longitudinal vessels providing critical functions within the trunk remain networked and redundant.

The evolution of trees has led to interesting survival mechanisms, whereby it is clear that resilience expands beyond the systems of the tree, or its parts, or the tree itself. The loss of a single tree to a forest is similar in scale to the loss of a leaf or branch on a tree. It is a redundant element, and the forest can continue to thrive while tolerating a certain amount of damage or loss. Trees and forests have adapted mechanisms to limit (or embrace) the widespread effects of destructive events; a large fire may destroy the trees but in the process trigger the beginning of the seed cycle (Schwilk and Ackerly, 2001).

Unlike trees, which must rely on evolution over long time scales to exhibit adaptation, people have a capacity to immediately influence the vulnerability and resilience of the organ systems providing essential functions. Also unlike trees, the human body has high level organs, such as the heart, spinal cord, and brain, which are critical to function and survival. These organs lack redundancy and have little recovery capability; they are not particularly resilient, but they are protected by solid bone, reducing their exposure and sensitivity, and therefore vulnerability. People make decisions daily regarding the protection of critical resources based on real and perceived threats. The choice of protection level (decreasing vulnerability

through sensitivity and exposure reduction) tends to increase with increasing criticality, and decreasing resilience. Motorcycle riders wear hard protective helmets – while police wear bulletproof vests. The choice of wearing a vest and helmet are in turn based on the criticality, vulnerability, and resilience of the underlying body systems, as well as the anticipated threat. Protecting the head and torso to reduce vulnerability are direct consequences of the high criticality, high vulnerability, and low resilience of these areas. Like a tree to a forest, the injury or death of a single person does not represent system failure or collapse of a larger group. Up to a certain level of population loss, the group (e.g. community, society) can survive.

In all cases, a resilient system would be defined as one that can tolerate or absorb a certain amount of damage, and heal, recover, or transform. Beyond the resilience capacity of the system considered, the resilience scale moves up one level. The scale of the assessment determines the assessment of resilience. Failure is scale based – the failure of a single component is not the same as system failure; different thresholds exist at different scales for what constitutes acceptable performance, and what constitutes a failure. Similar to vulnerability and resilience, critical systems can only be defined at a specific scale. The heart and brain are critical systems in the human body, but that one individual may not be critical to the survival of the group, or of the larger society.

Applying a hierarchical resilience framework to the built environment, architecture and infrastructure, it becomes apparent that vulnerable systems should either reduce their vulnerability (exposure and sensitivity), or increase their resilience. The resilience of a community is a function of the vulnerability and resilience of individual components (physical and social), as well as the fabric or network that connects them. Climate change adaptation strategies should involve the protection or relocation of vulnerable assets, and the addition of resilient characteristics (absorption, redundancy, and recovery capacities) for those systems that remain vulnerable.

4.3 CRITICALITY AND THE PERSISTENCE OF NEEDED FUNCTIONS

While many national programs have moved from a focus on critical infrastructure protection to critical infrastructure resilience, often with explanations of why resilience is now the preferred method, they have been less explicit when explaining the specificity of what is critical and what is not (AU, 2010; Cabinet Office, 2010; GAO, 2010; Graham, 2011). Critical infrastructure is defined, and the sectors that comprise it are listed, but little effort is made to tease out which specific elements are essential to providing the needed services.

The large scale resilience of a city is a function of its intentions and ability to provide essential services and satisfy the needs of its inhabitants. This does not imply that every sub sector or component providing necessary functions needs to exhibit resilient characteristics - it is the persistence of function that is important. An alternate approach to defining criticality within a city would be to focus on the functions that are essential for urban survival. A place to start is with the seminal work on human needs and motivation by Abraham Maslow.

Necessary functions can be elucidated using Maslow's hierarchy of needs – introduced as motives for human behaviour, which been updated and revised through the years (Kenrick et al., 2010; Maslow, 1970, 1958, 1943). The hierarchy of needs posits a human motivation system whereby each subsequent need is predicated on the attainment or fulfilment of more basic needs (Figure 3).

While the hierarchy of needs is regularly scrutinized over the specifics of some certain segment of the hierarchy, the overall pattern remains well accepted (Clarke et al., 2006; Hagerty, 1999; Kiel, 1999; Koltko-Rivera, 2006; Wahba and Bridwell, 1976; Wicker et al., 1993). In the case of the defining and prioritizing human needs, there is little argument that survival is the most basic human need. These basic needs, the "immediate physiological need" for homeostasis (dynamic balance with the environment, including elements

such as hunger, thirst, and temperature regulation), as well as the need for safety (self-protection) from direct harm, form the foundation from which other motivations and needs can build upon (Kenrick et al., 2010; Maslow, 1958, 1943). Based on this hierarchy of needs we can propose that the provision of food, water, (temperature regulated) shelter, and the immediate and longer term minimization of risk of injury and death are the most critical human needs.

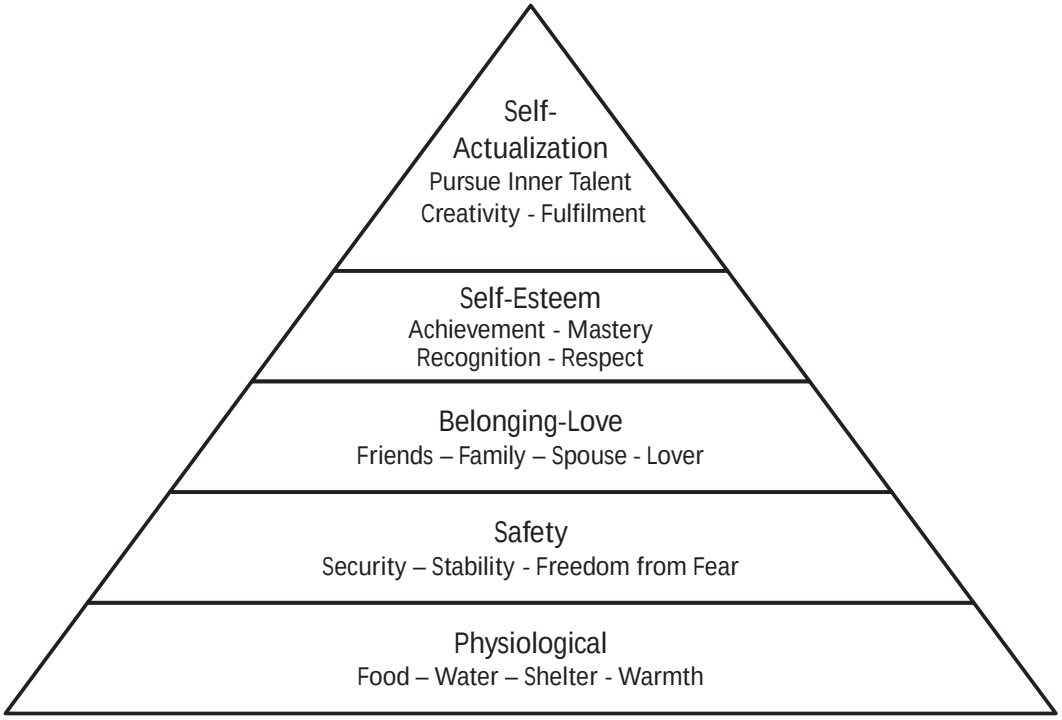

Fig. 3 Maslow's hierarchy of needs, adapted from (Maslow, 1970, 1943)

The hierarchical arrangement posits that these needs must be satisfied before moving up a level and confronting other needs and motivations.

Many of these critical needs are functions of the fabric of the urban city – they are dependent on, or consist of, services provided by architecture and infrastructure networks. In order to attempt to determine resilience at the city scale, the first task is to resolve which aspects of service provision could be considered critical to society. Beyond the definition and assessment of criticality, it is necessary to determine ultimate responsibility for these services – differentiating for example between personal, local, regional, and national responsibilities; as Maslow notes, there are various "paths to the same goal" (Maslow, 1943, p. 370). Admittedly, this differentiation is fuzzy, and subject to extreme cultural variability. An example of a potential needs hierarchy for services provided by architecture and infrastructure is shown in Figure 4.

5 CHARACTERISTICS FOR RESILIENT ARCHITECTURE AND INFRASTRUCTURE

5.1 TEMPORALITY

In addition to the varying potential scales of application, the three different temporal phases associated with resilience pose serious methodological challenges: Efforts necessary to anticipate, prevent, and prepare a system take place before a disruptive event; A system resists and absorbs during an event; Recovery occurs after a disruption.

These three phases (Figure 5) may correspond to different fields of expertise – vulnerability and risk management, crisis management, or adaptation – which are confronted with different challenges and develop specific methods accordingly.

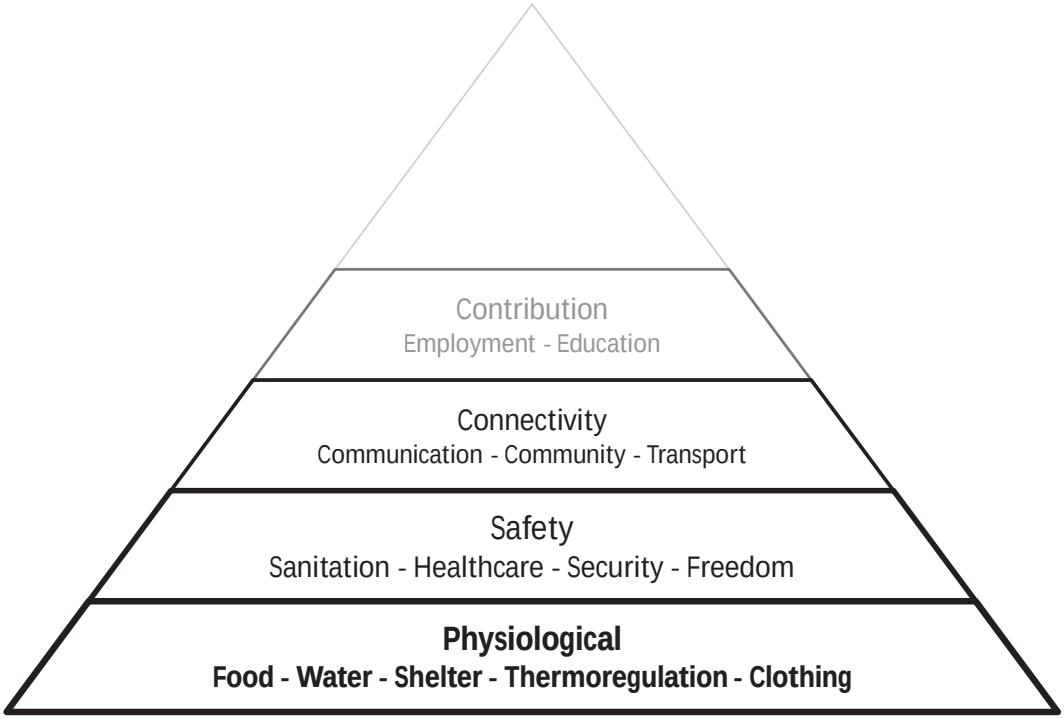

Fig. 4 Hierarchy of service functions provided by architecture and infrastructure, based on (Maslow, 1970, 1943)

In the context of climate change, this cycle of phases related to events becomes more complicated. This resilience cycle operates within different temporal as well as spatial scales – climate change could be considered one huge event, where all three phases will be conflated and occur simultaneously. The effects of climate change will likely be realized in a recurring and successive manner with increasing intensity, so the temporal order retains its validity albeit in the form of miniature cycles that may occur within a larger phase.

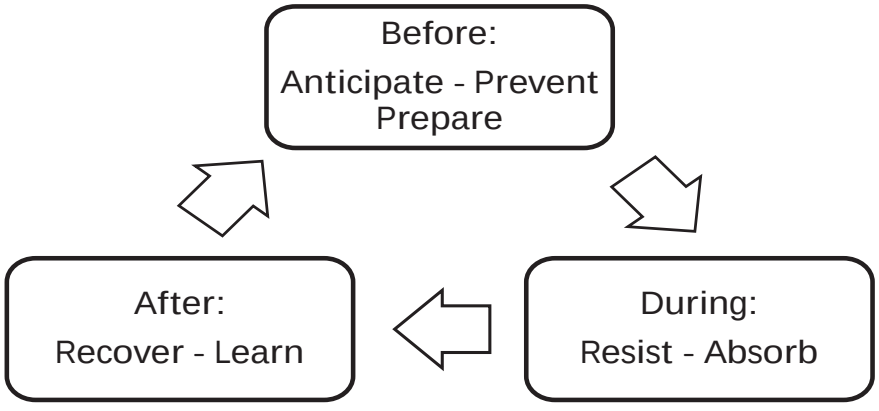

Fig. 5 Temporal phases and corresponding activities related to resilience

5.2 PHYSICAL AND ORGANIZATIONAL RESILIENCE

The provision of critical services from architecture and infrastructure is imperative for people's quality of life. Architecture and infrastructure should be designed or adapted to reliably provide these services, resilient even in the face of potential hazards and threats. Resilient systems should be able to maintain function while maintaining or enhancing the spatial quality of the environment that surrounds people in their daily life. In the RAMSES project architecture encompasses design and management of urban fabric ranging from buildings to public spaces, landscape and urban form.Infrastructure describes built assets (physical) and all the institutions that are required to maintain the standards of living of a community (organizational). Infrastructure can be considered in terms of physical objects and networks or in terms of services. Physical assets are designed to provide services to their users and owners – in terms of resilience to climate change it should be recognized that the services provided are more important than the structures themselves.
A set of characteristics attributed to resilient systems was derived through literature review, and categorized according to their application to physical (Table 1) or organizational (Table 2) systems and networks.

PHYSICAL CHARACTERISTIC	**DESCRIPTIONS**
Connectivity, Feedbacks, Modularity	"How quickly and strongly the consequences of a change in one part of the system are felt and responded to in other parts of the system" (Walker and Salt, 2006) in (Schultz et al., 2012, p. 54). "The extent to which the components and processes that make up a system are dependent upon each other to maintain function" (Walker and Salt, 2006) in (Schultz et al., 2012, p. 53). "Interacting components composed of similar parts that can replace each other if one, or even many, fail" (Tyler and Moench, 2012, p. 313).
Dependence on Local Ecosystems	Local control over the essential "services provided by local and surrounding ecosystems" (the city's green and blue infrastructure - providing "flood control, temperature regulation, pollutant filtration and local food production)" ... "and taking steps to increase their health and stability" (da Silva et al., 2012, p. 136). "...presence of buffer stocks within systems that can compensate if flows are disrupted (e.g. local water or food supplies to buffer imports)" (Tyler and Moench, 2012, p. 313).
Diversity	The "different types of available resources that perform a particular function." Diversity in available resources for critical functions "provides a multitude of options for accomplishing those particular functions" (Longstaff et al., 2010b, p. 6). "...key assets and functions physically distributed so that they are not all affected by a given event at any one time (spatial diversity) and ... multiple ways of meeting a given need (functional diversity)" (Tyler and Moench, 2012, p. 315).
Performance	The "general level of capacity and quality at which an element or elements of a system performs an essential role" (HSSAI, 2009) cited in (Longstaff et al., 2010b, p. 6).

PHYSICAL CHARACTERISTIC	DESCRIPTIONS
Rapidity, Responsiveness	The time required to restore system performance to a pre-disturbance level. "The capacity of a system to meet priorities and achieve goals in a timely manner to contain losses and avoid future disruption" (Bruneau et al., 2003, p. 738). "The ability to reorganise, to re-establish function and sense of order following a failure. Rapidity is a key part of responsiveness in order to contain losses and avoid further disruption" (da Silva et al., 2012, p. 135)
Redundancy	Substitutable "elements, systems, or other units" ... "capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality" (Bruneau et al., 2003, p. 737; Schultz et al., 2012; Walker and Salt, 2006). "Superfluous or spare capacity to accommodate increasing demand or extreme pressures" (da Silva et al., 2012, p. 134). "Spare capacity for contingency situations, to accommodate extreme or surge pressures or demand" (Tyler and Moench, 2012, p. 313). A "quantifiable measure, or count, of a single resource type that performs a specific function. Redundant resources provide a failsafe, or back-up, when any individual unit fails. Redundancy is also a form of operational slack, or buffering from external shocks" (Longstaff et al., 2010b, p. 6).
Robustness	The "ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function" (Bruneau et al., 2003, p. 737). Robustness "depends on the ability of individuals, groups, or technologies to tolerate a broad range of conditions" ... determined as function of "performance, redundancy, and diversity" (Longstaff et al., 2010b, pp. 6, 21).
Safe Failure	The "ability to absorb shocks and the cumulative effects of slow-onset challenges in ways that avoid catastrophic failure if thresholds are exceeded. When a part of the system fails, it does so progressively rather than suddenly, with minimal impact to other systems. Failure itself is accepted" (da Silva et al., 2012, p. 135). "Ability to absorb sudden shocks (including those that exceed design thresholds) or the cumulative effects of slow-onset stress in ways that avoid catastrophic failure." Linkages designed such that "failures in one structure or linkage are unlikely to result in cascading impacts across other systems" (Tyler and Moench, 2012, p. 313).

Tab. 1 Core dimensions of resilient physical systems and networks

ORGANIZATIONAL CHARACTERISTIC	DESCRIPTIONS
Adaptability, Flexibility	"Capacity to change as the surrounding environment changes while still maintaining functionality" (Walker and Salt, 2006) in (Schultz et al., 2012, p. 53). "The ability to change, evolve and adopt alternative strategies (either in the short or longer term) in response to changing conditions" (da Silva et al., 2012, p. 134). Adaptive capacity is represented as a function of "institutional memory, innovative learning, and connectedness" (Longstaff et al., 2010b, p. 7).
Connectivity, Feedbacks, Modularity	"Interpersonal and group connectedness is critical to the diffusion of institutional memory and innovative learning throughout the community" (Longstaff et al., 2010b, p. 8). The "ability to internalize past experiences, avoid repeated failures, and innovate to improve performance" (Tyler and Moench, 2012, p. 315).
Diversity	"Variety in the number of species, people, and institutions that exist in a social-ecological system" (Walker and Salt, 2006) in (Schultz et al., 2012, p. 53).

ORGANIZATIONAL CHARACTERISTIC	DESCRIPTIONS
Learning, Memory	Individual and institutional learning "from past experiences and failures" provides the ability to "use such experience to avoid repeating past mistakes and exercise caution in future decisions" (da Silva et al., 2012, p. 135). Accumulation of "shared experience and local knowledge of a group of people" resulting in institutional memory (Longstaff et al., 2010b, p. 7) Ability to use" information and experience to create novel adaptations to environmental changes or to avoid repeating old mistakes" (Longstaff et al., 2010b, p. 7).
Performance	The "general level of capacity and quality at which an element or elements of a system performs an essential role" (HSSAI, 2009) cited in (Longstaff et al., 2010b, p. 6).
Rapidity, Responsiveness	"The ability to reorganise, to re-establish function and sense of order following a failure. Rapidity is a key part of responsiveness" … but should achieve a balance so as not to compromise the ability to learn (da Silva et al., 2012, p. 135) "Capacity to organize and re-organize in an opportune fashion;" ability to establish function, structure, and basic order in a timely manner both in advance of and immediately following a disruptive event or organizational failure (Tyler and Moench, 2012, p. 315).
Redundancy	Substitutable "elements, systems, or other units" … "capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality" (Bruneau et al., 2003, p. 737; Schultz et al., 2012; Walker and Salt, 2006).
Resourcefulness	"The capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, or other unit of analysis" including "the ability to apply material (i.e., money, physical, technological, and informational) and human resources to meet established priorities and achieve goals" (Bruneau et al., 2003, pp. 737–8). "The capacity to visualise and act, to identify problems, to establish priorities and mobilise resources when conditions exist that threaten to disrupt an element of the system. This capacity is related to the ability to mobilise assets (financial, physical, social, environmental, technology and information) and human resources to meet established priorities and achieve goals" (da Silva et al., 2012, p. 135). "Capacity to mobilize assets and resources for action. It also includes the ability to access financial and other resources, including those of other agents and systems through collaboration" (Tyler and Moench, 2012, p. 315).

Tab. 2 Core dimensions of resilient organizational systems and networks

5.3 CHARACTERISTICS AND DIMENSIONS OF RESILIENCE

Highlights from the various physical and organizational dimensions and understandings of resilience attainment and assessment were presented and discussed during two workshops:

- A RAMSES stakeholder workshop with city representatives in Brussels 11 October 2013 organised by ICLEI-Local Governments for Sustainability
- A researchers' workshop with climate change mitigation and adaptation experts in Helsinki 23 October 2013 organised within the framework of COST (European Cooperation in Science and Technology) Action TU0902 Integrated Assessment of Cities

During these workshops three aspects were emphasised: core dimensions of resilient systems, identification of resilience characteristics for architecture and infrastructure, and approaches in which indicators can be identified and applied to recognise opportunities for intervention.

One of the activities in the workshop focused on identifying and assessing the implications and understanding of resilience characteristics. In this activity workshop participants were first asked to list core dimensions of resilience according to their own experience and knowledge, after which this input was matched with resilience characteristics derived from literature reviews. This set consisted of characteristics gleaned from the literature, separated from context and scale and presented without value in expert and stakeholder workshops. The purpose of this exercise was to tease out the current understanding of these terms - especially with respect to their relationship with resilience. The characteristics are used to inform the development of an operational understanding of resilience, while not necessarily maintaining (or narrowing debate into) existing patterns. Due to the variety of approaches of considering resilience in the literature, the list of characteristics includes both variables related to mechanisms of achieving, promoting, or enhancing resilience, as well as variables related to ex-post evaluation.

Table 3 summarises the main characteristics of resilient systems identified in literature and by RAMSES workshop participants (the latter's additional contribution *in italic*).

CHARACTERISTIC	**DESCRIPTIONS**
Adaptability, flexibility	Capacity or ability to: • change while maintaining *or improving* functionality • evolve • adopt alternative strategies *quickly* • respond to changing conditions *in time* • *design open and flexible structures (in general)*
Connectivity, feedbacks, safe-failure	Functional interdependence of system components and processes (effect of change in one part of the system on other parts of the system). Capacity or ability to: • absorb shocks • absorb cumulative effects of slow-onset challenges • avoid catastrophic failure if thresholds are exceeded • fail progressively rather than suddenly • fail without cascading impacts (domino effect) • *analyse and implement across spatial scales (city to site)* • *analyse as human-technology coupled system* • *identify lock-in effects and potential conflicts with mitigation* • *identify synergies with other city policies, added value assessment* • *balance clear distribution of responsibility with concerted action*
Dependence on local ecosystems	Local control over services provided by local and surrounding ecosystems. Maintaining health and stability of green and blue infrastructure, providing: • flood control • temperature regulation • pollutant filtration • local food production etc. • *bioclimatic design and management (adjusted to local conditions)*
Diversity	Spatial diversity - Key assets and functions physically distributed to not all be affected by a given event at any time Functional diversity - Multiple ways of meeting a given need • *balance diversity with potential cascading effects*

CHARACTERISTIC	DESCRIPTIONS
Learning, memory, *foresight*	Individual and institutional. Capacity or ability to: • learn from past experiences and failures • use information and experience to create novel adaptations • avoid repeating past mistakes • accumulate, store, and share experience • *build on long-term cultural value and history of the city* • *integrate resilience in long-term development scenarios*
Performance	How well does the system perform in its role? • Functional capacity • System quality • *in an appropriate and efficient way* • *self-sustaining, reducing external dependencies* • *compared to others – "I want a bigger dike than my neighbours"*
Rapidity, responsiveness	Following a disruptive event, the capacity or ability to: • contain losses, including mortality and illness • reorganise • maintain and re-establish function • reinstate structure • restore basic order • avoid future disruption
Redundancy, modularity	The capacity or ability to: • substitute systems, or elements of systems • buffer from external shocks or demand changes • replace components with modular parts • *balance redundancy with potential cascading effects*
Resourcefulness	The capacity, ability, *resources and infrastructures* to: • identify (and anticipate) problems • establish priorities • mobilise resources • visualise, plan, collaborate and act • *re-evaluate* • *integrate resilience in governance and working processes* • *involve and co-create with citizens (e.g., crowd-sourcing and funding)*
Robustness	The capacity or ability to: • withstand a given level of stress or demand • without degradation or loss of function • *capacities that ensure sufficient margins*
Co-benefits	• *Added value assessment of resilience* • *No/low regret measures*

Tab. 3 Core dimensions of resilient systems, from RAMSES workshop participants (Adger et al., 2005; Briguglio et al., 2008; Bruneau et al., 2003; Chang and Shinozuka, 2004; Chuvarayan et al., 2006; da Silva et al., 2012; Davis, 2005; Fiksel, 2003; Galderisi et al., 2010; Godschalk, 2003; ICSU, 2002; Longstaff et al., 2010a; Maguire and Hagan, 2007; McDaniels et al., 2008; Reghezza-Zitt et al., 2012; Schultz et al., 2012; Tierney and Bruneau, 2007; Tyler and Moench, 2012; UN-ESCAP, 2008; Van Der Veen and Logtmeijer, 2005; Wilson, 2012)

The importance of thresholds was emphasised by the workshop participants, in particular the difference between life and death - which measures are needed to prevent injury and loss of life. Linking resilience to co-benefits, no- and low-regret measures, was mentioned often and stressed as a core manner in which to operationalize visions of resilience in cities' daily routines. At the request of the participants an additional row was added to the table to indicate the importance of this dimension.

5.4 DEVELOPING RESILIENCE INDICATORS

The development of indicators for resilience in architecture and infrastructure is a difficult task, as they must address the typical challenges of assessment (e.g. feasible, cost-effective, and informative) while simultaneously addressing and capturing the very complex nature of resilience. In practice, different indicators have been proposed to assess proxy properties of resilience. Any indicator framework developed for assessment of resilience must not only address its multi-scale nature, but must acknowledge the difference between measurement of ex-post resilience to a realized event, and system characteristics perceived to contribute to resilience:

- Persistence, resistance, robustness could be assessed with outcome-based indicators which measure the effectiveness of action and policy
- Adaptability, responsiveness, ability to recover could be assessed with process-based indicators which monitor progress in implementation.

The theoretical underpinnings and specific definition of resilience has been approached by many different disciplines, stakeholders and schools of thought. This extreme diversity is reflected in the nature and focus of understandings of resilience. While there may be no universal, standardized definition or assessment methodology for resilience in the built environment, research in the field is accelerating, and seems to be converging around a few key themes. Three related capabilities are considered important (or necessary) for increasing resilience in systems and networks:

1. The provision of absorptive capacity so that the system or network can withstand disruptions;
2. Adaptive capacity so that service functions can be delivered via alternate paths;
3. Restorative capacity so that recovery from a disruptive event can be accomplished quickly and with minimum effort (Turnquist and Vugrin, 2013).

As such, resilience can be facilitated through redundant, distributed components, and design for safe failure, whereby the system is designed so that failure of a component can be absorbed by a network and does not propagate (cascading or escalating through the system). This requires localised, knowledge-based and integrated cross-scale indicators of resilience for design and management of urban architecture and infrastructure.

6 CONCLUSIONS

Resilience in architecture and infrastructure networks refers to the maintenance of function in spite of damage. Individual components themselves may be resilient, but the resilience of the system does not depend on this, only that the desired function persists or is able to resume with minimal time and resources after a disruption. A resilient system can be comprised of resilient components and subsystems, or alternately individual components can be protected, distributed, redundant, or even expected to fail. As long as these lower level components are well understood and managed spatially and functionally, the resilience at a higher scale can be maintained. The goal of the system is persistence of provision of desired functions, regardless of the specific methodology used to attain this.

In principle, incorporating resilience principles and metrics into standards and codes could provide a monitoring framework for improvement of practices, and a consistent approach across sectors and countries. Review of research literature, codes and standards, design guidelines and assessment schemes and corresponding testing of the review results in stakeholder and expert workshops however show that few operational indicators exist. Instead, best practice guidelines are increasingly perceived as efficient tools to encourage and promote resilience and deliver a level of reassurance not otherwise available through specific indicators. A number of publications provide design recommendations for a climate change adapted built environment, including a wide range of recommendations for "resilient" architecture and infrastructure adaptation to climate change impacts, such as adjustment in grey and green infrastructures (e.g. BRTF,

2013a, 2013b; BSA, 2013; DEFRA, 2012; KK, 2011). Grey infrastructures can be defined as "construction measures using engineering services", while green infrastructures are "vegetated areas and elements such as parks, gardens, wetlands, natural areas, green roofs and walls, trees etc. contributing to the increase of ecosystems resilience and delivery of ecosystem services" (EEA, 2012a, p. 7).

These design measures show how morphological factors and socio-economic activity can alter exposure and impact at local scale in cities, and how appropriate architecture and infrastructure design can mitigate these effects. Damage risks and costs can likely be considerably reduced when designing the built environment with inherent flexibility for adaptation to climate change, prioritising passive and local solutions, and providing redundancy of solutions (diverse supply options). In addition, low- and no-regret options could provide a range of co-benefits for climate change mitigation/adaptation as well as quality of life; for example, green areas and water bodies could provide storm water management, delay the urban heat island effect, and create local leisure facilities for the urban population. Costs could further be reduced when adaptation measures are timed according to upcoming windows of opportunity such as building retrofits, urban renewal, densification or development (EEA, 2012a).

Resilience exists as an inherent characteristic of a system, yet one that cannot be fully exposed ex-ante; Resilience is only observable after an event. It may however be possible to learn from past examples of resilience which system characteristics help it exhibit resilience in the face of adversity - developing a database of events and responses in order to derive which characteristics are most associated with realized resilience. These characteristics can be cultivated in new developments and existing communities. Indicators based on these characteristics and determining factors are useful for phenomena that have yet to be observed, or are not directly measurable, but for which a conceptual understanding is available. The problem with applying this indirect approach to resilience assessment is determining which characteristics of systems influence or determine their capacity for resilience, and clarifying and simplifying these complex concepts into indicators. Resilience may be directly measurable as successful restoration of functionality after a disruptive event, but indicator development requires working backward from ex-post assessment to ex-ante indicators of system characteristics.

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IMAGE SOURCES

Title image: Mining scars; Montaña La Sahorra, Tenerife, Spain. Photo: J. Kallaos

AUTHOR'S PROFILE

James Kallaos

He received consecutive Master's degrees in environmental science and management at (University of California, Santa Barbara) and sustainable design (Harvard University Graduate School of Design) before beginning a PhD in Civil Engineering at NTNU. While finishing the PhD, he works as a researcher in the Department of Architectural Design, History and Technology at NTNU.

Gaëll Mainguy

He is a graduate of the Ecole Normale Supérieure in Paris and a Doctor in Molecular neurobiology (Pierre and Marie Curie University). He has worked for the CNRS (Paris), the Center for Biomedical Genetics (Utrecht) and the INSERM (Paris). In 2006, Gaëll Mainguy joined the Veolia Environment Institute to develop its scientific editorial policy. In 2008 he launched S.A.P.I.EN.S, a new, Open Access, international, multidisciplinary peer-reviewed journal focused on integrating scientific knowledge for sustainability. He is currently the managing director of S.A.P.I.EN.S.

Annemie Wyckmans

She is a Professor, the Vice Dean of Research and Smart Cities coordinator at NTNU. She has 15 years of experience in energy- and environment-friendly architecture and coordinates several EU project work packages in this field (e.g. in FP7 RAMSES, FP7 ZenN, COST TU0902). She has also been involved in a corresponding Norwegian project since 2006.

TeMA vol.8 n.2 (2015) Cities, Energy and Built Environment

DEADLINE 10TH MAY 2015

The improvement of energy efficiency is one of the main challenges for addressing the objectives set by the EU 20-20-20 Strategy. Cities are responsible for two-thirds of global energy consumption and this proportion is expected to grow further. Cities represent complex systems in which physical assets, strategic and economic activities as well as the most of the world population are concentrated. Hence, to achieve relevant and enduring results in addressing energy efficiency issues, it is necessary to broaden our vision from the building scale to the whole urban structure. Urban planning is more and more considered as a crucial element in the long-term energy efficiency strategies. Hence, relevant and enduring results in addressing energy efficiency issues, can be achieved broadening our vision from the building scale to the whole urban structure and taking into account the relationships between the different urban components and energy. Numerous topics are connected to the main one; among them:

- Integrating Spatial and Energy Planning: Tools, Practices and Techniques;
- Energy Efficiency Modeling: from Buildings to Urban Areas;
- Retrofitting Energy Strategies for Existing Urban Areas;
- Energy Mapping and Monitoring in Urban Areas;
- Urban Microclimate and Energy Consumptions;
- User behavior and Social Practices to Reduce Energy Consumptions;
- Zero Energy Urban Development;
- Lessons Learnt from International Case-Studies.

TeMA vol.8 n.3 (2015) Cities, Energy and Mobility Strategies for consumptions' reduction

DEADLINE 10TH SEPTEMBER 2015

Transport energy consumption accounts for about one third of total energy consumption in the EU. Despite significant advances in transport technology, energy consumption in this sector has increased in most EU countries over the last three decades. Long-term forecast to 2030 suggest that energy consumption will further increase in all major sectors, experiencing the most rapid growth in the transport sector. This issue of TeMA will be focused on methods, techniques and tools related to urban and regional mobility considered in a key dimension of energy saving. Contributions are welcome on a wide range of topics about the methods, strategies and practices for consumptions' reduction, low carbon emissions, public and individual transport, in a word what can be called: "Smart Mobility". Numerous topics are connected to the main one; among them:

- Sustainable mobility;
- Advanced smart public transport;
- Approaches, Methods ad Tools for Integrating Energy Issues, Urban and Transportation Planning;
- Intelligent traffic management;
- Transport Energy Demand Forecasting Models;
- Methods for traffic congestion avoidance;
- Relationships among Land Use, Travel and Transport Energy Consumption;
- Low emission in mobility;
- Modeling for urban mobility;
- Urban mobility demand management;
- Intelligent Transport Systems (ITS);
- Information and communication for the urban and regional moving.

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NEW TECHNOLOGIES FOR SUSTAINABLE ENERGY

IN THE SMART CITY: THE WET THEORY

ROMANO FISTOLA[a], ROSA ANNA LA ROCCA[b]

[a] Department of Engineering – University of Sannio
e-mail: rfistola@unisannio.it
URL: www.romanofistola.it

[b] Department of Civil, Architectural and Environmental Engineering
University of Naples Federico II
e-mail: larocca@unina.it

ABSTRACT

The paper tries to develop a new approach to the sustainable planning for the smart city based on the assumption that the relationship between new technologies and urban system could be developed in a new way considering the WET theory.
The WET theory starts from the main components for the establishment and the survival of the human settlements: Water, Energy and Technologies (WET). By Considering this approach, technology could be envisaged as a switch element for the bifurcation that could be generated inside the process of management of the modern urban systems. On the one hand, technology can improve the use of renewable energies and it can promote a different way of using energy inside the city. On the other hand, technology can produce a huge structural work that can drive the urban system towards a worst dimension, by causing permanent change inside the territory as a whole, particularly at large scale.
Starting from these considerations, the paper proposes a focus on the two mentioned possibilities, by considering the best dimension, represented by the DESERTEC project and the worst one prefigured by the South to North Water Diversion Project (SNWDP) that is going to start in China.

KEYWORDS:
Smart City; Urban Entropy; New Technologies; WET Theory.

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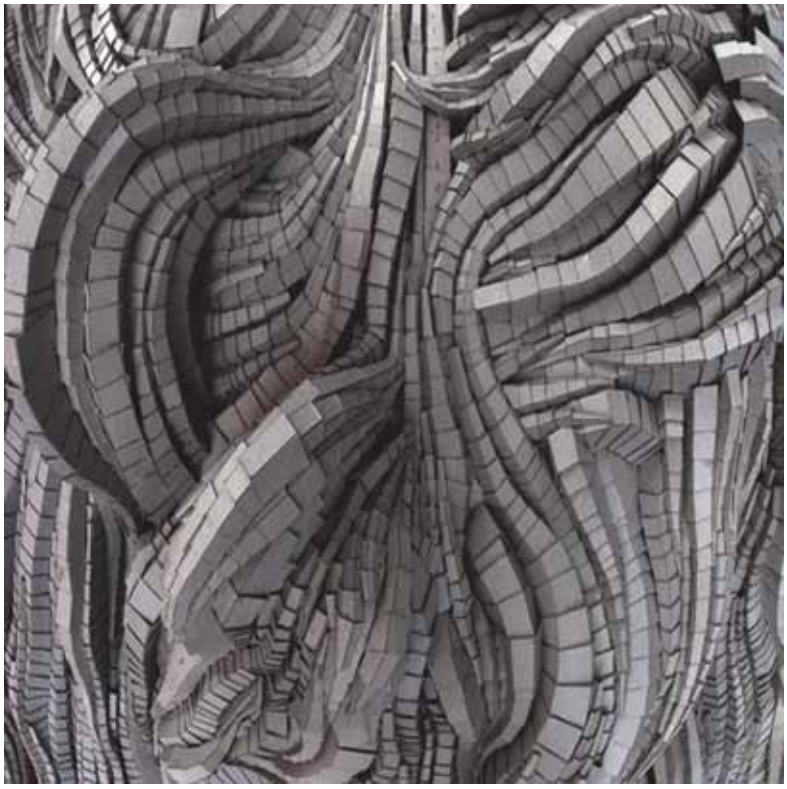

智能城市中

的持续能源新技术

ROMANO FISTOLA[a], ROSA ANNA LA ROCCA[b]

[a] 贝内文托萨内奥大学工程系
e-mail: rfistola@unisannio.it

[b] 那不勒斯菲里德里克第二大学民用建筑与环境工程系
e-mail: larocca@unina.it

摘要

本文旨在为智能城市的可持续发展规划开发一种新方法，其基础是设想通过 WET 理论以一种新的方式在新技术和城市体系之间建立关系。
WET 理论源于人类居住区的建立和生存所必需的主要因素：水、 能源和技术（WET）。通过考虑采用此方法， 将技术视为能够打通现代城市体系管理进程中关键节点的转换因素。 而且，技术还可以提高对可再生能源的利用， 并在城市能源利用领域中开拓出一条与众不同的道路。 但在另一方面，技术可带来大量的建筑施工， 这会使城市体系朝向不利的一面发展， 总之会在区域内造成大规模的永久性改变。
从这些考虑因素入手，本文将就上述两种可能进行着重阐述，以 DESERTEC 项目代表有利的一面，以在中国即将开始的南水北调工程 代表不利的 一面。

关键词

智能城市；城市熵；新技术； WET理论.

1 TECHNOLOGY AND CITY

Technology represents a basic element in the process of building up the urban artefact. When man has felt the need to adapt the natural environment in order to establish human activities, he has used technology to do it. From sharp stone or primitive axe towards digital excavators or remote controlled crane.

The term technology is connected with the term technique. Nevertheless, with technological revolution we have been driven to consider technology, which identified the process and the study to transform materials into goods, with the product itself. Today the term "technology" is used to refer to ICT tools available. In a certain way it's so possible to identify technology with technique. Furthermore, it is possible to say that the term technique means all the actions, choices and behaviors that transform an object into a tool.

"Without technique the man would not exist and would not existed ever" (Ortega y Gasset 1933). It is important to preserve anyway the meaning of process, also mental, which is inside the word: "mechanic", definitely confirmed with word: "machine". The term: "mechanè" is already present inside the Omero's writings with the meaning of: gear, mechanism, but not only in a physical way, it can mean: reasoning cunning, trick as well. "The machine has been designed to get a certain result, born in order to get this goal and represents the materialization of a strategy useful to get a specific purpose" (Boncinelli 2006).

Starting from those assumptions it is very interesting to consider the city as a human artifact created just thanks to the technique/technology. If we consider the evolution of the technique related to the process of progressive transformation of the natural environment, made by man in order to survive to different natural threats, we will observe a curve growing from the proto-techniques toward the mature phase of technology (figure 1).

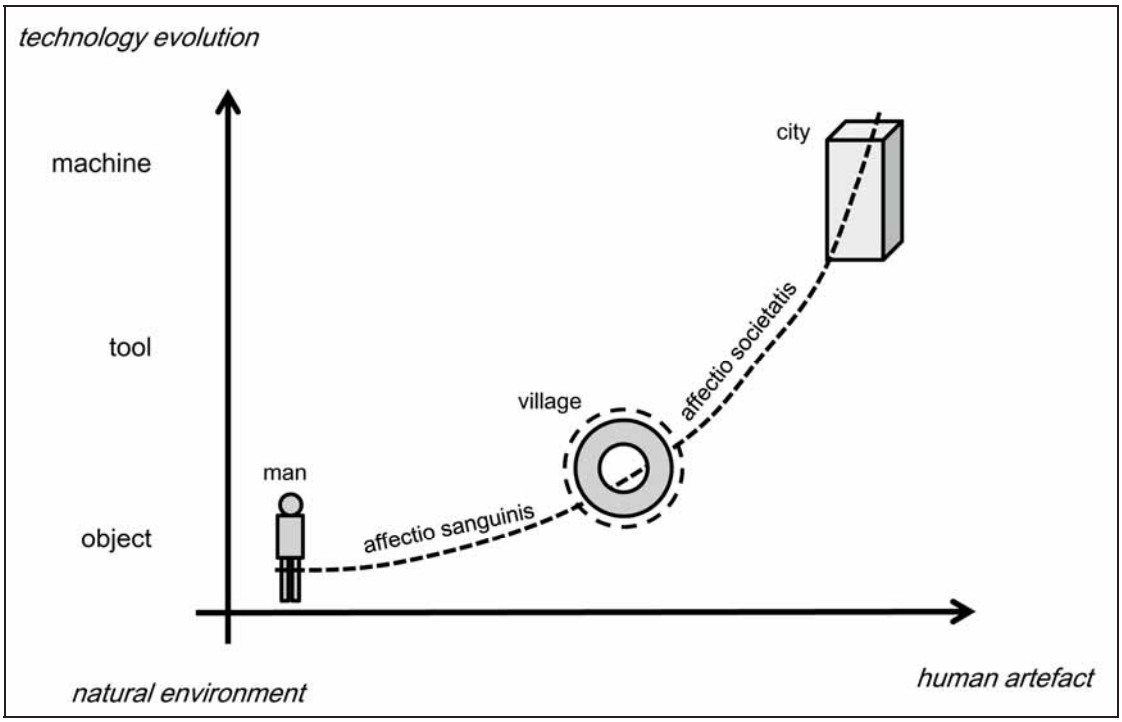

Fig. 1 The curve of the adapted space related to the evolution of technology and the development of the human settlement

City and technology have very close relationship since the first human action made to resist to natural events or produce a human settlement because of the changes and the evolution between the *affectio sanguinis* and the *affectio societatis*. Technology has to be considered like a fundamental factor inside the evolution process of the human beings. Thanks to technology, man can extend its senses in order to have a best perception of the environment. Thanks to technology, man can develop his capabilities to understand natural events, to carry on sciences development and to build a common space for more people.

Technology has to be intended as a basic factor of the human evolution. Today, technology has a new acceleration, which can separate it from the human evolution process. In the industrial revolution the machine was employed to support men in the production activities. In that period there was a total change in human settlements but technology was still inside the process. With the digital revolution, technology has gone beyond the human capability of using it, by producing a huge transformation in the human capabilities of relationship. If men don't understand that technology has to be adopted and not added up in the evolution process, there will be a wrong use of innovation and a distorted dimension of mankind.
The smart city has to consider the adoption of the ICT inside its process of development and not the addition of the technological equipment (like sensors) to the physical system of the city.
According to this approach, technology is one of the fundamental factor for the smart city as the WET theory tries to describe.

2 URBAN ENTROPY INSIDE THE SMART CITY

Considering the system approach to the interpretation of the city (Regulsky 1983) it is possible to say that the evolution of the urban system is closely connected with the evolution of its subsystems and mainly with the socio-anthropic ones (Gibson 1993). One of the problem that can cause a wrong development of the system is entropy. The urban entropy is intended like a negative condition of the system, which tends to move out itself from the management process, following distorted trends of development. The urban entropy is related to several factors: urban pollution, energy waste, the excessive production of waste, the increment of the conditions of vulnerability of sub-systems, the high social conflict, a high crime rate, etc.. These conditions may produce adverse effects and different kinds of discrepancies within the urban system, related to the improper use of available resources.
It is possible to say that a city is much more sustainable when the physical system and the functional one evolve with a compatible speed. In other words, the system has a dimension of urban sustainability when it saves the permanence of the functions in the historic sites of the city. The more the urban functions are moved away from the traditional sites of location, the less the urban sustainability improves.
The functional system represents the subsystem of great importance, but this should be considered in relation to the other subsystems: the physical (spaces and areas where the functions take place), the economic (represented by the processes that support the functioning of the city) and the social (composed by the individuals who populate the city and their interactions) (Papa 1992).
Considering this approach, it is possible to define policies for the governance of urban and territorial transformations by starting from the need to make the evolution of the system be compatible and sustainable. However, it should be immediately noted that, interpreting the city as a system within larger metasystems (including the Earth), and being the planet a closed system, the amount of entropy inevitably generated by the processes of transformation of energy (considering the second law of thermodynamics) is steadily increasing (Pulselli e Tiezzi 2008).
The cities, being energy-consuming systems (Fistola 2010), are the places where policies to reduce entropy should be implemented through appropriate actions of urban planning. Delving into the matter, it is possible to say that the first actions of a new territorial government are due to the entropic mitigation. The more we can control the urban entropy (which the system generates for its survival and evolution), the greater we can contain urban development into the expected range of trajectories within which the potentially positive states (i.e. sustainable and compatible with the available resources) are located. Reconsidering the graph showing the trend of urban evolution (figure 2), it is possible to identify the entropic areas, represented by the portions of space outside the expected range of the paths. When the system crosses into these areas, it means that the levels of entropy are dramatically high and an over-use of resources to bring back the system within the range of the expected trends is needed.

The entropic areas can be further subdivided according to the increasing entropy. The areas can be distinguished in two different kinds. The first one refers to reversible entropy areas, for which it is possible to recover the system tracing it back to the range of urban sustainability (by using a considerable amount of social, environmental and economic resources). The second one refers to unrecoverable entropy areas where the system goes to the "heat death" and the city suffers the structural collapse and the disintegration of the relationship among elements (Fistola 2012).

In order to give some examples of the above said assumptions, it can be supposed that inside the recoverable entropy area it is possible to place those cities in which entropy has been mainly produced by a "dominant" cause such as urban pollution, strong social conflicts, widespread urban hazard for natural causes, hydrogeological instability, and so on. The extra resources to be used for the "reconversion" of the system within the range of sustainability can be of energy, social financial nature and so on.

In a very marginal position and borderline in respect to the unrecoverable entropy area there are the urban contexts where, in the different subsystems, some entropic generations/productions take place, which act in synergy and entail the use of exceptional resources for reconversion through specific interventions. It is the case of the promulgation of special laws for those cities affected by a heavy structural crisis. Finally it will be said that the cities affected by the "heat death" are those exposed to a constant and very high entropic pressure or those hit by disasters that require evacuation. Indeed the case of Chernobyl is a striking example.

Starting from this idea, it is possible to say that the reversible entropic areas characterize the processes of "growth", while the range of sustainability includes the processes of "evolution" of the city. As for the concept of sustainable development, it must be recognized the impossibility of defining a condition of perfect sustainability (because any development process produces entropy), also within the range of expected trends the city produces entropy since it use resources (energy) for its evolution.

3 THE WET THEORY: A NEW GENERATIVE ENVIRONMENT FOR THE CITY

Thus entropy, considered as urban energy dissipation (derived from the available resources), is the element to mitigate in the will of orienting the urban system towards sustainability. As above-assumed, technology can play a vital role in this regard.

To consider the relationship between technology and energy within the city it is possible to refer to the "WET Theory". The WET theory can provide a useful scientific reference for managing territorial transformations since it reconsiders the essential resources for the urban evolution which, as for the primordial wet environments of our planet, allow the growth of vital systems. Water and energy represent the necessary conditions for the survival of the socio-anthropogenic and functional subsystems respectively and therefore able to ensure the subsistence of the urban system.

Technology ensures the progress and the advancement of the urban system by representing the key factor in the evolution. It is known from the theory of entropy applied to social systems (Rifkin 1992) and from other studies on the environmental impacts (produced by the anthropic presence) that technology acts as a transformer of energy and therefore as an entropy generator.

In particular, the equation "IPAT", (Chertow 2001) describes how the Impact can be correlated to factors such as Population Affluence and Technology.

Even from this equation, it can be assumed that the environmental impacts, which here can be considered like the systemic expression of entropy, are directly associated with the development of the elements of the urban subsystem (Commoner 1972).

Among the terms of the equation, technology seems to offer possibility to make an immediate and effective action to reduce impacts (Sachs 2008). It is clear that, the technology component seems to be the regulatory element on which it is possible to act immediately.

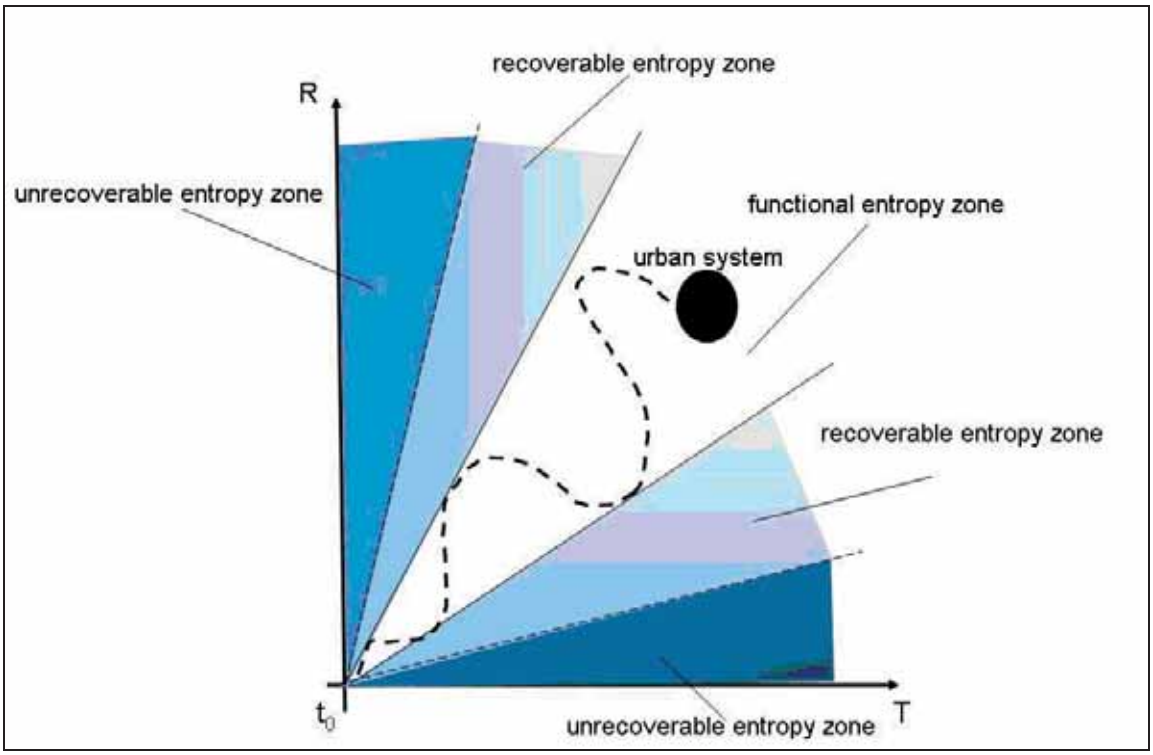

Fig. 2 The evolution trend of the urban system and the different entropy zones

A first example can be provided by the processes of virtualization (Fistola and La Rocca 2001) which can be activated through the new technologies that effectively reduce the intensity of use of urban functions and also its land consumption.

This reflection could possibly lead to reconsider the "anti-technological" approaches in the field of urban science that for a long time have led to move away from the possibility of understanding and interpreting the processes of urban change, and have produced the consequent impossibility of defining new policies, in order to manage the evolution of the urban system.

Cities are the places of human survival, spaces for a new society and factories of knowledge, technology now pervades every relational, productive and economic process.

The smart city seems to be the closest urban scenario to which it is necessary to define the methods, the procedures and the policies for the government of the evolution of the urban system (Fistola 2013).

The use of the system logic in the paradigmatic definition of smart city allows to extend the idea of "smartness" by including also the metropolitan area and the landscape components.

In other words, maybe it is possible to consider also the "smart landscape", which can refer to the setting up of the identity components of the extra-urban dimension capable of stopping territorial entropy and to drive the governance of transformations towards harmonic and balanced contexts, whose development could be always checked and compatible with the available resources of the system evolution.

The task of the new urban planning consists in proposing and implementing these processes by considering new approaches and new theories oriented to increase the social capital in the city and inspired by the sustainability and compatibility of the urban evolution.

The use of new technologies for building a complex territorial knowledge have to support the decision-makers in their choices.

Accordingly, for example, the GIS become the innovating environments of territorial knowledge development (Fistola 2009) and, combined with the remote sensing techniques, can help in building information complex scenarios for an effective support to transformation.

However, it should be considered that the use of technology could have a dual development in relation to the entropy production. When technology is adopted to drive evolutionary urban processes (and it is used by considering the general principles of sustainability), it produces positive effects and it greatly reduces urban entropy. On the other hand, when technology is mainly used in relation to the need to foster and promote the process of economic growth of a specific region, it may trigger a significant number of negative externalities that can spread on contiguous territories and ecosystems.

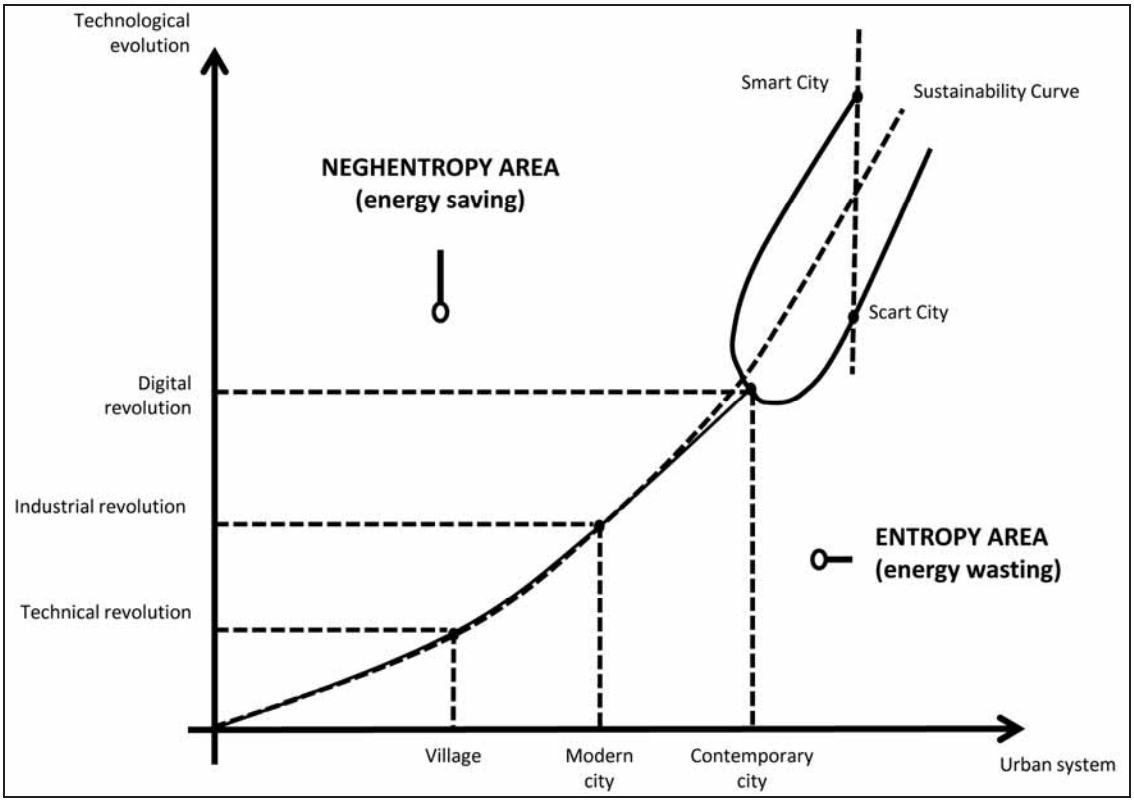

Fig. 3 The curve of sustainable evolution of the urban system and the bifurcation in the possible use of technology inside the city.

This possibility can be seen as a bifurcation that is generated on the curve that describes the evolution of sustainable urban system and it can usefully represent the proper, or improper, use of the technology (Figures 3).The proper use, described by the high branch of the bifurcation, allows a significant advancement of the city towards the sustainability dimension, increases the urban smartness (Fistola, 2013) and generates a reduction of entropy. The lower branch, instead, which is located below the curve of urban sustainability, leads the city towards a condition of entropic spread and continuous wasting of energy resources.

Then the two branches of the bifurcation can describe two potential conditions that the urban system can take according to the correct or incorrect use of technology: the smart city or the scart city.

The two mega-projects, described in the following, can represent this bifurcation, showing how the use of technology can drive an urban (territorial) system towards two opposite conditions.

4 THE ENTROPIC WAY: THE SOUTH TO NORTH WATER DIVERSION PROJECT IN CHINA

In China, since about a quarter of century, researchers and scientists, people and politicians have been discussing about the South to North Water Diversion Project (SNWDP), which is considered the greatest work of engineering infrastructure in the world, if it will be completed. There are different opinions between those who believe that the project is essential to solve the water requirements of the northern countries and those who believe that the environmental and economic impacts will be higher than the benefits.

The project bases on the idea of diverging four principal rivers from south to north to supply the need for water in the northern developed regions. The northern part of China is historically characterized by water scarcity compared to the southern regions, also because it has been a center of population growth, industrial development and intensive agriculture for a long time. The idea was conceived by the former Chinese leader Mao Zedong in 1952. After fifty years of discussions and conflicts, it was approved by the Country's Cabinet, in December 2002. The mega project has an estimate total cost of 62 billion of US dollars.
In the government's opinion, the project is essential to guarantee the economic developing of the northern and western regions in the fastest way even though this vision is very controversial.

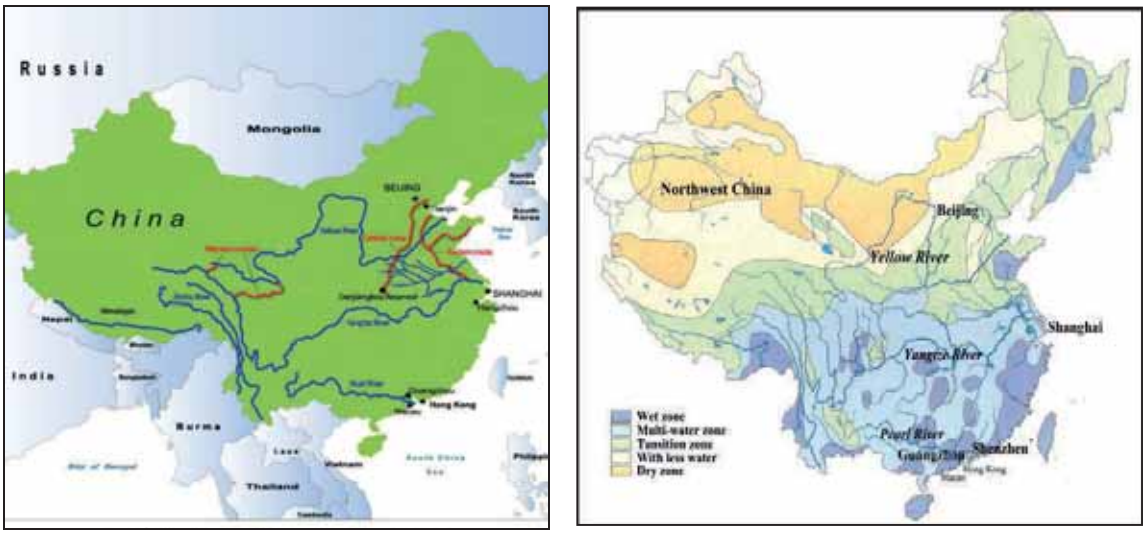

Fig. 4 Map of the South to North Water Diversion Project (left) and distribution of wet and dry zones in China (right))

The project consists of three water-transferring routes -the Eastern Route, the Central Route and the West Route-, which will connect four rivers basins: the Yangtze River in the central China to the Hai, the Yellow and Huai Rivers in the north area. The eastern and central routes will be channeled under the Yellow River, while the western route entails pumping water over a part of the Himalayan mountain range.
The Eastern Route has started to be built since December 2002 and is expected to be finished in 2030. This route diverts water from the Yangtze River and is an upgrade of the ancient course of the Beijig-Hangzhou Grand Canal that was built to transport grain and other commodities to Beijing through the Jangsu, Anhui and Shandong provinces.
This part of the project is in an advanced state and through a tunnel under the Yellow River the water will reach Tianjin. The finished diversion will involve a complex system of pumping stations (23 total stations with a power capacity of 454 megawatts) to take about 1 billion m^3/year.
The Middle Route started in 2003 and was expected to be finished in 2010 but still now it is under construction. The northern stretch was finished in 2008 and its cost was about two billions of US dollars.
It doesn't takes water from rivers but from reservoirs in Hebei province, where farms and industries had to cut their consumes to let the water be diverted to Beijing and Tianjin.
One of the main problem occurred in the construction of this route has been the displacement of people living near the Danjiangkou Reservoir and along the canal. This created a lot of social conflicts and discontent both in people and scientists wondering about the real utility of the project, especially considering the state of water pollution. It is very likely that the project will have no benefit at all, because it will not diverge any potable water.
The third route, called the Big Western Line, started in 2010. It has been scheduled to bring water from the major tributaries of the Yangtze (Tongtian, Yalong and Dadu rivers) to the northwest Chinese region.

For the water transfer project it is expected to build some pumping stations for lifting water, while some long tunnels will drive the water course through Bayankala Mountain. The whole project is expected to be completed in 2050 and it is clear by now that the initial cost has been underestimated.

Fig.5 Tunnel under the Yellow River

At present, this project raises many concerns. First of all the high levels of pollution in China affect also the quality of water and the opportunity to bring potable water through these three routes is very improbable. At that time it would have had to take 426 sewage treatment plants to bring water to Beijing.
The second issue regards the incapacity of the Chinese government to make appropriate decisions to solve the problem concerning the policy for coping for supplying water as well as for encouraging conservation and rationalized use of the resource. In this sense, the SNWDP seems to be the mean for Chinese government to rely on technologies to avoid making decisions.

5 THE SUSTAINABLE WAY: THE DESERTEC PROJECT, A NETWORK OF RENEWABLE ENERGY

DESERTEC seems to be the largest project to use renewable energies, even though it is quite far from getting large approval and consensus. Nevertheless, it can represent a positive example of using technologies potentiality in order to reduce impacts on the inevitable territorial transformation.
The project is based on the idea of taking renewable energies from countries where they are more available and abundant. This could be possible by means of a super smart grid using the high voltage direct current (HVDC) as method of transmission.
The DESERTEC concept considers to use all kinds of renewable sources of energy (wind, sun, water) leaving a central role to energy produced by sun in the desert regions of the world.
The Desertec Foundation official web site shows the principles for the individuation of the main sources inside the smart grid on which the project is based:

- Solar-Thermal Power (CSP) in desert regions;
- Wind power in coastal areas;
- Hydro power in mountainous regions;

- Photovoltaics in sunny areas;
- Biomass and Geothermal power where geographic conditions are favorable.

The Trans–Mediterranean Renewable Energy Cooperation (TREC), an international network of politicians, academics and economists that gave rise to the Desertec Foundation (DF), developed this concept in 2003. The Foundation's target regards the implementation of the project in the EUMENA (Europe, Middle East and North Africa) region.

In 2008, the first version of the Mediterranean Solar Plan of the Union for the Mediterranean (UfM), aimed at developing the renewable energy projects, was presented. The Foundation's studies, in fact, demonstrated that it could be possible to satisfy both the whole energy demand by the MENA (Middle East and North Africa) region and a part of the European demand by using a little part of the desert sun. The energy produced would be enough to feed the desalination plant for the potable water in the MENA region too.

The research developed during the recent years states that the MENA region could satisfy its own energy requirement and it could export the surplus considerably reducing CO_2 emissions by 80%. It has been also calculated that the savings for Europe would amount at about € 30 megawatts/h (Desert Power 2050).

But the real challenge of DESERTEC consists in realizing a global network of renewable energy connecting those countries where this energy is more easily produced. This means, first of all, to work on political convergence of all the involved countries because the net will overshoot borders.

It is a very hard target to get, if we consider the economic interests at stake. Probably related to these uncertainties, in 2009, the no profit Desertec Foundation started an industrial initiative -called Dii GmbH- aimed at implementing the project by assuring technological, political and economic conditions to its realization. The Desertec Principles, Criteria and Indicators (PCIs) were worked out in 2012. They are based on the idea of cooperation between regions and nation-states and affirm the necessity of a transition from fuel energy to green energy.

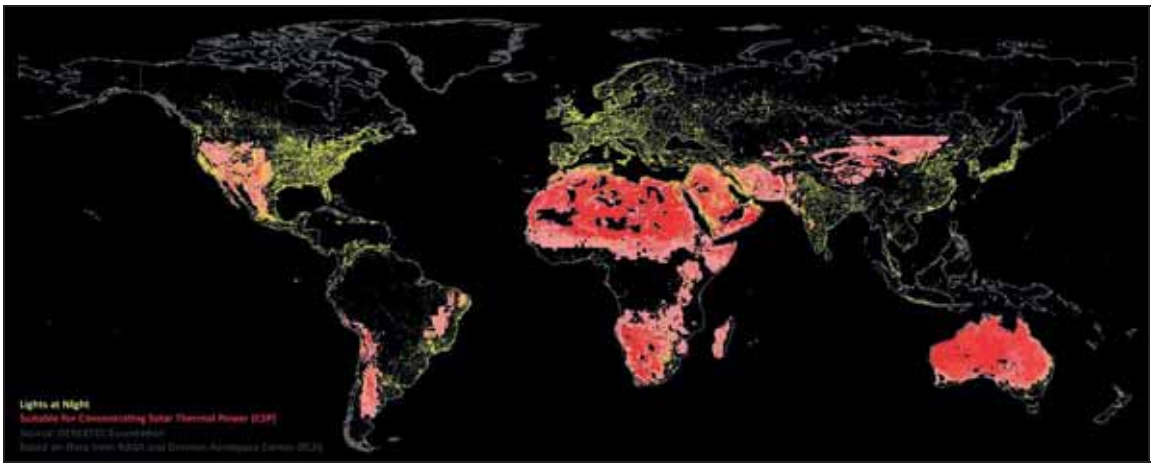

Fig. 6 Localization of deserted areas (red) and energy demand concentration (yellow)

The document points out five main principles for achieving the final goal of sustainability (environmental, economic, social):

1. Electricity from renewable resources,
2. Reliability of electricity supply,
3. Water use,
4. Socio-economic impact / Local benefits,
5. Environmental responsibility and conservation of natural resources and biodiversity.

Each principle is articulated into criteria and indicators to achieve sustainable levels.

The Desertec criteria are a work in progress that will be developed and transformed also according to the contribution of the actors involved. The Desertec-Dialogue, in fact, is the project promoted by the German Ministry of Foreign Affairs and is based on the definition of the criteria that are to be shared and accepted by local and external stakeholders involved in the realization of the energy plants.

The main objective consists in combining the legitimate interests of investors and companies with the important demand for a reasonable regional development. Following the vision of the Foundation, which is based on the collaboration between Europe and MENA regions, this dialogue project is also aimed to satisfy the demand for employment by creating new opportunities of working. It started in Morocco and Tunisia in autumn 2013.

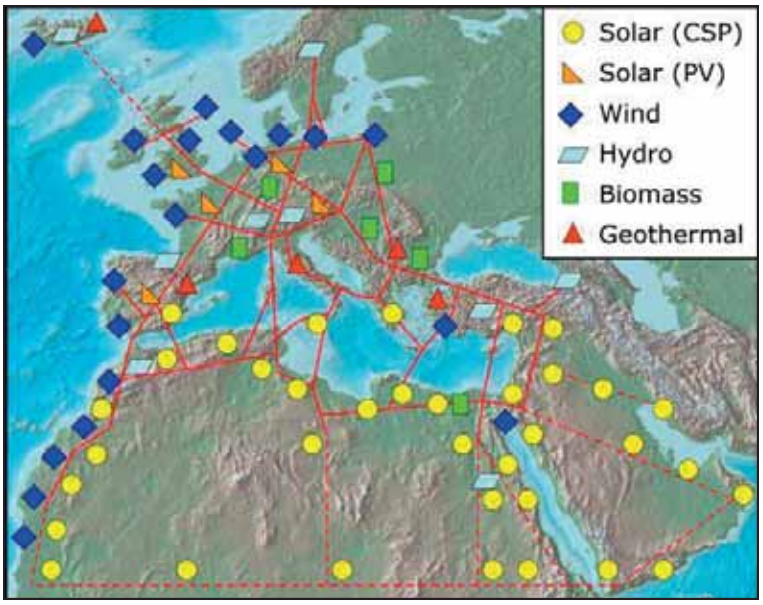

Fig. 7 The DESERTEC mega grid

The objective to create consensus both at local and at large scale is pursued by a network of regional skilled coordinators who are placed in each state. Their role consists in individuating the adequate conditions to spread out the DESERTEC vision also by involving local actors (no profit organizations, academics, private societies, etc.).

The implementation of the DESERTEC project is based also on scientific cooperation: in 2010, in fact, a University Network as a cultural platform to develop studies and research in energetic field was founded.

The network consists of 18 universities from North Africa, the Middle East and from Europe engaged in promoting the knowledge transfer. Among its targets, the Universities Network also contributes to the education of skilled experts able to improve the production and the installation of alternative and renewable energy systems.

Some experimental projects have been started to test the DESERTEC theory on sustainability and clean energies. The first project has been the TuNur project. Begun in 2011, it was aimed at developing the first utility-scale solar export project between Tunisia and Europe. The project is worked out by a South-North partnership between a group of Tunisian investors (50%) and UK-based Nur Energie (50%). It is expected to induce about 20.000 new jobs and it will use dry-cooling systems to reduce water by 90%. And that will bring energy to Italy by 2016. In Algeria, an ambitious national program was launched to promote energy efficiency. The program is targeted to install 12,000 MW of power and to generate capacity from renewables until 2030 to supply 40% of the domestic electricity demand and to allocate an additional 10,000 MW for export (Dii-Eumena, 2011). In Morocco, an agreement has been signed between Dii and the Moroccan Agency for Solar Energy (MASEN) to investigate the possibility to integrate African and European market in

producing sustainable energies. The energy that will be produced will feed both the Moroccan and the Spanish network by 2016. In 2011, the Desertec signed a Memorandum of Understanding (MoU) with Medgrid, the other meta-project launched in 2009 by the French government under the Mediterranean Solar Plan (MSP). This agreement showed an integrate vision, which is to connect the two projects by five interconnection and to create a single market of renewable energies. At present, the Desertec project has stopped and its possibility of realization are in discussion. As in the case of the SNWDP, it raises some concerns especially about its costs and its capacities of integrating different political interests.

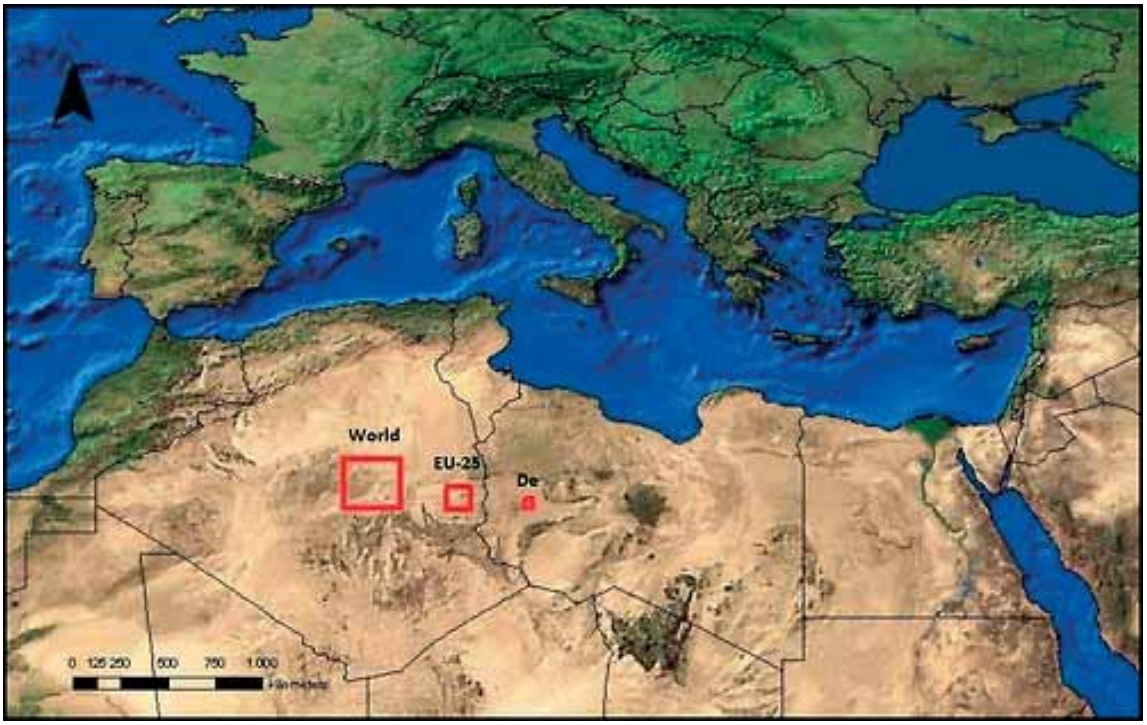

Fig. 8 The DESERTEC concept is based on the realization that a little part of the Sahara desert area could feed energy for Europe and the rest of the world

The project has also been considered as a new colonialism for being too much concentrate on the export of energy from the producing countries. It is surely a top-down process of change that probably will need a long time to be realized, but it well represents the case of adopting technology to drive evolutionary urban processes towards sustainability consumption of resources.

Although its limits, also due to the presence of important exponents of the world finance, the DESERTEC could represent an attempt to drive the inevitable change that we have to impose on our current lifestyle in terms of consumption of resources (La Rocca 2011). On the contrary, the SNWDP project represents an example of using technologies to realize mega-projects that could create deep differences of development within the same country. The negative effects that can affect the natural ecosystems and the contiguous regions will generate entropy and energy wasting. In this sense, it is possible to state that urban smartness, at the urban scale as well as at large scale, strongly depends on the use of technology.

6 CONCLUSION

The focus on the urban smartness (Fistola 2013) and the study about the relationship between urban smartness and the proper use of energy inside the city have mainly to deal with the concept of urban entropy. This new way to analyze the trend of the city seems to allow an alternative way to envisage the right or the wrong way to use technology for the evolution of the urban system.

Surely, technology speeds up the development process and permit the realization of mega-projects, but its use (proper or improper) can strongly affect the urban and territorial development in terms of livability and subsistence. As the paper tries to state, it is important to underline that in a condition of poor resources it is no possible to take the wrong way (of the bifurcation), because this way produces a very high increase in entropy and drives towards the heat death of the urban system.

The two examples considered show how everything seems to be achived by using technologies. The case of the Chinese project seems to lack a global vision regarding the effects that the mega-project could have on the economic and social development of the southern regions. The project target is so much concentrated on the necessity of assuring water to the capital region that it does not take in any account the negative effects this change could generate.

On the other hand, the DESERTEC shows how it is possible to optimize the use of the resources to get energy and how technology can be used also to soothe political conflicts among different countries involved. This could have a positive effect on the production of entropy inside the evolution process of territory.

The WET theory, which is at the first stage of its development, could be useful to point out, from a different point of view, the relationships between water, energy, technology and the urban system considering the technology as a key factor for the sustainable evolution of the city.

NOTES

Although the paper grounds on a common research work, paragraphs 1, 2, 3 has been written by R. Fistola and paragraphs 4, 5 by R.A. La Rocca. Conclusions are the result of joint reflection.

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AUTHORS' PROFILES

Romano Fistola

Architect, researcher in Town and Country Planning at University of Sannio (Benevento) since 2004 where he theachs "Urban Planning" and "Management of Urban and Territorial Changes"; he also has held courses at University of Naples Federico II in "Geographical Information Science". His researches focus on relationship among new technologies, GIS, urban system and sustainability recently referred to the concept of "smart city". He is author of more than 100 papers published on national and international books and journals.

Rosa Anna La Rocca

Architect, PhD in Urban and Regional Planning, researcher at University of Naples Federico II. Her research activities refer to the analysis of phenomena that can change urban organization and they are focused on the study of three main relationships: tourism and town planning; land use and mobility, innovation technologies and urban transformations.

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CLIMATE CHANGE ADAPTATION

CHALLENGES AND OPPORTUNITIES FOR SMART URBAN GROWTH

ADRIANA GALDERISI

Department of Civil, Architectural and Environmental Engineering, University of Naples Federico II
e-mail: galderis@unina.it
URL: http://dicea.dip.unina.it/it/persone/docenti/

ABSTRACT

Climate change is one of the main environmental issues challenging cities in the 21th century. At present, more than half of the world population lives in cities and the latter are responsible for 60% to 80% of global energy consumption and greenhouse gas (GHG) emissions, which are the main causes of the change in climate conditions. In the meantime, they are seriously threatened by the heterogeneous climate-related phenomena, very often exacerbated by the features of the cities themselves.
In the last decade, international and European efforts have been mainly focused on mitigation rather than on adaptation strategies. Europe is one of the world leaders in global mitigation policies, while the issue of adaptation has gained growing importance in the last years. As underlined by the EU Strategy on adaptation to climate change, even though climate change mitigation still remains a priority for the global community, large room has to be devoted to adaptation measures, in order to effectively face the unavoidable impacts and related economic, environmental and social costs of climate change (EC, 2013). Thus, measures for adaptation to climate change are receiving an increasing financial support and a growing number of European countries are implementing national and urban adaptation strategies to deal with the actual and potential climate change impacts.
According to the above considerations, this paper explores strengths and weaknesses of current adaptation strategies in European cities. First the main suggestions of the European Community to improve urban adaptation to climate change are examined; then, some recent Adaptation Plans are analyzed, in order to highlight challenges and opportunities arising from the adaptation processes at urban level and to explore the potential of Adaptation Plans to promote a smart growth in the European cities.

KEYWORDS:
Climate Change; Urban Adaptation; Smart Growth.

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智能城市增长的挑战和机遇

ADRIANA GALDERISI

那不勒斯费德里克二世大学土木建筑和环境工程系
e-mail: galderis@unina.it
URL: http://dicea.dip.unina.it/it/persone/docenti/

摘要

气化变化是城市在二十一世纪所面临的主要环境问题之一。欧洲城市容纳了该地区人口的四分之三， 并占用了总体能源消耗和温室气体（GHG）排放的60%至80%， 这是造成气化条件变化的主要原因。与此同时欧洲城市受到各类与气候相关的现象的严重威胁，而这些与气候相关的现象常常因这些城市的自身功能而更加恶化。

在过去十年中，国际和欧洲一直将工作重点放在缓解战略而非适应战略上。欧洲是倡导全球缓解政策的先导之一，而与此同时适应性问题的重要性在过去几年中也有所提升。尽管气化变化缓解战略仍然在全球范围内保持优先地一位，但随着针对气候变化适应的欧盟战略得到强化，为有效应对气候变化所带来的不可避免的影响和相关的经济、环境及社会成本，必须为适应措施的应用提供更大空。

因此，有关气候变化的适应措施正在得到越来越多财政上的支持，并且越来越多的欧洲国家正逐步实施国家和城市适应战略，来应对当前和潜在的气候变化影响。

依上述考虑因素，本文探讨了目前在欧洲城市中实施的适应战略的优势和劣势。首先要审查关于提高城市对气候变化适应能力的主要欧共体建议；然后分析一些最新的适应方案，其目的是突显出在城市层面的适应过程中所生产的挑战和机遇，并探讨适应方案对于在欧洲城市中促成智能增长的潜在能力。

关键词
气候变化；城市适应；智能增长.

1 CITIES DEALING WITH CLIMATE CHANGE IMPACTS

Climate change and the growth of urban population are widely recognized as the major drivers of change in the 21st century.

Climate change, which represents one of the most challenging issues of our time, refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC, 2007). According to IPCC, it is largely due to greenhouse gas (GHG) emissions. Carbon dioxide (CO_2) is the most important anthropogenic GHG and recent data confirm that consumption of fossil fuels accounts for the majority of global anthropogenic GHG emissions (IPCC, 2011).

At present, more than half of the world population lives in cities and it will further increase by 2050. In Europe, the 73% of the population was living in urban areas in 2011 and the level of urbanization is expected to be at 82% by 2050 (UN, 2012) (fig. 1).

Hence, as the cities are responsible for 60% to 80% of global energy consumption and GHG emissions, it is clear that the two phenomena are largely interconnected and that the ways in which climate change and urban population trends will develop and interact "will be of great consequence to the well-being of human populations as the century proceeds" (Klein, Schipper, Dessai, 2003). According to the last report of the IPCC (2013), indeed, the "continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions".

Thus, cities play a key role in face of climate change and climate related phenomena. On the one hand, urban lifestyle and economy are largely responsible for global energy consumption and contribute for about the 70% to the GHG emissions (Birkmann et al. 2010; EU, 2011). On the other hand, cities are seriously threatened by the impacts of climate change, requiring serious and effective strategies addressed to reduce their exposure and vulnerability to climate-related phenomena and, consequently, to prevent the potential damage to urban population.

Up to now, major efforts have been addressed to promote mitigation strategies, aimed at reducing GHG emissions, while less attention has been devoted to adaptation strategies, aimed at improving cities' capability to deal with the impacts of climate change. In Europe, one of the world leaders in global mitigation policies, ambitious energy and climate change objectives have been established in 2007 by the EU 20-20-20 Strategy. In 2011, the 2050 Energy Roadmap set new long-term targets, addressed to achieve the 80-95% reduction of GHG emissions by 2050 (compared to 1990) (Egenhofer, Alessi, 2013).

The issue of adaptation is gaining importance only recently: the EU Strategy on adaptation to climate change, adopted in 2013, clearly underlines that "although climate change mitigation must remain a priority for the global community (…), we (…) have no choice but to take adaptation measures to deal with the unavoidable climate impacts and their economic, environmental and social costs" (EC, 2013). Thus, the measures for adaptation to climate change are receiving an increasing financial support and a growing number of European countries are implementing national and urban adaptation strategies to deal with actual and potential climate change impacts (Birkmann, 2011). The focus on adaptation stems from the growing and shared awareness that, despite the efforts to reduce GHG emissions, climate change is going to occur (Solomon et al., 2007) and its impacts will be particularly severe in urban areas (ICLEI, 2011), due to the concentration of people and assets.

In Europe, the changes in climate conditions are already affecting numerous countries and are going to spread on all European countries. Nevertheless, according to the results of the ESPON 2013 Programme, climate stimuli are heterogeneous in nature and typology and not uniformly distributed in the European regions.

Hence, in order to understand the impacts of climate change on European cities, both the heterogeneous distribution of climatic stimuli in the European regions and the role of urban features in modifying regional climate conditions have to be taken into account.

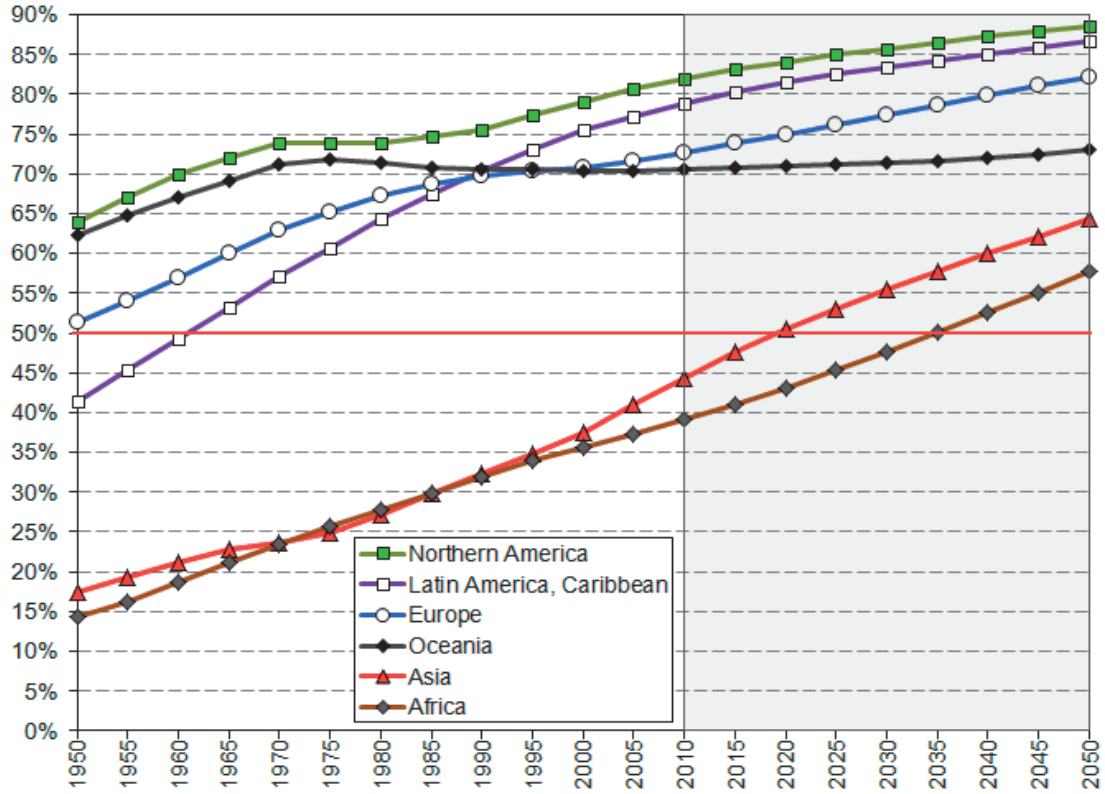


Fig. 2 Urban Population by major geographical areas (% on total population)

Numerous scholars have pointed out the key role of local factors in modifying climate change impacts on urban areas (McCarthy et al., 2010; Nguyen Xuan, 2011), even though up to now the features of urbanized areas have received little attention in climate model projections (IPCC, 2007).

Nevertheless, it is largely recognized that cities may experience different impacts in respect to surrounding regions, due to heterogeneous factors: for example, a high degree of surface sealing may impair rainwater drainage, reinforcing the urban heat island effect (Magee et al., 1999; Müller, 2012; Lehmann et al. 2012); the prevalence of built-up areas on natural spaces creates a peculiar microclimate in cities, which may affect air temperature, wind direction and precipitation patterns. Moreover, the growing concentration and the ageing of urban population may exacerbate exposure and vulnerability of cities to climate-related phenomena. Finally, since cities are strongly dependent on their hinterland, namely for food and water supply, they are also significantly vulnerable to climate change impacts occurring in the surrounding areas (Hunt and Watkiss, 2011; McEvoy et al., 2010).

Thus, due to the variability of climate phenomena in the European regions and to the peculiar features of cities, impacts may be very heterogeneous, ranging from floods to droughts, from cold snaps to heat waves, with serious consequences for human health, livelihood and urban assets. Cities in low-elevation coastal zones have also to deal with the combined threat of sea-level rise and storm surges.

Although detailed quantitative analyses of climate-related hazards on a city scale are still at an early stage, in the last decade, numerous scholars and institutional documents have focused on the potential impacts of climate change on cities. Thus, referring to the existing studies for a detailed description of the main impacts of climate change on European cities (McEvoy, 2007; Wilby, 2007; Hunt and Watkiss, 2009; EEA, 2012), it is worth mentioning here only the most common ones.

Heat waves

Climate-change projections suggest that the length, the frequency and the intensity of summer heat waves will increase in the next future, affecting different European Regions, with significant effects on human health, mainly on vulnerable population (elderly, people affected by chronic respiratory diseases, etc.) (Schär

et al., 2004; Meehl and Tebaldi, 2004; D'Ippoliti et al., 2010). The phenomenon can be worsened by the features of cities themselves: the lack of blue and green areas, the population density, the additional heat production due to the concentration of human activities may aggravate the phenomenon in the cities located both in the South and in the North of Europe.

Sea-level rise

Sea-level rise is one of the most certain elements of climate change and probably the most studied impact of climate change on coastal cities (Hunt and Watkiss, 2009). Many European cities are close to coastal areas and will be highly vulnerable to rising sea levels and associated increases in extreme events such as storm surges. A rise of 20 centimeters (possible by the year 2030) could threaten the coastal settlements, wetlands, and lowlands. The entire Dutch coast, Hamburg, Copenhagen, and Venice could be affected. Raising dams could be very expensive for individual countries and regions. Moreover, sewage treatment in coastal cities is geared to a certain range of water levels and the rising sea levels may contribute to make this infrastructure obsolete.

Flooding

Many scholars agree that climate change will affect precipitation pattern worldwide, with serious impacts on cities. Nevertheless, there is still a great deal of uncertainty in findings about climate-change impacts on future extreme precipitation and considerable differences among estimates of precipitation in different climate models and for different emission scenarios. Floods have caused the greatest economic losses in Europe in the last years (EEA, 2012). Flooding phenomena result from the interaction of rainfall, surface run-off, evaporation, wind, sea level, and local topography: hence, due to the changes in climate conditions, they can be significantly increased in cities. Most European cities are already committed to address flood risk issues, even though the types of flooding they have to face are heterogeneous, from flash floods to urban drainage floods or to coastal floods, occurring during storm surges when there are temporary increases in sea levels above the normal tidal range (EEA, 2008).

Water scarcity and droughts

Water availability is crucial for urban development: "fresh water is used for drinking,by industry (production processes and cooling), energy production, recreation, transport and nature. Sufficient water of good quality is therefore indispensable to ensure human health and to fuel the economy" (EEA, 2012).

Water is a crucial issue for Europe. In 2007, the European Commission adopted a Communication on Water Scarcity & Drought (WS&D) (EC, 2007), which identified seven policy areas that had to be addressed in order to move Europe towards a water-efficient economy. In 2012, "A Blueprint to Safeguard Europe's Water Resources", addressed "to tackle the obstacles which hamper action to safeguard Europe's water resources and based on an extensive evaluation of the existing policy" (EC, 2012) has been issued.

At present, water scarcity and droughts represent a threat not only to the drier areas in Europe, although dry conditions reduce water availability for drinking and sanitary purposes, but also for central and eastern European regions. Moreover, water resources might further decrease in Europe due to the "increasing imbalance between water demand and water availability" and climate change may reduce the availability and reliability of the water supply and exacerbate the adverse impacts, "with the occurrence of more frequent and severe droughts in many parts of Europe" (EEA, 2012).

Thus, climate-related hazards, combined with the high vulnerability of cities to extreme meteorological events, will induce an increase in the frequency and in the consequences of the existing risk levels and, consequently, in the damage costs, as largely demonstrated by the heat waves that affected numerous cities in Central and Western Europe (2003) and in Eastern Europe (2010) or by the urban drainage flood in Copenhagen (2011).

The pivotal role of cities in addressing climate change has been largely recognized in the last decade (Betsill, Bulkeley, 2007; Bulkeley et al. 2011). Nevertheless, while numerous European cities have joined the Covenant of Majors, giving rise to a mitigation strategy, few of them have started an adaptation process

addressed to establish local strategies - closely related to the existing disaster risk reduction and to land use planning strategies - for enhancing urban resilience in face of "the unavoidable climate impacts and their economic, environmental and social costs" (EC, 2013).

Based on these premises, this paper explores the potential of Adaptation Plans to promote a smart growth in the European cities, translating the challenge of climate change into a chance for a better urban development (Birkmann et al, 2010). The term "smart" is referred, on the one hand, to the principles established by the Smart Growth Network[1] and addressed to the development of sustainable communities and places that are attractive, convenient, safe, and healthy (ICMA, EPA, 2006; Inam, 2011). On the other hand, it refers to the current debate on "smart cities", meant as cities where investment in human and social capital and in communications infrastructure actively promote the overall urban performances and, above all, the quality of life of citizens and the management of natural resources (Caragliu, Del Bo, Nijkamp, 2009; Papa, Gargiulo, Galderisi, 2013).

Hence, being sustainable development one of the most urgent challenges that smart cities have to deal with (Schaffers et al. 2011), by optimizing energy and water usage and by offering safer cities, climate adaption plans, through an effective use of ICTs, could largely contribute to make European cities safer and, above all, to effectively integrate environmental issues (from energy saving to risk prevention and mitigation) into sustainable land use planning processes, capable of enhancing the quality of life and prosperity for current and future generations as well as to protect and improve the quality of urban environment.

2 EUROPEAN STRATEGIES IN FACE OF CLIMATE CHANGE: FROM MITIGATION TO ADAPTATION

Europe has been defined as one of the world leaders in the global mitigation policies, whereas only recently the focus of European policies has been shifted towards adaptation issues. As remarked by the EU Strategy on adaptation to climate change, although three quarters of the population of Europe live in urban areas, European cities "are often ill-equipped for adaptation" (EC, 2013).

Mitigation and adaptation strategies, although complementary, differ both in their objectives and in their temporal and spatial scales of references. Mitigation strategies, which aim at reducing GHG emissions, generally result from international agreements, although implemented at national or local levels, and refer to a long-term perspective. Adaptation strategies, which aim at adjusting natural or human systems in response to actual or expected climatic stimuli or their effects (UNISDR, 2009), are strongly characterized as site-specific measures. Moreover, as they generally refer to the scale of the impacted system, they are defined and implemented at local level - although sometimes based on wider common platforms at national or upper level - and provide local benefits (Bulkeley et al. 2009; Walsh, 2010; EEA, 2012).

Focusing on mitigation issues, it is worth mentioning that the two milestones of the European path for reducing GHG emissions can be identified in the "20-20-20" Strategy and in the "Roadmap for moving to a competitive low carbon economy in 2050" (Galderisi, Ferrara, 2012; Gargiulo, Pinto Zucaro, 2012). The first one, adopted in 2007 by the European Council, established ambitious energy and climate change objectives, consisting of three key objectives to be achieved by 2020:

- a 20% reduction in EU GHG emissions from 1990 levels;
- an increase in the share of renewable energy up to 20%
- an improvement of 20% in energy efficiency.

1 The Smart Growth Network is a partnership of government, business and civic organizations that support smart growth. It has been created in the late Nineties and, based on the experience of communities that have used smart growth approaches to create and maintain livable neighborhoods, has developed a set of ten basic principles (http://www.epa.gov/smartgrowth/about_sg.htm).

Currently, the EU is on track to meet the first target, good results have been recorded in respect to the second one, but the third one is still far from being achieved.

The Roadmap 2050, issued in February 2011, has established new targets, related to a long-term scenario and addressed to reduce GHG emissions by 80-95% by 2050 compared to 1990.

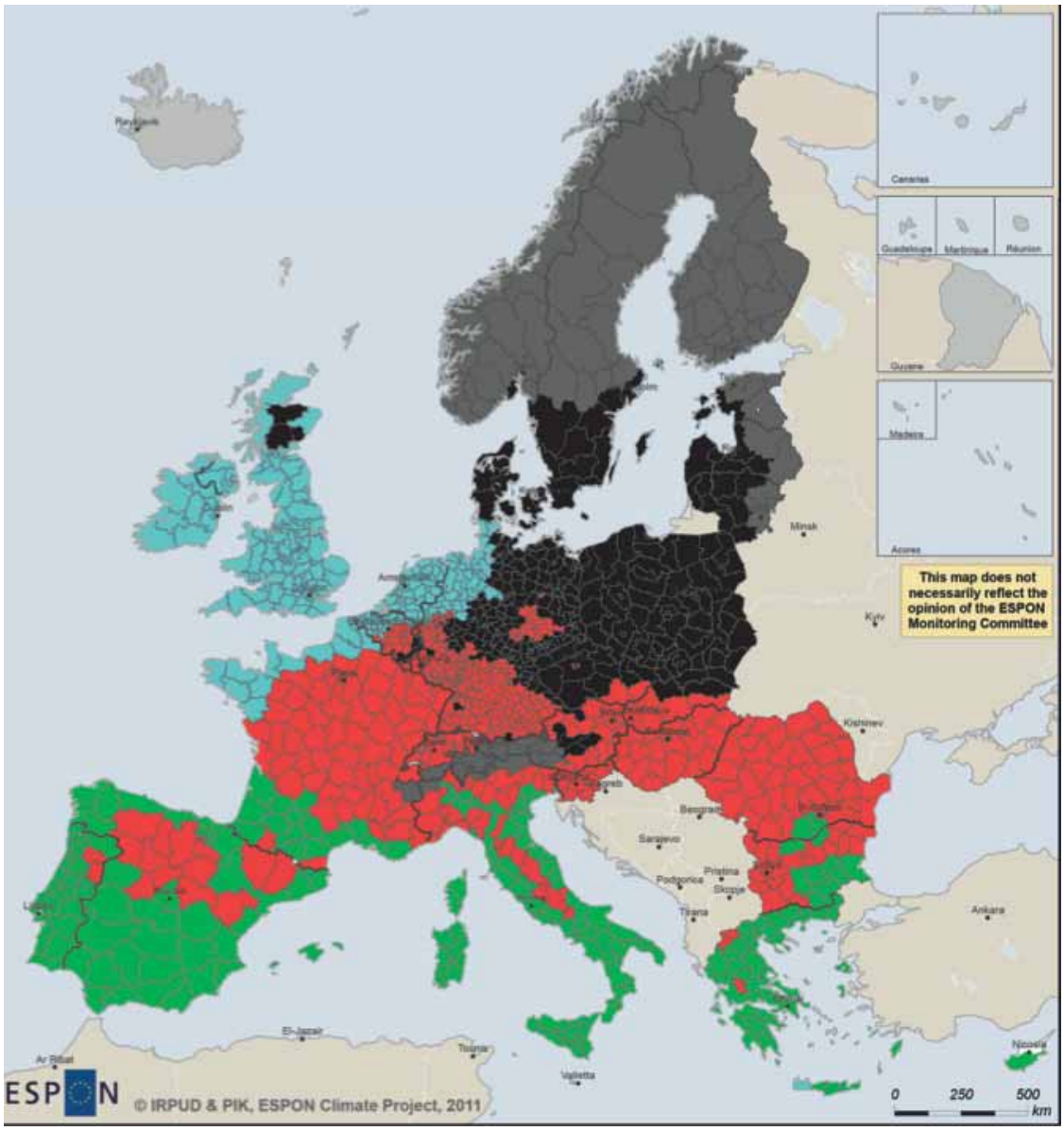
Moreover, the EU has started numerous initiatives addressed to improve knowledge and awareness in respect to adaptation issues. The numerous reports published since 2007 by the European Environment Agency (EEA) on adaptation to climate change, the White Paper "Adapting to climate change: Towards a European framework for action", issued in 2009, the web-based European Climate Adaptation Platform (Climate-ADAPT), launched by the EU and the EEA in 2012 and the related EU Cities Adapt Project - addressed to support European cities in developing and implementing a climate change adaptation strategy by exchanging knowledge and good practices, and by developing tools and guidelines - the EU projects on climate adaptation (e.g. BaltCICA, 2009-2012; RAMSES, 2012-2017) show the growing attention to climate adaptation and, mainly, the growing awareness of the need to enhance cities' resilience in face of climate related risks. Furthermore, on the 16th of April 2013, the EU Strategy on adaptation to climate change, addressed to enhance preparedness and capacity to respond to the impacts of climate change at different levels, from the European one up to the local level, was issued (EC, 2013).

The strategy promotes coordination and information-sharing among the Member States, also through a further development of the European climate adaptation platform (Climate-ADAPT); encourages the State Members to adopt adaptation strategies, providing funds for improving national adaptation capacities; supports adaptation in cities by launching a voluntary commitment based on the Covenant of Mayors initiative; guarantees that adaptation issues are considered in different sectors of EU policies. The Strategy represents a key step towards the adoption and the implementation of effective adaptation strategies at different levels, since in Europe, "adaptation is in most cases still at an early stage, with relatively few concrete measures on the ground. Some Member States have developed sector-specific plans, such as plans to cope with heat waves and droughts, but only a third carried out a comprehensive vulnerability assessment to underpin policy" (EC, 2013).

At present, referring to the national level, it is worth noting that more than half of the European Member States have adopted an adaptation strategy, in many cases followed by action plans.

Shifting to the city level, which represents the focus of this study, although cities are considered as pivotal both to mitigation and adaptation issues, the European cities that have drawn up an adaptation plan are still few and mainly located in North-Central Europe (UK, Finland and Germany). A recent study highlights that, on a sample of 200 large and medium sized cities located in 11 European countries, the "35 % of European cities studied have no dedicated mitigation plan and 72 % have no adaptation plan. No city has an adaptation plan without a mitigation plan. One quarter of the cities has both an adaptation and a mitigation plan and set quantitative GHG reduction targets, but those vary extensively in scope and ambition" (Reckien et al., 2013).

The obstacles to an effective climate change adaptation at city level are numerous and heterogeneous (Adger et al., 2009; Bulkeley et al. 2009; Corfee-Morlot et al. 2011). First of all, it is worth underlining that adaptation has to be conceived not as a one-time effort but as a process articulated in different interrelated phases (fig. 4) (Hennessy et al., 2007; The World Bank Group, 2011, UN, 2013): a knowledge phase, addressed to assessing climate impacts and risks at urban scale; a preparation phase, addressed to define strategies and measures for adaptation; a response and revision phase, addressed to implement, monitor and update the defined measures. In the knowledge phase, the main difficulties are related both to the downscaling of climate change models to urban scale and to the assessment of urban vulnerability to climate-related phenomena. Scientific information about the future climate conditions is generally characterized by high uncertainty.



European climate change regions

- Southern-central Europe
- Northern Europe
- Northern-central Europe
- Mediterranean region
- Northern-western Europe
- no data*

Cluster/stimuli	Northern-central Europe	Northern-western Europe	Northern Europe	Southern-central Europe	Mediterranean Europe
Change in annual mean temperature	+	+	++	++	++
Decrease in number of frost days	---	-	---	---	-
Change in annual mean number of summer days	+	+	0	++	++
Relative change in annual mean precipitation in winter months	+	+	++	0	-
Relative change in annual mean precipitation in summer months	-	-	0	---	---
Change in annual mean number of days with heavy rainfall	0	+	+	0	-
Relative change in annual mean evaporation	+	0	+	0	-
Change in annual mean number of days with snow cover CDSC	-	0	---	0	0

Fig. 3 European Climate Change Regions

The uncertainties that characterize large/regional scales climate models are generally exacerbated when these models are downscaled at city scale, which is the crucial step for identifying the city-specific impacts and, consequently, to identify vulnerabilities. Furthermore, on a city level, the climate impact assessment should take into account both the gradual/long term climate-related impacts (increases in the mean temperature or sea level rise) and the sudden shocks due to the changes in the intensity and frequency of extreme events (Wilbanks et al., 2007; Corfee-Morlot et al, 2011; Hunt and Watkiss, 2011).

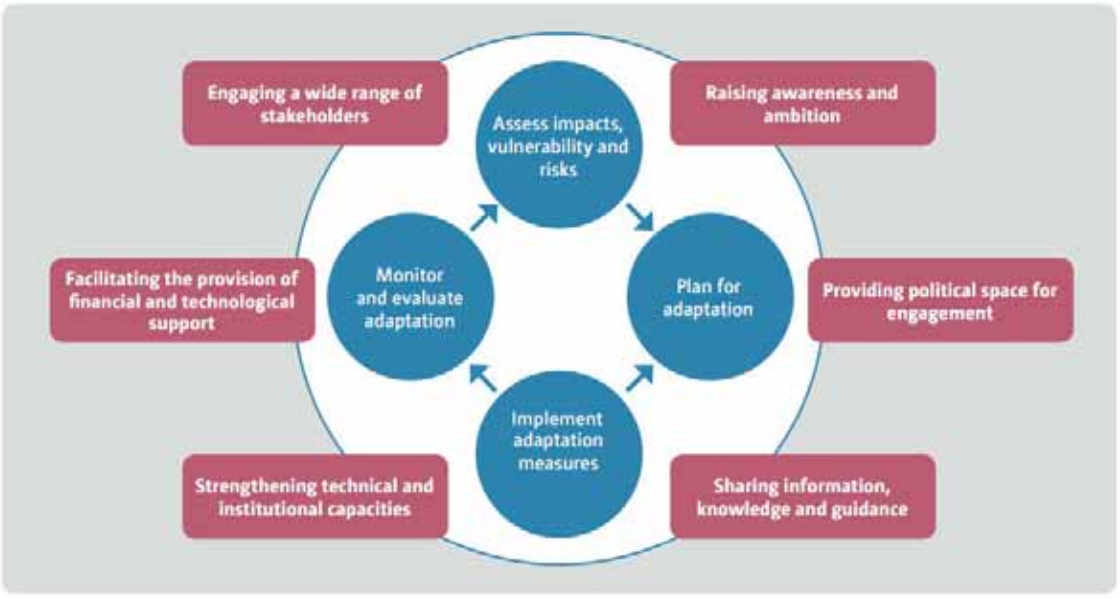


Fig. 4 (a, b, c) Examples of Adaptation Processes

Further difficulties in the knowledge phase arise from the assessment of urban vulnerabilities to the heterogeneous impacts of climate change. The assessment of the multi-dimensional concept of vulnerability shows difficulties and uncertainties largely debated in the field of natural hazards and related, for example, to the need for taking into account the different facets of vulnerability (physical on built and natural environment, systemic, economic, etc.) as well as the adaptive capacities of an urban context (Birkmann, 2006; Galderisi et al., 2008; UNISDR, 2009; Menoni et al. 2011). The different temporal perspectives of climate change impacts, combined with the uncertainties that affect long-term urban development trajectories, make even more difficult the assessment of urban vulnerability to the climate-related phenomena. The uncertainties that characterize the knowledge phase have also repercussions on the preparation phase, addressed to single out effective adaptation strategies. The availability of a reliable risk assessment is crucial, in fact, to identify priorities as well as the availability of in-depth and disaggregate information on the heterogeneous risk factors (hazards, exposure, vulnerabilities) is essential to outline appropriate adaptation strategies. Moreover, the heterogeneity of adaptation measures represent a significant difficulty in the preparation phase. Even though they can be grouped under some general categories – 'grey' measures, relying on technology and civil engineering projects; 'green' or nature-based measures and 'soft' measures addressed to alter human behavior (EEA, 2013) – urban adaptation measures have to be site-specific and tailored on the urban context. Thus, these measures have to be defined according to the peculiarities of local impacts and to the vulnerabilities arising from the physical, functional and socio-economic features of the considered city.

Moreover, climate change may affect different sectors (from land use to transportation, from water supply to energy). Hence, the need for coordination across different sectors and for broad partnerships including local communities, nonprofit organizations, academic institutions and the private sector has been largely emphasized as a potential barrier to an effective adaptation. Numerous scholars have pointed out, in fact, the importance and at the same time the difficulty in coordinating policies and measures across both local agencies and levels of government, as well as among institutions, private stakeholders and communities, (Bulkeley et al, 2009; Corfee-Morlot et al., 2011).

Finally, the need for integrating adaptation strategies, disaster risk reduction (DRR) policies and land use and transportation planning choices at local level has been also emphasized. According to Corfee-Morlot et al. (2009), adaptation strategies could be important for reducing "vulnerability to current and future hazards such as floods, water shortage or heat waves, even though "cities should also consider incremental or gradual changes in climate that affect government operations or community life in less immediate and visible ways than conventional disasters" (The World Bank Group, 2011). Moreover, Hallegatte et al. (2011) emphasize that "land use decisions and zoning may exacerbate or limit the vulnerability of urban dwellers and of infrastructures to the growing threat of climate change".

Obviously, an effective integration of adaptation policies into existing tools for risk reduction as well as for urban and transportation planning is a key challenge for cities, given the difficulties that they currently face in guaranteeing an integration of DRR policies into land use planning tools (Galderisi, Menoni, 2007).

Nevertheless, such integration could be a great opportunity for cities and communities, generally dealing with significant resource constraints, to access financial resources and to reduce potential conflicts between climate change issues and other local priorities. According to the Guidelines for Climate Change Adaptation in Cities provided by the World Bank, "cities that are able to integrate adaptation well with a broad spectrum of existing planning processes and goals - including priorities in disaster risk reduction, sustainable development, and poverty reduction - will be best positioned to thrive in this new era of climate change" (The World Bank Group, 2011).

The complexity and long-term horizon of climate change phenomena, of the evolution of cities as well as of the adaptation processes assign a key role to the revision phase, important for ensuring the effectiveness of the whole process.

The implementation of the adaptation measures have to be constantly monitored, evaluated and revised, according both to the updating of the available knowledge on climate change and climate-related phenomena and to the effectiveness of policies, programs and measures. Nevertheless, "monitoring and evaluation is proving to be particularly difficult, as indicators and monitoring methodologies have hardly been developed" (EC, 2013). Hence, the revision phase has an inherent complexity and is currently considered one of the weakest areas of adaptation process, due to the difficulties of monitoring heterogeneous measures (grey, green or soft ones), affecting different sectors, acting on different scales and over different time spans. Moreover, the common lack of financial, human and technical resources, of baseline data and historical trends as well as the insufficient sharing of information across different sectors have to be considered.

3 ADAPTION PLANS: TOOLS FOR SMART GROWTH?

This paragraph will be focused on three Adaptation Plans: the London Mayor's Climate Change Adaption Strategy "Managing Risks and Increasing Resilience, (2011); the Copenhagen Climate Adaptation Plan (2011); the Rotterdam Climate Adaption Strategy (2013).

The selected cities are defined as climate leader cities, being very active both on mitigation and adaptation issues: they belong to the C40-network of the world's cities engaged in mitigation actions (Reckien et al., 2013) and can count on adaptation strategies established on a national level.

Since the selected Plans have been approved very recently, we do not intend here to provide an assessment of their effectiveness. Based on the available on-line documents, we will try to point out and compare their main features and, so doing, we will seek to understand their potential for overcoming obstacles and barriers previously discussed and, above all, to answer the main research question posed by this paper: may adaptation plans contribute to the promotion of a smart growth in the European cities?

To this aim, in respect to each case-study, the capacity to integrate smart solutions in the different phases of the adaptation process as well as to improve the quality of life of the citizens, to preserve and enhance the quality of natural environment, to promote participatory processes - increasing the awareness of communities and decision-makers about the climate-related phenomena and consequent risks - to integrate adaptation policies into DRR and land use planning processes will be explored.

London

The Greater London, with a population of 8,173,941 (Census data, 2011), is the biggest city in the UK and the largest one in Europe. According to the UK legislation, in 2007, the responsibility for climate change mitigation, adaptation, and energy strategies have been transferred from central government to the Greater London Authority (GLA), which includes the Mayor and the Assembly.

The GLA has the duty to assess the consequences of climate change and to define adequate strategies. It has also extensive planning powers and is responsible for producing London-wide strategies for spatial planning and environment (the latter includes adaptation, mitigation and energy policies). Thus, according to the current legislation, the GLA has the opportunity to coordinate the actions of different partners and to guarantee that proposed actions are effectively implemented (Davoudi et al., 2011). Recently, the GLA has played a key role at both international and local level: it "has acted as a driving force at the international level, through putting its weight behind the C40 Climate Leadership Group and its association with the Clinton Climate Initiative"; moreover, at local level, it "has taken steps to address the various climate challenges" (Davoudi et al., 2011).

The milestones of the London strategy for addressing climate change issues can be identified in The Mayor's climate change mitigation and energy strategy, "Delivering London's Energy Future", and in The Mayor's Climate Change Adaption Strategy, "Managing Risks and Increasing Resilience", both of them issued in the October 2011. The former details the Mayor's strategic approach to reduce London's CO2 emissions by 60% of the 1990 levels by 2025 and to secure a low carbon energy supply for London. The latter, on which we will focus here, is addressed to evaluate the consequences of climate change on the city of London, to prepare the city for dealing with the impacts of climate change and extreme weather and, in the meanwhile, to protect and enhance the quality of life of citizens.

The London Strategy emphasizes that adaptation has to be shaped as a dynamic and flexible process, capable of dealing with the many uncertainties related to the future of climate and of city development. In fact, "measures that address the impacts of our climate today may not provide an acceptable level of protection in the future, or enable us to make the most of the opportunities that arise, and so new measures will be needed. There is, therefore, no steady-state of being adapted" (London Mayor's Climate Change Adaption Strategy, 2011). Moreover, the Strategy emphasizes that climate change adaptation

not require new policies or new planning tools but the capacity of understanding "how climate change may affect the world around us and then routinely integrating that understanding into our decision-making processes to make better choices" (The Mayor's Climate Change Adaption Strategy, 2011).

The London Strategy grounds on the UK Climate Projections 2009 (UKCP09), which updates the UK Climate Impacts Programme 2002 (UKCIP02), and provides probabilistic projections for a number of atmospheric variables (such as temperature, rainfall and humidity) according to different emission scenarios, temporal and geographic scales. It focuses on three main climate-related risks: flooding, drought and overheating. In respect to each risk, a wide range of actions and measures has been provided.

All the measures are organized into a framework stemming from the Emergency Planning: the Prevent-Prepare-Respond-Recover (P2R2) framework. The prevention measures aim at preventing the events through structural measures as well as through spatial planning.

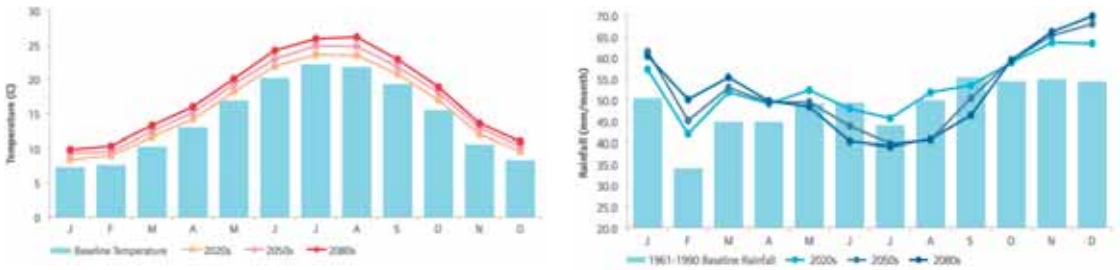


Figure 5 Average monthly maximum temperatures (°c) in London over the century, under a medium emissions scenario, compared to baseline period (left); Average monthly rainfall (mm of rainfall per month) in London over the century, under a medium emissions scenario, compared to baseline period (right)

The preparation measures are addressed to improve the preparedness of institutions, communities and individuals in face of the different risk factors through Risk Management Plans, Early Warning Systems, insurances mechanisms, etc.

The response measures aim at reducing the consequences of events through an effective emergency planning, while the recovery phase refers to post-event interventions and is addressed to guarantee a "rapid, cost-effective and sustainable return to normality" (Davoudi et al., 2011).

Grounding on the these premises, the Adaptation Strategy focuses on each risk, in order to assess current and future impacts, taking into account the probability of the hazardous events, their consequences, the exposed people and assets and their vulnerability.

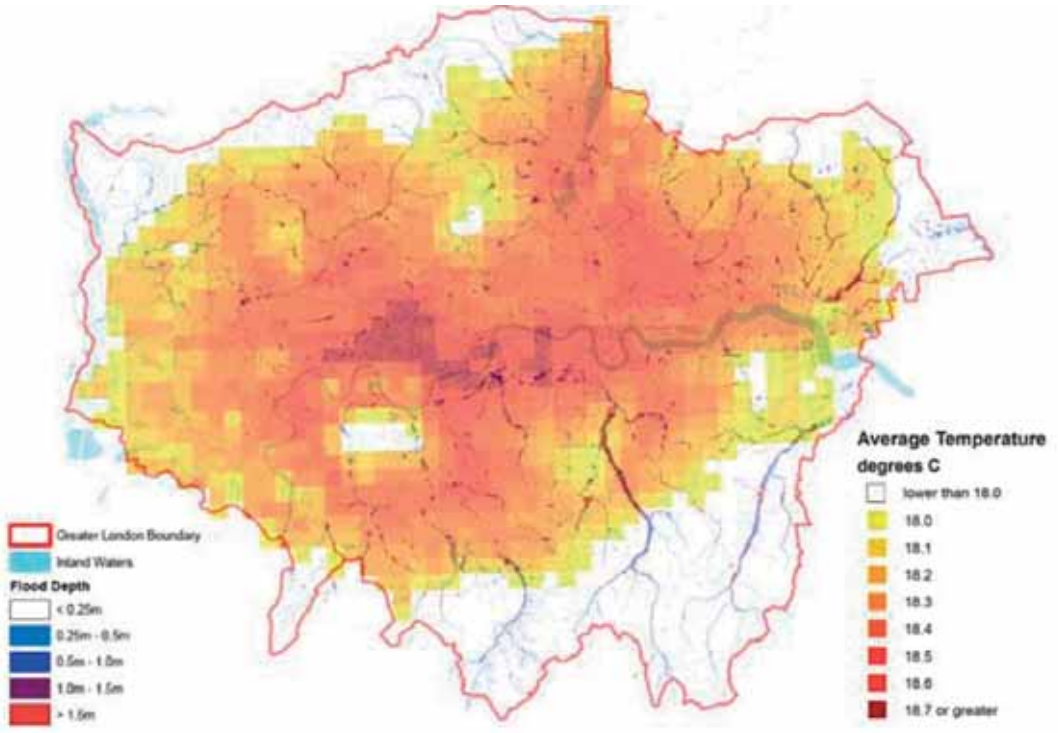


Fig. 6 The Combined Flood and Overheating Risk in London

For each risk, the Plan outlines the general vision and, according to it, the main policies and actions to be put in place. Then, the Plan focuses on the impacts of the different climate-related hazards on four key aspects - health, environment, economy and infrastructures - providing specific actions for each aspect.
Finally, in the last section, a roadmap to build up a resilient London in face of the different threats has been outlined: the Plan provides in fact a detailed list of the objectives to be achieved in the time span 2010-2013, specifying the related actions and the subjects in charge of their implementation.

Copenhagen
It is the capital city and the most populated city in Denmark, with a population of 559.440 in 2013 and more than one million inhabitants in the urban area. In the last years, the city of Copenhagen has devoted large attention to climate issues.
Copenhagen aims to be the first carbon neutral capital city in the world, with a reduction of city's CO_2 consumption from current level of around 2.5 million tonnes to 1.2 million tonnes in less than two decades.
To achieve such an ambitious goal, the city has adopted the CPH Climate Plan 2025, focused on energy consumption, energy production, mobility, and city administration: "wind farms, citywide efficient heating systems, energy efficiency, and the development of public transportation networks and bike routes are some of the initiatives in the works to bring Copenhagen closer to its carbon-neutral goal" (CPH Climate Plan 2025). Moreover, in 2009, the city started the adaptation process, with the draft of the City of Copenhagen Climate Plan. In 2011, in order to continue to be a safe and attractive city to live and spend time in, despite the expected changes in the future climate, Copenhagen has adopted its Climate Adaptation Plan. The local climate projections are based on the IPCC's reports as well as on the reports from the Danish Meteorological Institute (DMI) in connection with the climate strategy for the Capital Region, on the publications of the Water Pollution Committee of the Society of Danish Engineers and on the high-water statistics of the Danish Coastal Authority.
Nevertheless, uncertainties due both to climate projections as well as to urban development trajectories are largely emphasized. The Plan highlights that the "IPCC's projections for the development of climate are relatively certain for the next 30 to 40 years" and that "no one knows precisely how the world will develop technologically, in population terms, politically etc., or precisely how this will affect the climate, and whether this will be overlain by natural disasters etc." (Copenhagen Climate Adaptation Plan, 2011).
Therefore, the Plan provides a flexible strategy capable of meeting uncertainties, by incorporating new knowledge and technology as and when they emerge.

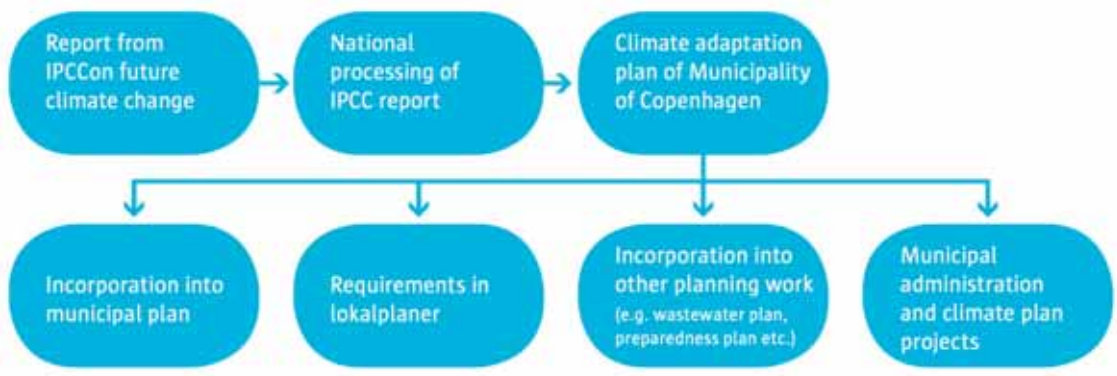


Fig. 7 The Copenhagen Climate Adaptation Process

Adaptation strategy identifies as primary challenges the impacts of heavier precipitations, sea-level rise and storm surges, while as secondary challenges focuses on the impacts of higher temperatures and consequent urban heat islands and on the indirect impacts affecting human health, biodiversity, air quality.

In respect to the primary challenges, the Plan includes a detailed risk analysis, outlining different risk scenarios according to the magnitude of the hazardous events, to different time spans and taking into account the potential effects of protecting measures.
Risk analysis provides a comparison among the potential damage, in monetary terms, of the different scenarios, according to the land use of the affected areas. Nevertheless, an in depth analysis of exposure and vulnerability to the different hazard factors is missing.
According to the different risk scenarios, the Plan outlines three different adaptation levels:

- level 1, aiming at reducing the likelihood of the event up to its complete prevention, includes structural measures as well as building regulations (e.g. dikes, building higher above sea level, etc.);
- level 2, aiming at reducing the impacts of the event, includes for example warning systems for rain, adaptation of public spaces in order to store rainwater etc.;
- level 3, aiming at reducing the consequences of the event, includes for example measures addressed to improve emergency preparedness.

Moreover, adaptation measures are structured in respect to different geographical scales, from the regional one up to the district, street and building levels.
Although the Plan is primarily concerned with the safeguard of the city and its inhabitants against climate change impacts, it is firstly intended as an opportunity to promote urban development so that Copenhagen may continue to be one of the world's best cities to live in (Copenhagen Climate Adaptation Plan, 2011).

Fig. 8 The Hazard Scenarios: Floods In A 100-Year Rain Event In 2110

Thus, the Plan outlines a wide range of measures and projects, all of them clearly framed into the proposed vision for future development: the "Greener Copenhagen".
Such a vision contributes to strengthen a tradition started in the late 1940s, with the "Copenhagen Finger Plan", which has shaped urban development on a regional scale, by limiting built-up areas to linear corridors starting from the central core and separated by green areas.

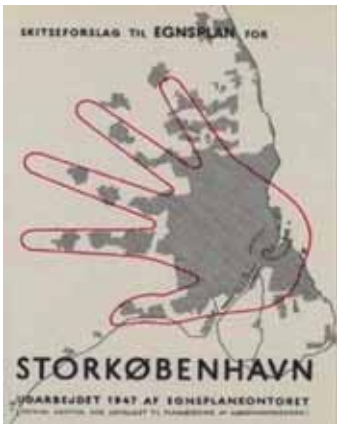
	Level 1	Level 2	Level 3
Measure Geography	Reduce probability	Reduce scale	Reduce vulnerability
Region	Establishment of dikes	Establishment of warning system for high waters	Protection of vulnerable infrastructure, metro, S-trains, tunnels
Municipality	Establishment of dikes	Planning, warning	Planning, preparedness
District	Raised building elevation, dikes	Preparedness, sandbags etc.	Moving of vulnerable functions and installations
Street	Raised building elevation, dikes	Preparedness, sandbags etc.	Moving of vulnerable functions and installations
Building	Raised building elevation	Backwater valves, sealed basements, preparedness, sandbags etc.	Moving of vulnerable functions and installations

Fig. 9 The Articulation by Levels and Geographical Scales of the Adaptation Measures

According to such a vision, the Adaptation Plan suggests measures addressed to:

- preserve and look after existing green spaces;
- provide the city with more green and blue spaces;
- create continuous green networks in the city.

Finally, it is worth noting that the Adaptation Plan pays large attention to integrate the climate adaptation measures into existing planning tools at local level as well as into existing tools for disaster risk reduction and emergency preparedness; it provides a detailed overview of costs and the time scheduling of all the foreseen measures and projects, although in respect to a short time span (2011-2015).



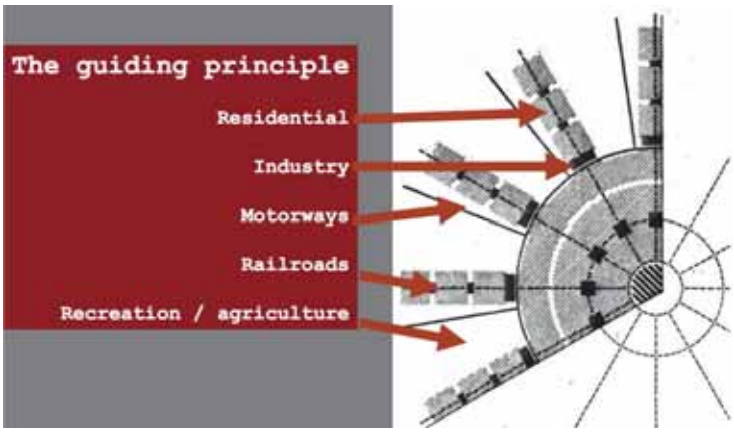


Fig. 10 The Copenhagen Finger Plan: Principles

Rotterdam

The city, with a population of approximately 600.000 inhabitants, is the second-largest city in the Netherlands and the biggest port city in Europe.

As Copenhagen, Rotterdam has outlined a comprehensive strategy to address climate change aimed, on the one hand, at reducing by 50% CO_2 emissions in 2025 in respect to the levels in 1990; on the other hand, to adapt to climate change effects, in order to guarantee a fully climate change resilient city by 2025. Rotterdam has always lived with the threat of water: “the dams, dikes and land reclamation have brought the dangers

and the risk of flooding under control (…). This has made Rotterdam, although still vulnerable, one of the safest delta-cities in the world" (Rotterdam Climate Adaption Strategy, 2013).
Nevertheless, in face of a changing climate and of a city that is still growing and continuously developing, the likelihood of casualties, losses and economic damage in case of flooding, might significantly increase.
Hence, the main goal of the Adaptation Strategy is to build up a climate-proof Rotterdam by 2025. To achieve such a goal, the city's strategy is addressed to develop smart solutions, capable of integrating technical innovation and urban development, technology and nature, large-scale and small-scale solutions. The Rotterdam strategy points out the need for increasing robustness of the complex system of storm surges barriers and dikes, canal and lakes, sewers and pumping stations, even though it clearly emphasizes that structural measures, although essential, are not sufficient for dealing with a changing climate. Hence, the need for solutions capable of involving all the aspects of urban development and, above all, of enhancing urban resilience is outlined.

The Adaptation Strategy grounds on the climate scenarios developed by the Royal Meteorological Institute of the Netherlands in 2006 and on the considerable knowledge developed within the Delta Programme, a national program issued in 2013 and addressed to protect the Netherlands from flooding and to secure a sufficient supply of freshwater for generations ahead.

Based on this knowledge, the Plan identifies the main climate-related phenomena affecting the city:

- higher sea and river levels;
- more intensive rainfall;
- longer period of droughts;
- heat waves.

For each phenomenon and in respect to different temporal spans, the Plan provides risk maps, singling out vulnerable areas and elements. Moreover, the main interactions among the different phenomena are taken into account. In face of the different risks, the Plan provides an articulated adaptation strategy, a framework to promote, favor and stimulate initiatives of different actors. The provided strategy combines, indeed, top-down and bottom up initiatives, as well as large-scale and small-scale solutions, ordinary actions of management and maintenance and new developments projects, general guidelines and detailed projects. The adaptive measures are based on the risk features and the peculiarities of each urban area (outer and inner dike areas; compact city; port area, etc.) and range from the flood-proof buildings and public spaces to the floating communities, from the green roofs and facades to the green-blue corridors. Moreover, in respect to each considered risk, the Plan provides a sample project, generally an on-going one, which represents a sort of "guide-project" for tackling the phenomenon at stake.

The Rotterdam Climate Adaptation Strategy devotes large attention to the development of smart solutions capable of increasing city's smartness. The integration of ICTs into an innovative and adaptive flood control system as well as tools for promoting community's involvement have been developed and tested. "Smart gaming, a war room like 'demonstrator', decision support systems, application of sensor technology in dikes and many other tools will be developed and integrated into one system to make Rotterdam a smarter and safer city in the future" (Dircke, Molenaar, 2010). Among the smart solutions it is worth mentioning the "Interactive Climate Atlas", which is accessible to different stakeholders, provides general information about climate scenarios, vulnerable areas and buildings and allows the comparison among the consequences of various climate scenarios; the "Climate Adaptation Tool Box", a key tool for project managers, urban and building designers, which provides an overview of potential adaptation measures for different spatial scale-levels and objectives.

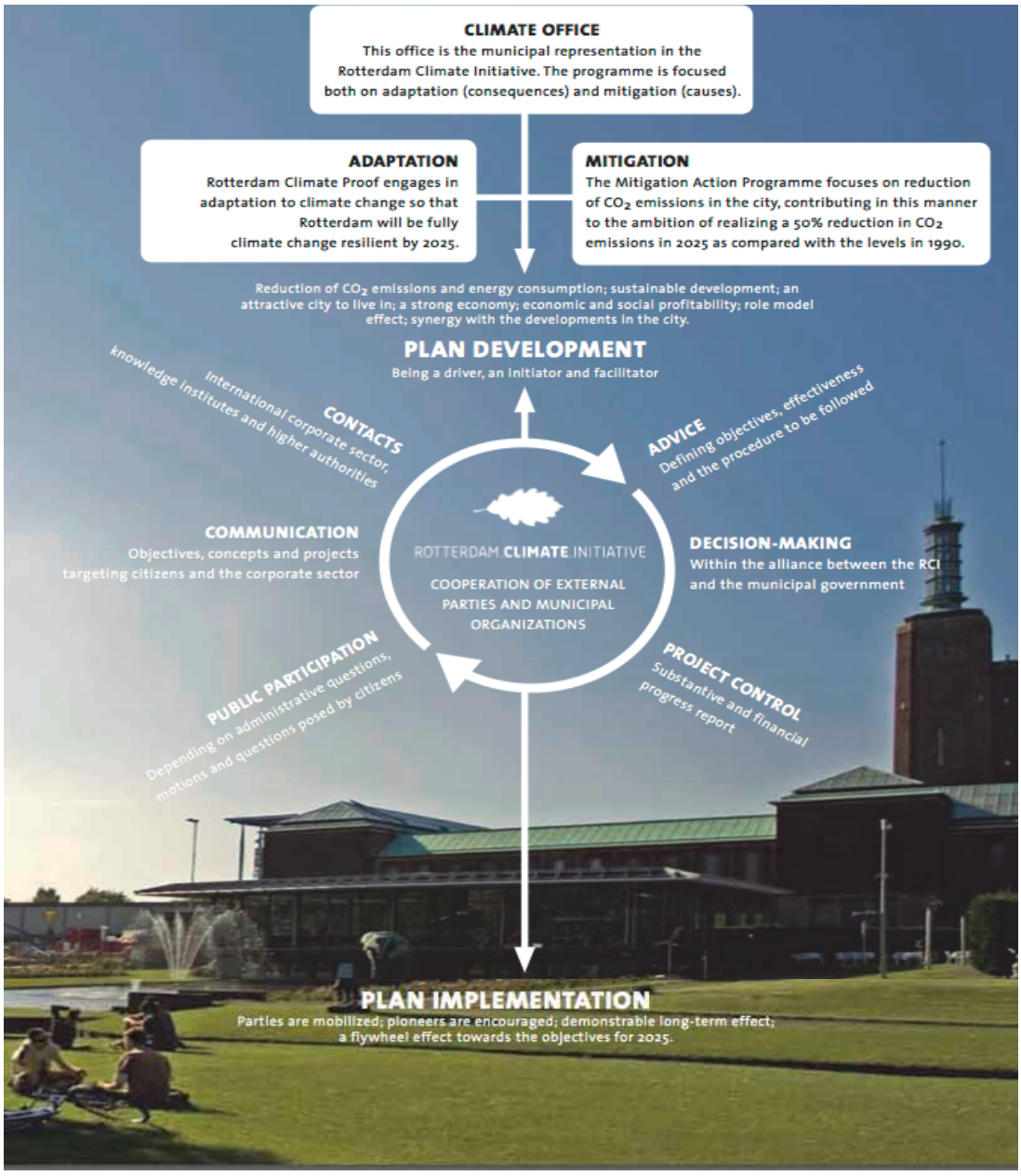


Fig. 11 The Rotterdam Climate Strategy

Fig. 12 Urban Heat Island: Risk Map

Moreover, based on the opportunities offered by the digital environment, the potential of new communication tools - such as the apps for smart phones or the social media - has been explored. In the same line, the "Climate Game" - which allows users to play an active role in the adaptation process, learning more about the various involved interests and stakeholders and about the consequences of different choices - has been developed. All these tools are addressed to inform people, improving the awareness of the community about the climate-related phenomena and consequent risks, but also to favor and sustain bottom-up initiatives and to build up consensus on adaptation measures. Moreover, they largely contribute to disseminate knowledge, which represents a key issue for enhancing urban resilience in face of climate change (Davoudi, 2013; Galderisi, 2014).

Summing up, based on the case studies here briefly described, adaption plans seem to have a great potential for starting innovative processes, addressed to make European cities safer and, above all, to integrate environmental issues (from energy saving to risk prevention and mitigation) into sustainable land use planning processes, also through an extensive use of ICTs.

The proposed examples are addressed not only to prevent or reduce the impacts of the numerous climate-related hazards but, above all, to preserve and enhance the quality of life and prosperity for current and future generations as well as to protect and improve the quality of urban environment. Moreover, they seem to have the potential for overcoming most of the obstacles that currently curb adaption processes. Nevertheless, even though the selected Adaptation Plans represent a cutting edge in the European context, they present strengths and weaknesses that will be briefly discussed in the following.

First of all, the proposed case studies result from multilevel and integrated climate policies, developed according to a clear structure of competences and duties both at national and at local level. In the UK the responsibility for climate change mitigation, adaptation, and energy strategies have been transferred from central government to the Greater London Authority, which has extensive planning powers and is responsible for producing London-wide strategies for spatial planning and environment.

Denmark is characterized by a close cooperation among national and local government. In 2008, the Danish Ministry of Climate, Energy and Building published the general strategy for climate change adaptation, which promotes and supports the coordination among Local Authorities and favors informed decisions at lower levels. The Netherlands has a long tradition of cooperation among different government bodies, stakeholder organizations and citizens. National government, provinces, municipalities and regional water boards work together, indeed, with inputs from the social organizations and the business community, in order to realize climate resilient urban areas. Moreover, in the 2012, the "Delta Act", a nationwide programme addressed to coordinate adaptation strategies at the local level, entered into force. On the local scale, the three case studies have developed an integrated climate policy, since Mitigation and Adaptation Plans have been issued together or within a few years. Such a circumstance is important in order to guarantee synergies and to reduce the conflicts, which often arise between mitigation and adaptation policies. For example, compact settlements may reduce energy demand and transport emissions; on the opposite, the increase in built mass would intensify the urban heat island effect, posing serious problems to urban drainage. Furthermore, the increasing urban heat island effect would lead to an increased use of air-conditioning and, consequently, to an increase in emissions (Walsh et al., 2010).

As for the knowledge phase, the case studies present relevant strengths in respect to the assessment of the climate-related hazards. Despite the difficulties related to the downscaling of large-scale climate models, the selected plans provide in-depth analyses of the climate-related phenomena on an urban scale, based on large-scale scenarios and in-depth studies at local scale.

Fig. 13 The Rotterdam Climate Game

On the opposite, they show some weaknesses in the vulnerability assessment, since they do not provide any definition of vulnerability and do not refer to the long and rich tradition of studies and researches on vulnerability carried out in the field of natural hazards. In this field, although methodologies for analyzing and assessing vulnerability are still heterogeneous, the concept has been widely recognized as a multi-dimensional one, comprising different aspects (physical, systemic, social, economic, environmental, institutional, etc.), constantly interacting in time and space (Birkmann, 2006; Galderisi et al., 2013; UNISDR, 2009; Menoni et al., 2011).

Unfortunately, based on the available on-line documents, the examined Plans provide aggregate risk evaluations, generally expressed in monetary terms, paying scarce attention to the different aspects of urban vulnerability and including little or no vulnerability maps (generally only maps of the exposed elements to the different hazard factors are available). This represents a weak point in current adaptation plans. Even though risk assessment is important to identify priority areas and sectors, in fact, vulnerability analysis is crucial to outline appropriate adaptation policies. Moreover, although some of the case studies explicitly refer to resilience, the latter is not defined and no indicators for measuring resilience are provided.

As for the preparation/response phase, all the selected Plans show a great awareness of the uncertainties that, characterizing the knowledge phase, reflect on the preparation phase. Indeed all of them refer to a short-term time horizon and emphasize that adaptation does not represent a steady state. The selected Plans outline dynamic and flexible adaptation processes in face of the uncertainties related to changing climate projections, to urban development trajectories as well as to future technical development and capable of continuously incorporating new knowledge and revising, accordingly, their goals, objectives and actions. Although with reference to a short time span, most of them provide a detailed economic and temporal program of adaptation measures, articulated in respect to different geographical scales or to different urban areas, singling out subjects and tools for their implementation.

In respect to the obstacles that generally characterize the preparation phase - related to the heterogeneity of policies, to the need for integrating adaptation policies into existing planning tools and, consequently, for coordinating different stakeholders - it is worth noting that all the sample Plans emphasize that climate change adaptation does not require new policies or new planning tools. On the opposite, all of them clearly state that adaptation requires a clear understanding of how climate change may affect the context at stake and the integration of such understanding into all decision-making processes affecting urban development. Furthermore, they emphasize the need for linking adaptation strategies to other policies and projects, as well as to existing management and maintenance programs and, namely, for mainstreaming adaptation policies into existing disaster risk management and land-use planning process. As mentioned above, such integration requires an intensive cooperation among different stakeholders. Therefore, it is crucial to have shared aims for a climate-proof urban development and the capability of coordinating all the involved stakeholders.

As for the revision phase, it has to be noticed that whereas the Mitigation Plans, grounding on international or European thresholds, may constrain their strategies to precise targets - which facilitates the control on the effectiveness of the implemented strategies and actions – the Adaptation Plans generally include site-specific measures, referred to the peculiarities of the impacted systems. Hence, both the comparison among different Plans and the monitoring of the adaptation process are generally more difficult.

Furthermore, even though the analyzed Plans provide a detailed economic and temporal planning of the proposed actions, none of them provide indicators capable of monitoring the effectiveness of the foreseen actions. Finally, a weak area of the analyzed adaptation plans can be related to the usage of smart tools for improving the awareness of climate-related impacts among different stakeholders.

Only the Rotterdam Plan provides smart solutions (e.g. sensor technologies, decision support systems, interactive knowledge tools, etc.) for collecting and disseminating knowledge as well as for building up consensus on adaptation measures and sustaining bottom-up initiatives.

4 CONCLUSION

In face of the impacts of the climate-related phenomena (floods, heat waves, etc.) that numerous European countries are already suffering and following the initiatives started by the EU for improving knowledge and awareness of adaptation issues, numerous European cities have recently started an adaptation process, despite the significant obstacles due to the uncertainties in the future climate scenarios.

This contribution, after a brief description of the main impacts of climate change on urban areas and of the main hints provided by the European Community to improve urban adaptation to climate change, has been focused on three Adaptation Plans:

- the London Mayor's Climate Change Adaption Strategy "Managing Risks and Increasing Resilience, (2011);
- the Copenhagen Climate Adaptation Plan (2011);
- the Rotterdam Climate Adaption Strategy (2013).

The three selected Plans represent a cutting edge in the European context where, although cities are widely recognized as pivotal both to mitigation and adaptation issues, up to now most of them do not have an adaption plan (Reckien et al., 2013).

The selected case studies have allowed a better understanding of the challenges and opportunities arising from the adaptation processes. On the one hand, in fact, they shed light on the numerous difficulties related to the different phases of the process.

On the other hand, they clearly underline that adaptation planning might be a great opportunity for promoting a sustainable and smart growth, enhancing urban resilience in face of "the unavoidable climate impacts and their economic, environmental and social costs" (EC, 2013).

Key-Aspects		Adaptation Plans		
		London (2011)	Copenhagen (2011)	Rotterdam (2013)
integrated Climate Policy	*Availiability of a National Climate Strategy*	✓	✓	✓
	Availiability and integration with a Mitigation Plan	✓	✓	✓
Knowledge phase	*Hazard assessment: availability of climate studies at local scale*	✓	✓	✓
	Definition of vulnerability as multidimensional concept			
	Availability of vulnerability maps (in the on-line documents)	Mainly Exposure maps		✓
	Risk assessment	Risk as a combination of probability and cost of damage	Cost of damage in respect to different hazard scenarios	Risk maps combining hazard and vulnerability
	Multi - Risk Assessment		A qualitative assessment combining different threats is available	
	Typology of available scenarios	Hazard	Hazard	Risk
Preparation/Response Phase	*Fexible strategy capable of meeting uncertainties*	✓	✓	✓
	Short term horizon for adaptation policies	✓	✓	✓
	Detailed economic and temporal planning of the adaptation measures	✓	✓	
	Measures articulated for geographical scale/urban areas		✓	✓
	Capacity of integrating large scale and small scale solutions	✓	✓	v
	Availability of Guide-Projects		✓	✓
	Integration with tools for Risk Prevention/Mitigation and Emergency Planning	✓	✓	✓
	Integration with tools for Land Use Planning	✓	✓	✓
Revision Phase	*Avaiability of indicators for monitoring the adaptation process*			
Smart tools	*Smart tools for disseminate knowledge among different stakeholders*			✓
	Smart tools for increasing people awareness			✓

Fig. 14 The key aspects of the London, Copenhagen and Rotterdam Adaptation Plans (*in green the main weaknesses*)

In respect to the opportunities, it is worth noting that climate change phenomena and their increasing impacts on urban areas are forcing planners to look behind, paying a renewed attention to the principles of environmental planning.

The concept of adaptation to the threats as well as to the opportunities arising form the natural environment has always represented, in fact, a crucial issue for environmental planners (Whiston Spirn, 1973; Michel, 2000; Steiner, 2006). Such issue can be currently revisited and improved according to the large debate developed in the last decades on sustainability and resilience.

In respect to the challenges, it is worth stressing that the selected experiences do not seem to fully benefit either by the significant results already achieved in the field of risk analysis or by the significant opportunities arising from the current debate on smart cities. As for the first point, despite the numerous projects funded by the European Community and addressed to promote the building up of a shared knowledge and common methodologies among the scholars working in the field of natural hazards and the scholars involved in studies and research on climate change, a difficulty in transferring concepts, methods and results from one field to the other still persists. This is even more troubling in the light of the close relationships between climate related impacts and the increasing occurrence of natural hazards (e.g. floods) and of the consequent need, largely emphasized in current experiences, for better integrating adaptation

strategies and DRR policies and for including both of them into the wider framework of urban planning processes. As for the second point, according to some scholars a city can be defined smart when investments in human/social capital and IT infrastructure fuel sustainable growth and enhance a quality of life, through participatory governance (Nam and Pardo, 2009; Papa, Galderisi, Gargiulo, 2013). Unfortunately, the application of ICTs in the adaptation processes, although they could play a key role in each phase of the process, seems to be still at an early stage. Only the Rotterdam Climate Adaption Strategy, in fact, explicitly focuses on the opportunities arising from the ICTs in disseminating knowledge, improving the awareness of the climate change consequences among different stakeholders, favoring the information exchange and sustaining bottom-up initiatives.

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IMAGE SOURCES

Fig. 1: Source: www.ilfoglio.it

Fig. 2: UN, Department of Economic and Social Affairs, Population Division (2012)

Fig. 3: Greiving et al., 2011

Fig. 4: 4a) United Nations (2013); 4b) http://weadapt.org/knowledge-base/adaptation-decision-making/adaptation-planning-process; 4c) Hennessy, Fitzharrisì et al. (2007)

Fig. 5, 6: London Mayor's Climate Change Adaption Strategy (2011)

Fig. 7, 8, 9: Copenhagen Climate Adaptation Plan (2011)

Fig. 10: Vejre, Skov-Petersen, Henschel (2007)

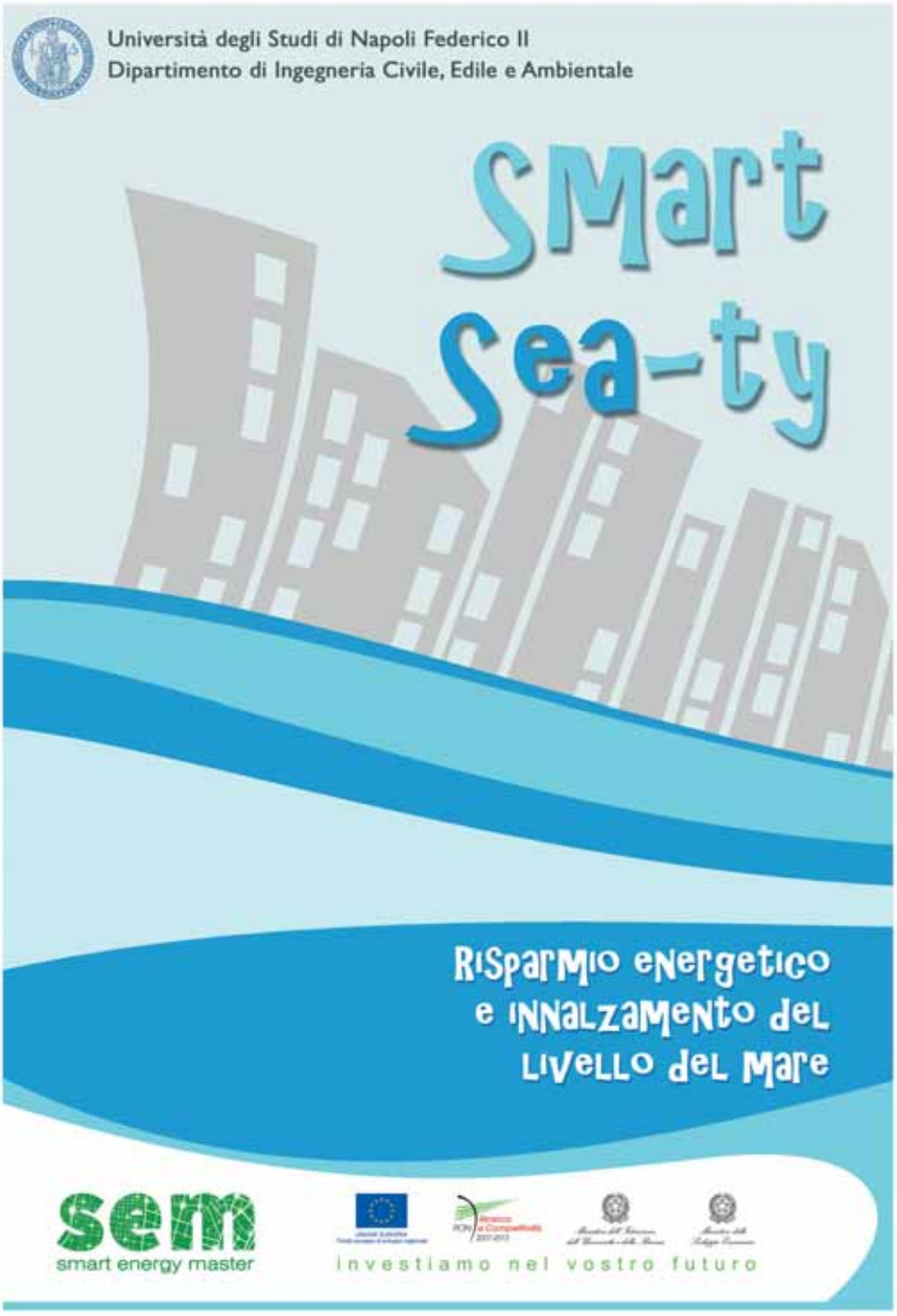
Fig. 11, 12: Rotterdam Climate Adaption Strategy, 2013

Fig. 13: Source: http://vimeo.com/68119632

AUTHOR'S PROFILE

Adriana Galderisi

Assistant Professor at the Department of Civil, Architectural and Environmental Engineering - University of Naples Federico II. Professor of Town Planning at the Faculty of Engineering of the University Federico II; Ph.D. in Urban and Regional Planning. Since 2004, she has been Member of the Researcher Doctorate in Hydraulic, Transport and Territorial Systems Engineering of the University of Naples "Federico II". Research activities are mainly focused on the urban environment requalification and namely on two issues: the relationships between land use planning, mobility and environmental issues; vulnerability and resilience of urban systems to natural and na-tech events. In respect to the latter, she has coordinated research teams within numerous National and European Projects (e.g. EU Project ARMONIA - Applied Multi Risk Mapping of Natural Hazards for Impact Assessment". VI Framework Program; EU Project SCENARIO - Support on Common European Strategy for sustainable natural and induced technological hazards mitigation) from 2000 to 2008. From 2008 to 2011, she has been the Scientific Responsible for the European Project "ENSURE - Enhancing resilience of communities and territories facing natural and na-tech hazards" (7° Framework Programme - Theme 6 Environment - Topic 6.1.3.2.1 Frame for better vulnerability assessment). From 2012 to 2015, she is Responsible for the Training Project of the National Project "Smart Energy Master for the energy management of territory" (PON 04A2_00120 R&C Axis II). She is author of more than 70 publications (monographs, chapters in books and articles).



The research group SEM has taken part in the event Futuro Remoto 2014, a science fair in Naples.
The theme was the sea and the group has shown the students how individual behavior influences raising sea levels.

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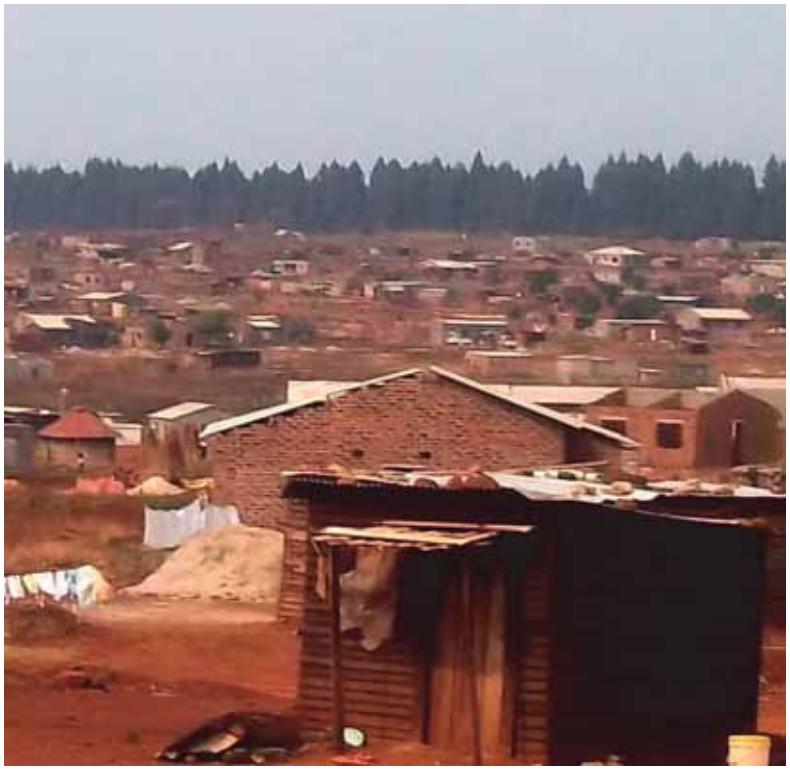

LIMITS TO ECOLOGICAL-BASED PLANNING IN ZIMBABWE

THE CASE OF HARARE

INNOCENT CHIRISA[a], ARCHIMEDES MUZENDA[b]

[a]Department of Rural and Urban Planning, University of Zimbabwe
e-mail: chirisa.innocent@gmail.com
URL: http://www.uz.ac.zw

[b] Department of Rural and Urban Planning, University of Zimbabwe
e-mail:amuzendah@gmail.com
URL: http://www.uz.ac.zw

ABSTRACT

This paper explores the feasibility of adopting ecological based planning in low-income residential development. It explicates that in developing countries efforts by housing authorities have been on housing provision irrespective of the environmental threats to sustainability. As these houses are built, future of urban ecology is under threat. The questions regarding this phenomenon are several: how do low-income populations perceive environmental issues of urban settlements? How capable and willing are the local authorities to embrace and apply ecological based planning in residential development? What are the facilitating instruments of ecological-based planning? What are the prospects of integrating ecological based planning to low-income residential development? What are the restraining factors towards embracement of ecological based planning and how best can they be harnessed towards future ecological cities? The case study of Hatcliffe residential area in Harare shows that there are many challenges to overcome uncoordinated planning approaches, ineffective policies and legislative frameworks, weak institutional settings, financial constraints, outdated planning standards and regulations, poverty, lack of environmental stewardship and lack of political will among others. The study findings call for robust environmental conservation strategies, strong environmental stewardship, responsive institutional and funding mechanism backed by realistic legislative frameworks and robust policy rectification.

KEYWORDS:
Ecological-based Planning; Low-income Residential Areas, Sustainability; Urbanisation.

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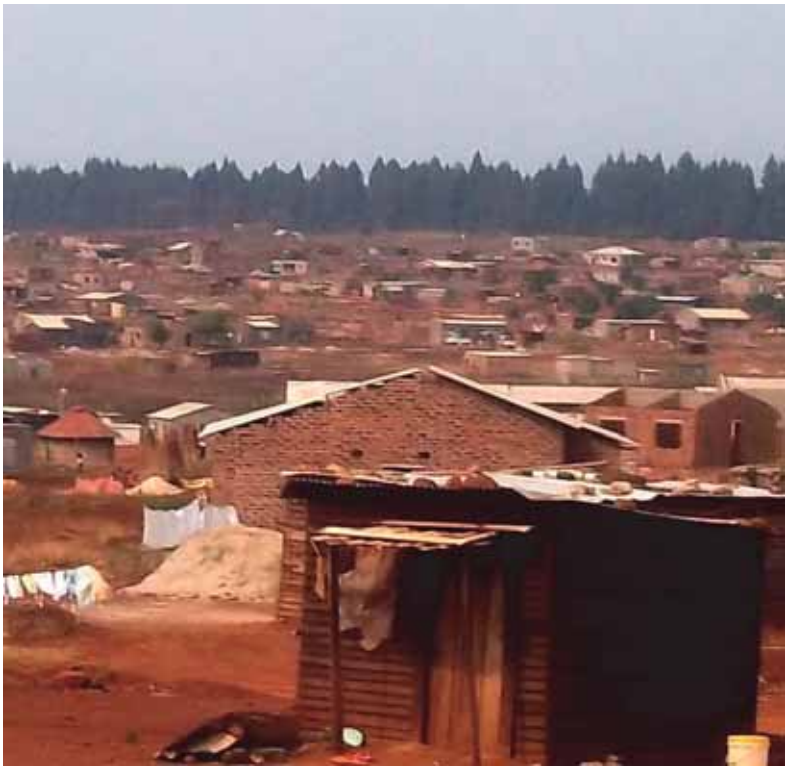

津巴布韦的生态规划限制

哈拉雷案例

INNOCENT CHIRISA[a], ARCHIMEDES MUZENDA[b]

[a]津巴布韦大学
e-mail: chirisa.innocent@gmail.com
URL: http://www.uz.ac.zw

[b]津巴布韦大学
e-mail:amuzendah@gmail.com
URL: http://www.uz.ac.zw

摘要

本文探讨了在低收入住宅区开发中采用生态规划的可行性。本文揭示发展中国家的房管部门一直以来只注重房屋供应，而忽略了环境给可持续发展带来的威胁。随着这些房屋的建成，城市生态的前景受到威胁。针对这种状况有如下几个问题：低收入群体如何认知城市居住区的环境问题？地方当局如何有能力并愿意在住宅开发中接受和应用生态规划？生态规划的促进手段有哪些？集成化生态规划在低收入住宅开发中的前景如何？对于生态规划的接受有哪些制约因素，以及对于未来的生态城市如何更好地驾驭这些制约因素？ 对哈拉雷 Hatcliffe 住宅区的案例研究表明，在克服僵化的规划方法、无效的政策和立法架构、薄弱的机构设置、财政制约、过时的规划标准和规定、贫穷、环境管理和政治意愿匮乏等方面，仍面临诸多挑战。研究结果表明亟需强大的环境保护战略、有力的环境管理工作、能够做出响应的机构和筹资机制，这些均需要有效的立法架构和稳健的政策调整来提供支持。

关键词
生态规划；低收入住宅区；可持续性；城市化.

1 INTRODUCTION

In the time of rapid urbanisation process, residential development has been of critical concern to cater for expanding populace within the urban space. In efforts to accommodate the exploding population, nature has been 'designed out' of the residential development equation. As well, low-income residential areas constitute the largest space of the built environment in most cities of the developing countries. Departing from such a complexity, this paper makes a feasibility study on the applicability of Ecological Based Planning (EBP) to low-income residential development. Conceptually, EBP entails the sustainable marriage of the hard and soft space that is development of environmentally sensitive settlements. EBP constitutes components of green space enhancement, wildlife conservation, green architecture as well as green energy within urban settlements. These components holistically shape the syntax of urban environmental planning.

The study notes that there is inherent environmental crisis globally of rapid growth of the human population; the depletion of both non-renewable and renewable resources; and extensive and intensive damage caused to ecology. This is being exacerbated mainly by a generally huge influx of population in cities.

In the developed world, such a trend of huge population influx is explained by increasing exilic and Diaspora populations in urban territories (Mbiba, 2000). In the developing countries, rural-to-urban migration is rampant (Simone, 2003; Toriro, 2011). Overall, cities in developing countries are experiencing spontaneous expansion of low-income residential areas (Maphosa *et al*, 2008). Once they arrive in the cities, the migrants require somewhere 'to put their heads' hence the logic of low-income housing. Low-income residential areas have thus tended to occupy a critical space, normally reserved for 'nature'. In this regard, the 'invasion' of ecologically sensitive areas (ESA) has been inevitable and to the detriment of urban ecosystems. In cities of the developing world, little emphasis has been paid to low-income residential areas, which account for the largest proportion of the urban land. Likewise, policy makers have been reluctant, if not resisting, addressing facets of environmental sustainability of low-income residential areas (Muderere, 2011; Maphosa *et al,* 2008). Urban nature does not seem to be incorporated into urban planning. Thus, the hard and soft space appears as two rivers flowing parallel whilst eroding the banks of each other.

This paper relates ecological-based planning components to low-income residential areas with the methodological lens of Hatcliffe case study in Harare, Zimbabwe. The paper maps out the capacities, opportunities and constrains of adopting EBP in low-income residential development. The qualitative methodologies used to construct the discourse are the key informant interviews and observations. Key informants were local planning authorities, environmental boards and the local residents of Hatcliffe. The study provokes a discussion on capabilities of the local authorities to embrace the adoption of EBP as well as scrutiny of low-income residents as enemies of ecological sustainability, reasons for ecological exploitation. This leads to a discussion on the nature of residential development in Zimbabwe as well as the feasibility study of incorporating EBP as an environmental planning tool for sustainable human settlements. The paper concludes by suggesting possible policy options to be espoused for robust integration of EBP in low-income residential areas towards environmentally sensitive settlements.

2 CONCEPTUAL AND ANALYTICAL FRAMEWORK

The concept of Ecological-Based Planning has been a critical approach in the anthropocene epoch. EBP is an approach of creating environmentally sensitive human settlements, which means living in harmony with nature through use of its principles.

Contemporary urban environmental praxis has broadened intergenerational inequalities and there is need for moderation through robust planning intervention (Shu-Yang *et al,* 2004). EBP constitute the enhancement of green space of green, wildlife protection, green energy, wetland protection as well as green architecture (Gilbert *et al,* 1996).

Globally ecological based planning is practiced with cornerstones as green space enhancement, urban wildlife protection, sustainable construction, environmentally friendly energies and protection of environmentally sensitive areas (Said *et al,* 2009). The package of ecological based planning is multifaceted but for it to work effectively it requires integrated approach of applying them holistically. In conquest to conserve nature, these components seek to marry the built space with urban ecology. Within the realm of ecological based planning, green space enhancement is crucial.

Green space plays a vital role in enhancing the quality of urban life by creating attractive cityscapes; improve health, sustainable neighbourhood renewal and better community cohesion in deprived communities (House of Commons, 2009). It also offers environmental benefits, including pollution control, water management, wildlife havens and biodiversity. Naturalising urban ecosystems by increasing or maintaining the dominance of native species and their communities have been of great importance (Shu-Yang *et al,* 2004). Green space enhancement also encompasses the protection of ecologically sensitive areas (ESAs) such as wetland areas. Green architecture is another crucial component of ecological based planning. It entails the construction of buildings that are environmentally friendly throughout their life cycle from construction, use and demolition. Ecologically friendly houses facilitate more affordable living in the end, as they minimize energy costs (Said, *et al,* 2009).

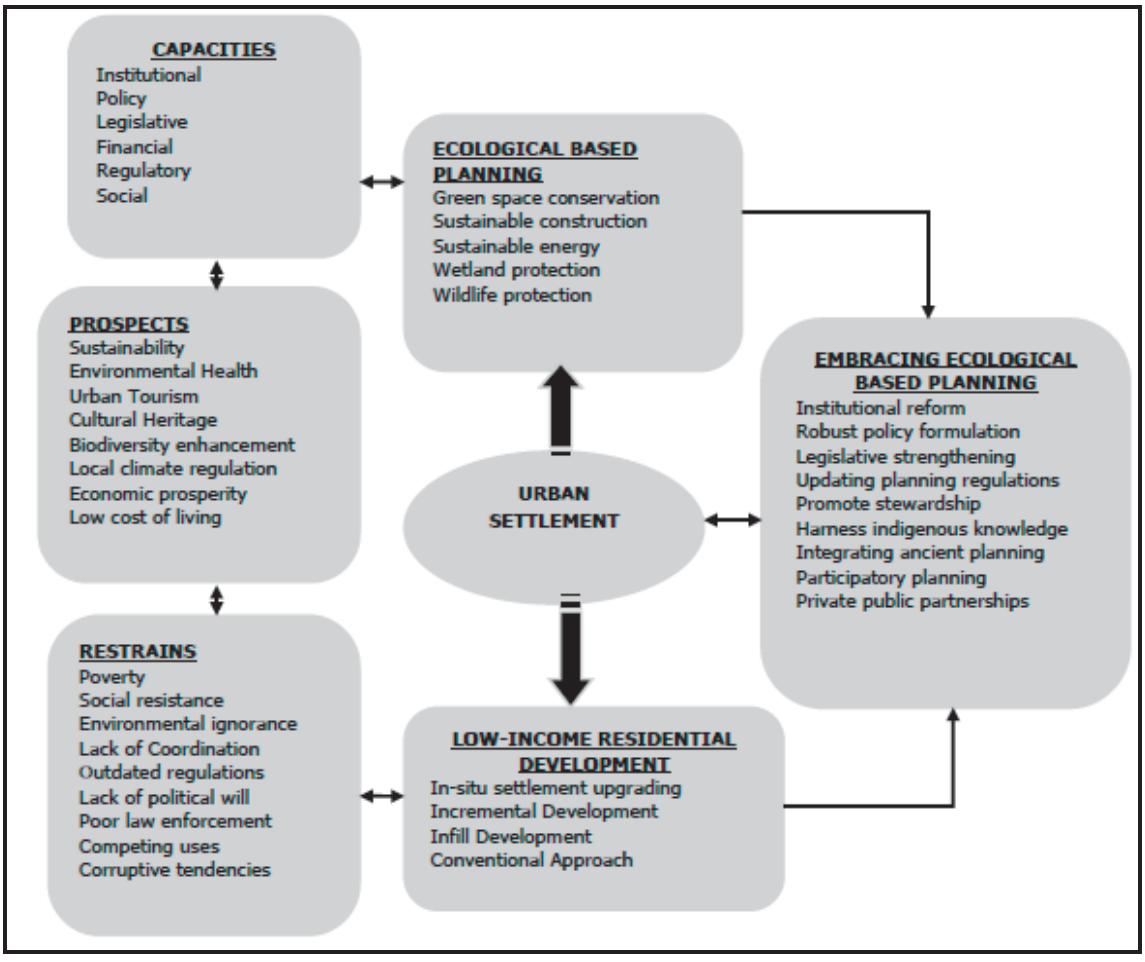

Fig. 1 Ecological-based planning conceptual framework

Nevertheless, neither the private nor the public housing providers have shown much interest in environmentally friendly housing provision and this has raised the eyebrows of environmentalists globally. Ecological construction is also contemplated in several traditional building designs where local materials are used in their construction in order to become more energy and resource efficient. The American architect

Frank Lloyd Wright who introduced "organic architecture" at the beginning of the twentieth century marked the revolution of green architecture within urban settlements (Hough, 1991). He initiated the design of houses constructed of local building materials, also known as vernacular architecture. Whilst made much progress, there is still need for more attention to energy and resource efficiency in the construction and operation of residential buildings as a crucial component of ecological based planning.

In addition, other components of ecological urbanism are the use of green energy, and sustainable waste management. Globally use of sustainable energies has become a crucial necessity in order to avoid the depletion of non-renewable energies. The concept of green energy constitutes use of energy with minimum or no negative impact on the natural environment. These include the use renewable clean energy such as solar, wind energy in substitution of fossil fuels, which have an adverse environmental damage. Waste management and waste reduction have been of great concern to environmentalists (Said *et al,* 2009). The mechanism of waste minimisation comes in three modes of Re-use, Reduce and Recycle (Beer, 2003). The reduction of the garbage has been a major global concern. Thus, there is continuous increase of their huge bulk, because of the modern society and the urban and one of modern societies' greater challenges. Also the increasing tendency of global consumption on secondary consumable (Pieterse, 2011), thus call for ecological based planning intervention in the realm of urban development with regard to waste management.

Whilst unpacking ecological based planning components, urban wildlife protection has been of great concern to urban planning as urban wildlife has been hastening towards extinction. Conservation of urban fauna has been of less attention in the discussion table of the developing world but its importance rang the bell of the global community (Hough, 1991). Muderere (2011) as well notes that, through ecological networks and nature sanctuaries, urban wildlife had been habituated in urban places either by natural existence or by confinement. Conceptually, ecological based planning comprises several principles which include meeting the needs of humans and the economy, sustaining ecosystem integrity, the use of renewable resources, natural debt elimination, nature conservation and biodiverstity enhancement (Shu-Yang *et al,* 2004). It also seeks to increase environmental literacy to build social support for sustainable development, resource conservation, and protection of ecology. These principles are fully espoused by enhancing the ecological based planning components (see Figure 1). The use of force field analysis realises the capacities, opportunities and constrains of ecological based planning - low-income residential areas conjugate.

Greening the environment for the planning of human settlements has been a continuous debate at international forums, but these debates are yet to be scaled down to low-income residential areas in cities of the developing world. Studies on the sustainability of residential development have been extensive, but the ecological development and operation of low-income residential areas lacked recognition (Maphosa, *et al,* 2009). The continuity of a dynamic balance between needs and demands of people for equity, prosperity as well as quality of life at the same time maintaining healthy ecologies are cornerstones of sustainable development (Castels, 2000). The housing realm is multi-faceted as it depletes natural resources as well as producing impact on the natural environment (Said, *et al* 2009). As the poor population is the most dependent on the environment, Low-income residential areas have become hubs of massive ecological destruction. While globally planning has acquired a more "ecological" conscience, in conquest to face the matters of environmental defects, the legislators in cities of the developing countries are still concerned with survival of the current generation regardless of compromising the needs of the future.

Ecological based planning has long history of praxis being practiced by early ancient societies. Regarding the population, they had considerable impact on the natural environment in comparison to contemporary urban settlements. Ecological based planning reflected in several traditional building designs that use local materials in their construction, situated and designed to achieve optimalities of heating and cooling. Examples of such sophisticated architecture include traditional buildings constructed using adobe, animal hides, or living spaces excavated from soft rock (Van der Ryn and Cowan 1995 cited in Shu-Yang *et al,*

2004). Scaling down to the local scale, ancient African societies had sophisticated ecological conservation practices. The concept of sacred controls on forests *(rambokutemwa)* was a way of creating ecological networks devoid of human disturbances and a form of biodiversity enhancement.

In relation to the African societies, the concept of totems was a cultural filtration strategy to wildlife consumption where every tribe had an animal devoid of human consumption leading to conservation of wildlife with even national emblem of bird species (*Hungwe)* as sacred. Ancient societies had fascinating architectural concepts of sustainable construction. Use of biodegradable building materials such as timber, thatch grass and mud proved environmentally beneficial as their high rate of migration left no prints of environmental disturbance thus, all building materials returned to nature. In a complex world, where human populations cluster in densely populated settlements with exorbitant pressure on the urban environment the challenge is; how these ancient ideas can be harnessed in formulation of robust environmental conservation strategies? Applicability of such sophisticated ideas in contemporary cities has been controversial due to several reasons amongst others being incompatible with modern bylaws and planning regulations as well as cultural change.

3 LOW-INCOME RESIDENTIAL DEVELOPMENT IN ZIMBABWE

While not blanking out the memories of prohibitive colonial city regulations, independence in 1980 in Zimbabwe witnessed a huge influx of rural migrants to urban areas (Mbiba, 2000). A compounding of 'rural push' and 'urban pull' elements defined the urbanization trends. Housing delivery has been a burning issue since the 1950s and limited governmental involvement in housing provision, which occurred during the early post-colonial period in Zimbabwe, has been the exacerbating factor (Chaeruka and Munzwa, 2009; Maphosa *et al* 2007). Demographically urban population has exorbitantly expanded as the 2002 Census placed the urban population at 35% with nearly half (46%) living in Harare (Chaeruka and Munzwa, 2009). The harsh macro-economic conditions have been main cause of poor residential development in Zimbabwe. The legislative instruments: Housing Standard Act, Model Building Byelaws and the Regional, Town and Country Planning Act missed environmental concerns regarding housing development, which gradually deteriorated residential space. As Chaeruka and Munzwa (2009) argue, the rapid urbanisation that Zimbabwe witnessed after 1980 put a strain on the physical, economic and social fabric of most towns and cities; they missed out hardly the environmental impact of rapid urbanisation. This led to a situation whereby the low-income residential development has been done haphazardly to the deteriment of environmental quality. In fact, most of the recently developed housing in the peri-urban of most Zimbabwean cities qualify as substandard housing given the lack of water and sanitation, and paved roads.

Thus, nationwide there has been galloping of over a million of populace on housing backlog (Chaeruka and Munzwa, 2009). This has pushed the shape of residential space to informal and peri urban settlements, putting the urban ecological space at jeopardy. More often than not, the existing settlements have exceeded their carrying capacity stressing the environment they rest upon and occupying ESAs in the name of "land dearth". Currently the sustainability of low-income residential development consists of more questions than answers. Low-income residential AREAS have been neglected and rejected as hubs for urban ecological treasure. As such, there have been reluctant reactions on the adoption of sustainable residential development. This issue emanates from city legislators who regard ecological based planning as a bureaucratic hurdle to urban planning (Chaeruka and Munzwa, 2009).

3.1 FACILITATING FACTORS

Zimbabwe has a broad legislative framework positioned to govern environmental management. The section 4 of Environmental Management Act, chapter 20:27, 2002 enhanced environmental rights to Zimbabwean citizens. This instrument promotes environmental stewardship among urban residents. Also in relation to

nature conservation, the Forest Act of 1949 chapter 19:05 protects the urban flora, and the Parks and Wildlife Act of 1975, chapter 20:14 protects the exploitation of urban wildlife (fauna). These instruments have failed to promote the conservation of urban ecology in low-income residential areas since they have been calling for updating as they are now outdated in regard to incorporation of environmental sustainability, reform, and strengthening for their operation to be fully functional. This has been a result of the local planning authorities not using them in their full capacity. Additionally there are various institutional and administrative structures in charge of environmental management. The Ministry of Environment and Natural Resource Management (MENRM) plays a pivotal role in management of environmental resources. The National Environmental Council (NEC) alternatively supports as an advisory board to allied institutions on environmental management. There is also Environmental Management Agency (EMA), which fosters environmental policies such as Environmental Impact Assessment policy of 1997 and the National Environmental Policy of 2003. However, having various institutions in charge of the environmental management creates a situation where a lack of a clear-cut of responsibilities compromises their effectiveness. As diversity leads to generalization, these institutions have proved to be aseptic to their responsibilities regarding state of environmental sustainability in low-income residential areas.

3.2 RESTRAINING FACTORS

Enforcing environmental instruments remains difficult because of inherent weaknesses in law enforcement and development control mechanisms. The prevailing environmental policies act as edentulous bulldogs in guarding against environmental exploitation. There are often repellent reactions in the forms of abnegation, resistance, relativism, and aseptic regulatory responses (Maphosa *et al,* 2009).

As regards to local practice, this hinders the initiation and implementation of environmental conservation strategies for low-income residential areas. No direct legislative instruments exist to govern environmental sustainability of low-income residential areas as several legislative instruments and institutions lack clear responsibility of the low-income residential areas, which consequently leads to reluctance in their commitment. The Regional, Town and Country Planning Act (1996), Environmental Management Act (2000) lack concerted effort to relate with other allied supporting instruments towards embracement of environmental sustainability in low-income residential areas.

The institutional responses have been naïve to embrace ecological based planning in residential areas thus their multiplicity led to generalization in role-playing (Maphosa *et al,* 2009). Corruption exists within the phase of striking a balance between low-income residential areas and ecological based planning. The low-income housing developers play unscrupulous development practices, greasing the hands of environmental bodies and agencies to be granted development permits regardless of their adverse environmental impacts. Hence, there is need for interplay cooperation among responsible stakeholders.

The goal to achieve sustainable development is the greatest challenge humankind has ever faced, demanding a concentrated articulated effort among consumers, the housing industry and government itself (Said *et al,* 2009). For the sake of resources mobilization to foster the ecological based planning initiatives, lack of political will holds back progress.

Environmental initiatives have been regarded as bureaucratic red tape to development and housing provision having an extortionate size of housing backlog in Zimbabwe (Maphosa *et al,* 2009). Referring back to the origin of the case area Hatcliffe, it is full of political rebuttals on its existence and development. On the other hand, interventions by international organizations in the environmental management of local resources are being restrained by political connotations of illegitimacy. Drawing from the case study of Hatcliffe residential area, there are several areas calling for discourse.

Planning regulations are super-annuated to govern environmental protection. The Regional Town and Country Planning Act is backdated to 1996 where environmental aspects had not provoked hot debates

globally hence, it lacks environmental aspects as a backbone of urban planning. Several local development plans and the master plan at large are as outdated as 1984 where environmental aspects are poorly expressed if not excluded in these statutes. In addition, the current planning area characterised by high degree of inflexibility where they poorly respond to dynamics of environmental change. This invokes planning failure to address environmental issues in modern urban planning. Currently there are reluctant efforts to update these planning regulatory frameworks with speculation of persistence if no robust measures have been adopted.

The scaling down of global environmental initiatives to local levels such as the concept of ecological based planning in low-income residential development is facing hindrances of local resistance and ignorance. The developing world on the environmental discussion tables tends to favour the initiator rather than the concept. That is a great question of legitimacy rather than effectiveness, which conclusively is blind obedience rather than rational discussion. Several global environmental initiatives are rejected because of lacking legitimacy to the third world community (Potts, 2009; Termorshuzein *et al,* 2007). Worldwide environmental scientists are being blamed for interpreting global environmental issues poorly and for being poor communicators, who present environmental issues overcautiously.

The management of urban settlements raises the crucial issue of environmental democracy. However, it goes further beyond urban management, into transparency, accountability, and the rule of law, participation, reciprocity, and trust (Castels, 2000). What makes democratisation particularly relevant is the fact that by virtue of various forms of environmental management, urban centres have obtained increasing formal authority over their areas of jurisdiction, although often stopping short of a genuine devolution of decision-making power towards environmental sustainability (Gilbert *et al,* 1996).

There have been doubts over the financial feasibility of fostering ecological based planning within low-income residential areas and this has been stimulated by adoption of the techno-centrism approach rather than eco-centrism approach to environmental chastening. In addition, repellent exists as well as repudiate reactions towards initiation of densification approach to residential development pointing fingers on financial incapacities of local authorities and local communities themselves (Brand, 2006).

The current horizontal approach to residential development is exacerbating urban sprawl (encroaching to agricultural land and forestry space) which in turn is compromising the ecological networks of the urban settlements. The dearth of land is being used as an alibi as to why there has been the exploitation of ESAs for residential expansion in cities of developing countries. Having the restraining factors overweighing the facilitating instruments low-income residential areas is left at jeopardy of environmental exploitation.

4 CHARACTERISING THE STUDY AREA: HATCLIFFE

Hatcliffe is a high-density residential area situated twenty-two kilometres to the north of Harare city centre (see Figure 2). It was established in 1984 at the outskirts of Harare as a holding camp of urban migrants coming from different places in Harare: some from Churu farm, some from squatter camp in Mbare and others from nearby farms (Dirwai, 2000).

A range of low-income dwellers posing strains on the environment comprises it. Being located on the former peri-urban farm of red soils, it is surrounded by suburbs of high-income earners, Hodget Hill and Philadelphia.

The residential area was originally designed to meet the housing needs of a small population, but housing demand increased rapidly (Chirisa and Muchini, 2011; Dirwai, 2000). The remarkable increase in housing demand has exceeded the ecological carrying capacity of the residential settlement considering the stress on the ecological treasures by residential development. The residential area comprises of ecologically sensitive areas of wetland bands (see Figure 2).

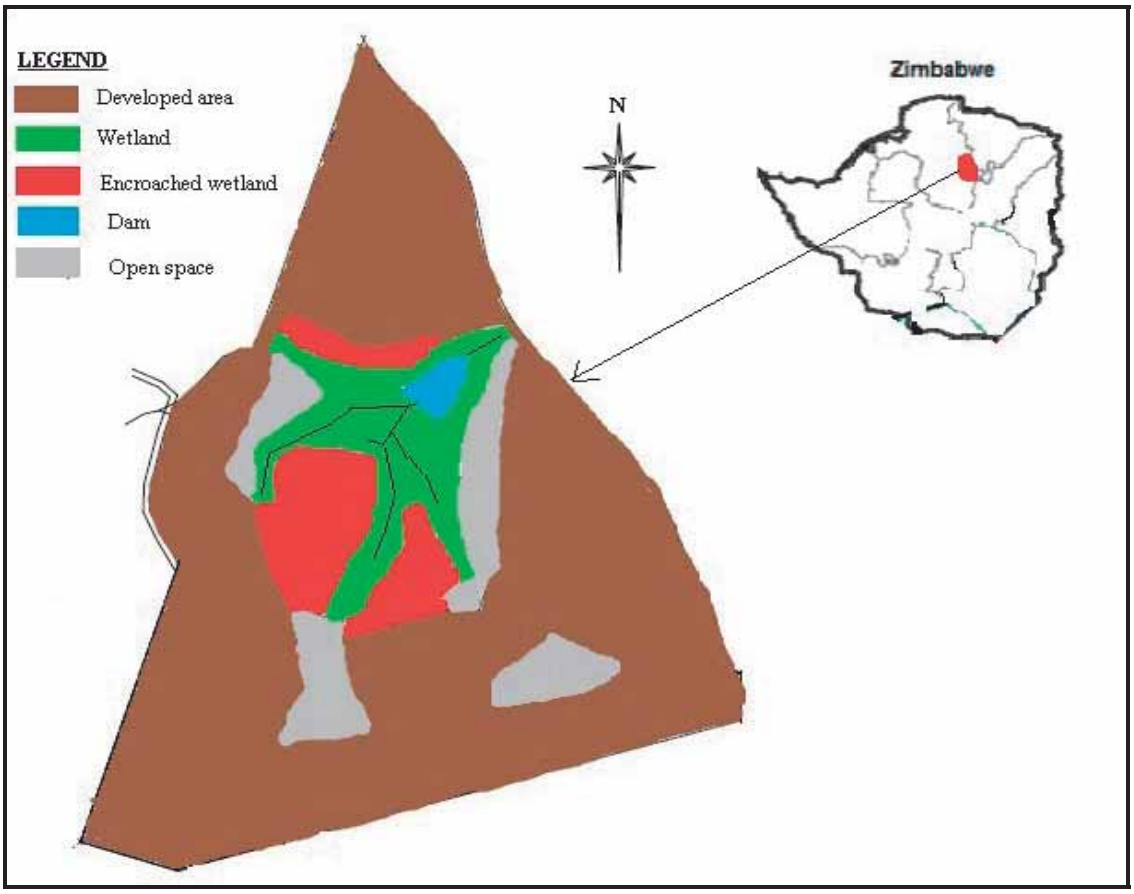

Fig. 2 Land-use simulation for Hatcliffe

Hatcliffe is characterised by several informal urban practices cross cutting urban agriculture, wildlife exploitation with negative implications on the urban environment. In terms of green space management, there has been exploitation of the major wetland area for urban agriculture by the local residents as a poverty eradication strategy. The local dam in Hatcliffe has majorly multifaceted with several indicators of environmental pollution such as water hyacinth (*Eichhornia crassipes*) as evidence of eutrophication from excessive use of agricultural chemicals in the practice of urban agriculture within wetland areas and idle pieces of land (see Figure 3). This depicts priority dilemma between environmentalism and urban poverty where there is need to strike a balance between the two poverty and environmentalism of which policy makers in the developing world prioritize poverty eradication for various rationalities.

Indiscriminate solid waste disposal has been remarkable on residential space due to inefficient and ineffective waste collection system; these wastes pose danger to aquatic lives and compromises environmental health for the local residents (see Figure 4). There are no waste recycling mechanisms in the residential area and lack of environmental stewardship cooked by inefficient municipal waste collection systems, which have led to dumping of waste haphazardly and aesthetically displeasing whilst compromising health of the community (see Figure 4). This problem has not received enough attention from local authorities.

The construction in the residential area rises certain environmental concerns since the manufacturing of commonly used farm bricks pose environmental defects emitting green house gases from firewood used on the manufacturing at the same time depleting forestry resources of the area (see Figure 5).

There is a pattern of gullied settlement landscape due to indiscriminate extraction of building materials for brick making and construction.

Fig 3: Eutrophication from urban agricultural chemicals

Fig 4: Indiscriminate Waste Dumping

Poverty has exacerbated environmental exploitation by the local residents, as they have no other option than exploiting the environment to subsist. Hatcliffe residential area is characterised by low density vegetation and high usage of firewood. Burning firewood is used as an alternative energy to compensate for electricity power cuts. This practice exacerbates the destruction of (ESAs) (see Figure 6). This also has been contributing to green house gases emissions posing adverse effects at both local and global scale. These practices have become the normal life of Hatcliffe inhabitants. Striking the status of the residential settlement as a hub of ecological treasure is perceived as towers of ivory.

The conscience of protecting the remaining ecological treasures among the local residents has been defused by such factors hence there need for tools of social mobilization towards environmental stewardship.

Wildlife seems to be non-existent in the residential areas, as the confined wildlife habitats have been exploited by agricultural practices and firewood harvesting (see Figure 7).

The local residents had no conscience of their extinction out of ignorance and lack of option to address urban poverty. There are no mechanisms in place to protect urban wildlife from human interference. The residential settlements are just conventional landscapes devoid of wildlife habitats, and the human species forget to incorporate what used to habitat there before artificial development due to agricultural practices (see Figure 7).

Fig. 5: Unsustainable conventional construction of houses

5 DISCUSSION

Priority dilemma subsists on whether to conserve urban nature, when the people are hungry in their stomachs and have a shortage of housing (Maphosa *et al,* 2009). This dilemma dilutes nature conservation priorities in an economy multifaceted with unaddressed problems that cut across economic, social and political realms. From the study area, one informant clarified that *"hatingachengete sora isu tichifa nenzara itsika yechitema kurima, zvakabva kumadzitateguru edu, varungu ndovanorimira mumasupermarket chete"* (we cannot conserve weeds while dying of hunger; it is our tradition to practice agriculture, only whites rely on food from supermarkets). When people lack financial resources, they often had a little choice but to take what they can from the environment as a survival strategy (Chenje and Johnson, 1994). It clarifies why the local populace exploit the wetland bands for agriculture and open space invasion in low-income residential areas.

Fig. 6 Brown landscapes in the residential space

Fig 7: Wetland exploitation for urban agriculture

This has led to a critical situation of "Farming houses, yielding exploited environment" which is detrimental to sustainability of urban space. At the same time ecological illiteracy has led to ecologically sensitive areas being regarded as waterlogged areas, unsuitable for development in the immediate and short-term, rather than areas rich in the flora and fauna species. Social resistances are common where society perceives environmental conservation in a reluctant manner mimicking the parable of boiling frog. *If you take a frog and put it in hot water, it can quickly jump out with some injuries as a reaction to high temperatures, but if you put it in cool water and gradually heat, it you will get frog soup.* This is related to how the society react to challenges where instant (hot) problems receive quick attention and high priority whilst gradual problems such as environmental issues receive less concern. The society is blinded by short-term benefits of degrading the environment (*warmth*) until they are caught in the destruction of human life due to environmental destruction (*boiling water),* which will be too late.

5.1 POLICY ALTERNATIVES

For fruition of ecologically conscious low-income residential development, there is need to espouse the following measures into praxis:

- Incorporate traditional ecological conservation strategies into modern residential planning in Harare.
- Reform and revise town planning instruments towards ecological-based planning.
- Strengthen legislative frameworks that govern environmental management in low-income residential areas.
- Reform the building standards by-laws *vis-a-vis* residential development on environmental sustainability.
- Strengthen responsible institutions' proactive and reactive measures to environmental conservation.
- Promote ecological education awakening to enhance ecological literacy among local residents.
- Initiate and coordinate public, private partnerships in promoting environmental conservation to maximize financial and institutional capacities.

- Harness Indigenous knowledge of the development area in formulation of environmental conservation strategies.
- Adopt a participatory planning approach to environmental conservation to enhance public participation and environmental stewardship amongst environmental stakeholders.
- Formulate poverty eradication strategies devoid of ecological destruction in Hatcliffe residential area.

6 CONCLUSION

The paper explored the capacities, opportunities and constraints of implementing the principles of ecological-based planning into low-income residential development with the purpose of achieving sustainable settlements. It explores the existing legislative, policy and institutional approaches to the environmental planning of low-income residential settlements in Harare. Our study concludes that the restraints overweighed the capacities available, thus the development of low-income housing requires considerable planning intervention. The findings of this study call for a robust implementation of environmental conservation strategies, the propagation of a strong environmental stewardship, and the need for responsive institutional and funding mechanisms backed by realistic and updated legislative framework and robust policy rectification. The conjugate faces common urban challenges, which require uncommon treatment to celebrate the ecological cities' success story.

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IMAGE SOURCES

Fig. 1: Authors' creation (2013)

Fig. 2: Adapted from Google Earth (2013)

Fig. 3: Field Surveys by authors (2013)

Fig. 4: Field Surveys by authors (2013)

Fig. 5: Field Surveys by authors (2013)

Fig. 6: Field Surveys by authors (2013)

Fig. 7: Field Surveys by authors (2013)

AUTHOR'S PROFILE

Innocent Chirisa

Senior lecturer and teacher at courses in environmental planning and urban planning; author of more than 45 articles in referred journals, 5 book chapters and 3 books.

Archimedes Muzenda

He is an undergraduate final year student in the Department of Rural & Urban Planning in Zimbabwe; he is a kin researcher in the areas of urban planning, urban design and environmental planning and management.

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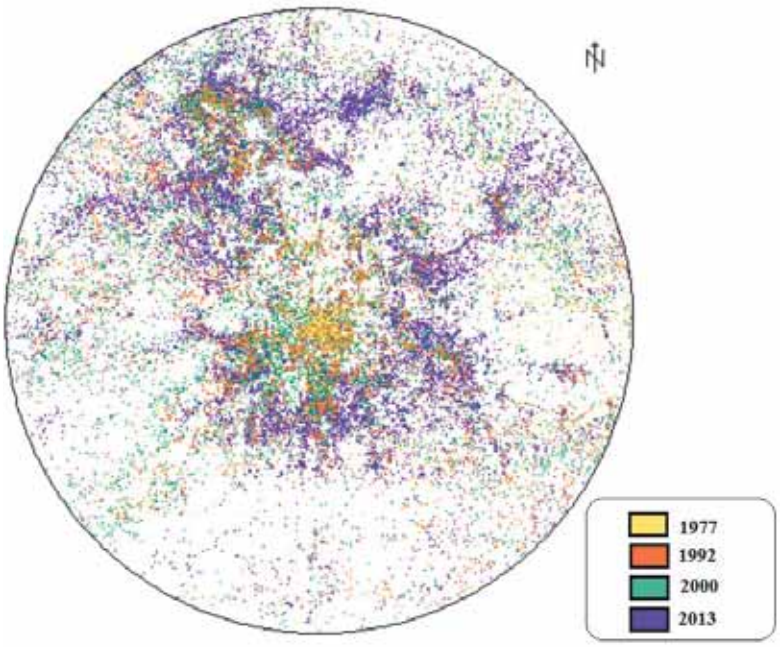

URBANISATION PATTERN OF INCIPIENT MEGA REGION IN INDIA

RAMACHANDRA T V[a,b,c], BHARATH H AITHAL[a,b], BEAS BARIK[a]

[a] Energy & Wetlands Research Group, Center for Ecological Sciences [CES]

[b] Centre for Sustainable Technologies (astra)

[c] Centre for infrastructure, Sustainable Transportation and Urban Planning [C*i*STUP]
Indian Institute of Science, Bangalore, Karnataka, 560 012, India
e-mail: *cestvr@ces.iisc.ernet.in*
URL: http://ces.iisc.ernet.in/energy; http://ces.iisc.ernet.in/foss

ABSTRACT

Urbanisation refers to the growth of the towns and cities due to large proportion of the population living in urban areas and its suburbs at the expense of its rural areas. Unplanned urbanisation leads to the large scale land use changes affecting the sustenance of local natural resources. This necessitates an understanding of spatial patterns of urbanisation to implement appropriate mitigation measures. The focus of the current study is to analyse the spatial patterns of urbanisation and sprawl in Pune city with 10 km buffer using temporal remote sensing data through geo-informatics and spatial metrics. Land use analyses of the city with a buffer of 10km reveals that there has been a significant increase of built-up land from 2.96% (1977) to 20.4% (2013) with the reduction of vegetation from 22.49 to 17.96%. Shannon entropy reveal the tendency of sprawl in NW direction. Zone and Gradient-wise spatial metrics analysis is done to understand the spatial patterns of urbanisation at local levels. The analysis suggests that urbanisation has caused fragmentation with adjacencies in buffer zones. Spatial metrics substantiate rampant sprawl at the peri-urban regions and infilling at city centre. However, this value has reduced in 2013 indicating of reaching the threshold of urbanization. These analyses highlight of the significant changes in land cover with the decline in vegetation, water bodies, etc. This necessitates an integrated approaches in urban planning to ensure the sustenance of water, moderation of micro climate, etc. Conservative urban planning would take into account the sustenance of natural resources and people's livelihood aspects. Visualization of urban growth at local levels helps the urban planners and decision-makers in understanding the role of policy decisions (industrialization, etc.) on land use dynamics, which helps in evolving region specific development strategies to mitigate the potential impacts on the urban environment.
This research provides the details of land use and its development for guiding scientific-based decision support and policy making.

KEYWORDS: Pune; Urban Sprawl; Landscape Metrics; Shannon Entropy; India.

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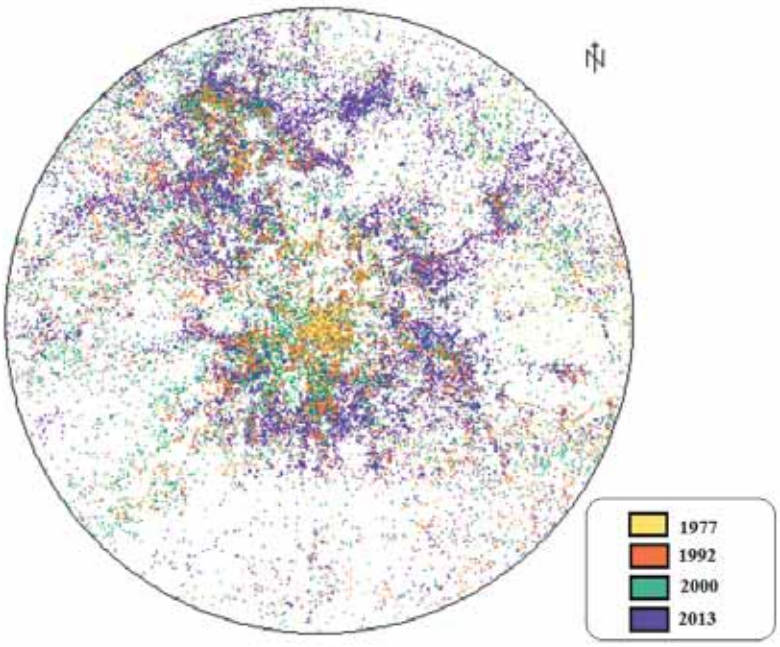


印度初期大都市圈的城市化模式

RAMACHANDRA T V[a,b,c], BHARATH H AITHAL[a,b], BEAS BARIK[a]

[a] Energy & Wetlands Research Group, Center for Ecological Sciences [CES]

[b] Centre for Sustainable Technologies (astra)

[c] Centre for infrastructure, Sustainable Transportation and Urban Planning [C*i*STUP]
Indian Institute of Science, Bangalore, Karnataka, 560 012, India
e-mail: *cestvr@ces.iisc.ernet.in*
URL: http://ces.iisc.ernet.in/energy; http://ces.iisc.ernet.in/foss

摘要

城市化是指大部分人口居住在市区和郊区并以牺牲其农村地区利益为代价的城镇和城市的增长。无序的城市化可导致土地利用的大规模转变，从而造成当地的自然资源无法维系。因此，这就需要对城市化的空间模式有所了解，以便采取适当的缓解措施。 此次研究的重点是分析普 市及其10 公里缓冲带范围内的城市化和扩张的空间模式，采用的是通过地理信息学和空间测量得到的时相遥感数据。对该市及其10公里缓冲带范围内的土地利用分析发现， 建设用地从2.96%（1977年）大幅增长至20.4%（2013年），而植被覆盖则从22.49%降至17.96%。香农熵揭示城市向西北方向蔓延的趋势。为了解局部层面的城市化空间模式，进行了区带和梯度式空间测量分。分析表明城市化已经在缓冲带内的毗邻区域造成破碎化。空间测量证实了城市化在城乡结合部的大肆蔓延和对城市中心的不断挤占。但此值在2013年已有所降低，表明城市化进程达到临界点。该项研究为科学决策和制定政策提供了土地利用和开发的详细资料。

关键词
熵；城市化； 大都市圈；普纳.

1 INTRODUCTION

Cities origin can be traced back to the river valley civilizations of Mesopotamia, Egypt, Indus Valley and China. Initially these settlements were largely dependent upon agriculture, however with the growth of population the city size increased and the economic activity transformed to trading. The process of urbanisation gained impetus with industrial revolution 200 years ago and accelerated with globalization in 1990's.

Urbanisation refers to the growth of the towns and cities due to large proportion of the population living in urban areas and its suburbs at the expense of its rural areas. In most of the countries the total population living in the urban regions has extensively accelerated since the Second World War. Current global population is 7,057,075,000 billion (Population Reference Bureau, 2005; United Nations, 2011). The rapid urbanization of the world's population over the 20th century is evident (Revision of the UN World Urbanization Prospects report, 2005) from the dramatic increase in global urban population from 13% (220 million, in 1900), to 29% (732 million, in 1950), to 49% (3.2 billion, in 2005) and is expected to increase to 60% (4.9 billion) by 2030 (Ramachandra and Kumar, 2008; Ramachandra et. al., 2012) and 9.6 billion in 2050 (United Nations, 2011).Urban population has been increasing three times faster than the rural population, mainly due to migration in most parts of the world (Girardet 1996; Massey et. al., 1999).

People migrate to urban areas with the hope of a better living, considering relatively better infrastructural facilities (education, recreation, health centres, banking, transport and communication), and higher per capita income. However, rapid unplanned urbanization has led to serious problems in urban areas due to higher pollution (air, water, noise) inequitable distribution of natural traffic congestion, development of shanty towns and slums, unemployment, increased reliance on fossil fuels, and uncontrolled outgrowth or sprawl in the periphery

The direct implication of such urbanisation is the change in land use and land cover of the region. Urban ecosystems are the consequence of the intrinsic nature of humans as social beings to live together (Sudhira, et al., 2003). The process of urbanisation contributed by infrastructure initiatives and consequent population growth and migration results in the growth of villages into towns, towns into cities and cities into metros. However, in such a phenomenon for ecologically feasible development, planning requires an understanding of the growth dynamics. Nevertheless, in most cases there are lot of inadequacies to ascertain the nature of uncontrolled progression of urban sprawls.

Urban sprawl refers to the dispersed development along highways or surrounding the city and in rural countryside with implications such as loss of agricultural land, open space and ecologically sensitive habitats. Sprawl is thus a pattern and pace of land use in which the rate of land consumed for urban purposes exceeds the rate of population growth resulting in an inefficient and consumptive use of land and its associated resources. This phenomenon is characterized by an unplanned and uneven pattern of growth, driven by multitude of processes evident from lack of basic amenities. Urban sprawl is thus a term often used variously to mean the gluttonous use of land, uninterrupted monotonous development, leapfrog discontinuous development and inefficient use of land that are influenced by a myriad of factors, including land features, infrastructure, policies, and individual characteristics. This is characterised by low levels of some combination of eight distinct dimensions such as density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity (Sudhira, et al., 2004; Ramachandra, et al., 2012a).

Process of urbanisation bring the development of a region (Verzosa and Gonzalez, 2010), which could be planned (in the form of townships) or unplanned (organic). Unplanned urbanization leads to the haphazard or irregular growth with the loss of green spaces and water bodies. Dispersed urban growth without proper infrastructure and basic amenities is often referred as sprawl (Yeh and Li, 2001; Sudhira et al., 2004; Verzosa and Gonzalez, 2010, Bharath H A et al., 2012, Bharath S et al., 2012) and this phenomenon is widespread in developing countries (Bhatta et al., 2010a; 2010b). Implications of sprawl are excess demand

on natural resources, improper allocation of basic amenities and infrastructure, (Ramachandra et al., 2012b), deteriorating water quality, an increased potential for harboring disease vectors, etc. Large scale land use and land cover (LULC) changes, such as the loss of forests to meet the urban demands of fuel and land (Ramachandra and Kumar, 2009) has led to the changes in the ecosystem structure, impacting its functioning and thereby threatening sustainable development (Yeh and Li, 1999; Ji et al., 2001; Chen et al., 2005; Xiao et al., 2006; Liu et al., 2007; Ramachandra et al., 2013).

Urban expansion is one of the most direct forms of land use change, and refers specifically to changes in land use patterns and urban space distribution resulting from the social and economic pressures (Pathan et al. 1989, 1991; Gillies et al., 2003; Alphan et al., 2009; Bhatta 2009; Ramachandra and Bharath, 2012a). Land cover changes involving the disappearance of ecologically vital natural systems is the major concern in developing countries (Taubenbock, 2009; Ramachandra et al., 2012a). This has necessitated the understanding of spatial patterns of urbanisation and quantification of changes. Several earlier studies have addressed issues relating to urbanisation in relation to energy, land use and climate (Roth et. al., 1989; Grimm et. al, 2000; Voogt and Oke, 2003; Bharath H. A et al., 2012, Vinay et al., 2012).

Analysis of the urbanisation process and provision of appropriate management strategies requires monitoring of the spatial extent of urbanisation with the location (Kong et. al., 2012).Availability of temporal data through space borne sensors with geographic information system (GIS)has aided in the understanding of spatial patterns and visualization of urbanization with environmental implications (Clapman, 2003; Sutton, 2003; Gillies et al., 2003; Martinuzzi et. al., 2007; Yang et al., 2003; Lopez et al., 2001; Ramachandra et al., 2012b). Remote sensing data provides a birds-eye view of urban land-use changes at regular intervals. Geographic information system (GIS) enables spatial analysis of temporal data, which aid in understanding land use dynamics. Land use (LU) indicates the socio-economic use of land (for example, agriculture, forestry, recreation or residential use), which implies the purpose for which land is employed (Codjoe, 2004) or activities humans undertake inducing a change or maintain it (Di Gregorio and Jansen, 1997; Jansen and Di Gregorio, 1998; Codjoe, 2004).

The spatial patterns elucidate the heterogeneity and complexity of the urban patches in the landscape (Uuemaa et al., 2009) that can be measured using spatial metrics that help in quantifying and monitoring the urban growth (Sudhira et al., 2003; Ramachandra and Bharath., 2012b; Ramachandra et al., 2012a).Landscape structure is a prime factor in analysing the pattern and effects the various natural processes (Molles, 2006), which is determined by size, shape, composition of land use patches within the landscape. The analysis of structure of the landscape is essential to understand the implications of land use changes. In this regard, spatial metrics with a robust mathematical framework help to understand and quantify the spatial patterns of urbanisation (Gustafson, 1998; Sudhira et al., 2004; Herold et al., 2003; Uuemaa et al., 2009; Bharath H.A et al., 2012). Spatial metrics can be computed using Fragstats and Patch Analyst. Fragstats is designed to compute a wide variety of spatial metrics to understand landscape dynamics (McGarigal and Marks, 1995). India has been experiencing urbanisation subsequent to globalisation and opening Indian markets during 1990's. Pune city is the eighth populated Indian city with higher economic growth, industrial development and IT sectors has been experiencing rampant land use changes. However, unplanned urbanisation in most cities in India including Pune has enhanced the environmental concerns in recent years (Bhaskar, 2012). Pune city with sprawl is facing lack of infrastructure and basic amenities such as sanitation, housing, improper drainages, transportation, etc. (Desai et al., 2009). This has necessitated the analysis of spatio temporal patterns of urbanisation for implementing appropriate policy measures to mitigate environmental consequences.

The focus of the current paper is to understand the spatial patterns of urbanisation through (I) the analysis of land use dynamics, (ii) investigation of sprawl through Shannon's entropy and (iii) patterns of urbanisation through spatial metrics using gradient and zonal approach.

2 STUDY AREA

Pune, earlier known as Poona is the cultural capital of Maharashtra and is also known as "Queen of Deccan" as it is located atop the Deccan Plateau and also "Oxford of East" and "Detroit of India". Pune is located in the western part of Maharashtra state between 18°32´ N and 72° 51´E at a height of 560 m above mean sea level. It lies near the confluence of the Mula-Mutha River. Rivers Pavana and Indrayani flows along the north-western outskirts of the urban area. The Pune Municipal Corporation covers an area of 243.84 sq. kms. Pune has a tropical wet and dry climate, with three distinct seasons- Summer(March to May), Monsoon (June to September) and Winter (November to January).The River Bhima flows through the city and provide water supply for the domestic, commercial and irrigation purpose. Rice, Jowar, Bajra, sugarcane, groundnut and sunflower are major crops grown in the Pune. Fig. 1 depicts the population dynamics during 1901 to 2011 showing an increase by 347% during the last 110 years. Pune being one among incipient mega cities in India has seen the large scale development in recent times. Population of Pune has increased by 2 million to 9 million (Census 2011) from 7 million in 2001 (Census 2001, JNNURM, 2006-2012). Fig. 1 shows the population statistics of Pune in last 100 years.

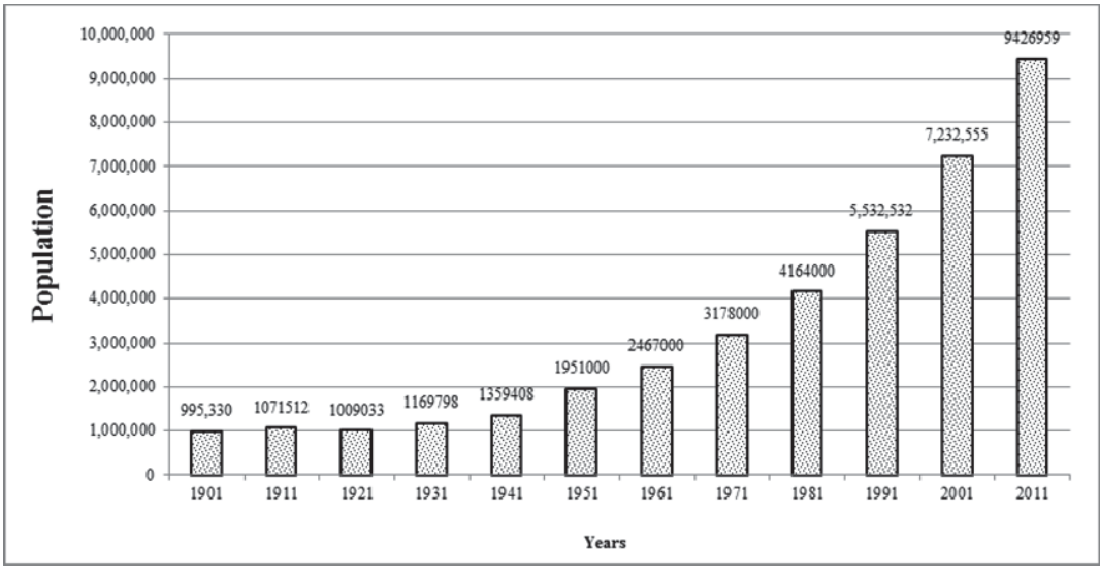


Fig. 1: Growth of population in Pune

Pune Municipal Corporation with forty-eight wards is the civic body that is responsible administration and infrastructure development of the city and it is known as the Pune Mahanagar Palika (PMP). The current study has been carried out in a region of 1524.4 sq. km consisting of municipal corporation administrative region with 10 km buffer. Buffer of 10 km is considered to account the growth in the peri-urban regions (Fig. 2). Time series spatial data acquired through Landsat Series Multispectral sensor (57.5m) and thematic mapper (30m) and Landsat 8 operational image scanner (30m) sensors for the period 1973 to 2013 were downloaded from a public domain Global Land Cover Facility (http://www.glcf.umd.edu/index.shtml) and (http://www.landcover.org/). Survey of India (SOI) topographic sheets of 1:50000 and 1:250000 scales were used to generate base layers of city boundary, training sites, etc.

3 METHOD

Spatial pattern of urbanisation is assessed using temporal remote sensing data of 1977 to 2013. The analysis is outlined in Fig. 3, which includes pre-processing, analysis of land cover and land use, and finally spatial patterns analysis through gradients and zones using spatial metrics.

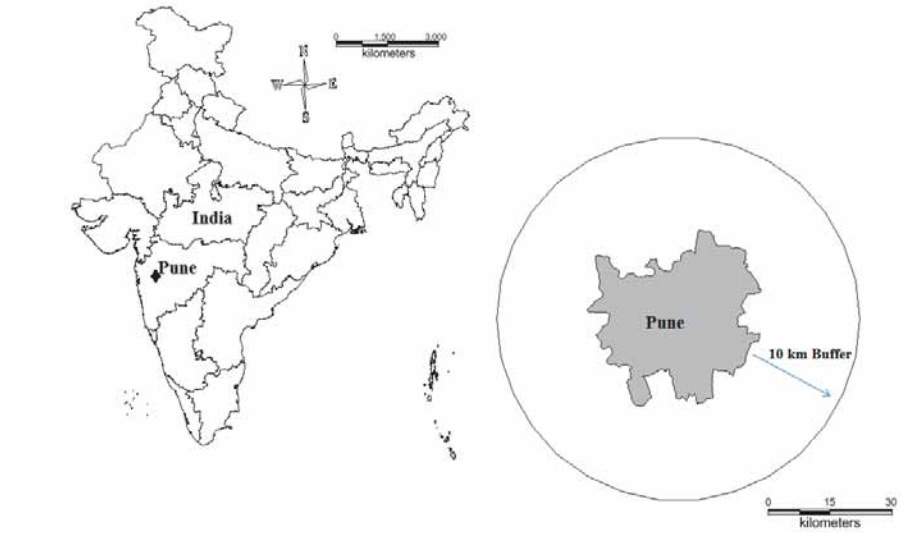


Fig. 2: Study area considered, Pune and 10km buffer.

The study region includes Pune administrative area with 10 km buffer to account pockets at city outskirts experiencing sprawl.

Pre-processing: Remote sensing data (Landsat series) for Pune, acquired for different time periods, were geo-corrected and cropped pertaining to the study area. Geo-registration of remote sensing data (Landsat data) has been done using ground control points collected from the field using pre calibrated GPS (Global Positioning System) and also from known points (such as road intersections, etc.) collected from geo-referenced topographic maps of the Survey of India.

The Landsat satellite data of 1977 (with spatial resolution of 57.5 m x 57.5 m (nominal resolution) were resampled to 30 m in order to maintain uniformity in spatial resolution of data across time periods 1992 - 2013 (30 m x 30 m (nominal resolution)).

Land Cover analysis: Land cover analysis was performed to understand the changes in the vegetation cover through Normalised Difference Vegetation Index (NDVI), which ranges from -1 to +1. Very low values of NDVI (-0.1 and below) correspond to soil or barren areas of rock, sand, or urban built up. Zero indicates water cover. Moderate values represent low density vegetation (0.1 to 0.3), while high values indicate thick canopied vegetation (0.6 to 0.8).

Land use analysis: The method involves i) generation of False Colour Composite (FCC) of remote sensing data (bands – green, red and NIR). This helped in locating heterogeneous patches in the landscape ii) selection of training polygons (these correspond to heterogeneous patches in FCC) covering 15% of the study area and uniformly distributed over the entire study area, iii) loading these training polygons co-ordinates into pre-calibrated GPS, iv) collection of the corresponding attribute data (land use types) for these polygons from the field. GPS helped in locating respective training polygons in the field, v) supplementing this information with Google Earth, vi) 60% of the training data has been used for classification, while the balance is used for validation or accuracy assessment.

Land use analysis was carried out using supervised pattern classifier -Gaussian Maximum Likelihood Classifier (GMLC) algorithm using various classification decisions based on probability and cost functions (Duda et al., 2000, Ramachandra et al., 2012a, Ramachandra et al., 2012d).

Remote sensing data was classif ed using training data of all land use types as detailed in table 1. Mean and covariance matrix are computed using estimate of maximum likelihood estimator.

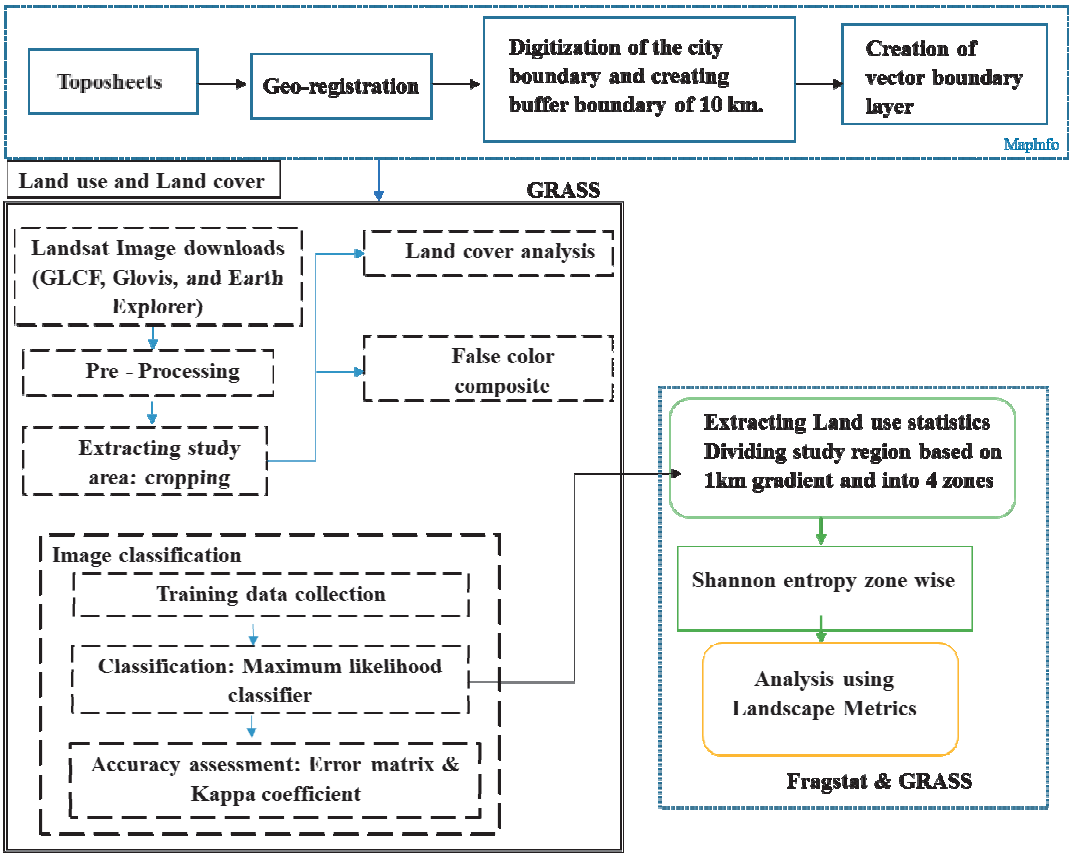


Fig. 3: Procedure followed in analysis

Land use Class	Land uses included in the class
Urban	This category includes residential area, industrial area, and all paved surfaces and mixed pixels having built up area.
Water bodies	Tanks, Lakes, Reservoirs.
Vegetation	Forest, Cropland, nurseries.
Others	Rocks, quarry pits, open ground at building sites, kaccha roads.

Table 1: Land use classification categories

Land use was computed using the temporal data through the open source program GRASS - Geographic Resource Analysis Support System (http://ces.iisc.ernet.in/foss). Signatures were collected from field visits and with the help of Google Earth. 60% of the total generated signatures were used in classification, 40% signatures were used in validation and accuracy assessment.

Statistical assessment of classifier performance based on the performance of spectral classification considering reference pixels is done which include computation of kappa (κ) statistics and overall (producer's and user's) accuracies (Mitrakis et al., 2008, Congalton et al., 1983).

Accuracy assessment and Kappa coefficient indicate the effectiveness of the classifier (Congalton, 1991; Lillesand & Kiefer, 2005). Recent remote sensing data (2013) was classified using the training data collected from field using GPS and earlier time period, training polygon along with attribute details were compiled from the previously published topographic maps, vegetation maps, revenue maps, etc.

Division of these zones to concentric circles (Gradient Analysis): All of the zones were divided into concentric circles with a consecutive incrementing radius of 1 km from the centre of the city. This analysis helped in visualising the process of change at local levels and understand the agents responsible for the changes. This helps in identifying the causal factors and locations experiencing various levels (sprawl, compact growth,

etc.) of urbanization in response to the economic, social and political forces. This approach (zones, concentric circles) also helps in visualizing the forms of urban sprawl (low density, ribbon, leaf-frog development).

The built up density in each circle is monitored over different time period through time series analysis. This helps the city administration in understanding the urbanization dynamics to provide appropriate infrastructure and basic amenities. Shannon's Entropy (Hn): Further to understand the growth of the urban area in a specific zone and to understand if the urban area is compact or divergent, Shannon's entropy (Lata et al., 2001; Ramachandra et al., 2012a) given in equation 1, was computed for each zone.

$$Hn = -\sum_{i=1}^{n} Pi \log(Pi) \quad \ldots\ldots (1)$$

Where, Pi is the proportion of the built-up in the i^{th} concentric circle. If the distribution is maximally concentrated, the Shannon's Entropy (H_n), of zero is obtained. If distribution is evenly among the concentric circles, H_n will have maximum of log n.

Computation of spatial metrics: Spatial metrics are helpful to quantify spatial characteristics of the landscape. Select spatial metrics with details given in Table 2, were computed to analyse and understand the urban dynamics through FRAGSTATS (McGarigal and Marks in 1995) at three levels: patch, class and landscape levels.

Indicator	Formula
Number of patches(Built-up)(NP)	$N = n_i$; Range: NP≥ 1
Patch Density (PD)	$PD = \frac{n_i}{A}(10{,}000)(100)$; Range: PD> 0
Normalised landscape shape Index (NLSI)	$NLSI = \frac{e_i - \min e_i}{\max e_i - \min e_i}$; Range: 0 to 1
Total edge	TE=E, E=no of edges, TE ≥ 0, without limit.
Edge Density	$ED = \frac{E}{A}$; Range: ED ≥ 0
Clumpiness Index (Clumpy)	$G_i = \left[\frac{g_{ii}}{(\sum_{k=1}^{m} g_{ik}) - \min e_i}\right]$ $CLUMPY = \begin{cases} \left[\frac{G_i - P_i}{P_i}\right] & \text{for } G_i < P_i \text{ and } P_i < 5; \text{else} \\ \frac{G_i - P_i}{1 - P_i} & \end{cases}$ Range: Clumpiness ranges from -1 to 1
Percentage of Land adjacencies (Pladj)	$PLADJ = \left(g_{ii} / \sum_{k=1}^{m} g_{ik}\right)(100)$ g_{ii} = number of like adjacencies (joins) between pixels of patch type (class) i based on the *double-count* method. g_{ik} = number of adjacencies (joins) between pixels of patch types (classes) i and k based on the *double-count* method. 0<=PLADJ<=100
Cohesion Index	$Cohesion = \left[1 - \left(\sum_{j=1}^{n} P_{ij} / \sum_{j=1}^{n} P_{ij}\sqrt{a_{ij}}\right)\right]\left[1 - \frac{1}{\sqrt{A}}\right]^{-1} * 100$ Range:0≤cohesion<100

Table 2. Landscape Metrics used in analysis

4 RESULTS

Land cover analysis: Land cover computed through NDVI, shows a decline of vegetation from 26.62% (1977) to 21.32% (2013) and year wise changes are tabulated in table 3 and depicted in Fig. 4.

Land use analysis: Land use analysis was performed to classify into four categories through GMLC using training data collected from the field, Google earth and SOI toposheets. Fig. 5.The statistics calculated is as tabulated in table 4. The results show that the urban paved surface increased by around 689 times from 3% to 10%. The analysis showed the increase in vegetative cover which can be attributed to increase in

agricultural area with crop. Water class remained fairly constant and other class which included open area, agricultural plots without crop decreased overtime from 73% to 60 %.

Urban growth in past 4 decades in the study region can be seen in Fig. 6, this explains growth of urban land use in every decade. Assessment of land use dynamics helps in understanding the trends of urban expansions.

This illustrates the maximum growth in South-East, North-East and North-West directions and occurs mainly in the gradients near the centre. Minimal growth or marginal growth compared to central gradients is seen in buffer zones and the periphery.

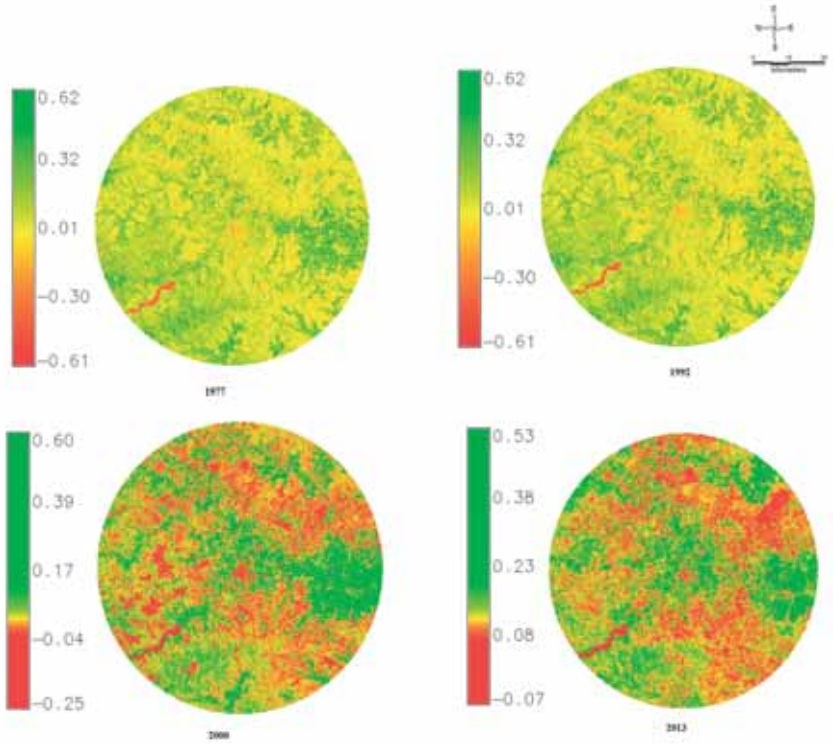


Fig. 4 land cover of Pune with 10 km buffer

Land cover in %	Vegetation	Non-Vegetation
1977	26.62	73.38
1992	16.74	83.26
2000	16.42	83.58
2013	21.32	78.68

Table 3: Land covers statistics for the study region

Accuracy assessment: Accuracy assessment of the classified images was done through the computation of overall accuracy and kappa statistics as shown in table 5. Overall accuracy ranges from 81% to 94%.

Urban growth in each decade is as represented in Fig. 6.

Shannon entropy: Shannon entropy was computed zone wise (by dividing the region into 4 parts based on cardinal directions and with one km incremental radius from the center). The Values close to log of the gradients in each direction explains that the region is completely fragmented and has experienced sprawl. The values close to zero indicated clumped central core growth.

The results of the analysis are as shown in Fig. 6. The values show that there is influence sprawl in the region especially in NW and NE directions.

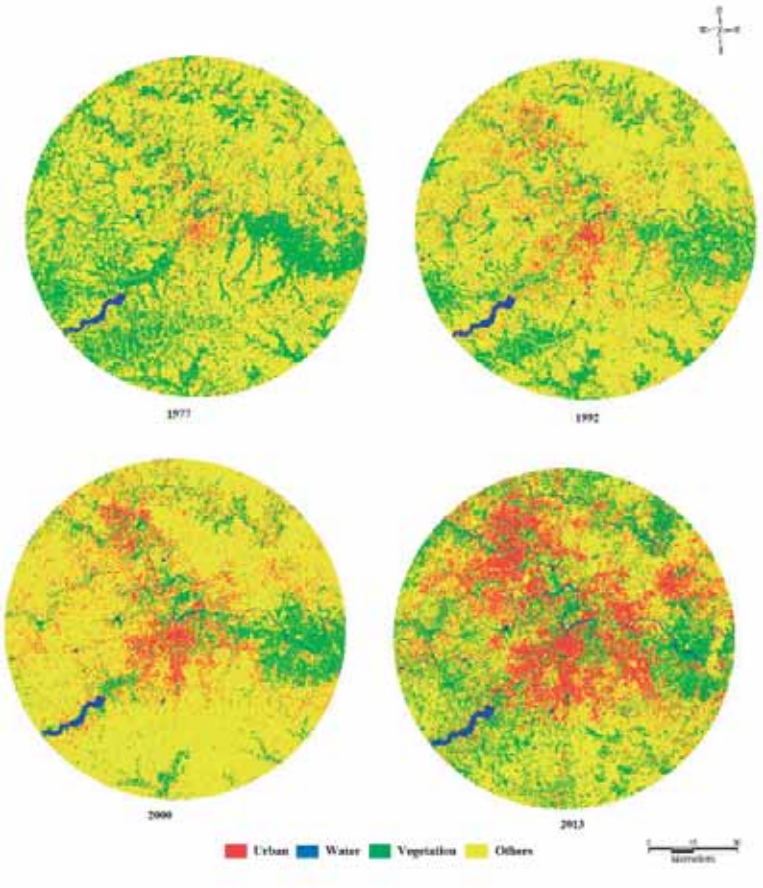


Fig. 5 Land use of Pune with 10 km buffer

Land use in %	Urban	Water	Vegetation	Others
1977	2.96	0.92	22.49	73.63
1992	5.09	1.33	14.09	79.49
2000	9.46	1.21	12.13	80.10
2013	20.40	1.75	17.96	59.89

Table 4: Land use statistics for the study region

1977		1992		2000		2013	
OA	κ	OA	κ	OA	κ	OA	κ
81	0.82	91.2	0.9	93.1	0.9	94.6	0.91

Table 5: Overall Accuracy and kappa statistics of classified images

The values are as high as 0.52 in NW and 0.41 in NE are just midway of log (22) (22 gradients) = 1.3. Shannon Entropy highlights that the region is experiencing land transformation from centric growth to multi-dimensional fragmented growth.

This growth might create more concentrated unconnected patch growths, leading to haphazard development without basic facilities, thereby impacting the local environment.

This indicates that the region has to be monitored gradient wise to understand the specific pockets of growth that will help city managers to plan further developments (Fig. 7). Thus an analysis of landscape metrics gradient wise and zone wise was carried out.

Spatial patterns of urbanisation: Spatial pattern of urbanization were assessed zone-wise for each gradient through select spatial metrics.

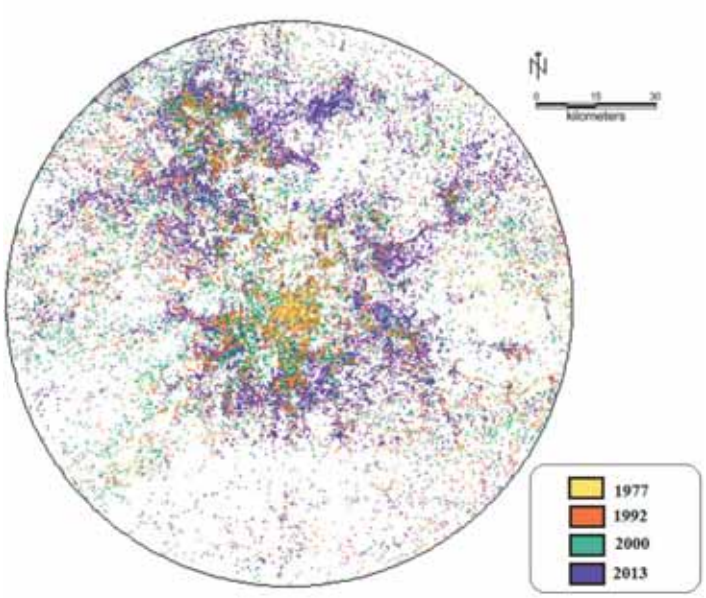


Fig.6 Urban growth pattern

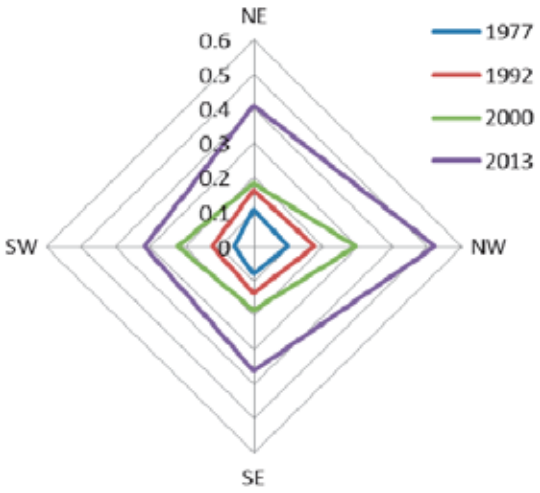


Fig. 7 Shannon entropy index calculated

Number of Urban patches (NP) and Patch density (PD): These metric quantifies patches that helps to identify the level of fragmentation (Fig. 8a). Higher the number of patches, then the region is under fragmentation. Patch density analogous to NP reflects number of patches per unit area is given in Fig. 8(a) and Fig. 8(b). Highlights that Pune had clumped growth during 70's and 90's in all zones and confined to the core areas of the city. Post 2000 the city showed the signs of fragmentation especially in north-west and north-east directions with values reaching 500 patches in near periphery. Buffer zones also show similar trends with approximately 200 patches on an average, and 800 patches (2013) in all directions resulting in higher patch densities which indicates of sprawl in the region.

Total edges and edge density: Edges and edge density basically are indicator of fragmentation in the landscape. Edge density represents denseness of the patches/edges in the landscape. Edges in 1977 across all zones and circles indicates that the core of the city are clumped. Further, post 1992 edges have increased highlighting fragmented out growth. In 2013, Gradients covering the inner core are clumped in the north-east and north-west directions, and the outskirts are with large number of edges (~300000 edges) in NW and NE directions. Density of 1.5 signify higher edges. Fig. 8c and 8(d) represents outputs of Total edge and Edge density.

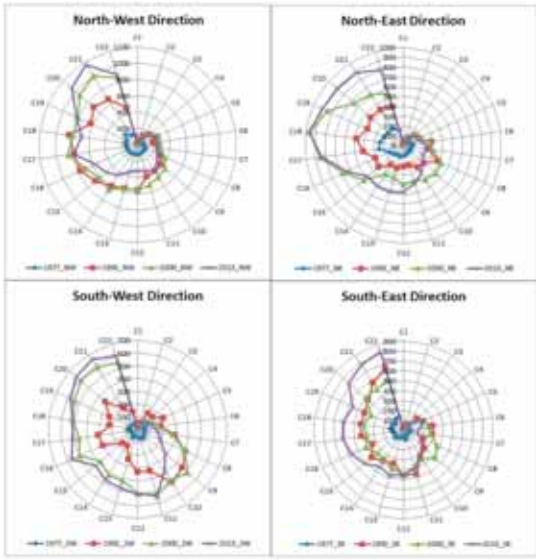


Figure 8(a) Number of urban patches

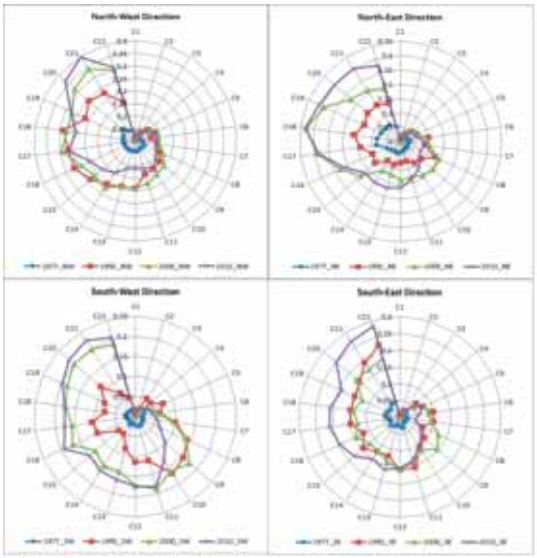


Figure 8(b) Patch density

Normalized shape index (NLSI): NLSI describes the shape of the particular class in the landscape. It is 0 when the landscape consists of a maximally compact patch and increases as the patch type becomes increasingly disaggregated and is 1 when the patch type is maximally disaggregated (Fig. 8(e)). The results of the analysis show that the gradients near the core with aggregations are forming a compact patch, whereas outer gradient in all direction with the spurt in urban activities show a value closer to 0.9 in almost all zones in the buffer zones indicating of sprawl as the shape of landscape is irregularly disaggregated and fragmented.

Cohesion index: Cohesion index implies the physical connectedness of the focal class and the value is 0 with the decline of the proportion of urban class in the landscape, which is indicative of fragmented outgrowth else increases monotonically, evident in Fig. 8f, indicating the emergence of urban sprawl in buffer zones and the decrease of the physical connectedness near the core similar to earlier metrics.

Clumpiness index (Clumpy) and Percentage of like adjacencies (Pladj): CLUMPY metric directly measure aggregation and disaggregation of the class in the landscape, equals -1 when the class is maximally disaggregated; and equals 0 when the class is distributed randomly, and approaches 1 when the patch type is maximally aggregated. PLADJ equals 0 when the focal class is maximally disaggregated and no like adjacencies and is equal to 100 when the focal class is a single patch is adjacent between same classes. These metrics are dependent on adjacent characteristics of the focal class in the landscape.

Fig. 8g and 8h shows that gradients reaching aggregation or single patch class from 1977 to 1992 in all zones. However, post 2000 the initiation of fragmentation value reaches 0 for Clumpy and Pladj signifying the fragmentation due to urban outgrowth. This phenomena can be mostly seen in the buffer zones and in regions under extreme pressures of sprawl.

Spatial metrics indicates of sprawl especially in the periphery and the buffer zones. These regions requires an immediate attention by the decision makers to provide appropriate infrastructure and basic amenities.

Metrics computed in each temporal gradients equip the decision-makers with fundamental information about the growth, the role of agents (for example policy decisions to setup industrial layouts, etc.), rate of growth, spatial patterns of growth and information about site specific details such as patches or clumpiness or shapes in the landscape.

This knowledge helps in visualizing the extent and patterns of future growth, which helps in adopting strategies to control or mitigate potential impacts on the sustenance of natural resources due to large scale land cover changes.

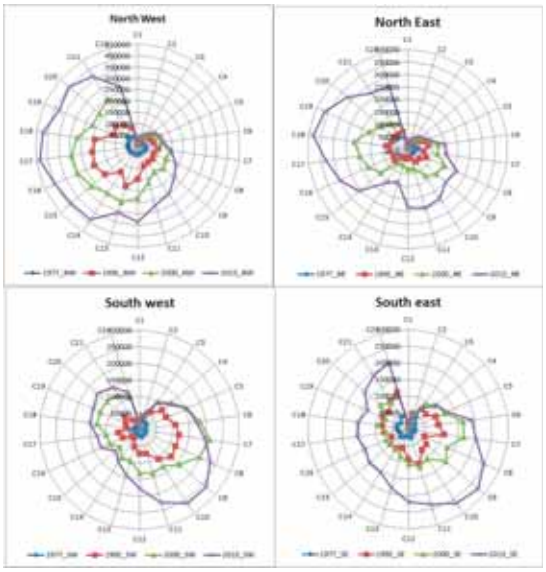


Figure 8(c) Total edge

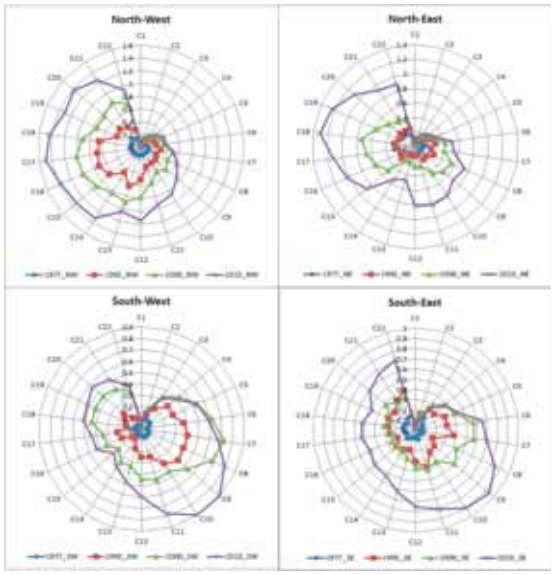


Figure 8(d) Edge density

Spatial pattern dynamics elucidation throws light on the role of earlier government policies (Fig. 9) in urban sprawl or urbanisation process in the region. This also helps in assessing the effectiveness of earlier urban policy measures to address sprawl and development of a city. Integrated management of natural resources involves understanding the rationale of development and making decisions of placing the regions specific development trajectory while maintaining the urban open spaces (parks, lakes, vegetation, etc.), natural water drains and resources.

Localities such as Pimpri, Chinchwad, Kahdakwasla, Dhayari phata, Katruj, Yerwada, Pashan, Lavale, Warje, Baner, Khadki, Tharwade, Pirangut etc., in and around Pune are experiencing large scale land cover changes due to the government push for industrialization in 1990's are now facing the problem due to sprawl and associated problems such as lack of basic amenities, etc.

The spatial analyses establishes that gradient based metrics computation helps in understanding thespatial patterns of a dynamically evolving urban landscape (Keiner and Arley, 2007, Aguilera, 2008) like Pune given the momentum of growth and pressing need to characterize and plan in efficient manner. Fig. 9 illustrates the potential of gradient based spatial pattern analysis in understanding the land use dynamics due to policy interventions.

Pimpri Chinchwad was established in 1988 and developed to cater the requirement of industrial needs. This region is located in gradients 11, 12 and 13 in the north-west zone.

These gradients had higher vegetative cover in the pre-1990. But post 2000 it can be seen extensive conversion of vegetative area urban land use. Landscape metrics for this gradients show that the urban impervious surface were located as a continuous simple shape concentrated surface pre-2000 (Fig. 9a). Post 2000 these regions have experience significant land use change and conversion in to highly fragmented area. In 2013 these regions have changed into most fragmented gradients in North West zone.

Warje (Fig. 9b) is located close to periphery of the Pune municipal boundary. Gradient 6-9 represents this industrial region in the south west zone. The land use before 1990 was dominated by other land use class and post 2000 is dominated by the urban land use. Post 2000, the region formed a clumped simple patch, which indicates of prevalence of urban patch dominance.

Yerawada and Nagar road (Fig. 9c) is located in north east region of Pune and 7-8 gradient of North east zone and contribute about 10% to the industrial output of Pune. Landscape metrics of urban land use highlights that these gradients (post 2000) are in the verge of forming a single dominant urban class with simple shapes.

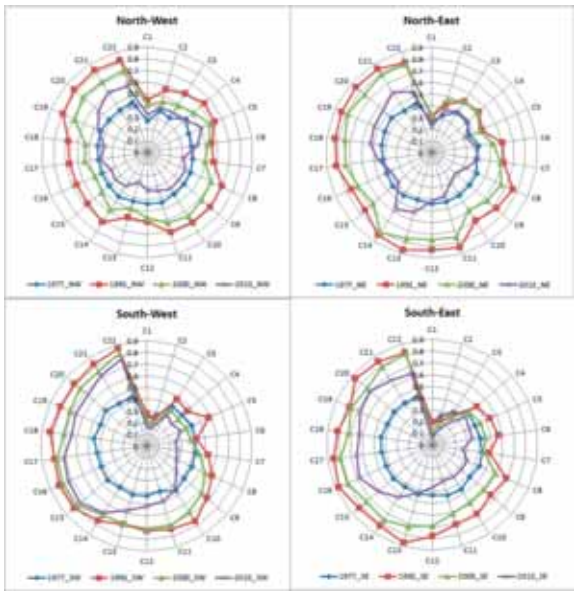


Fig. 8(e) Normalized landscape shape index

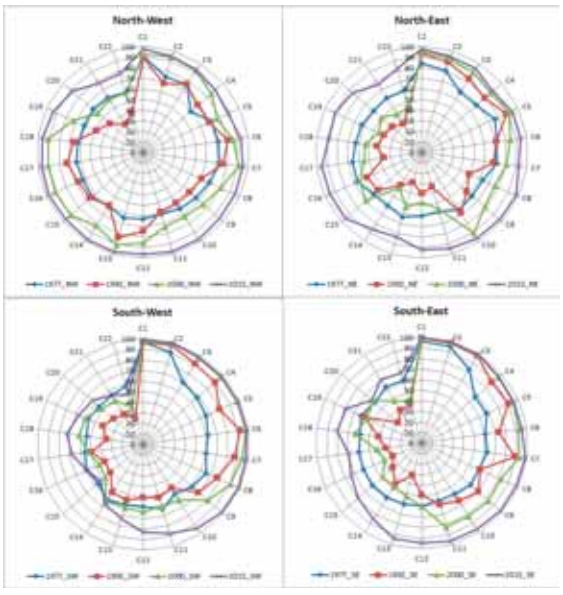


Figure 8(f) Cohesion index

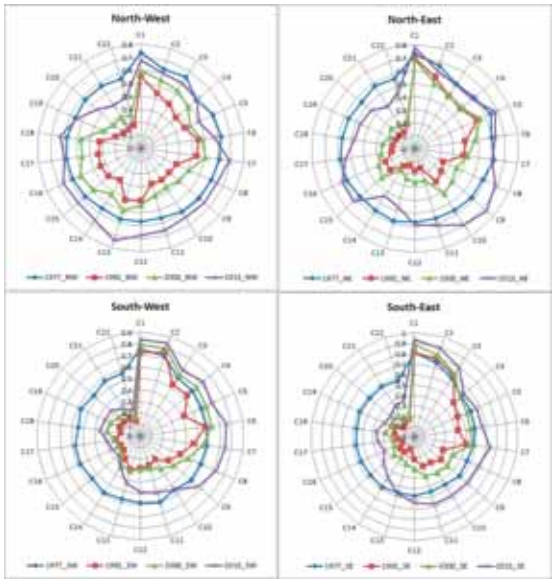


Fig. 8(g) Clumpiness index

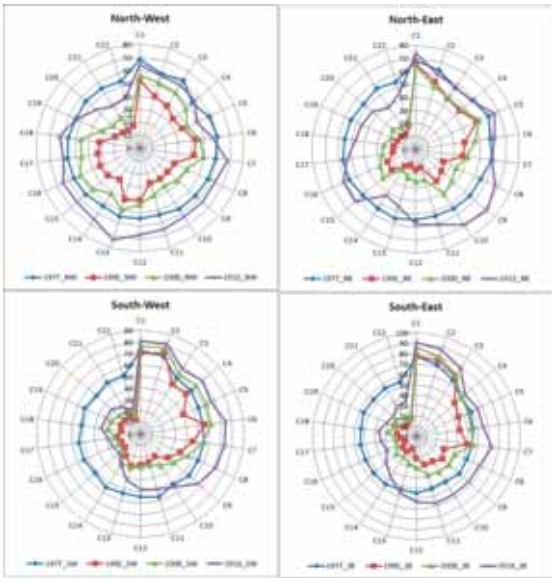


Fig. 8(h) Percentage of like adjacencies

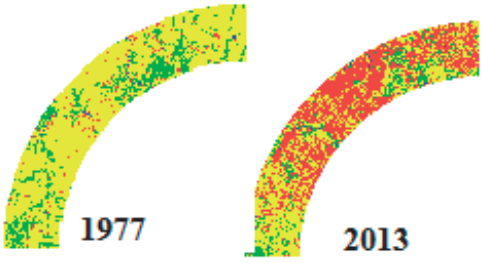
These spatial analyses confirm that policy and socio-economic factors fuel URBANIZATION. Urban planning require essential up-to-date knowledge of spatial patterns of land use changes to regulate and plan the city's expansion as well as infrastructure development. Access to consistent and integrated spatial information about land use dynamics aids in the strategic understanding of the region specific growth for formulating effective cognitive decision on natural resources management by city planners with all stakeholders. Location specific information enhances the planning process through multitude of factors having decisive role in the land use sustainability.

5 CONCLUSION

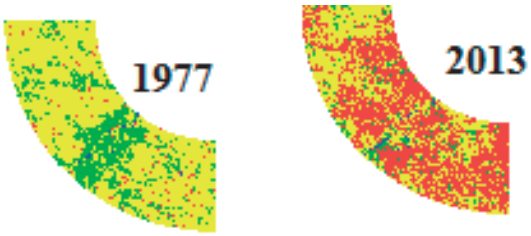
Spatial patterns of urbanisation and sprawl in Pune city with 10 km buffer has been analysed zone wise gradients using temporal remote sensing data through Geoinformatics and spatial metrics during 1977 to

1992 there was infilling in the core city area. During 2000 and 2013 the fragmentation was quite evident at city outskirts. Spatial pattern dynamics analysed through patch, contagion, edge and shape metrics.

a). Pimpri chinchwad



b). Warje



C). Yerawada and Nagar

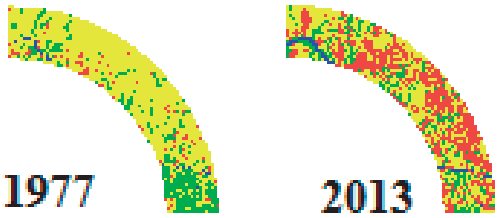


Fig.9 Spatial patterns of urbanization with industrialization in 1990's

The temporal pattern of the urbanization process of this region highlights the process of coalescence during the rapid urbanization decade (2000 to 2010). Results indicate the process of aggregation in the core compared to the periphery and the buffer zones. Globalisation and the reforms in the industrial sector during 1990's witnessed a spurt in urban growth, which is evident from the occurrence of large number of urban patches surrounded by other land uses, especially in industrial pockets such as Pimpri chinchwad, Warje, Yerawada, etc. Subsequent urban growth witnessed consolidation of fragmented patches with lower patch density and larger urban patch to form clumped urban pockets in NW and SE directions by 2010. Specifically, aggregation of patches is noticed in northwest at the outskirts and even at the buffer zone. Gradients with metrics provide vital information to the decision makers about level of urbanisation and the role of agents (policy issues, etc.). Information about the patterns of growth, rate of growth, patches, clumpiness etc. would help in evolving appropriate location specific strategies to mitigate environmental consequences. Visualisation of urban growth based on the behavior of agents with the temporal data help the city managers in help city planners and administrators to design towards achieving the goals of sustainable cities.

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AUTHOR'S PROFILE

Ramachandra T V

Ph.D. in energy and environment from Indian Institute of Science. At present, Coordinator of Energy and Wetlands Research Group (EWRG), Convener of Environmental Information System (ENVIS) at Centre for Ecological Sciences (CES), Indian Institute of Science (IISc). He has made significant contributions in the area of energy and environment. His research area includes wetlands, conservation, restoration and management of ecosystems, environmental management, GIS, remote sensing, regional planning and decision support systems. During the past ten years he has established an active school of research in the area of energy and environment. He teaches principles of remote sensing, digital image processing and Natural resources management. He has published over 206 research papers in reputed peer reviewed international and national journals, 178 papers in the international and national symposiums as well as 14 books. In addition, he has delivered a number of plenary lectures at national and international conferences. He is a fellow of Institution of Engineers (India), IEE (UK), Senior member, IEEE (USA) and many similar institutions.

Bharath H Aithal

Electrical and Electronics Engineering graduate from Bangalore University. Currently, he is pursuing Ph.D at Indian Institute of Science. His area of interest are spatial pattern analysis, Urban growth modelling, natural disasters, geoinformatics, landscape modelling urban planning, open source GIS, digital image processing. He is a Graduate student member of the IEEE.

Beas Barik M

She is enrolled at the Symbiosis Institute of Geoinformatics, Pune. Her area of interest are spatial pattern analysis, geoinformatics, open source GIS, digital image processing.

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THE EFFECTIVENESS OF PLANNING REGULATION TO CURB URBAN SPRAWL

THE CASE OF STRIANO (NA)

LAURA RUSSO

TeMALab – University of Naples Federico II
e-mail: laurarusso88@hotmail.it

ABSTRACT

Italy is facing an almost irreversible, extremely serious condition. A vital asset for humankind and the ecosystem, such as land, today suffers the negative effects of anthropogenic activities, first of all its uncontrolled and limitless consumption.
Such transformation of landscapes and environments, due to the misuse of land, not only affects the Italian country, but it spills over its borders: across Europe, urban sprawl is threatening agricultural productivity and biodiversity, increasing the risk of flooding, reducing water resources and contributing to global warming (ISPRA 2012).
The catastrophic impacts related to the spread of urban sprawl have made the identification of planning strategies capable of reducing the phenomenon essential. In Italy, many regions are trying to conform regulations and planning tools to control land use, and among them the Campania Region.
To date, only few studies have evaluated the effectiveness of these tools in curbing the phenomenon (Anthony 2004), to this end, the paper aims to assess the ability of Campania's Planning regulations and tools in checking urban sprawl.
The analysis was conducted in the town of Striano, within the complex urban conurbation of the Metropolitan Area of Naples, which can be considered an example of urban sprawl development pattern.
In particular, a hypothesis of Area Action Plan for Striano was developed on the basis of the measures imposed by Regional Law n. 16 of 2004 and the ones proposed by PTCP of Naples, then the potential outcomes achieved by the Plan were evaluated in terms of land use and density.
The case study results show a disconnection between the current legislation and the new planning tools which are pending approval, therefore, the paper suggests the need to update Campania's Planning legislation to the new guidelines, which are much more effective in terms of land protection.

KEYWORDS:
Urban Sprawl; Land Cconsumption; Soil Sealing.

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规划法规对遏制城市扩张的有效性

斯特里亚诺案例

LAURA RUSSO

那不勒斯菲里德里克第二大学民用建筑与环境工程系TeMA实验室
e-mail: laurarusso88@hotmail.it

摘要

意大利正面临着一个几乎不可逆转并且极为严重的状况。对于人类和生态系统至关重要的资产（如，土地），如今正遭受人类活动（首当其冲的是不受控制和无节制的消耗）的破坏。
这种因土地滥而用造成的地貌和环境的改变，不仅对意大利的国土产生影响，而且还跨越了国界：在整个欧洲，城市扩张正威胁着农业生产和生物多样性，同时增加洪灾的风险、减少水资源并导致全球变暖。
城市扩张的泛滥所带来的灾难性影响，已使人们意识到通过规划战略能够在根本上遏制这种状况。意大利的许多地区正在采用法规和规划工具来控制土地的使用，其中就包括坎帕尼亚大区。
到目前为止，仅有少数几项研究对于这些工具遏制这种状况的有效性进行过评估，有鉴于此，本文旨在评估坎帕尼亚的规划法规和工具对城市扩张的遏制能力。
分析过程是针对斯特里亚诺镇进行的，该镇位于那不勒斯大都会区的城市圈范围内，可将其视为城市扩张发展模式的一个样本。
尤其是，根据《地区法2004年第16号》的强制措施和那不勒斯PTCP提出的措施，制定出了“斯特里亚诺地区行动方案”， 然后根据土地利用和密度情况，对该方案能够实现的可能结果进行评估。
案例研究结果表明，当前立法和待审批的新规划工具之间存在脱节，因此，本文提出，需要将坎帕尼亚的规划立法更新至对土地保护更为有效的新的指导原则。

关键词

城市扩张；土地消耗；土壤板结.

1 INTRODUCTION

Urban sprawl processes, born in the U.S. as a result of economic development after World War II, spread all over the world affecting urban and metropolitan areas, creating new ways of land use and damaging the environment and social relations.

Urban sprawl is now considered by the scientific community one of the most dangerous land transformation's processes involving Western cities: the uncontrolled use of land and the increasingly rapid expansion of cities, have weakened, if not eliminated, any kind of boundary between urban and natural space and, as Mumford stated in 1961, the shape of the metropolis is its shapelessness.

To stop urban sprawl, even European Commission decided to get involved, stating that after 2050 it won't be possible to build on free areas anymore (EU 2011).

In Italy, soil sealing related to urban sprawl is causing every day the transformation of over 100 ha of agricultural area in order to build housing, parking, commercial centers, quarries, etc.

Such change of landscapes and environments is threatening agricultural productivity and biodiversity, increasing the risk of flooding, reducing water resources and contributing to global warming (ISPRA 2012).

The Metropolitan Area of Naples can be considered a clear example of urban sprawl development pattern, for this reason the analysis has been conducted here.

The paper aims to verify if Campania's regulations and planning tools are able to curb urban sprawl and promote a sustainable use of land.

The concept of urban sprawl, its causes, its impacts as well as the planning policies adoptable to control the phenomenon are defined in the first part of the paper.

On the contrary, the definition of a hypothesis of Area Action Plan for the town of Striano is the core argument of the second part of the paper.

At the end, the study analyzes the impacts of the Area Action Plan in terms of land consumption and density and finds out that Campania's current planning regulations are not effective in curbing urban sprawl.

2 FROM CONCEPT OF SPRAWL TO THE POSSIBLE INTERVANTATION STRATEGIES TO STOP IT

The term urban sprawl was introduced in the U.S. in the beginning of '60, when the phenomenon was studied for the first time (Self 1961; Clawson 1962; Harvey and Clark 1965).

Over fifty years have gone by, the term has been used so widely that today it lacks of a precise meaning (Galster 2001).

Four types of urban sprawl definition can be found in scientific literature, each one of them focusing on a different feature: urban shape, land use, impacts and density (Chin 2002).

Regarding urban shape, sprawl is identified versus the ideal urban shape, such as the compact city: if the compact city is characterized by high density, by mixed used, by the presence of a central core and by the strong separation between city and countryside, it means that urban sprawl is the opposite.

When urban sprawl is defined by land use, it refers to the development of low-density residential areas with single-familiy houses and mixed use functions (Duany, Plater-Zyberk and Speck 2000).

An other type of definition of the phenomenon is that based on its effects on the environment: Ewing (1997) identifies some of the indicators of sprawl in the reduced accessibility and lack of available open spaces, which are both factors easy to measure.

Furthermore, you can define urban sprawl in term of density: several authors used density to define the phenomenon, but often without a clear measure of the parameter.

Recent studies tried to overcome the limits of preceding analysis by including within the definition of urban sprawl more than one feature:

(1) «Sprawl is a pattern of land use in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity» (Galster et al. 2001);

(2) «Urban sprawl is synonymous with unplanned incremental urban development, characterized by a low density mix of land uses on the urban fringe» (EEA 2006);

(3) «Sprawl is defined here as a process of uncoordinated change, an approach that broadens the analytical perspective to incorporate the role of spatial planning in steering the activity in the urban hinterland» (Chorianopoulos, Pagonis, Koukoulas and Drymoniti 2009);

(4) «Urban sprawl is known worldwide as the uncontrolled expansion of low-density, single-use suburban development, that in Italy is mainly shaped by settlements scattered around the countryside» (La Greca, Barbarossa, Ignaccolo, Inturri and Martinico 2011).

From these recent definitions of the phenomenon, the absence of planning polices and coordination emerges as one main characteristic of urban sprawl development. Hence, it is necessary to sustain a correct planning strategy that is able to contain the random growth of the city.

The numerous literature that investigated urban sprawl pointed out several factors which can be considered responsible of its proliferation.

From early studies, researches agree to consider innovations in transportation technology the main cause of the phenomenon (Mumford 1961; Holden & Turner 1997; Antrop 2004): train railways first, automobiles later, favoured access to the city centre, making it easy to reach from the suburbs (Antrop 2004).

The growing attractiveness of suburbs compared to the urban core can be considered responsible of starting sprawl too (Friedman and Miller 1965; Mumford 1961): exodus towards suburbs is the first reaction to the dramatic decline of post-industrial cities.

Technological innovation in telecommunications largely reduced the supremacy of the city centre making it possible to widen several activities, contributing to urban sprawl (Ewing 1997).

Also planning policies adopted from several governments to increase competitiveness can be added to the list of urban sprawl causes: public investments for building highways and street systems represent a necessary condition to the automobile becoming the first mean of transportation.

At last, zoning regulation contributes to the spread of the phenomenon because it forces the separation of the different urban functions favouring the rise of residential suburbs, which are typical of urban sprawl environments.

In 2006, the European Environmental Agency (EEA) conducted the research *Urban sprawl in Europe; the ignored challenge* identifying a great number of variables responsible of the phenomenon, amongst which the aforesaid elements are mentioned together with others that can be considered more current, such as globalization, availability of agriculture land at convenient prices and weak application of planning rules.

The wide range of causes responsible of urban sprawl shows the complexity of the phenomenon that quickly evolves because of social, cultural and technological changes and, at the same time, it has dangerous consequences, discordant with the sustainable development of the city.

The effects of urban sprawl can be grouped in three categories: environmental, economic and social.

The increase of air pollution due to the use of automobiles is one of the environmental effects (Ewing 1997; Arbury 2005; EEA 2006), in fact, in low-density urban areas there is a reduced attitude to use public transport, absolute absence of pedestrian movement, and vice versa, a great use of the automobile; even

the strict separation between the different city's functions, typical of urban sprawl, leads to a higher distance between urban areas which makes the automobile the only possible means of transportation.

Air pollution related to car's emissions represents only one of the environmental effects due to urban sprawl, to these we should add land consumption, typical of the phenomenon.

Land consumption causes the loss of a non-renewable resource of primary importance, in fact, soil acts as a carbon sink, additionally, the little distance between urban activities and natural space causes noise and pollution, which are dangerous for animals and plants as well as for the integrity of the remaining natural areas. Land fragmentation produces negative impacts on the environment too, because it disconnects natural habitats so that wildlife species are split (IUNC 1980; Harris 1984; Kautz 1993).

Nonetheless environmental effects have to be considered as well as the economic and social ones, which are utmost relevant. The phenomenon of urban sprawl is absolutely unsustainable from an economic point of view because of the huge expenses that it demands of local governments for the deliverance of services and infrastructures. As a matter of fact, the costs of public investment for sewerage and water supply in sprawl urban areas tend to be greater than those ones you'd have in the case of a compact setting, that is to say that single-family houses request much more expenses that the multi-family ones: Burchell e Mukherji (2003) state that in the U.S. you could save more than 12 billion of dollars only by a more compact development, without limiting the user's request.

The infrastructure development represents an other relevant item of the administration's financial statement and its costs depend on the distribution and on the users density so that sprawl has direct negative consequences: in such a greatly wide territory, with low-density, the expenditure for road construction will be higher than the one you'd need for a more compact urban setting. A similar analysis can be considered for other public services such as schools and hospitals.

Besides the direct costs of urban sprawl we just mentioned, we have to take into account the indirect ones, deriving from the environmental effects we described above: the costs due to pollution, amongst which those deriving from health, agriculture and buildings damage.

Altogether with the economic effects, urban sprawl has also social impacts of similar relevance even if they are more complex to measure and to monitor.

A compact urban setting with pedestrian paths, mixed use functions and public meeting spaces, favours the interaction between inhabitants and a sense of belonging to the community in a way which is different from the suburbs of sprawl areas, where inhabitants have to move about for any kind of requirement, where the automobile is a necessary need and where the sense of place is weak, if not completely absent.

Urban segregation is one of the social effects which are typical of sprawl, not surprisingly, most of the residents of suburbs belongs to the same social class, with similar income and type of family.

If in the U.S. families with children and high income represent the typical inhabitant of the suburb, generally coming to escape the city's congestion and pollution, in Europe we can observe the opposite situation, meaning that suburbs generally are the place where lower classes and immigrants live. In both cases, urban segregation is harmful, because it creates a separation, which is impossible to overcome, between the different classes, that loose any form of dialogue and interaction. The consequences of urban sprawl we just analysed show why the phenomenon has to be curbed and checked.

In the U.S., where urban sprawl has been a matter of interest for the first time, its harmfulness was soon recognized and the initial tools to limit it were found.

From the beginning, researchers all agree to consider that urban planning is the most powerful way to stop urban sprawl: "my answer to sprawl is active planning" (Ewing 1997).

The early policies to reduce sprawl have been engaged in the U.S. from the beginning of '60 and are known with the term *growth management*. The goal of this programs is to control urban development introducing limits to quantity, timing and geographical distribution of new urban settlements.

The first program of growth management was adopted in Hawaii (Land Use Law 1961), where urban growth was putting agriculture at risk; since then, more than twelve American states adopted similar policies to reduce urban sprawl.

From the early '90 the idea of smart growth became popular with the aim of building compact, mixed used and pedestrian friendly districts, to preserve natural resources and open spaces, and assimilate instead of separating residential units by characteristics and price.

Pretty often the terms *growth management* and *smart growth* are confused or used alike: some sustain that smart growth is just a more appealing definition to identify policies of growth management. If we accurately analyse both concepts, you can find instead some important differences regarding the goals they want to reach: the aim of the programs of growth management is above all that of limiting the quota of urban development, on the contrary, strategies of smart growth focus more on the shape and type of settlements rather than on their volume.

This renewed interest for urban shape is tied to New Urbanism, a movement born at the beginnings of '80 and led by the architect Andres Duany, who paid much attention to urban design promoting the transformation of the basic principles of zoning, which was considered a wrong planning technique, also responsible of the increasing growth of urban sprawl.

Similar statements to those promoted by the New Urbanism movement inspired a new revolutionary tool for urban government, known as Transit Oriented Development (TOD), which transfers to public transport system a central role in the process of urban transformation. The term TOD refers to a high-density urban district built in such a way that any single house unit has a maximum distance of 10 minutes on foot from a public transport stop (Fig. 1). Favouring the use of alternative to the automobile is the main way to improve the quality of life and reduce environmental risks. So far, in the U.S. we have more than a hundred examples of TOD and it is advisable that in the upcoming years this number will keep growing.

Urban policies that we described have been introduced in last few years and, although there is plenty of scientific literature regarding urban sprawl, very few papers assessed the efficacy of such tools in limiting and control the phenomenon (Anthony 2004), in fact, their impacts on ground, economy and environment are not yet measurable. Among the available studies, the analysis by Anthony compares the variation of urban density in 49 American states between 1982 and 1997 and it points out that, although growth-managed states generally experienced a lesser density decline than states without growth management, regression analysis revealed that state growth management programs did not have a statistically significant effect in checking sprawl (Anthony 2004). The mismatch between measures adopted at state level and those implemented at local level is a possible explanation of the result, according to the author who states that if local support lacks, the implementation of any central policy ends up being of little efficacy.

Moreover, Anthony concludes his analysis suggesting a modification of actual zoning regulations to make anti-sprawl American urban policies more effective. These rules, in fact, impose a maximum density value which was fixed when American urban settlements were congested, crowded, with few available infrastructures; nowadays, things are different, so it is necessary to update the rules and define a minimum density value instead of a maximum density one, in order to guarantee compact urban development, inspired to principles of sustainability and land preservation.

Anthony's analysis results provide the opportunity to verify if, in Italy, planning policies are effecting in curbing urban sprawl, or if they are weak as well as the American ones.

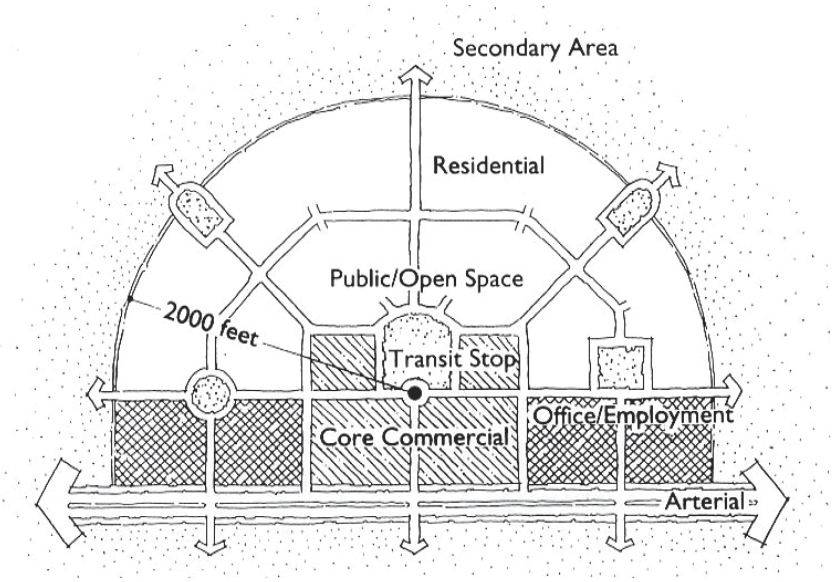

Fig. 1 TOD's model

3 STRIANO CASE STUDY

Inspired by Anthony's analysis, the paper aims to analyze the way planning regulations drive urban development in the Campania Region, now that urban sprawl represents one of the most dangerous phenomenon for the preservation of land.

Instead of comparing how urban density changed in a given period of time, the choice is to formulate a hypothesis of Area Action Plan so as to practically measure how much soil is necessary for the settlement of a given number of inhabitants in Campania, respecting the current legislation.

The town of Striano, which belongs to the Metropolitan Area of Naples, represents an interesting case study because it is identified by the proposal of Territorial Plan of Provincial Coordination (PTCP) of Naples as one of the few areas where increase in housing is allowed.

3.1 THE METROPOLITAN AREA OF NAPLES

In Italy, the metropolitan area notion was introduced with Law n. 142 of 1990 that, at art. 17, Section VI-*Aree Metropolitane*, states as follows: "We consider metropolitan areas those including the cities of Turin, Milan, Venice, Genoa, Bologna, Florence, Rome, Bari, Naples and other municipalities whose urban settlements maintain strict relations with them regarding economic activities, social life and culture, as well as territorial characteristics".

The institution of this new authority, the metropolitan city, which is similar to the Province but with greater powers, shows to which extent urban sprawl impacts Italian landscape: in fact, big isolated cities, as well as little towns, don't exist anymore, but territory is characterized by huge urban conurbations where relations between municipalities belonging to them, are so strong that they became part of a unique entity.

Law n. 142 gave Regions the task to draw the borders of single metropolitan areas within one year it became effective, but so far, in Campania, no official delimitation exists at all, but only several hypothesis.

One study regarding the trend of population on the Metropolitan Area of Naples (Mazzeo 2011) is interesting for our analysis. The paper identifies the boundaries of the Metropolitan Area of Naples based on «5 concentric bands, drifting far from the center», including a total of 142 municipalities belonging to the Province of Naples (92), Caserta (40) and Salerno (10). The analysis of the demographic variation between 1861 and 2009 allows to isolate two trends: the first regarding Naples, where population increases up to

1981 and then progressively decreases; and the second one regarding the other bands, from 2 to 4, in which population increases from 1981 to 2009, without any flection. «From data you can point out how decreasing of population in Naples was distributed in its surroundings and, in particular, in municipalities of band 2 and 3» (Mazzeo 2011).

Leaving Naples was generally due to the difficulty of reaching an acceptable level of quality of life in its center, and it favored the urbanization of surrounding areas and, as a consequence, the increasing consumption of land. The danger represented from excessive and uncontrolled consumption of land is nowadays, and more than ever, of great concern: several studies regard this topic (EEA 2011; Gerundo and Grimaldi 2011; FAI and WWF 2012; European Commission 2012; EEA 2012; ISPRA 2012) and focus attention on possible strategies to adopt to limit the phenomenon in the near future.

In the Campania Region, planning tools specifically redacted in order to contrast urban sprawl have been recently introduced. For example, one of the main goals of the Regional Territorial Plan (PRT), adopted in 2005, is to preserve and protect the natural environment by creating the Ecological Regional Network. Even the proposal of PTCP of Naples states and regulates the consumption of land focusing on the conservation of natural and rural spaces, promoting the improvement of density standards, because the densification of urbanized territory ensures a better use of land.

The town of Striano is within those territories that according to PTCP are to be densified and it is also chosen as a new node of the high-speed railway. For these reasons, Striano represents an interesting case study to apply those strategies we have already analyzed in order to limit urban sprawl and so evaluate the results in term of land consumption and density.

3.2 THE TOWN OF STRIANO

Striano lies in the Valley of Sarno located 38 km far from Naples.

Although it is not distant from the Vesuvio, it is not part of the eighteen municipalities belonging to the so called *red zone* (Fig. 2).

Its population amounts to 8.368 people (ISTAT 2011), distributed on 7.58 km^2.

The discovery of a IX sec. a.C. necropolis bears witness of an ancient village during the iron age. Several populations have followed in the territory: from the Opici, early inhabitants of the area, the Etruschi and Sanniti, up to the Romans. The entire population of Striano was forced to leave its land because of two natural catastrophes such as the earthquake of 62 d.C. and the Vesuvio's eruption of 79 d.C., and for these reasons the area surrounding the volcano stayed unpopulated until the beginnings of II sec. d.C., when the peasant community came back.

The agricultural vocation of Striano is still pretty dominant for its economy, even if from the beginning of '70 several industrial plants settled in the area.

Urban facilities are particularly scarce: two green areas, two sport centers with a soccer field and one school institution including one primary school and a secondary one, and a food market which was instituted in 1906 and a new market realized in Risorgimento Road.

Medical assistance is offered by an ambulatory located by the cemetery, in the eastern part of the city.

Striano's urban fabric looks complex and messy, so that it can be difficult to find an urban model that might represent its main structure. The plan's complexity disappears in buildings height: buildings, in fact, reach almost the same elevation; most of the buildings are under three floors and only few of them reach the fourth. Around the city center, characterized by the mix of ancient and new architecture together with few degraded buildings, there are some neighborhoods of more recent development, that were built without a precise urban project and so contribute to extend the disorder outside the city center.

Fig. 2 the municipalities belonging to the *red-zone*

3.3 THE PROPOSAL OF PTCP OF NAPLES AND ITS MEASURES FOR STRIANO

The proposal of PTCP of Naples was made public in July 2006 with a Preliminary Document; in 2007, it was initially approved, but following the approval of PTR it was modified and integrated in conformity with PTR contents, and so newly approved in 2008.

After the administration election in 2009, the new provincial commission decided to extend the counselling phase before the final approval of PTCP, and for this reason, so far, PTCP remains a proposal.

One of the main goals of the Plan proposal is the preservation and the enhancement of the natural resources of the landscape, focusing attention on limiting land consumption.

The Plan isolates some area of *residential densification* to concentrate any intervention to increase housing supply, so that agricultural areas are preserved improving the use of building sites.

The area between Poggiomarino and Striano belongs to the *densification sites* where it is possible to make "interventions of requalification, densification and reinforcement of the existent settlements, towards the East, to move away from the high volcanic risk area" (Implementing Rules, PTCP of Naples).

According to the Table P.06.6. of PTCP, the area of Striano is classified in three different categories, relating to land use: historical area, urban area and agricultural area (Fig. 3).

The historical area lays in the central part of the town, confining with consolidated urban settlements that are surrounded by an area of urban integration.

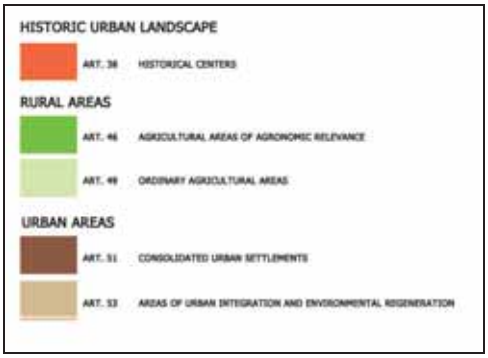

Fig. 3 Table P.06.6 of PTCP of Naples

Striano's rural areas are two, an ordinary agricultural area surrounding the area urban integration, and one of agronomic relevance in the East and Nord-Est part of the town, that the PTCP protects from future development. The first step to define the Area Action Plan is that of estimating the population housing needs, based on a ten year projection, using data from the National Institute of Statistics (ISTAT).

On this amount, a 15% of population rate has been added in order to supply the residential relocation needs, according to the forecasts of the execution rules of PTCP (art. 53)[1].

In the end, we have that the number of people to relocate in the project area corresponds to 3,908 inhabitants. Knowing the number of residents to relocate, it is possible to calculate the site area required, comprehensive of areas for building public facilities, called *Standards* (D.M. 1444/68) that include areas for schools, community facilities, green spaces and parking.

We chose to ensure an area for Standard destination of 20 m^2/person – greater than the minimum prescribed by the DM 1444/68 – as required by L.R. 14/82 for some types of municipalities[2]: the choice is justified by the expected significant increase in population that Striano will face in the future decade, in part due to the need for residential relocation of the communities of the close *red zone*.

The recently adopted L.R. 16/04 left in force the previous L.R. 14/82, which contains maximum residential density stipulations that restrict urban developments to 4 m^3/m^2; implementing such a measure, we obtain a site area of about 30 ha, corresponding to a population density of 127 persons for hectare (Tab. 1).

This result disagrees with the minimum population density value of 200 persons for hectare imposed by the proposal of PTCP for new residential developments[3].

Type of data	Threshold	Value	Measure unit
New population		3,908	
Residential Floor Area per person	35 m^2	136,780	m^2
Residential Building Volume (RBV) per person	105 m^3	410,340	m^3
Net Site Area (NSA)		170,975	m^2
Standard (DM 1444/68) per person	20 m^2	78,160	m^2
School	5 m^2	19,540	m^2
Community facilities	2.5 m^2	9,770	m^2
Green area	9.5 m^2	37,126	m^2
Parking	3 m^2	11,724	m^2
General Facilities per person	2.5 m^2	9,770	m^2
Residential Density (RBV / NSA)		2.40	m^3/m^2
Street Area	18%	46,603	m^2
Site Area		30.6	ha
Population Density		127	person/ha

Tab. 1 Area Action Plan for Striano

For this reason, a second hypothesis of Area Action Plan has to be formulated, respecting only PTCP's measures, in order to compare the two results. Calculating the site area for the second Area Action Plan based on a population density value of 200 persons for hectare means that 20 hectares of land are sufficient for the relocation of 3,908 people (Tab. 2).

1 PTCP of Naples, Article 53 (3): the allowable increase in residential development is that required to meet the existing needs of the resident population as well as a portion of what is required to meet the needs arising from the residential relocation, expressed in the strategy outlined by the PTCP. The aforementioned additional amount may not exceed 15% of the projected population for the decade of reference, determined in the manner set forth in Article 65. Interventions to increase residential development must be based on maximum savings in land consumption, providing new areas of residential urbanization only when the increase is not feasible through the reorganization of existent urban areas and the re-use of abandoned areas and buildings.

2 L.R. 14/82, Annex 1, Section 2 (1.4): the minimum allocation of areas for public facilities, established by art. 3 of the Ministerial Decree of 2 April 1968 n. 1444, of 18 m^2 per person, is increased to 20 m^2 per person in the Provincial capitals, in the municipalities with more than 50,000 inhabitants, and those with average rate of population increase in the last decade higher than 5%.

3 PTCP of Naples, Article 70: "General guidelines for the localization of new urban settlements".

Type of data	Threshold	Value	Measure unit
New population		3,908	
Population Density	200 person/ha		
Site Area		20	ha
Standard (DM 1444/68) per person	20 m^2	78,160	m^2
School	5 m^2	19,540	m^2
Community facilities	2.5 m^2	9,770	m^2
Green area	9.5 m^2	37,126	m^2
Parking	3 m^2	11,724	m^2
General Facilities per person	2.5 m^2	9,770	m^2
Street Area	18%	35,172	m^2
Net Site Area		72,298	m^2
Residential Building Volume per person	115 m^3	449,420	m^3
Residential Density		6.22	m^3/m^2

Tab. 2 Area Action Plan for Striano, second hypothesis

3.5 RESULTS

The hypothesis of Striano Area Action Plan based on the Campania Region's Law shows that for 3,908 inhabitants almost 30 ha of land are required, meaning a population density value of 127 persons per hectare. The second hypothesis of Action Plan, based only on PTCP prescriptions, indicates that 20 ha are enough for the relocation on 3,908 people, corresponding to a population density value of 200 persons per hectare. The Standard surface is the same in both hypotheses, because the number of people doesn't change, but in the second Plan this area is distributed on a smaller portion on land, thus confirming the greater settlement density of the new Plan. Hence, to make it easier to compare between the two hypotheses of Action Plans, the corresponding urban parameters have been summarized in the Table below.

	General data	Hypothesis 1	Hypothesis 2
Planning regulations and tools:			
L.R. 14/82		**Res. Density ≤ 4 m^3/m^2**	
PTCP Napoli			**Pop. Density ≥ 200 person/ha**
New population	3,908		
Residential Volume (m^3)		410,340	449,420
School Volume (m^3)	46,896		
Community facilities Volume (m^3)	23,448		
General Facilities Volume (m^3)	23,448		
Total Volume (m^3)		504,132	543,212
Site Area (m^2)		305,508	195,400
Street Area (m^2)		46,603	35,172
Standard (m^2)	78,160		
School (m^2)	19,540		
Community facilities (m^2)	9,770		
Green area (m^2)	37,126		
Parking (m^2)	11,724		
General Facilities (m^2)	9,770		
Population Density (person/ha)		127	200
Residential Density (m^3/m^2)		2.40	6.22

Tab. 3 Comparing the two hypothesis of Area Action Plan

4 CONCLUSIONS

The above analysis has attempted to evaluate the effectiveness of the Campania Region's planning regulation to stop urban sprawl by formulating a hypothesis of Area Action Plan for the town of Striano (NA) and measuring its impacts on land consumption and population density.

Basing the hypothesis of Striano Area Action Plan on the maximum residential density prescriptions imposed by the current Campania laws – LR 16/04 and LR 14/82 – implies allocating almost 30 ha of site area for 3,908 new inhabitants, instead, respecting the minimum population density limit required by the proposal of PTCP it is possible to save more than 10 ha of land, allocating 20 ha for the same population.

Therefore, the study as it was conducted indicates that the actual Campania Region's planning regulations are not efficient in limiting urban sprawl and end up being contradictory with the prescription contained in the proposal of PTCP to be approved. Thus, despite current Campania's planning Law 16/04 has been recently formulated, it needs to be updated because it maintained some preceding enacted laws (LR 14/82) created in a time when fast urban development was encouraged. On the contrary, new urban planning tools, such as the proposal of PTCP, contain all the necessary elements for a new approach to urban planning, based on the concepts of densification and sustainability.

More research is necessary to verify the possibility of extending the results of this analysis to the entire national territory, because the paper exclusively relates to Campania.

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IMAGE SOURCES

Fig. 1: Calthorpe P. (1993), The next American metropolis

Fig. 2: www.vesuvius.it

Fig. 3: PTCP of Naples

AUTHOR'S PROFILE

Laura Russo

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. She received a master's degree in Architecture and Building Engineering with a thesis on urban expansion and the sprawl phenomena, with particular attention for Campania.

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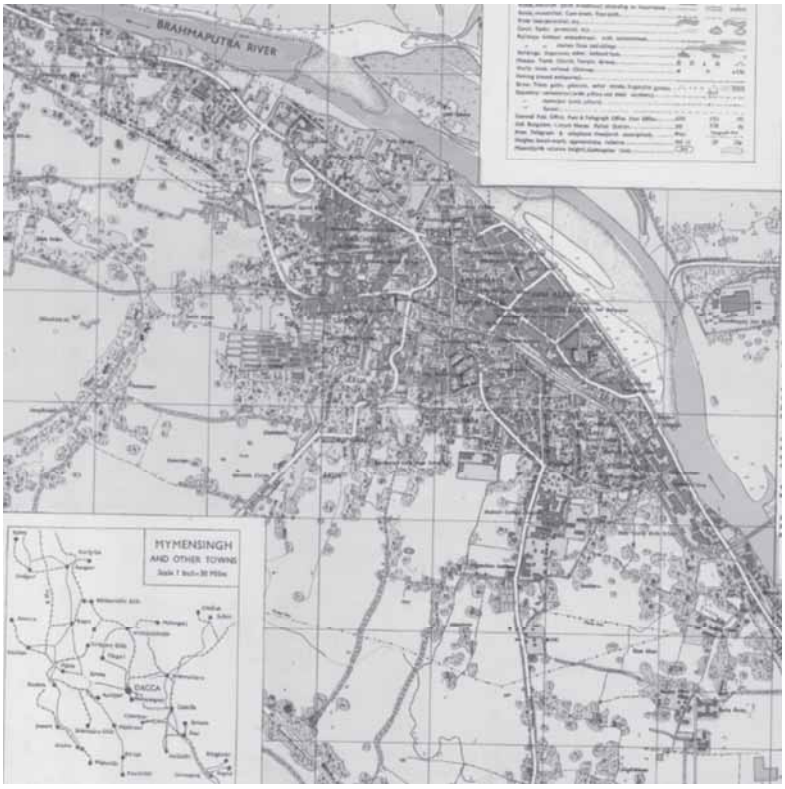

PREDICTION OF MYMENSINGH TOWN FUTURE EXPANSION

USING SPACE SYNTAX

SILVIA ALAM

Department of Architecture
Ahsanullah University of Science and Technology (AUST)
e-mail: silviaalam@hotmail.com

ABSTRACT

Urban space changes according to different space use with the passage of time, as seen in land use, location, and land value distribution. The paper intends to analyze the change of integration core related to the growth of commercial land use through different time periods. Two phases of Commercial land-use pattern is studied. The phases are i) 1974, ii) 2013.
The entire spatial structure of the commercial land use of Mymensingh reacts to the entire city system, particularly the road network pattern. In this context, this study aims to identify the influence spatial configuration exerts on the location of different types of commercial activity in terms of land use. The results of this study will help to interpret and predict the future commercial land use related to its road network. In this paper the process was conducted in the following steps: Step-01: A field survey was conducted to collect data regarding locations of commercial activity, Step-02: Land-use maps of two phases were collected to analyze the relation between commercial activity and road network, Step-03: Space syntax theory was applied to simulate the data to analyze the relationship and Step-04: Proposition.

KEYWORDS:
Integration-Core; Urban economy; Spatial Expansion; Axial - Analysis.

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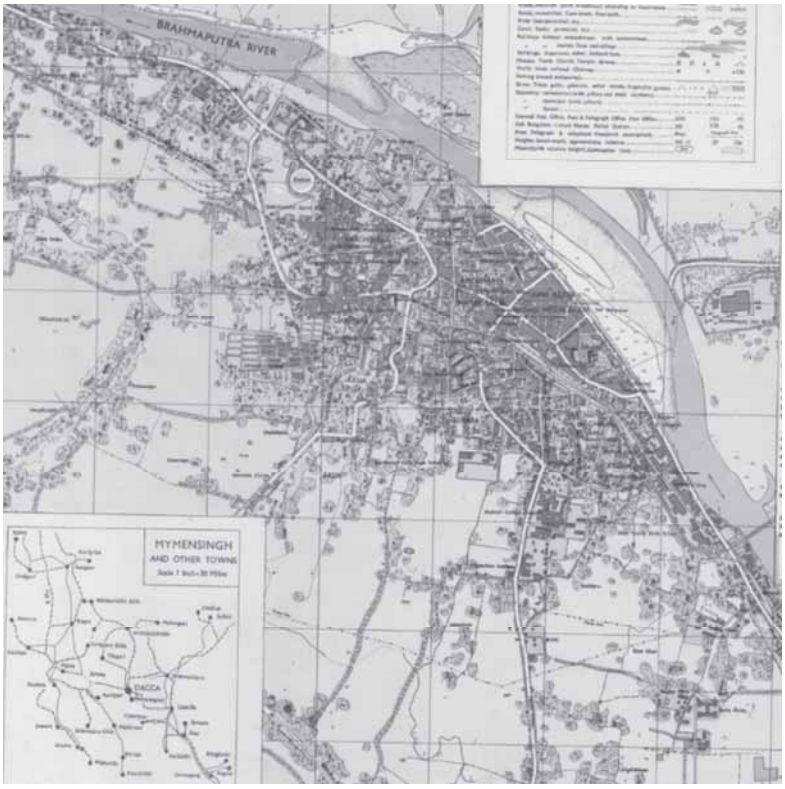

利用空间句法预测迈门辛县的未来扩张

SILVIA ALAM

蒂帕特蒙-奥夫-阿奇太科特。阿萨努阿-尤尼维西提-奥夫-西昂斯-安德-泰克诺劳及
e-mail: silviaalam@hotmail.com

摘要

城市空间根据不同的空间利用并随着时间的推移而改变，这种变化表现在土地利用、选址以及土地价值分配等方面。本文旨在分析不同时期与商业用地增长有关的整合核心的变化，对商业土地利用范式的两个阶段进行研究：阶段一为 1974 年；阶段二为 2013 年。

迈门辛商业用地的整体结构是对整个城市系统，特别是道路网络格局的回应。在此背景下，此项研究的目的在于就土地利用而言，确定空间配置对不同类型商业活动选址的影响。此项研究的成果将有利于解释与道路网络有关的未来商业土地的利用，并据此做出预测。

本文的研究步骤如下：第一步，通过实地考查搜集有关商业活动选址的数据；第二步，搜集两个阶段的土地利用地图，分析商业活动和道路网路之间的关系；第三步，使用空间句法理论来模拟数据，分析两者的关系；第四步，提出建议。

关键词
整合核心；城市经济；空间扩张；轴向分析.

1 INTRODUCTION

The economic progress of Mymensingh City completely depends on the commercial hub that consists of Shopping Centers, Banks, Local Bazaars etc. Since there is no industry or other business activity that exists in the city, the development of this commercial hub and its pattern of future expansion have a significant impact on the local economy. Hence this paper intends to study the formation and growth of the commercial hub of Mymensingh city over time and also analyze the possible direction for its future expansion. First, the commercial zones of the city were located through field survey and land-use data. Then the integration Core of Mymensingh city was identified by applying space-syntax theory. It was found that the formation of the Urban Core of the city (integration core) is codependent on the development of the Commercial Hub. Two of the city's economic phases (1974 and 2013) has been compared and analyzed for further results.

1.2 OBJECTIVES

- To find the relationship between the street patterns and the commercial land use patterns of a city on the basis of integrity of the roads
- To analyze the integration-core and the change of the most integrated route in relation to the economy of Mymensingh city.

2 METHODOLOGY

The methodology for the process of analysis and evaluation can be described in a structured way. The initial step is to acquire the basic information of the Mymensingh Paurashava, as such the historical background of the evolution of the city, the present dimension, the natural and geographical settings which influences the growth and expansion of the city.

The basic information of the land use patterns and street network is collected from the local authority of Mymensingh Paurashava. The land use maps include the different types of land use patterns and total areas. The depth map is used for simulation to generate the integration pattern of the streets of Mymensingh Paurashava. From this simulation the maximum and minimum integration of the streets can be generated and plotted through a map. Thus the maximum integrated part of the city or the urban core can be marked.

The comparison between the both simulated map and the land use map of 1974 and 2013 helps to understand the inner relationship of the different types of land uses and the integrity of the adjacent streets. It also helps to understand the reason of concentration and expansion of different parts of the city. The possibilities of future expansion of urban core and change of land use patterns can be assumed from the simulations and comparison of the land use pattern.

3 LITERATURE REVIEW

3.1 HISTORY OF MYMENSINGH CITY

Mymensingh (Bengali, pronounced *moy-mon-shing-haw*) is a city of Bangladesh situated on the river Brahmaputra. Since the 1980s the city has expanded with fast urbanization. Mymensingh city is clearly marked by the old Brahmaputra River flowing along its north. Shambhuganj is situated on the other side of the Brahmaputra, connected by the Shambhuganj Bridge. The other ends of the city are marked respectively by the beginning of the Agricultural University campus, the Medical College, Army cantonment and, finally, Sultanabad, a township built for the followers of Aga Khan. A railway line connecting Dhaka with northern districts, built between 1885 and 1899, passes through the city and divides it into two sides. The entire area between Durgabari Road, and Maharaja Road comprises the core commercial area. There are places like Ganginarpar, Boro Bazaar, Choto Bazaar, Mechua Bazaar within this area. There are spots like 'Jilapi Patty'

which is for making and selling 'jilapis'. The main road from Notunbazar to the railway station hosts a number of shops for manufactured products and clothing on the two sides.

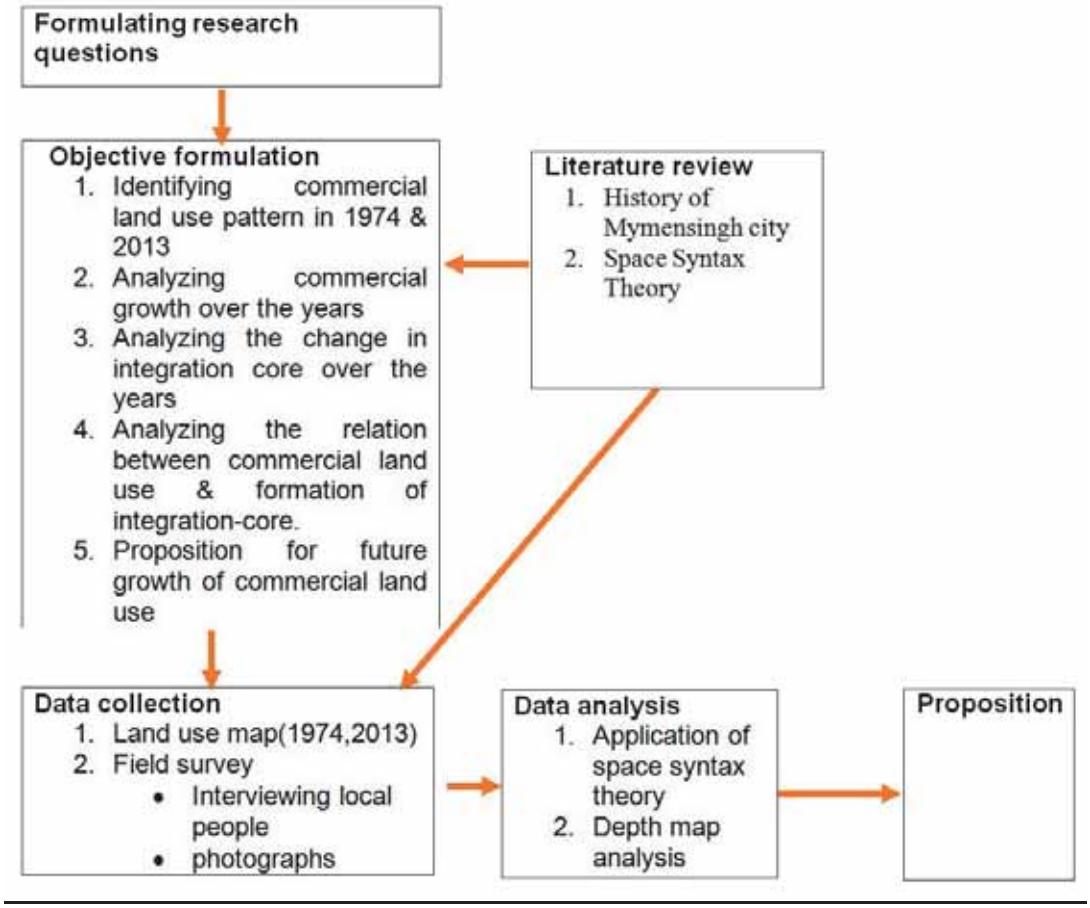

Fig. 1 Research methodology

3.2 SPACE SYNTAX THEORY

Space syntax is a methodology for measuring the relative accessibility of different locations in a spatial system by partitioning the spatial system into relatively independent but connected subspaces (Hillier and Hanson 1984, Batty and Rana 2004).

It adopts a configuration approach to study to what extent and in which conditions the social and spatial attributes are correlated. It analyzes the topological properties of the urban grid represented by urban street network, and compares that with the human movement including pedestrian and vehicle flow. Comprehensive mathematical models of the topology of urban street network, analyzed and supported by empirical data give deep insights into the functional patterns and settlements and cities (Hillier et al. 1993).

- Space syntax theory and technology were pioneered in 1970 by Prof. Bill Hillier and Colleagues at University of London.
- Built on quantitative analysis and geo-spatial computer technology, space syntax provides a set of evidence based techniques for the analysis of spatial configuration of all kinds, especially where spatial configuration seems to be a significant aspect for human affairs, as it is for buildings and urban areas.
- In this technique, the 'convex space' defined by polygons where no line is drawn between any two points in the space goes outside it. 'Axial line', defined as the longest and fewest straight lines of visibility and permeability that cover all the convex space represent the one dimensional organization of the spatial layout.

- In the context of a city, urban blocks or plots are considered as close spaces, while streets and squares as parts of the open spaces. Open space provides a unique vision in understanding the configuration of an urban system.
- There are ***four syntactic measures*** that can be calculated. These are used in quantitative representations of building and urban layouts:
  - **Connectivity** measures the number of immediate neighbors that is directly connected to a space. This is a static local measure.
  - **Integration** is a static global measure. It describes the average depth of a space to all other spaces in the system. The spaces of a system can be ranked from the most integrated to the most segregated.
  - **Control value** is a dynamic local measure. It measures the degree to which a space controls access to its immediate neighbors, taking into account the number of alternative connections that each of these neighbors have.
  - **Global choice** is a dynamic global measure of the '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.

Integration

Among all the measures, the first and the most important measure of Syntactic analysis is integration. The integration of a space is a function of the mean number of lines and changes of direction that need to be taken to go to all other spaces in the system. Integration is therefore about syntactic and not about metric accessibility and the word depth rather than distance is used to determine how far a space lies. The integration value of a line is a mathematical way of expressing the depth of that line from all other lines in the system (Hiller & Hanson 1984). In integration, the relative depth and shallowness of any spatial system are seen from any Particular point within it. Integration is a global static measure in that, every axial line is assigned a value which is characteristic to its relation to all other lines in the and thus provides a global index of relative integration and segregation for that line relative to all others. These values that are well below 1 – out of the order of 0.4 to 0.6 – indicate more segregation, while the value ending to and above 1 show strong integration. The warmer color axial line has, high global or local integration value and vice versa. For example, the red line represents the highest integration value; the dark blue line represents the lowest integration value, in other words, the most segregation.

Integration Core

Once the integration of each space of the whole system has been calculated, the "integration core" which illustrates the important deep structure of a spatial system, can be identified. The integration core forms the pattern of 'the most integrated line' of an urban system. The nature of the integration core, its size, and space depends on the shape, connectivity, and geometry of the urban system and on its mode of growth.

4 DATA COLLECTION

Defining a methodology is imperative to directing any research work. In general, a method is the way of doing something and a methodology is a broad framework of systematically arranged various methods and techniques devised to conduct any research work or study (Jahan 2007). Here secondary data was collected. Like the Master plan on Land use zoning, Structure plan, Strategic plan, Spatial growth of Mymensingh town and Mymensingh town ward map, Road map of 1974 & 2013 from UDD and others demographic, geographical, economical, historical data from literature review.

4.1 LAND USE MAP 1974

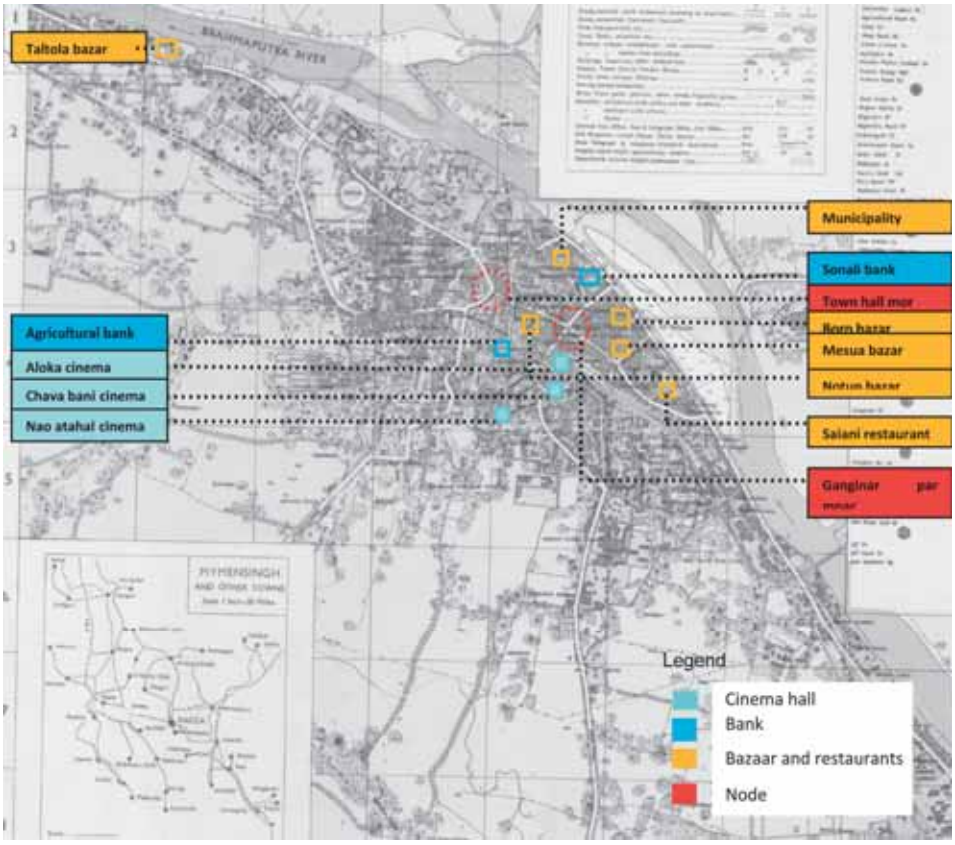

Fig. 2 Land use map of 1974

4.2 LAND USE MAP 2013

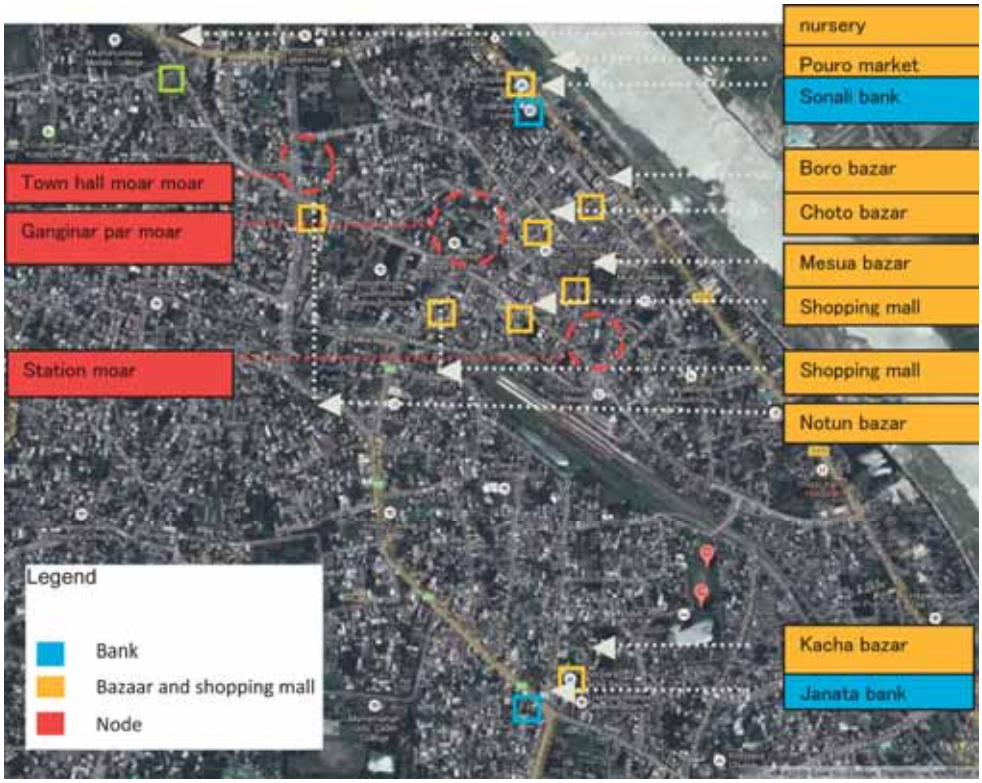

Fig. 3 Present name of the road and approximate locations of the selected commercial land use

4.3 LAND USE ZONING

According to the master plan, Mymensingh has attracted by the surrounding area which are treated as the hinterland and the development of Mymensingh adjacent with its near river "Bhrammaputra" and road. The **Ganginapar nodal point** and **Town Hall nodal point** is the main urban core that is connected with other roads and streets of the city. The movement from one part of the city to another part needed to pass these two nodes as the main road continues from east to west between these nodes and connected with Dhaka-Mymensingh highway (Mymensingh Master plan 2009-2013). The main commercial zone has been developed on both side of main road near the Ganginapar node after the establishment of Mymensingh Railway Station. The educational facilities have grown afterwards along the both side of main road near Town Hall node. The administrative facilities are established near the riverbank in an early period but the road connecting those buildings was not treated as main road of the city. The establishment of Agricultural University played an important role for expansion of the city on the east part though the development was slow comparing to southern part. At present the Dhaka Mymensingh highway is widened and the new commercial facilities are emerging along the connecting roads from Ganginapar node to Dhaka-Mymensingh highway.

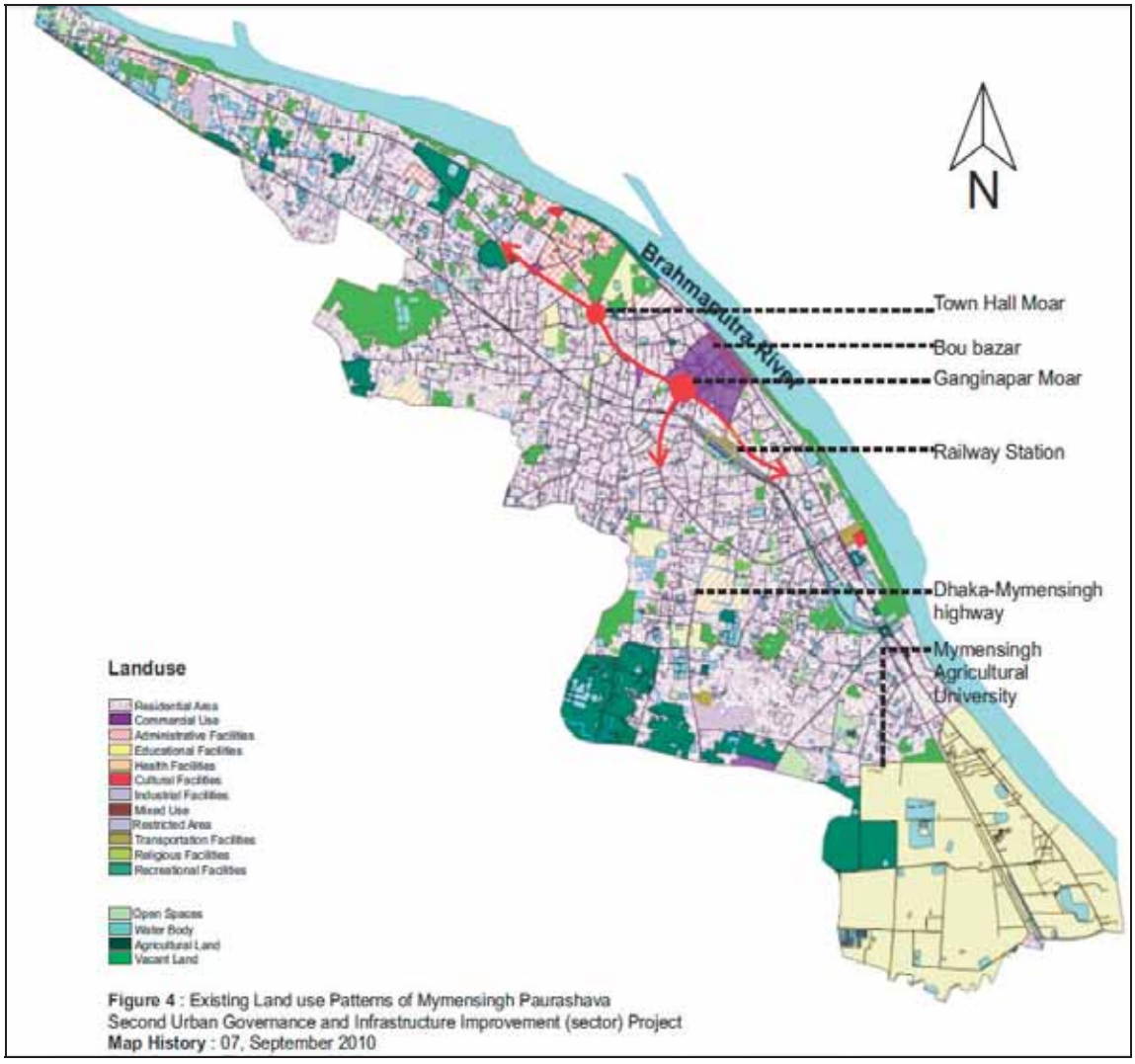

Fig. 4 Existing land use patterns of Mymensingh Paurashava, 07 Sept. 2010

Street Patterns

Mymensingh Paurashava is divided into 21 wards alongside the river of Brahmaputra. The main accessibility to the city center is from Dhaka-Mymensingh highway,Shamvuganj Bridge over the river Brahmaputra connecting Netrokona, Mymensingh-Tangail Road and from Fulbaria to Mymensingh road. The Ganginapar nodal point and Town nodal point are the main urban core that are connected with other roads and streets of the city. The movement from one part of the city to another needed to pass these two nodes as the main road continues from east to west between these nodes and connected with Dhaka-Mymensingh highway.

Town Hall Nodal Point

The major dynamic driving forces of the cities in developing countries are economic and social forces to change the urban system with the growing demand of population and urbanization. Of course all the urban problems are different and unique to a particular city based on the city growth pattern, economic and social character. The centre of economic hub of the city is “boro bazaar” and “notun bazaar” area. The changing city form gave “Boro Bazaar” the shape of mixed use zone rather solely commercial or business zone. As a central economic hubs in the city centre, Boro Bazaar needs to be more dynamic to response to the city economy and its growth pattern. For last one decade Boro Bazaar has faced compact unplanned haphazard development even along the riverside just to meet the demand of rapid urbanization process. Therefore it is now become an urban challenge to revitalize the Boro Bazaar area to make more effective response to the rapid economic growth and to ensure better urban environment for the residents, businessmen and the employers.

Ganginar Par Nodal Point

As a new economic hub, “Ganginar par” node has a great importance. At this node all kinds of mixed commercial business are running. All kinds of luxuries office and private Bank, insurance, show room has established. So, it has its own importance. The maximum traffic congestion occurs in some areas in different time period of the day. From morning 7 am to 9 am and 12 to 2 pm the traffic congestion can be seen in between Town Hall node to Ganginapar node as School and colleges are alongside the roads. The office vehicular flow for office going people is responsible for traffic congestion during 8 to 10 am and 6 to 8 pm. The main market and bazaar zone is along with the Station node and the connecting road towards Ganginapar node. The traffic congestion occurs here during 12 pm to 1 pm and 6-to 8 pm at the evening. The maximum pressure on the roads occurs at Ganginapar nodal point at all the rush hours because this point is passed by all types of vehicular flows for different purposes like educational, administrative and commercial. So it is clear that, the growth pattern of road runs with the city economy of Mymensingh. “Space syntax” has show; the transformation of the integrated core. This can be explained with the economic activities of the city.

4.4 FIELD SURVEY

Fig. 5 Bari plaza

Fig. 6 Notun bazaar node

Fig. 7 Ganginar par node

Fig. 8 Station node

Fig. 9 Charpara node

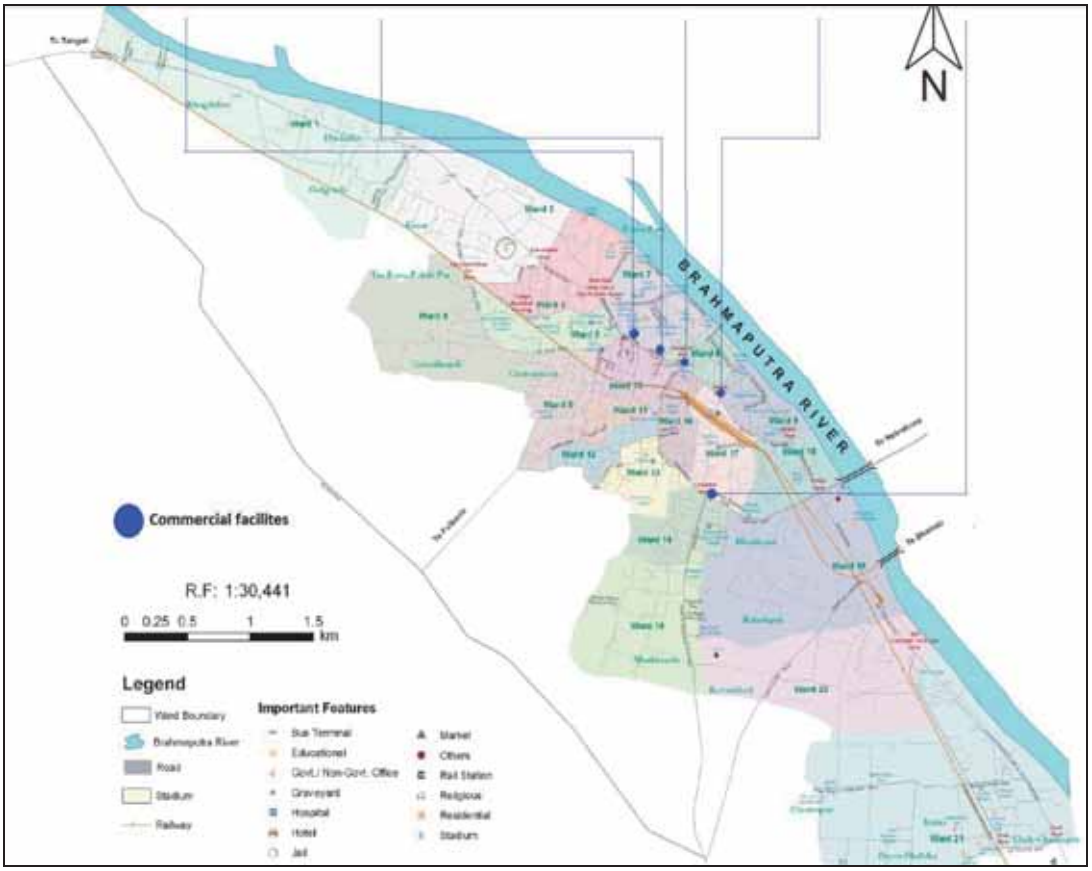

Fig. 10 Location map of Mymensingh town, 07 Sept. 2010

4.5 GENERATING AXIAL MAP

Fig. 11 1974 Road network layout drawn as convex space

Fig. 12 2013 Road network layout drawn as convex space

5 SIMULATION

5.1 IDENTIFYING INTEGRATION CORE

The space syntax simulation of the Mymensingh town is done with the help of depth map to create an axial map of the existing street patterns. The axial map is created by axial spaces or axial lines which are straight lines ("sight line"), possible to follow on foot. From the axial map the integration values of the streets are generated. The integration of a space is a function of the mean number of lines and changes of direction that need to be taken to go to all other space in the system. Integration is therefore about syntactic not about metric accessibility and the word depth rather than distance is used how far a space is lies.
The integration value of a line is a mathematical way of expressing the depth of that line from all other line in the system (Hiller & Hanson 1984). In integration, the relative depth and shallowness of any spatial system are seen from any particular point within it. This analysis has considered on the basis of Global theme (R= n).

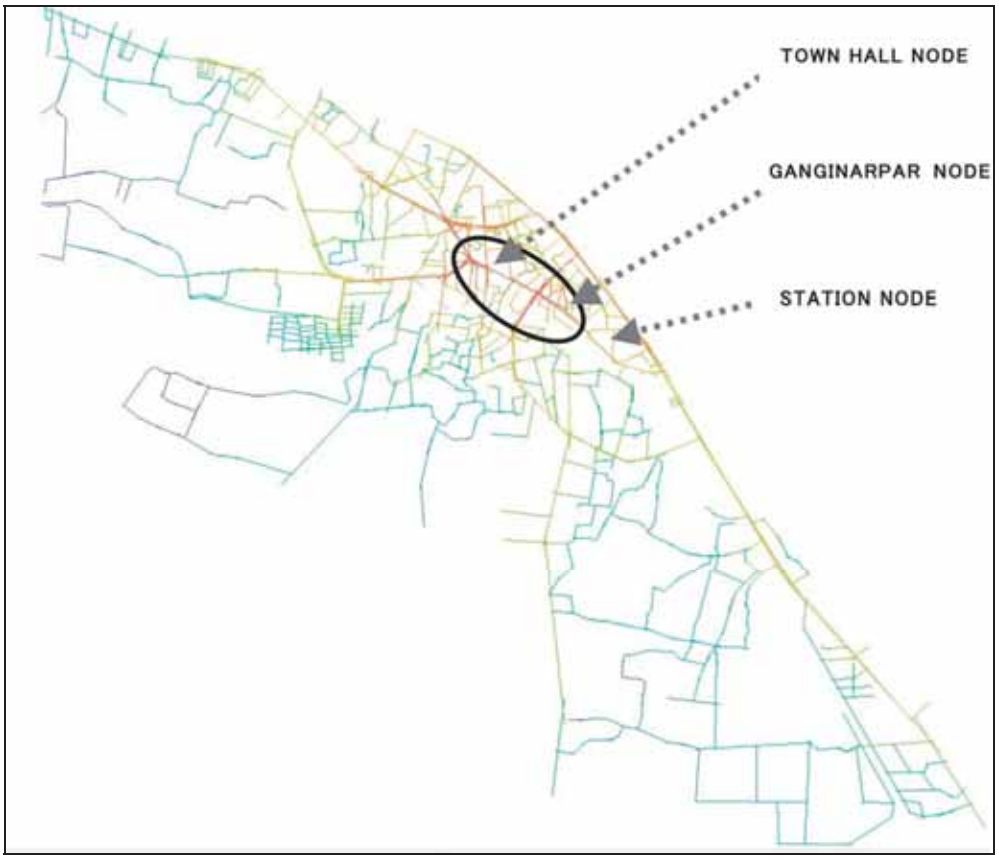

Fig. 13 1974 Axial map with global integration R=n

From Pouroshobha map of 1974 and 2013, it shows that each of the selected commercial zones is connected to a main road through a secondary access road. Global Integration, Connectivity of access road of commercial zone of 1974 & 2013 are given below.
From Tab. 1 it can be seen that Ganginarpar and Shemacharan roads were mostly integrated roads with the value of 1.38358 in the town and their connectivity were highest which is 34. Jubilee road was the second highest integrated road of the town as Borobazar and Chotobazar road were partially connected with it (Fig. 2). Chorpara road had the connectivity of 13 which had commercial buildings like Aloka cinema hall,

Anondolok cinema hall and agricultural bank (Fig. 2) which was low down integrated road than Ganginarpar and Shemacharan roads.

Fig. 14 2013 Axial map with global integration R=n

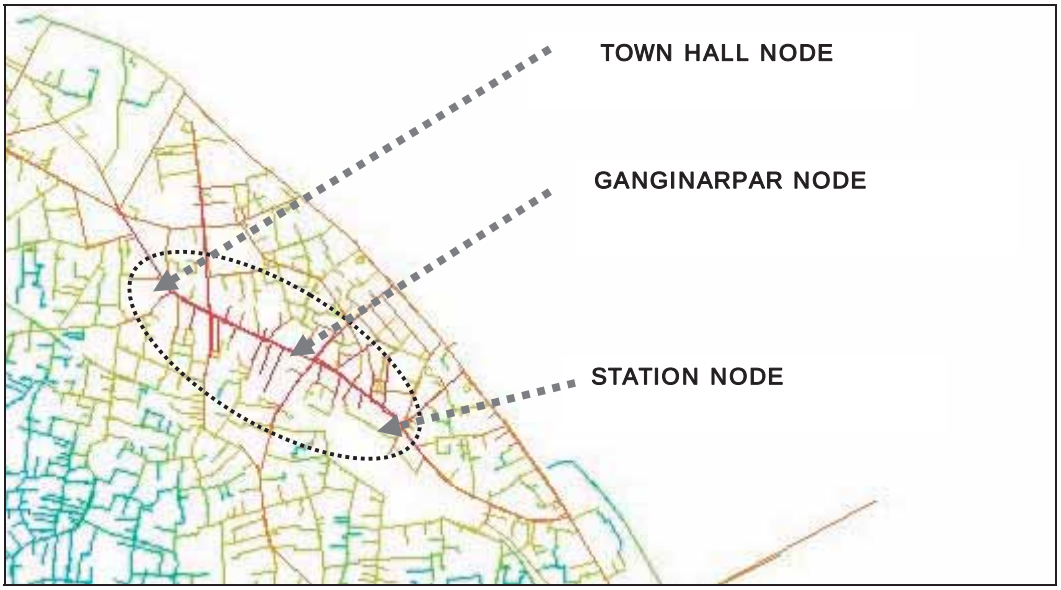

Fig. 15 Blow up of 2013 axial map with global integration R=n

5.2 ANALYSING AXIAL MAP OF 1974 & 2013

SL No	NAME OF THE BUILDING	ADJACENT MAIN ROAD	REFF NO.	INTEGRATION (HH)	CONNECTIVITY
1	Boro bazar	Borobazar Road	232	1.11073	6
2	Choto bazar	Choto bazar Road	231	1.0304	5
3	Mesua bazaar	Ganginar par Road	279	1.38358	34
4	Notun bazar	Shemacharan Road	279	1.38358	34
5	sonali bank	Jubilee road	295	1.21658	16
6	Anonda lok cinema, aloka cinema, agricultural bank	Chorpara road	272	1.07143	13

Tab. 1 Global integration, connectivity of access road of commercial zone of 1974

SLNo	NAME OF THE BUILDING	ADJACENT MAIN ROAD	REFF NO.	INTEGRATION (HH)	CONNECTIVITY
1	Boro bazar	Borobazar Road	1394	.745529	6
2	Choto bazar	Choto bazar Road	1523	.729942	5
3	Mesua bazaar, uttara shopping mall, harun tower	Ganginar par Road	1514	.818697	30
4	Notun bazar	Ram babu Road	1919	.843409	25
5	Municipality market, sonali bank	Jubilee road	1733	.768198	8
6	Nursery	Shemacharan road	2574	.810389	13
7	Chorpara kacha bazaar, janata bank	Chorpara road	1601	.797153	22

Tab. 2 Global integration, connectivity of access road of commercial zone of 2013

From Tab. 2 it can be seen that in 2013 the Rambabu road is mostly integrated road with connectivity of 28 roads because of their land use pattern are converted from residence into commercially used buildings. The commercial mall like, Uttara shopping mall, Harun tower, Bari plaza, Banks, Restaurants, Mesuabazar, other companies outlets, retail stores are developing alongside of Ganginarpar road which leads towards station node (Fig. 3). The Chorpara road which is connected from Ganginarpar node at south east side is third highest integrated road with the connectivity of 22 roads. Janata bank, Hotel al Rifat, Panch Tara hotel, Chorpara bazaar were developed in this road.

5.3 OBSERVATIONS

- Initially with the formation of the city the main commercial zone was located around town hall node during 1888 to 1889.
- The 1974 map shows that the business activity has shifted around Ganginar par node.
- At present time Ganginar par node is still important for its business potentiality. But at the same time this core has south ward pull to station node.
- Ganginar par node has become the integrated core.
- "Chorpara road" has gotten its importance which is connects towards Dhaka Mymensingh highway.

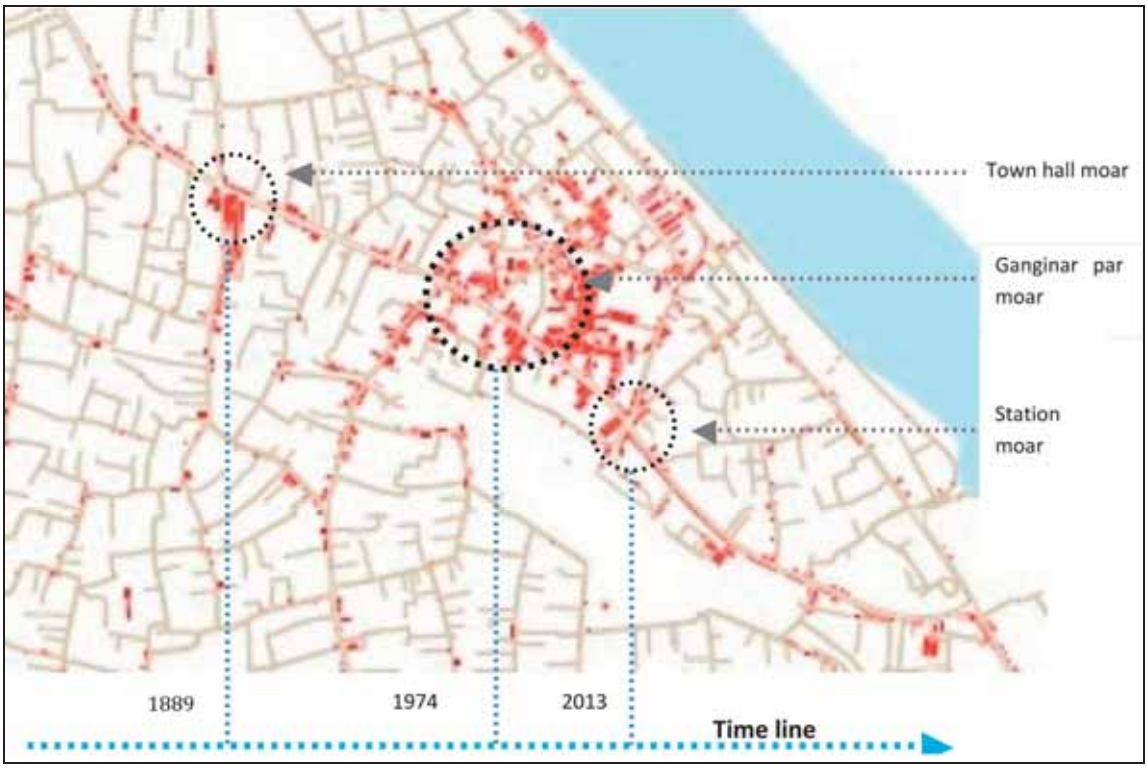

Fig. 16 Progression of commercial zone through time

6 PROPOSITION

A number of proposition can be illustrated from the analysis that are given below:

- The Axial Line Analysis explore that, the city integrated core has extended from north east to south west (Fig. 16).
- The shifting of the integration core can be assumed either towards i) the Dhaka-Mymensingh highway or ii) along Brahmaputra River through Station nodal point.
- Hence the possible future growth of commercial zone of Mymensingh city may take place towards Dhaka City or along with Brahmaputra River.

7 CONCLUSION

The objective of the paper was to analyze the relationship between the road network along with the commercial land use and its growth pattern in different time periods through space syntax. Two phases of axial maps are analyzed and it can be said that it has a strong relationship between commercial zones with mostly integrated cores. The survey data and the space syntax simulation help to represent this comparative

analysis of the past with the present situation and possible future changes in the urban area. The future transformation and expansion of the city area in a logical and effective way can be plotted and necessary steps for city development can be assumed and suggested for the betterment of total urban area.

Fig. 17 Possible future expansion

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I would like to express my heartfelt gratitude to my teacher Farida Nilufar, Professor of Architecture Department, BUET. Her systematic and sincere supervision and guidance enabled me to complete this research work successfully. I would also like to thank urban development directorate (UDD) for their constant support.

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History of Mymensingh - http://en.wikipedia.org/wiki/History_of_Mymensingh

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http://timstonor.wordpress.com/space-syntax-2/

http://www.bdresearchpublications.com/admin/journal/upload/09161/09161.pdf

http://www.banglapedia.org/

IMAGE SOURCE

Fig. 10: Field Survey, 2010

AUTHOR'S PROFILE

Silvia Alam

Born on June 2, 1986 in Dhaka, Bangladesh. She graduated in Architecture in 2009 at Ahsanullah University of Science and Technology (AUST) and worked there as a lecturer at the Department of Architecture for the last three years. She is also currently attending a Master in Architecture from the University of Engineering and Technology Bangladesh (BUET).

TeMA Journal of Land Use, Mobility and Environment

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REVIEWS PAGES

SMART CITIES CHALLENGES
SMART ENVIRONMENT
FOR SUSTAINABLE RESOURCE MANAGEMENT

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. During the last two years a particular attention has been paid on the Smart Cities theme and on the different meanings that come with it. The last section of the journal is formed by the Review Pages. They have different aims: to inform on the problems, trends and evolutionary processes; to investigate on the paths by highlighting the advanced relationships among apparently distant disciplinary fields; to explore the interaction's areas, experiences and potential applications; to underline interactions, disciplinary developments but also, if present, defeats and setbacks. Inside the journal the Review Pages have the task of stimulating as much as possible the circulation of ideas and the discovery of new points of view. For this reason the section is founded on a series of basic's references, required for the identification of new and more advanced interactions. These references are the research, the planning acts, the actions and the applications, analysed and investigated both for their ability to give a systematic response to questions concerning the urban and territorial planning, and for their attention to aspects such as the environmental sustainability and the innovation in the practices. For this purpose the Review Pages are formed by five sections (Web Resources; Books; Laws; Urban Practices; News and Events), each of which examines a specific aspect of the broader information storage of interest for TeMA.

01_WEB RESOURCES
The web report offers the readers web pages which are directly connected with the issue theme.

author: Laura Russo
Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

02_BOOKS
The books review suggests brand new publications related with the theme of the journal number.

author: Floriana Zucaro
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@gmail.com

03_LAWS
The Law section proposes a critical synthesis of the normative aspect of the issue theme.

author: Valentina Pinto
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: valentina_pinto@hotmail.it

04_URBAN PRACTICES
Urban practices describes the most innovative application in practice of the journal theme.

author: Gennaro Angiello
Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

05_NEWS AND EVENTS
News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

author: Gerardo Carpentieri
Tema Lab- Università degli Studi di Napoli Federico II, Italy
e-mail: ger.carpentieri@gmail.com

TeMA
有关土地使用、交通和环境的杂志

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评述页

适用于可持续资源管理的智能环境

TeMA 从城市规划和流动性管理之间的关系入手，将涉及的论题逐步展开，并始终保持科学严谨的态度进行深入分析。在过去两年中， 智能城市课题和随之而来的不同含义一直受到特别关注。
学报的最后部分是评述页。这些评述页具有不同的目的 ： 表明问题、趋势和演进过程；通过突出貌似不相关的学科领域之间的深度关系对途径进行调查；探索交互作用的领域、经验和潜在应用；强调交互作用、学科发展、同时还包括失败和挫折（如果存在的话）。
评述页在学报中的任务是，尽可能地促进观点的不断传播并激发新视角。因此，该部分主要是一些基本参考文献，这些是鉴别新的和更加深入的交互作用所必需的。这些参考文献包括研究、规划法规、行动和应用，它们均已经过分析和探讨，能够对与城市和国土规划有关的问题作出有系统的响应，同时还对诸如环境可持续性和在实践中创新等方面有所注重。
因此，评述页由五个部分组成（网络资源、书籍、法律、城市实务、新闻和事件），每个部分负责核查TeMA所关心的海量信息存储的一个具体面。

01_WEB RESOURCES
The web report offers the readers web pages which are directly connected with the issue theme.

author: Laura Russo
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: laurarusso88@hotmail.it

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01

SMART CITIES CHALLENGES: SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

REVIEW PAGES: WEB RESOURCES

LAURA RUSSO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

In this number
ICTs FOR A SMART AND SUSTAINABLE ENVIRONMENT

Already a quarter of the world's population is connected to the Internet, which can be considered the defining technological invention of our era. Information and communication technologies (ICTs) affect the way we work, live, and communicate, enabling the development, production, exchange and delivery of goods and services. Almost every aspect of our life has been touched by this digital revolution, which is having huge impacts on culture, business, politics and the environment: today, building a sustainable environment is easier thanks to the contribution of ICTs, which allow the global spread of information.

The first web resource analyzed in this number is the website of the International Telecommunication Union (ITU), which is the specialized agency of the United Nation for ICTs. As more and more people get connected, ITU drives innovation by allocating global radio spectrum and satellite orbits, setting technical standards, which all improve access to ICTs.

The other two web resources presented in this number refer to specific sectors affected by information and communication technologies: agriculture and waste disposal.

The application of ICTs in agriculture is increasingly important, but unfortunately, all over the world, many farmers still don't have access to the Internet and ICTs, or sometimes, they are not able to use them; for this reason, during the World Summit on the Information Society in 2005 it was decided to establish the e-Agriculture community of practices, with the goal of sharing knowledge and information about the role of ICTs in building a sustainable agriculture. E-Agriculture website is described below.

In the end, a focus on the use of ICTs in the waste management industry concludes this number: the Waste Management World website represents a point of reference for the stakeholders involved in the sector because it gathers information, news, article and much more about the latest innovation for the waste disposal, many of which involve the use of ICTs.

The aforesaid web resources clearly bear out that ICTs are fundamental for the development of a sustainable and smart environment.

INTERNATIONAL TELECOMMUNICATION UNION - ITU

http://www.itu.int/en

The International Telecommunication Union (ITU) is the United Nation specialized agency for information and communication technologies (ICTs), whose goal is to preserve people's right to communicate by improving access to ICTs.
Although ITU was born in 1865 as the International Telegraph Union, in 1934 it took its current name and it now covers the entire ICT sector and not only the telegraph as when it was founded.
ITU has three main areas of activity: Radiocommunications, Standardization and Development.

- Radiocommunication means space services such as satellites and radio-frequency, that today play a fundamental role in our everyday lives: phone calls and TV programmes are possible thanks to satellites, while wireless communications need radio-frequency spectrum to provide broadband services. ITU's Radiocommunications Sector coordinates these radiocommunication services and organizes meetings and study groups in order inform and to keep up-to-date those who are involved in the sector.
- Standardization can be considered one of the most relevant activities carried out by ITU, because without ITU's *Recommendations* things as simple as a phone calls or surfing the Internet would not be possible, in fact, every year, ITU generally produces over 100 standards that allow systems to work efficiently.
- The Development Sector's goal is to increase access to ICT worldwide. In order to achieve this target, ITU promotes a wide number of different initiatives, such as ITU Connect events, and it also publishes statistics and indicators, which are an important tool to support deployment of ICT networks and services globally.

All the information relating to the three main areas of activities are available on ITU's website, together with a variety of other material on the Agency and the ICT world.
Articles, latest news and events about ITC are available on the Home page of ITU's website, which also includes direct link to *Join ITU,* to *Get Involved* with its work and to access the *Video Corner,* which gathers all videos published by ITU on YouTube with interviews, debates, conference speeches, etc.
Furthermore, one section of ITU's website is dedicated to ITU Telecom World, a knowledge-sharing platform that involves public and private stakeholders belonging to the ICT sector; the platform aims to stimulate dialogue and debate, encouraging connections and collaboration among experts in the field.
High level events allow to extend the virtual conversation offered on ITU Telecom platform and offer interactive discussion with renowned speakers.
ITU counts over 700 members and represents the leading world forum for the development of the ICT industry.

E-AGRICULTURE
https://www.e-agriculture.org

E-Agriculture counts over 11.000 members from all over the world; the goal of the community is sharing knowledge and experiences related to the use of information and communication technologies (ICT) for agriculture. Different professional profiles are part of the e-Agriculture community of practice, such as researches, farmers, politicians, entrepreneurs and volunteers, all of which interested in rural development. Such heterogeneity of figures allows for a greater exchange of information, encouraging constructive dialogue between different disciplines.

E-agriculture was officially born in 2007, but the idea was already clear after the World Summit on the Information Society in 2003 and 2005, when problems related to the weakness of communication in the rural context became evident. Nowadays, the community is still growing and one of its most popular activities is the e-Agriculture Forum, available for registered members only on e-Agriculture website.

The Forum is just a small part of what the website offers to visitors, in fact, it collects over 2.000 news, 500 events and discussions. The Home includes a section gathering a wide range of international Blogs and, yearly, a countdown of the ten most popular blogs of the year is arranged on twitter; for example, the blog "Current Scenario of India Farmers" by Rakshit Agrawal was read 730 times and won the first position in the list of the Top 10 blogs of 2013.

The numerous posts published by the community are organized into four main sections: *Agricultural Value Chains and ICT; Gender, ICTs and Rural Livelihoods; Mobile telephony in Rural Areas; Public Private Partnerships (PPP).*

In the section *Agricultural Value Chains and ICT*, there are several materials looking at key opportunities and challenges of ICT interventions in the agricultural value chain with a special focus on the most beneficial actions in rural areas.

The section *Gender, ICTs and Rural Livelihoods* is dedicated to the critical role of women in agriculture, and the positive benefits that ICTs can have in the livelihoods of rural women.

Furthermore, posts about mobile phones and their contribution in creating economic benefits and in improving communication are included in the section *Mobile telephony in Rural Areas.*

In the end, the section *Public Private Partnerships (PPP)* offers a great variety of posts regarding how PPPs can facilitate the generation and delivery of relevant and timely contents, particularly to reach the most isolated farmers.

In order to facilitate dialogue and connection between the members of the global network, it is possible, for registered members only, to see member's profile and easily connect with them; different colored badges identify different type of members: current members of the e-Agriculture team have an orange badge on their profiles, previous members of the e-Agriculture team have a gold one, and featured members have a green one.

For those who are interested in staying up to date with the latest information about the Community, you can follow its profile on Twitter, Facebook, LinkedIn, YouTube and Delicious.

WASTE MANAGEMENT WORLD
www.waste-management-world.com

Waste Management World (WMW) is an open access digital journal entirely dedicated to the industry of waste management. The bimonthly magazine collects information about the industry main news, innovative technologies, products and services with special focus on recycling and sustainability.
Each volume is dedicated to a specific theme but it also includes a regular section with the editorial, comments, product news and information on the International Solid Waste Association.
In compliance with the idea to support the free global exchange of knowledge, all the magazine's contents can be easily accessed on line at the WMW website, which is a rich source of information for the industry.
WMW website is organized into eight sections, each of which including articles, videos, news and events on a given topic; the eight main topics are: collection/transport, recycling, landfill, biological treatment, waste to energy, markets & policy, video and products.
Proving the strong relationship between Waste Management World and the International Solid Waste Association (ISWA), WMW website gives users the opportunity to download the full *State-of-the-art Report* of ISWA on Waste-to-Energy plants, which offers technical information and data on the plants in U.S. and 18 European countries. Moreover, the section on Opinions collects a significant number of interviews with leading figures of the industry, explaining their point of view on specific issues and contributing to widen the debate on the topic. For example, one of the latest interviews is that made to the managing director of a waste management machinery manufacturer, who explains why the waste and recycling industry should be more proactive in communicating its achievements to encourage an inflow of investment and talent.
The managing editor of the magazine daily updates the website with detailed articles on the latest news about waste management, gathering information from all over the world in order to provide the industry a useful tool to keen up to date; he is also the conductor of the *WMW Weekly Newscast,* that together with a wide range of video with different contents, constitutes an attractive video library easily accessible to everyone. The video library includes video about ongoing waste management projects as well as a mini collection of short film aiming to raise public awareness of the benefits of recycling beverage cans.
In order to better exploit the potential of the internet, Waste Management World does not limit itself having only the website, in fact, it uses several different social networks to expand its diffusion, such as Facebook, You Tube, Twitter, Linkedin and Google Plus, showing a great number of subscriptions. This success proves the strong interest for this type of industry, especially by insiders who want to be informed and updated on the latest news and technological innovation.

IMAGE SOURCES

The images are from: http://deeptech.org/four-conversations-on-greening-ict/; http://wmw.hotims.com/r5/search.asp?action=search&return_by_category=y; http://it.appszoom.com/android_applications/business/wmw-magazine_ijzpr.html; http://groups.itu.int/stocktaking/About/e-AgricultureCommunity.aspx; http://www.rle.mit.edu/eems/research/completed-projects/.

02

SMART CITIES CHALLENGES: SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

REVIEW PAGES: BOOKS

FLORIANA ZUCARO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@gmail.com

In this number

ICT ROLE IN THE CURRENT ENERGY AND ENVIRONMENTAL CHALLENGES

In the late 1980s and early 1990s, the publication of the Brundtland Report Our Common Future and the first Earth Summit held in Rio de Janeiro, focused the world's attention on sustainable development. The world has been changing more and more since then and the sustainable growth, such as the wide use of information and communication technology (ICT), represent the two main issues in the worldwide and current debate about a low-carbon development. Sustainability is a critical challenge that must be overcome, while ICT is seen as both an opportunity and a strategic way to reach environmentally sustainable forms of economic and social growth, within an important historic context of growing world population, without requiring an end to growth.

More and more studies have been dealing with the role of ICT (broadband, mobile communications) in energy efficiency and climate change solutions, including the effects on the productivity of the economy and the role in monitoring and environmental management (Fuhr *et al.* 2007; Laitner 2008; ITU 2008). In regard to climate change, ICT can contribute to mitigate its effects especially in developing countries where emissions have been steadily got worse due to the necessity of developing faster and faster.

World poor countries are more vulnerable to climate change than the more developed ones, because low incomes and limited resources make the ability to cope with climate change impacts weak. Furthermore most of world poor people live in rural areas, which are highly dependent on natural resources and engaged in climate-sensitive livelihoods. These countries also use high carbon footprint technologies in energy applications and transport, as well high-carbon fossil fuels are used intensively. In order to create a low-carbon society where a strategic role has to be played by local communities, considering that most energy is consumed in urban areas, authorities should know how ICT-based energy efficiency solutions can be implemented.

According to these brief considerations, this section proposes three documents related to three main opportunities of ICT application: the first one concerns how new technologies can be used for improving climate change adaptation capacity of developing countries; the second one focuses on local initiatives to promote energy efficiency through ICT; the third one describes how emission reduction and energy saving in the ICT sector itself can be reached.

Title: Africa transformation-ready: the strategic application of information and communication technologies to climate change adaptation in Africa
Author/ editor: AA VV
Publisher: n.d
Download: :http://siteresources.worldbank.org/
Publication year: 2010
ISBN code: n.d.

The International Institute for Sustainable Development (IISD) has been commissioned by the African Development Bank and the World Bank Group to study constraints, opportunities, implementation risks and challenges related to the use of ICT for adaptation to climate change. This report represents the up-to-date account of what has been done (chapters 1 and 2), what can be done (chapters 3 and 4), and what should be done (chapter 5) in order to contribute to building Africa adaptation capacities through ICT. Africa countries are highly vulnerable to climate change: the temperatures are increasing faster and faster compared to the global average, the dominant economic sectors (such as agriculture or fishing) are very climate-sensitive and stress factors (such as disease or land degradation) limit the adaptive capacity of communities more and more. All African governments are working collaboratively through intergovernmental bodies both preparing national adaptation strategies and identifying several priority areas in which ICT can be used in order to reduce the vulnerability:

- managing and communicating information about the risks resulting from climate change, and extreme climate events, as well as preparing for their effects on food security and water supply;
- improving an information system within the food sector that is better able to reflect household access to food and food consumption;
- developing early warning and hazard risk information systems to deal with the additional fire hazards associated with climate change and to enable integrated fire management;
- mapping vulnerable areas and provide spatial representations of climate change impacts.

Three case studies are described within the report so as to show examples of ICT programs and applications that can be replicated elsewhere. In Uganda ICT has been applied to extend existing meteorological services to help farmers adapt to climate change, while in Senegal national and local authorities have been developing online platforms for the sharing of data, knowledge and information for adaption actions. In Malawi GIS tools are used by local communities in order to create a centrally located model that can be used to determine current and future water needs. Nevertheless these three positive examples, the implementation of new technology in the most recent adaptation plans and strategies is still weak, and there are few adaptation and mitigation projects in which ICTs are explicitly intended or expected to play a central role. According to these issues IISD provides Africa governments with some main recommendations: ICT initiatives should support social and economic development (instead focusing narrowly on a specific sector), in order to reduce dependence on current sources of income that are vulnerable to the impact of climate change; the adaptation planning processes should embed ICT developing long-term programs and actions and including private sector especially mobile phone companies and Internet Service Providers, because any ICT action needs to be permanent and supported by lasting financial resources; policy makers and planners need to be able to connect with and learn from one another and this knowledge exchange needs to be made by open data and crowd-sourcing tools to generate real-time data on impacts of climate change.

Title: The contribution of ICT to energy efficiency: local and regional initiatives
Author/ editor: AA VV
Publisher: ICLEI
Download: http:// ec.europa.eu/information_society
Publication year: 2011
ISBN code: n.d.

Thanks to the collaboration with the Committee of the Regions European Commission developed this research and dissemination project focusing on local and regional initiatives in order to promote energy efficiency through the direct and enabling roles of ICT. The product is a toolkit for local and regional authorities, including guidance and a series of case studies, articulated in two main parts: the first one (sections 2-9) is related to a broad range of energy efficiency and ICT initiatives realized at different scales; the second one (sections 10-13) describes specific kinds of initiatives, providing detailed information on the operational issues. The ICT energy efficiency actions analyzed are related to:

- ICT infrastructure and equipment;
- ICT enabled buildings and construction;
- ICT enabled transport sector;
- ICT enabled carbon/energy management and reporting.

At local level, in order to encourage and implement ICT energy efficiency measures, the first step is the setting-up of an energy agency that supplies several services based on the specific local energy needs. Both in Slovenia and in the Bretagne region the local energy agencies have allowed to reduce energy use in public buildings, municipal lighting and transport sector, through IT software. Transport demand management measures are one of the main application areas involving ICT solutions, especially the road user charging schemes, also known as road pricing and congestion charging schemes. London and Stockholm represent two success congestion charging schemes which have applied some of the main types of electronic technologies (Automatic Number Plate Recognition, Dedicated Short Range Communication, Global Navigation Satellite Systems) and have monitored and evaluated the scheme's performance through economic, social, environmental and ICT energy efficiency indicators.

In addition to urban mobility local authorities are improving the energetic and overall rehabilitation of buildings, both public and private ones, more and more through ICT systems: for instance, in Aalst (Belgium) a real time information system of the energy building management has been set up, such as in Maribor (Slovenia) for over one hundred public buildings. It is worth noting that in all the case studies related to "ICT-based building automation tool" the key element to bring these initiative to success has been the participation of the final users: local residents have to be always involved, establishing a good cooperation with them to help create sustainable behaviour. In fact, the use of new and efficient technology alone is not enough, without a radical change in the energy habits of the users to reach both carbon emission reduction and energy efficiency targets that EC has established. Awareness raising and adopting technologies, which are accessible to all, represent two important strategies to ensure that the technology selected can be easily used by the final users. The adoption of ICT has also pushed local administrations to learn managing ICT risk, such as financial, operational and technological risk. In order to minimize and control these risks successfully, a traditional project risk assessment (initiation, planning and design, execution, monitoring and control, closure) is recommended within the toolkit.

Title: SMART 2020: enabling the low carbon economy in the information age
Author/editor: AA.VV.
Publisher: The Climate Group and GeSI
Download: www.smart2020.org
Publication year: 2010
ISBN code: n.d.

The partnership between not-for-profit organisation The Climate Group and ICT sector group Global e-Sustainability Initiative (GeSI) has allowed to identify and quantify specific ICT impacts and opportunities, related to carbon emission savings and potential economic value. This report is aimed at giving a clear picture of the key role that the ICT industry plays in addressing climate change globally and supporting a low carbon development. In order to reply to three main questions, what is the direct carbon footprint of the ICT sector, what are the quantifiable emissions reductions that can be achieved by ICT applications in other economy sectors and what are the new market opportunities related to reaching these reductions, the study outlines five key actions to demonstrate the potential role the ICT sector supporting a SMART transformation: ICT can provide information about standard (S) forms on energy consumption and emissions, across different sectors; it can incorporate monitoring (M) information into the design and control for energy use; it can provide the capabilities and platforms to improve accountability (A) of energy and carbon emissions; this knowledge can be used to rethink (R) the current ways of learning, living and working; it can apply integrated approaches to energy management of systems and processes, transforming (T) all sectors of the economy. The report predicts that the ICT sector emissions will represent an estimated 2,8% of total global emissions by 2020 but, at the same time, ICT will be able to reduce these emissions by 7,8 $GtCO_2e$ by 2020 (remaining on a BAU trajectory), an amount five times larger than its own carbon footprint. In this perspective the report describes the four biggest opportunities for reducing emissions, and points up the role of ICT and the hindrances to be overcome. These four opportunities have been analysed associating them four case studies, selected because of the size of their abatement potential, the scale of the economic opportunity and the quality of data available.

- Smart logistics (Europe): ICT can improve the design of transport networks, allow the running of centralised distribution networks and run management systems that can facilitate flexible home delivery services, in order to save 1.5 $GtCO_2e$ in 2020;
- Smart motor systems (China): reducing electricity consumption in industry through optimised motors and automation could save almost 1 GtCO2e in 2020;
- Smart grids (India): improving the efficiency of electricity grids is the largest opportunity identified in the study, with a potential saving of 2 $GtCO_2e$;
- Smart buildings (North America): ICT-based monitoring, feedback and optimisation tools can be used to reduce both at every stage of a building's life cycle, from design and construction to use and demolition, saving 1.7 $GtCO_2$ in 2020;

In addition to these four opportunity sector dematerialization has been considered; by replacing physical objects and activities with electronic or "virtual" alternatives could save 500 Mt CO_2e in 2020, the equivalent of the total global footprint of the ICT industry in 2002. Many companies are still reluctant to adopt dematerialisation technology, because it requires both adopting new ways of working and significant cultural shifts.

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03

SMART CITIES CHALLENGES: SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

REVIEW PAGES: LAWS

VALENTINA PINTO
TeMALab - Università degli Studi di Napoli Federico II, Italy
e-mail: valentina.pinto@unina.it

In this issue

EUROPEAN AND ITALIAN REGULATORY FRAMEWORK AGAINST FLOODING

Between 1998 and 2004, Europe suffered over 100 major floods, causing some 700 fatalities, the displacement of about half a million people and insured economic losses totalling at least 25 billion (EU 2007). These phenomena is not related only to climatic factors and to the geology and geomorphology of the national territory, but also to human actions (clearing of forests, straightening of rivers, and extensive building in high-risk areas) that have increased uncontrolled during the last decades. Atmospheric phenomena of considerable intensity over short periods of time accompanied to an improper use of the land, lead to a considerable increasing of the number of people and goods affected by flood risk.

Also Italy is extremely exposed to flash floods and pluvial flooding as witnessed by the recent catastrophic events occurred in Modena in January 2014 and in Sardinia in November 2013.

To effectively respond to repeated emergencies related to hydrogeological risk, in recent years various parties responsible for water and soil conservation, both at Community and national level, responsible for water and soil conservation are trying to pursue the goal of sharing the importance of risk prevention and mitigation. A brief analysis of the relevant legislation indicates, in fact, the intention of the lawgiver to move from a logic of interventions "ex post", aimed at recovering the damages, to an approach finalized to the identification of risk conditions and to the adoption of measures to reduce significantly the potential impacts of the events.

On this basis, the laws section in this number examines the European and the Italian regulatory framework related to the prevention and mitigation of flood risk. The current regulations about flooding are represented by Directive 2007/60/EC on the assessment and management of flood risks transposed into Italian Legislative Decree of February 23, 2014 n . 49.

Both at national and Community level, the legislation related to flood risk hinges on the Plan instrument that, according to the latest regulations will evolve from the general hydrogeological management Plan to the specific flood risk management plan of which the characteristic aspects have been investigated in this issue.

DIRECTIVE 2007/60/EC: A FRAMEWORK FOR THE ASSESSMENT AND MANAGEMENT OF FLOOD RISKS

The European Directive n. 2007/60/EC of 23 October 2007 seeks to establish "a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community."(art. 1) and it is connected to the WFD 2000/60/EC, according to which the Water Management Plans have been drawn up. For the purposes of this Directive, Member States shall implement three phases of activity according to predetermined dates:

- set up a preliminary flood risk assessment and identify areas of potential flood risk by December 2011; this includes gathering information on the boundaries of river basins in the concerned district, on floods that have occurred in the past, on the likelihood of future floods and on the estimated consequences. On the basis of the assessment, Member States must categorize river basins according to whether or not they have a significant potential flood risk. This assessment and the resulting categories assigned to river basins must be published and reviewed by 22 December 2018 and every six years thereafter.
- draw up flood hazard maps and flood risk maps by December 2013; flood hazard maps shall cover the geographical areas which could be flooded according to the following scenarios: floods with a low probability, or extreme event scenarios; floods with a medium probability (likely return period ≥ 100 years); floods with a high probability. For each scenarios the flood risk maps shall show the potential adverse consequences such as the indicative number of inhabitants and the type of economic activities potentially affected, the indication of areas where floods with a high content of transported sediments and debris floods can occur, etc.;
- establish flood risk management plans to support measures for each river basin district by December 2015. Where the area concerned extends into several countries, the Member States must cooperate in preparing, as far as is possible, a single management plan. In preparing a management plan, appropriate levels of protection must be established for each river basin, sub-basin and stretch of coastline and measures must be drawn up to achieve those levels of protection. Management measures must focus on reducing the probability of flooding and the potential consequences of flooding.

  They must cover prevention (i.e. preventing damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas or by adapting future developments to the risk of flooding), protection (by taking measures to reduce the likelihood of floods and/or the impact of floods in a specific location such as restoring flood plains and wetlands) and preparedness (e.g. providing instructions to the public on what to do in the event of flooding) and must take account of relevant aspects, such as water management, soil management, spatial planning, land use and nature conservation. Each management plan must contain certain components, including the level of protection, the measures planned, flood risk maps, and, in subsequent management plans, an assessment of the progress made since the last management plan was implemented.

THE ASSESSMENT AND MANAGEMENT OF FLOOD RISKS IN ITALY: FROM THE ENVIRONMENTAL CODE TO THE LEGISLATIVE DECREE 49/2010

In Italy, the regulatory framework in the field of hydro-geological risk is represented by Legislative Decree of 3 April 2006, n. 152 named "Environmental Code". The third part of the code, entitled "Provisions relating to soil protection and combating desertification, waters protection against pollution and water management", is aimed at ensuring the protection and remediation of soil and subsoil, the hydrological restoration of the territory through the prevention of instability phenomena, the safety of the risk situations and combating desertification. Article 64 of the Code provides for the division of the whole country into eight river basin districts and the establishment, for each river basin district, of a River Basin Authority District.

The latter have to draw up the river basin Plans which represent the cognitive, regulatory, technical and operational tool through which actions and rules of use for the protection and the defense of the soil and the proper use of the waters, based on the physical and environmental characteristics of the area concerned, are planned and programmed. Pending approval of the river basin plans, the Basin Authority shall approve, in accordance with Article 67, provisional hydro-geological management Plans (PAI), which in particular contains the identification of hydro-geological risk areas, the perimeter of the areas to be safeguards, and the determination of those safeguards measures. These plans, drawn up by the River Basin Authority District, had the aim of identifying the hydrogeological risk areas and determine the protective measures to be implemented in the identified areas. These measures provide for both non-structural measures, aimed at regulating land use management as a preventive action, and protection interventions to reduce the existing risk. Within the PAI were highlighted areas of hydraulic hazard for events with different return periods and in some cases was also shown the level of risk associated with them.

However, reducing the risk of floods is not one of the main objectives of this Decree, nor does it take into account future changes in the risk of flooding due to climate change.

It is only with the legislative decree 49/2010 of 23 February 2010 that the assessment and management activities of flood risks are regulated, implementing the EU Directive 2007/60/EC. The implementation of the EU Floods Directive in Italy provides an opportunity to revise the model of flood risk governance and confront the shortcomings encountered during more than 20 years of organized flood risk management (Mysiak et al. 2013). Before the adoption of Directive 2007/60/EC, in Italy the flood risk management was implemented through the above more general "hydrogeological management Plans" (PAI). With the Legislative Decree n. 49 of 2010, there is a shift from the PAI to the Flood Risk Management Plans (FRMP). According to this decree, the River Basin Authorities have to:

- set up a preliminary flood risk assessment through the preparation of: thematic maps of the river basin district; the description of the floods that occurred in the past that had significant negative consequences for the human health, land, property, environment, cultural heritage and economic and social activities and that, with high probability, can still occur in the future; the evaluation of the potential adverse consequences of future flooding, taking into account factors such as topography, location of surface water bodies and their hydrological and geo-morphological characteristics, the effectiveness of existing man-made flood defense, location of populated areas and economic and social activities. Italian Government considered the existed "hydrogeological management Plans (PAI)", prepared in accordance with Law 183/89, sufficient and appropriate to provide the information required by the preliminary flood risk assessment. This situation has led to national decision not to conduct such

an assessment and then proceed directly to the elaboration of hazard and flood risk maps with the criteria laid down by the European Directive.

- identify areas prone to potentially significant flood risk through the drawn up of flood hazard maps and flood risk maps; specifically, flood hazard maps shall cover the geographical areas which could be flooded according to the following scenarios:
  a) rare floods of extreme intensity: return time up to 500 years after the event (low probability);
  b) floods infrequent return period between 100 and 200 years (mean probability);
  c) frequent floods: payback time of between 20 and 50 years (high probability).

  On the other hand, the flood risk maps show the potential adverse consequences associated with floods under the previous scenarios expressed in terms of:
  a) the indicative number of inhabitants potentially affected;
  b) infrastructure and strategic structures (highways, railways, hospitals, schools, etc.) ;
  c) environmental heritage, history and culture of considerable interest in the area potentially affected;
  d) the distribution and type of economic activities potentially affected ;
- develop the flood risk management plans coordinated at the river-basin level.

On the other side Regions, in coordination with each other and with the national Department of Civil Protection, are committed to prepare the management plans for the emergency alert system both at national and regional level. The time limits for the preparation of the flood hazard maps and flood risk maps (art. 6) and for publication of flood risk management plans (Article 7) are, respectively, June 22, 2013 and June 22, 2015.

In accordance with Annex I of the decree 49/2010, the FRMP must contain:

- a description of the objectives of the flood risk management;
- a summary of the measures and their prioritization for achieving the above objectives;
- the description of the prioritization and procedures for monitoring the status of implementation of the plan;
- the summary of the measures or actions taken to inform and consult the different actors involved;
- a list of the competent authorities.

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IMAGE SOURCES

The image of page 2 is taken from: www.eea.europa.eu; the image of page 3: news.panorama.it;

04

SMART CITIES CHALLENGES: SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

REVIEW PAGES: URBAN PRACTICES

GENNARO ANGIELLO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

In this number

ICTS AND CLIMATE CHANGE: THREE CASE STUDIES

According to the United Nations (UNFCCC, 1992), the climate change can be defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". Unlike this definition makes a distinction between "climate change" attributable to human activities altering the atmospheric composition, and "climate variability" attributable to natural causes, many researchers agree that the human activity is the dominant cause of observed changing since the mid-20th century (Stocker *et al.* 2013).

Climate change is a problem that is affecting people and the environment worldwide. Many places, especially in the southern and south-eastern regions of the world (already suffering from environmental or other changes) have seen changes in rainfall, resulting in more floods, droughts, or intense rain, as well as more frequent and severe heat waves (Loarie *et al.* 2009). As these and other changes become more pronounced in the coming decades, they will likely present challenges to our society and our environment.

The climate change is a long-term challenge. However, given the pace and the scale of its effects, innovative strategies are urgently required. In this contest, the Information and Communication Technologies (ICTs) has shown to provide a valuable tool to tackle the challenges imposed by the changing climate. An increasing number of ICT-based actions have been recently developed around the globe in the past two decades. In this paper, we present three relevant case studies:

– The Sri Lanka Disaster and Emergency Warning Network;
– The Indian e-Arik project;
– The Brazilian Deforestation Monitoring System.

The case studies aim to analyze the currently emerging opportunities offered by the Information and Telecommunication Technologies in addressing climate changes challenges and to identify common successful factors. In this regard, a strong collaboration between key players (i.e. local governments, public utilities, research centres and local communities) has emerged as important common conditions for the successful implementation of climate change related actions.

With different strategies and different solutions, the case studies analysed have shown how ICTs can be key factors to better mitigate, monitor and adapt to the impacts of the changing climate.

THE DISASTER AND EMERGENCY WARNING NETWORK (DEWN) INITIATIVE – SRI LANKA

On December 2004, the mega-tsunami unleashed by the earthquake of magnitude 9.1 in the Sumatra-Andaman subduction zone caused enormous loss of lives and damage to property in Sri Lanka and in several other countries bordering the Indian Ocean. In Sri Lanka, 13 of the 14 districts lying along the coastal belt were affected: the natural disaster caused nearly 40.000 victims with 15.000 injured and about 89.000 housing units either completely or partially damaged, leaving one million people homeless and causing massive disruption to livelihoods (Wijetunge 2006). When this natural disaster took place in 2004, there was no mechanism in place to alert the vulnerable communities. Of particular significance is the fact that there was ample time for the people leaving along the Southern and South-western cost of Sri Lanka to be warned and evacuated after the Tsunami strike on the Eastern coast (Wijesinghe *et al.* 2008).

This unprecedented tragedy clearly underscored the need to have a proper system in place for tsunami early warning as well as for quick evacuation of vulnerable coastal communities to safer areas.

After completing a successful pilot period, in January 2009 the Disaster Management Centre (the responsible agency of the island for all the disaster management issues), together with Dialog (the Sri Lanka's largest mobile telecommunications company) and other partners launched the Disaster Emergency Warning Network (DEWN) - Sri Lanka's first mass alert early warning system. The DEWN initiative is a multi-agency collaboration aimed to deliver a cost effective and multi-modal mass alert system which can be deployed for the purpose of warning key stakeholders in disaster management as well as the general public in advance of the occurrence of life threatening situations.

When information is received by the DMC, the information is verified, and customized alerts (with message text and recipients specified) are issued. Messages can be received by mobile phones or by the specially developed DEWN alarm devices. In a potential disaster scenario, DEWN will be used to first alert the emergency personnel on their individual phones. Public alerts will issued only when a threat is adequately verified.

The remote alarm is activated through SMS or Cell Broadcasting. Short Messaging Service (SMS) will be used for directed messages while Cell Broadcasting will be used for mass-alerts. Cell Broadcasting is also suitable for post-disaster operations since it is immune to network congestion.

The specially developed DEWN alarm devices are designed to be fixed indoors in public buildings such as places of worship, hospitals, markets, etc. They contains a loud siren, a flashing lamp, a LCD display to show the trilingual message, a radio and inbuilt call-back facility. The radio can be tuned to a Disaster Frequency if available. Special phones have been developed for Java/Symbian capable (smart) phones that causes the phone to rings continuously until acknowledged and displays the messages in all three local languages. DMC District Coordinators and other key contact members, being the first contact in each district, will be instrumented with such phones.

The cost and the benefits of the project are hard to estimate. However, with approximately half of the Sri Lankan population using GSM mobile phones, DEWN is in a good position to make use of this advantage to dispel emergency warnings.

According to Wickramasinghe (2011), the benefits can be expected to much higher than the costs.

There are also some more quantitative benefits, from greater feelings of security within communities that can access the warnings, to reputational and other benefits for the mobile operator.

THE E-ARIK PROJECT – INDIA

Agriculture is highly exposed to the climate change, as farming activities directly depend on climatic conditions. Continued changes in the frequency and intensity of precipitation, heat waves, and other extreme events have a strong impact on the agricultural production. Furthermore, compounded climate factors can decrease plant productivity, resulting in price increases for many important agricultural crops.
In this context, accessing to appropriate agricultural information is considered a key factor for rural farmers in order to increase crops' productivity and to provide opportunities for their self-development. Access to the appropriate agricultural information is a difficult task for the farmers of North-East India. Due to inadequate dissemination of advanced farm information and technologies, agriculture exhibits low productivity and creates food insecurity problems. Indeed, on one hand, the economic growth of the entire region depends, to a large extent, on the progress of agriculture sector. On the other hand, inadequate information on advanced farm technologies, market intelligence and rural development hinder the progress of the agricultural sector. To address these issues, a research study was initiated in August 2007. The project named e-Arik ("Arik" means "agriculture" in the tribal dialect of Arunachal Pradesh) aims to experiment the application of ICTs in agricultural extension services provision. The project is a collaborative effort that involves different key players such as the Indian Ministry of Science and Technology and a multi-disciplinary team of researchers from different Indian Universities. Presently, 500 farmers from 12 remote tribal villages of the North-East India are registered under the e-Arik system.
The main objective of the project is to provide the farmers with better information about climate-smart agriculture in order to raise awareness and adoption of practices that are sustainable. The aim of such practices is to increase productivity and resilience, to mitigate greenhouse gas emissions and to enhance food security and development. The focus of the project is on two crops: paddy rice and Khasi mandarin oranges. In the early stage of the project, a survey was conducted in selected villages during 2007, to understand the current situation and future needs of information exchange on agriculture. The results indicated that only 4 per cent of farmers had regular access to agricultural information. A majority of tribal farmers who were growing paddy, expressed a strong need for information on pest and disease management. The survey also looked into the access and use of communication tools by local communities. While very few farmers possessed cellular phones, none of them owned a computer nor was there internet facility in the surrounding three villages. In fact, more than half of the households had no power supply. To tackle this problem, a Village Knowledge Centre with computer, internet, printer was established at Yagrung village. Farmers are assisted through agricultural professionals, a computer instructor and farmer-facilitators. Additionally a project portal was created which provides information on agricultural practices, responsible governmental departments, markets and weather forecasts. Information is adjusted by project staff who visit fields and diagnose problems and document these issues using ICTs in the field. Another approach to disseminate information is by supporting the establishment of local self-help groups and farmer-to-farmer communication. The project has originate significant progress in terms of crops productivity that, in turns, has determinate a growth in the income level of the farmers. It is estimated that the e-Arik approach is 3.6 times cheaper than a conventional agricultural extension system and that farmers can access information 16 times faster. Giving the success of this initiative, a scale-up phase of the project is planned with further government funding. The goal is to replicate the project in the other seven north-east states of India.

THE BRAZIL DEFORESTATION MONITORING SYSTEM

The forest of Amazonia is home of the most diverse and numerous arrays of species in the world and represents a major component of the Earth system (Soares-Filho *et al.* 2012).

The majority of the forest (about 60 percent) is contained within Brazil. In the last few decades the Brazilian Amazon forest has faced the dual threats of deforestation and stress from climate change. Between May 2000 and August 2006, Brazil lost nearly 150,000 square kilometers of forest – an area larger than Greece – and since 1970, over 600,000 square kilometers of Amazon rainforest have been destroyed (Butler 2008).

The Brazilian rainforest plays a major role in the world's climate system by storing large stocks of carbon and by regulating energy and water fluxes.

The release of this carbon to the atmosphere through deforestation and forest degradation is the second largest source of greenhouse gas emissions. Indeed, about 70 percent of Brazil's emissions come from the destruction of its forests, making it one of the world's top greenhouse gas emitters (Greenpeace 2011).

In one of the greatest environmental conservation challenges in history, Brazil has established a target for reducing Amazon deforestation by 80% below the historical baseline of 19,500 km^2 year by 2020.

Monitoring systems based on advanced ICT play a key role in tackling climate change by allowing policy makers and other policy stakeholders to make informed choices about strategies to curb greenhouse emissions.

Since the early nineteen, Brazil set in motion a plan to develop a satellite-based system for tracking changes in forest cover. Today Brazil has two major systems for tracking deforestation: PRODES (Program to Calculate Deforestation in the Amazon) and DETER (Real-time Detection of Deforestation), which allow it to rapidly identify where deforestation is occurring. PRODES, which has a sensitivity of 6.5 hectares, provides Brazil's annual deforestation estimates (measured each August), while DETER, which has a coarser resolution of 25 hectares, is a year-round alert system that updates Brazil's environmental protection agency (IBAMA) every two weeks.

This gives authorities the technical capacity — although not necessarily the political will — to combat deforestation as it occurs. In particular DETER is used for supporting the law enforcement actions, since data is provided rapidly.

PRODES is used for carbon accounting and year to year comparison. Both this two project have been developed by Brazil's National Institute for Space Research (INPE). PRODES and DETER detect deforestation based on satellite images captured through the US Landsat, which are then processed by computer algorithms developed by INPE and interpreted by a local team of technicians and scientists.

Following this process, it is possible to generate a georeferenced map for the whole Amazon with individual polygons indicating the location of deforestation.

Furthermore, since 2003 this estimates are available to the world through the INPE website, making transparency in the dissemination of Amazon deforestation data.

PRODES is the largest forest monitor project in the world, based on orbital remote sensing. It has become recognized as the standard-bearer for deforestation tracking and reporting worldwide. Data provided by these two projects has become the main baseline for discussing policies in the Amazon.

The wide acceptance of this systems in policy making in the Amazon and the related reduction in deforestation represent the main results of these projects.

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IMAGE SOURCES

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05

SMART CITIES CHALLENGES: SMART ENVIRONMENT FOR SUSTAINABLE RESOURCE MANAGEMENT

REVIEW PAGES: NEWS AND EVENTS

GERARDO CARPENTIERI
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: gerardo.carpentieri@unina.it

In this number
SMART ENVIRONMENT

In recent years it has been increasing the interest by the private investors, organizations and governments in the development of new solutions and strategies that have as target the reduction of energy consumption. To promote this, the authorities of the EU member states have defined the Community strategies, not only through a new definition of regulatory guidance, but also by financing numerous infrastructure projects and research that will significantly reduce energy consumption. Not only in Europe, but also in most countries of the world, it is starting numerous programs to encourage the development of energy efficiency solutions. One of the nations in the world where there are more investments in this sector is America, which with the American Recovery and Reinvestment Act of 2009 has planned to invest about seventy billion dollars in the energy sector. In particular, the federal funds allocated for scientific research in this area are about eight billion dollars.

In America, the interest in respect of this topic has grown thanks to the diffusion of the citizens, the professionals and the administrators of the need to make major changes to the energy sector. For the definition of the different needs and the individuation of new effective solutions is fundamental the organization of meeting moments between the various actors that have the task of initiating the improvement of this sector. In the 2007, a lot of leaders and international delegates took part in the Energy Efficiency Global Forum (EE Global), which in recent years has become the most important world conference for the energy efficiency.

In the last six years, EE Global was held in different places in the world and has gained an international following of experts and leaders. In the 2014, a lot of executives and politicians from all sectors that deal with energy efficiency will gather in Washington, DC from 20 to 21 May with the aim to present and develop new effective policies and practices for energy efficiency. EE Global 2014, hosted by the Alliance to Save Energy a non-profit organization that brings together businesses, government agencies, environmental groups and consumers. The Alliance to Save Energy, founded in 1977, promotes energy efficiency worldwide to achieve a correct economy, a cleaner environment, and improved energy security. To achieve this mission, the Alliance:

– leads worldwide energy efficiency initiatives in policy advocacy, research, education, technology deployment and communications that impact all sectors of the economy;
– provides vision and activism which includes active and engaged members of Congress, leaders from business, the public interest sector and academia;

– initiates and participates in public-private partnerships, collaborative efforts and strategic alliances to optimize resources and expand its sphere of influence;
– executes its mission through a team of recognized energy efficiency experts and professionals.

The initiatives organized by the Alliance to Save Energy, are structured according to different sectors, and ranging from energy recovery of the buildings to improve energy efficiency in the manufacturing sector.

In the 2012, the Alliance to Save Energy took part to the National Commission on Energy Efficiency Policy, this committee that includes federal and local politicians, energy experts and productive organizations working to promote the implementation of strategies that promote energy saving. This committee has worked for a year to identify the most incisive energy policy most widely shared. This work brought to the definition of the Energy Action Plan 2030, which urges policy makers at all levels of government – local and federal – to act in three main lines of action:

– invest in energy productivity in all sectors of the economy;
– modernize of U.S. infrastructure, buildings, transportation, and equipment;
– educate consumers, business leaders and policymakers to encourage smarter energy use.

In summary the goal of the Alliance is to work with all levels of Government and with the private sector to successfully implement the Commission recommendations, in order to double the productivity of the nation's energy by 2030 and reduce dramatically the consumption energy.

Recently, the knowledge of the negative effects of the current methods of waste disposal has led to greater accountability of those involved in the effective management of the waste cycle.

As regard to the situation in Europe, every year are produced about two billion tons of waste (Eurostat 2010). A part of these are also particularly dangerous in constantly increasing.

Now there is knowledge that the availability of landfills or other waste storage sites isn't a sustainable solution, their destruction is an optimal solution due to the pollutant emissions and waste resulting from their highly polluting incineration. The best solution is to intervention at the source of the waste cycle, so start of a concrete reduce of the production of waste and must be used when there are sustainable solutions ecologically and economically, so as to recycle the various components of the products. Due to the increasing of the volume and complexity of household and industrial waste and his management is a major problem in modern society. To achieve these objectives it is necessary to encourage the search for new methods or solutions to facilitate disposal of waste in a more sustainable way.

Every two years, the Wessex Institute of Technology (WIT) organizes the International Conference on Waste Management and the Environment. It's sponsored by WIT Transactions on Ecology and the Environment, and the International Journal of Sustainable Development and Planning. This year the conference begins from 14 to 15 May in the city of Ancona in Italy, now it's seventh edition, provides an opportunity for professionals, researchers and governments to initiate a constructive exchange of scientific information and discuss the current situation and the possible future developments in waste management.

For the energy efficient sector, it is giving particular importance to the implementation of programs and solutions that want promote to improve energy behaviour of the users. The importance of the behaviours revealed by a study conducted by a leading American companies working in the field of energy behaviours that showed that only with the use of adequate energy behaviours can reduce the energy consumption of the United States of approximately 18 MWh per year. This amounts to a reduction of CO_2 emissions by about 10 million tons in a year and a consequent saving of $ 2.2 billion for American consumers every year.

To promote the achievement of this objective Behave The Energy Conference is dedicated to the theme of reducing energy consumption through the change individual behaviour. The conference will be held 3 and 4 September at the Said Business School in Oxford, UK.

The title chosen for this conference "Behave Energy" is to emphasize that a important aspect for the correct use of energy efficiency solutions and to start a change in the habits of life of citizens. The main topics that will be covered in this conference, with the contribution of numerous participants, are:

- reduction of energy through the use of feedback;
- programs for Community Energy: consumption, procurement and production;
- transport and mobility;
- moving in time the demand for energy;
- the consumption of energy in organizations;
- reduce energy consumption in buildings;
- social practices and energy consumption;
- gamification and social media.

Recently another sector that is evolving much is that of the Intelligent Environments (IEs) that use computer technologies to create networked environments, sensitive and responsive to the presence of people. These systems are built using a mix of innovative software and hardware systems, structured so as to promote the efficiency of the operations and activities, facilitate the presence and participation, improve the user experience and allow to better or change styles of life or methods of production. The IEs are spaces in which computation is seamlessly used to enhance ordinary activity. One of the driving forces behind the emerging interest in highly interactive environments is to make computers, not only genuine user-friendly but also essentially invisible to the user (Steventon, Wright, 2006). The development of this new information technologies and their application require the combined use of numerous disciplinary skills, ranging from science, engineering, architecture, sociology, education and the economy. The need to reconcile all these skills in order to enable the development of technical solutions that are able to cope with the demands of the market related IEs. It is therefore essential the organization of moments that will enable constructive dialogue on these issues. The 10th Intelligent Environments conference is organized by the Departments of Computer Science & Engineering with the Department of Department of Automation of Shanghai Jiao Tong University (SJTU). The Conference will take place in Shanghai, China from 2 to 4 July. Another collateral event at the conference, to be held forever in Shanghai from 30 June to 1 July, with the organization of eleven different workshops dedicated to specific sectors that deal with the implementation of solutions that involve the use of Intelligent Environments (IEs).

The workshops are organized to allow the participants to showcase their research and to discuss in a constructive way with the wider scientific community present at the conference.

In relation to the development of solutions IEs, one of the research areas in recent years has been attracting great interest of private investors both scientific research institutions is that of Wearable technology. This sector covers all technologies, portable and wearable, modelled around the body of the people, that are used as natural support for their operation. The main goal of the use of these new technologies is to enable the detection and monitoring of exogenous and endogenous signals of the human body, also of an emotional nature, allow these technologies to become a valuable assistant to solve the user's needs broadening also sensory abilities. The possible applications of these new technologies are varied and range from the simple use during sports and recreation, their use as tools for decision support for the planning of special services such as education, mobility, tourism, etc. (Tirri, 2013) or for use in the medical industry for prevention or monitoring of health conditions of patients (Signorini et al., 2014). The need for further actions on behaviours to reduce energy consumption has been highlighted recently by some studies in which it was verified that the incorrect behaviour of the energy could also undo all the positive effects resulting from the introduction of new technological solutions.

THE 7TH INTERNATIONAL CONFERENCE ON WASTE MANAGEMENT AND THE ENVIRONMENT

Where: Ancona – Italy
When: 12 - 14 May 2014

ENERGY EFFICENT GLOBAL FORUM

Where: Washington, D.C. - USA
When: 20 - 21 May 2014

THE 10TH INTERNATIONAL CONFERENCE ON INTELLIGENT ENVIRONMENTS

Where: Shangai – China
When: 2 - 4 July 2014

BEHAVE ENERGY CONFERENCE 2014

Where: Oxford – United Kingdom
When: 3 - 4 September 2014

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AUTHORS' PROFILES

Gennaro Angiello

Engineer, Ph.D. student in Civil Systems Engineering at the Federico II University of Naples. His research interests are in the field of accessibility analysis and modeling, land-use and transport interactions and sustainable mobility. He is currently involved in the research project Smart Energy Master and in the COST Action TU1002 accessibility Instruments for Planning Practice in Europe.

Gerardo Carpentieri

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. He received a master's degree in Environmental and Land Engineering with a thesis on the integrated government of land use and mobility for environmental sustainability in the metropolitan areas. In July 2013 he won a scholarship within the PRIN project on the "Impacts of mobility policies on urban transformability, environment and property market". He is currently involved in the research project "Smart Energy Master" at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II.

Valentina Pinto

Engineer, Ph.D. student in Hydraulic, Transport and Territorial Systems Engineering at the University of Naples Federico II. Her research activity at DICEA department of the University of Naples Federico II is aimed at studying the relation among city, mobility, and environment and consists in setting up a support tool for the public decision-maker in individuating the possible influences of the urban planning policies on mobility tools.

Laura Russo

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. She received a master's degree in Architecture and Building Engineering with a thesis on urban expansion and the sprawl phenomena, with particular attention for Campania. Since 2014, she works at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II – within the European project "Smart Energy Master" and her research activity is focused on the complex and multidimensional relationship between the city and energy consumption.

Floriana Zucaro

Engineer, graduated in Environmental and Territorial Engineering at the University of Naples Federico II with a specialization in management of urban and territorial transformations. Since 2012 she has been a PhD student in Hydraulic, Transport and Territorial Systems Engineering at the Department of Civil, Building and Environmental Engineering – University of Naples Federico II. Since 2014 she has been a scholarship holder within the Project Smart Energy Master for the energy management of territory financed by PON 04A2_00120 R&C Axis II, from 2012 to 2015. Her research activity is focused on the integration of land use planning, sustainable mobility and energy saving policies in urban contests.

TeMA Journal of
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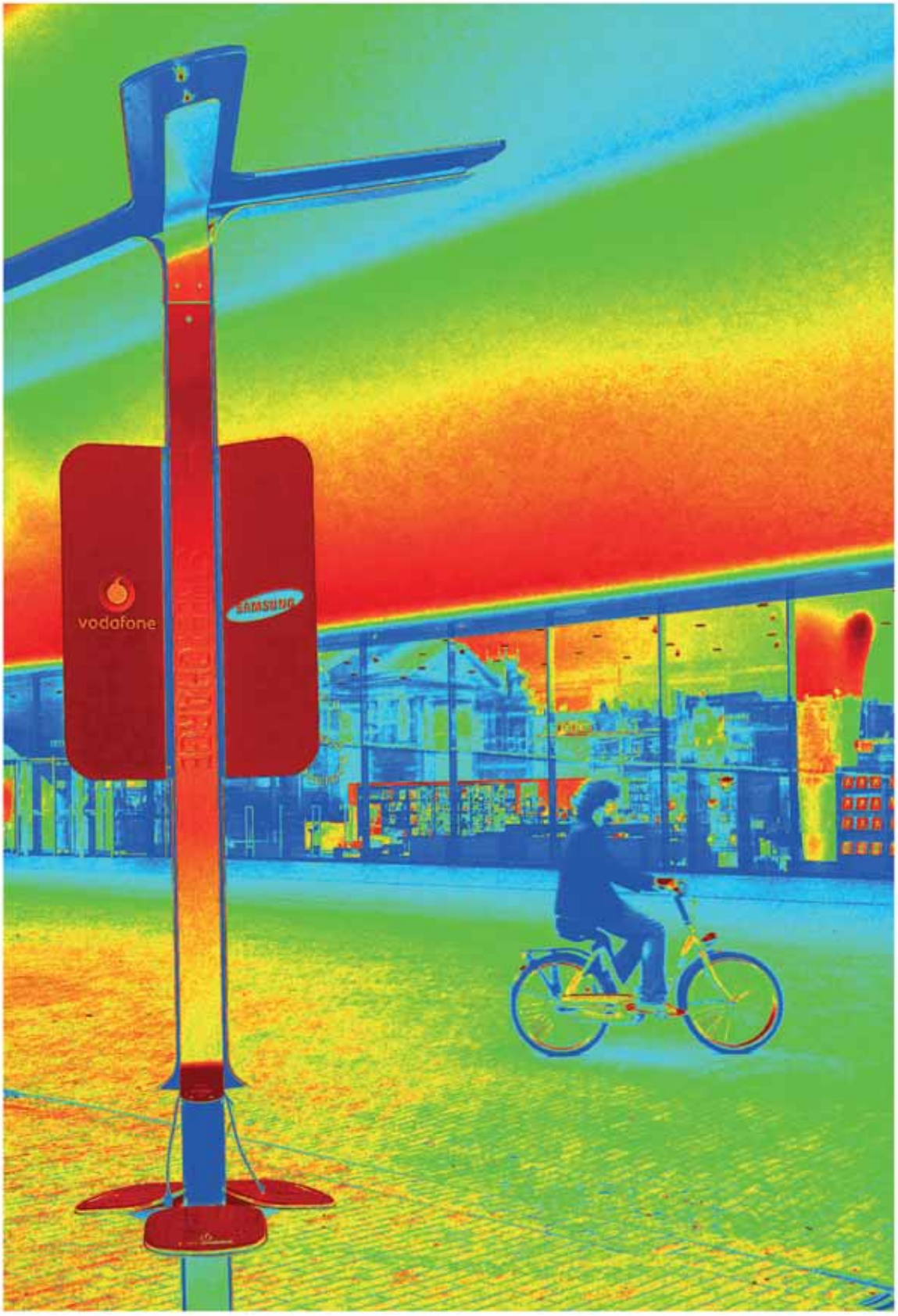
SMART CITIES CHALLENGES

SMART COMMUNITIES BETWEEN E-GOVERNANCE AND SOCIAL PARTICIPATION

2 (2014)



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EDITORIAL PREFACE:

SMART COMMUNITIES BETWEEN E-GOVERNANCE AND SOCIAL PARTICIPATION

ROCCO PAPA
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples Federico II
e-mail: rpapa@unina.it
URL: www.roccopapa.it

In a knowledge-based socioeconomy driven by technological change and innovation, new challenges are emerging. New information and communications technologies (NICT) are shaping the way people live, communicate, and work. Accordingly, innovative model of governance are needed with greater connectivity being facilitated by new technology; consequently, application of NICT in the local context leads to economic, social, and political transformations within the new smart community movement.

This second issue of the volume 7 of TeMA Journal of Land Use, Mobility and Environment focuses on this theme of e-governance and smart communities. In more details, the attention is put towards both the role of new information and communications technologies in the planning practice and on the ways society and citizen behavior has changed in the lasts decades, by mean of smart technologies.

In the FOCUS section three articles have been selected. The first article is named "Participation and Governance for more Human Smart Cities" by Gabriella Pultrone and analyses the concepts of participation and e-governance for more human cities. It starts from the idea that participation and governance are keywords on which to focus for a city conscious of its rich human and social capital, in which people are the real drivers of innovation and co-designers responsible for a smart city more humane and inclusive.

The second article titled "Social Mobile Marketing Evolution of Communication Strategies in the Web 2.0 Era" by Stefano Franco has the purpose of understanding how small organizations can utilize networks that characterize new trends in marketing and provide some reflections on the future evolution of the research in this field. The third article by Giuseppe Trieste e Silvia Gabrielli is titled "Accessibility in Smart Cities" and question if the smart city is also an inclusive city.

The section Land-use, Mobility and Environment collects two articles of the broader theme of integration between mobility, urban planning and environment. The article "The Determinants of Transportation Mode Choice in the Middle Eastern Cities: The Kerman Case, Iran" by Hamid Soltanzadeh and Houshmand E. Masumi, gives insights on the determinants of transportation mode choices and decisions under the influence of regional and cultural aspects. The paper outlines such determinants in the Iranian city of

Kerman as a representative of the similar Middle Eastern cities located in hot-arid climates and Moslem cultures. The descriptive analysis of the results derived from a short survey that was a part of a larger study conducted in the second half of 2013 indicated that adding to accessibility to public transportation and the convenience of using it can persuade people to shift from car driving to public transit use. The main barriers to bicycling are sociocultural aspects, while for walking the obstacles are physical and environmental. Increasing the quality of pedestrian infrastructure and spaces is a stronger deterrent than personal attitudes against walking. Such findings show slight dissimilarities from the results of some of the western studies that find the built environment more effective. In the same section, the article by G.K. Sinniaha, M.Z. Shahib, G. Vigarc, P.T. Aditjandrad titled "Residential Location Preferences: the significance of socio-cultural and religious attributes", has the aim to explore residential location preferences and how they are related to travel behavior. The study suggests social and cultural issue such as racial diversity which is literally to be a significance context. The case study reported is based on Iskandar Malaysia's development region. Reliability Analysis and Factor Analysis are applied to determine that religious and culture are influential in terms of residential location preferences. These findings add a different perspective on travel behavior studies, which are heavily dominated by researches from Western Europe, North America and Australasia. It is suggested that transport researchers need to reject universal conclusions and be clearer about the contexts in which their findings most applied and multi-cultural scenarios to consider cultural and religious factors more extensively.

Finally the Review Pages define the general framework of the theme of Smart City Environmental Challenges with an updated focus of websites, publications, laws, urban practices and news and events on this subject.

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PARTECIPAZIONE E *GOVERNANCE*

PER SMART CITIES PIÙ UMANE

GABRIELLA PULTRONE

Dipartimento di Architettura e Territorio (dArTe)
Università Mediterranea di Reggio Calabria
e-mail: gabriella.pultrone@unirc.it
URL: http://www.unirc.it/architettura/scheda_persona.php?id=776

ABSTRACT

The smartness seems to be the decisive factor that can enable the contemporary city to face a period of deep economic and social crisis, greater awareness of the scarcity of environmental resources and the increasing demand for security, health, education, technological progress.
The so called 'new urban question' is structured around issues which are difficult to separate such as social inequalities, climate change, the right to accessibility, with respect to which the smart perspective is an opportunity that must be used by territories and cities for the construction of development strategies based on the fundamental and inseparable dimensions of sustainability (environmental, economic, social) and on a more complex transdisciplinary approach with real effects on quality of life.
The same concept of smart city - initially with a pure energetic and technologic valence - has taken on a wider and more varied meaning, aimed at understanding the satisfaction of real and emerging needs, and contemplate the active involvement of the various urban actors, transforming the public institution from "provider" to "enabler", i.e. facilitator and promoter of development.
Participation and governance are therefore the keywords on which to focus for a city conscious of its rich human and social capital, in which people are the real drivers of innovation and co-designers responsible for a smart city more humane and inclusive. The ongoing experiments in this direction at the European level provide interesting insights to envision desirable future scenarios not too far away.

KEYWORDS:
Governance; Human Smart City; Innovation; Participation; Quality of Life

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您的参与和管理让城市更加人性化

GABRIELLA PULTRONE

Dipartimento di Architettura e Territorio (dArTe)
Università Mediterranea di Reggio Calabria
e-mail: gabriella.pultrone@unirc.it
URL: http://www.unirc.it/architettura/scheda_persona.php?id=776

摘要

现代城市已经进入经济和社会危机深度发酵的时期，环境资源的耗尽和人们对安全、健康、教育和科技进步的需求已经是普遍的共识，那么“智能化”是解决上述问题的关键所在。贝尔纳多-赛基 先生所指的“城市新课题”与社会不公平、气候变化、城市居住权利等问题密不可分，但相比较而言“智能”是城市和地区根据城市现有规模和可扩展规模、城市承载能力（环境、经济、社会）以及生活质量的具体效果等综合因素制定发展战略的出发点。“智能城市”的概念基于完美地利用能源和科技进步，它是一种包罗万象的内涵和逻辑，旨在满足市民的迫切需求和现实需求，并思考如何将城市的各种“因素”有机结合起来，让城市变成一个公共机构，扮演一个提供服务的“供应商”、推动和促进发展的“促成者”角色。
“参与和管理”是一个人口资源和社会资源丰富的城市瞄准的两个关键词，在这个过程中人就是智能城市创新的发动机和智能城市设计的参与者。我们在这个领域的经验处于欧洲先进水平，能够启发您预见不那么遥远的未来的画面。

关键词
管理，人性化智能城市，创新，参与，生活质量 .

1 LA SMART CITY COME RISPOSTA INNOVATIVA ALLA SFIDE URBANE?

Il fenomeno urbano contemporaneo tende a divenire sempre più complesso in quanto ambito di interazione di una grande eterogeneità di elementi che, oltre a riguardare le dimensioni sociale, umana, i fattori fisici e geografici, comprendono altri fattori che, pur presenti in passato, tendono ad acquistare un peso sempre maggiore, quali le tecnologie (soprattutto quelle che rendono possibile l'interazione a distanza come le ICTs), le immagini, rappresentazioni, le procedure, gli schemi organizzativi che, come un software, costituiscono un presupposto del buon funzionamento dei sistemi socio-spaziali (Amin & Thrift, 2001).
È pertanto necessario un approccio che vada oltre gli involucri disciplinari e settoriali per affrontare le questioni globali, difficilmente separabili, legate alla profonda crisi delle economie e delle società industriali, al cambiamento climatico, alla scarsità delle risorse ambientali, alle diseguaglianze sociali, alla crescente domanda di sicurezza, salute, istruzione, partecipazione, progresso tecnologico.

Al tempo stesso, i processi globali rafforzano il ruolo delle città, che possono cogliere l'opportunità di partecipare all'economia globale, in cui la conoscenza diventa risorsa chiave e fonte principale di vantaggio competitivo anche in caso di città medie e piccole che abbiano la capacità di agganciarsi alle reti globali, con riflessi importanti sul sistema produttivo locale e sulla configurazione fisica e sociale, avviando relazioni virtuose fra nuove tecnologie e trasformazioni del territorio in un'ottica di pianificazione integrata.
Il percorso verso la nuova dimensione di *smart city* richiede, infatti, processi di governo delle trasformazioni urbane e territoriali attraverso azioni di indirizzo compatibili con le risorse e le vocazioni dei sistemi urbani e territoriali di riferimento (Fistola, 2013).
In un quadro così articolato, si ritiene che partecipazione e governance siano le parole chiave su cui puntare per una città consapevole del suo ricco capitale umano e sociale, in cui le persone costituiscano i veri motori dell'innovazione come co-progettisti responsabili di città 'intelligenti' in quanto più umane e inclusive, dove i 'luoghi reali' non siano soppiantati dai 'luoghi virtuali' né i rapporti umani interpersonali e le relazioni sociali sostituiti dalle connessioni sulla rete web, ma prevalga un approccio orientato alla centralità della dimensione umana (Gargiulo, Pinto & Zucaro, 2013; Marsh, 2013; Papa, Gargiulo & Galderisi, 2013).
Città e aree urbane, infatti, se da un lato sono i luoghi in cui si addensano e amplificano i problemi, sono soprattutto i luoghi dell'innovazione, oltre che risorse riciclabili e rinnovabili, con enormi potenzialità di trasformazione atte a conferire più diffusa porosità, permeabilità, accessibilità e a costruire spazi pubblici di qualità, riducendo divari e diseguaglianze sul piano fisico-spaziale, sociale ed economico (Secchi, 2013).
In definitiva, la città è l'arena principale delle sfide per la qualità della vita e le politiche urbane sono il terreno su cui si mediano gli aspetti positivi e negativi dei processi di globalizzazione.
In queste dinamiche di trasformazione complesse e articolate la partecipazione e la capacità di *governance* – che secondo la definizione del Programma di Sviluppo delle Nazioni Unite comprende i complessi meccanismi, processi e istituzioni attraverso i quali i cittadini e i gruppi articolano i loro interessi, mediano le loro differenze ed esercitano i loro diritti ed obblighi legali – giocano un ruolo determinante nell'implementazione e nell'efficacia di politiche di promozione di modelli di sviluppo sostenibile, laddove le città interagiscano con i contesti nazionali ed internazionali e declinino le loro risposte a livello locale in base alle proprie risorse e alla propria vocazione (Vicari Haddock, 2004).

Considerato che gli studi più recenti su innovazione e competitività dimostrano le relazioni fra innovazione e crescita economica (World Economic Forum, 2012), in fase di definizione delle strategie più efficaci per affrontare le sfide economiche, sociali e ambientali del XXI secolo, nei documenti di indirizzo, nei programmi, nelle politiche, nei piani, nei progetti ai diversi livelli territoriali e istituzionali, è ricorrente il termine *smart* come attributo in grado di garantire di per sé una soluzione efficace ai problemi urbani.

La questione è in realtà più complessa e lo stesso termine *smart city* – inizialmente a valenza prettamente energetica e tecnologica – ha assunto una connotazione più ampia e variegata, tendente a includere il soddisfacimento dei bisogni reali ed emergenti del cittadino e a contemplare il coinvolgimento attivo dei vari attori urbani, trasformando l'ente pubblico da *provider* (fornitore di servizi) a *enabler* (facilitatore e promotore di sviluppo).

Infatti, poiché i settori primari di intervento (pianificazione e gestione territoriale; ciclo produzione-distribuzione-consumo energetico; trasporto di merci; mobilità delle persone; gestione del consumo degli edifici; istruzione; sanità; rifiuti; fruizione del patrimonio culturale e il turismo) sono ad alto impatto con interrelazioni complesse, per la loro programmazione e gestione sono necessarie opportune modalità di coordinamento fra soggetti pubblici e privati e condivisione delle scelte con la cittadinanza.

A livello internazionale, una città in grado di pianificare coerentemente l'integrazione di queste componenti con l'ausilio delle tecnologie dell'informazione e della comunicazione (ICT) al fine di migliorare la qualità della vita, la gestione dei processi urbani e uno sviluppo equilibrato e sostenibile, viene identificata come *smart city*, un paradigma che in Europa ha come politiche di riferimento l'*Agenda Digitale* e la *Strategia 20-20-20*. Numerose sono le esperienze divulgate sul web attraverso piattaforme intese come luogo di incontro e scambio di metodologie e strumenti, con l'obiettivo principale di riuscire a migliorare gli stili di vita e di comunicazione, grazie all'ausilio del *problem solving* atto a guidare le comunità urbane a risolvere i problemi in forme cooperative. In sostanza, in questa sede si rimarca che la *smart city* è fatta, oltre che di tecnologie, soprattutto di persone alle quali spetta un ruolo attivo nel processo di cambiamento e rigenerazione dei luoghi fisici e delle relazioni immateriali, attraverso un processo di creazione e/o accrescimento dell' 'intelligenza urbana', intesa come chiarezza di visione, responsabilizzazione dei cittadini, partecipazione (Caragliu, Del Bo & Nijkamp, 2009; Cittalia-Fondazione Anci Ricerche, 2012b; Intelligent Community Forum, 2012, 2013; Barresi & Pultrone, 2013, Fistola, 2013).

Tuttavia, nelle prime esperienze pilota, la portata innovativa dell'approccio smart nel processo di ripensamento dei sistemi di organizzazione e gestione delle città e dei territori di frequente sembra relegata ad una sola o solamente ad alcuni degli ambiti di applicazione codificati a livello internazionale come *Building*, *Economy and People*, *Energy*, *Environment*, *Living*, *Government*, *Mobility and Transport*, nei quali le tecnologie per l'informazione e la comunicazione (ICTs), insieme a prototipi tecnologici e dispositivi interoperabili, costituiscono il principale elemento propulsore dello sforzo innovativo.

La tecnologia – spesso interpretata come elemento fondativo della *smart city* ed *asset* dal quale si sviluppano i progetti – deve essere però intesa soprattutto come fattore strumentale nel quale investire per valorizzare le risorse e sviluppare le competenze distintive sulle quali il territorio punta per competere a livello globale. Prima di essere un fascio di traiettorie tecnologiche, la *smart city*, infatti, cerca di dare risposte ai bisogni sociali emergenti su scala urbana e costituisce concreta manifestazione di una nuova generazione di politiche per l'innovazione che già investono i diversi livelli di governo del territorio; è una città che diviene più competitiva a livello globale se cultura, condivisione della conoscenza, capacità di apprendimento e innovazione avranno un ruolo strategico (Campbell, 2012; Osservatorio Nazionale Smart City, 2013; Agenda Digitale Italiana). È quanto emerge anche dalle più recenti definizioni concettuali di *smart city*, intesa come 'proiezione astratta di comunità del futuro', perimetro concettuale e applicativo definito da un insieme di bisogni che trovano risposte in tecnologie, servizi e applicazioni riconducibili a domini diversi. Questi contribuiscono alla sua effettiva costruzione solo se integrati in una piattaforma che assicuri interoperabilità e coordinamento, e soprattutto la definizione di appropriati strumenti di governance, finanziamento e partecipazione essenziali alle realizzazione della sua visione politica e sociale, pianificata, organizzata e connessa alla capacità di leggere le potenzialità dei territori da parte di un organo politico in grado di immaginare un orizzonte di medio-lungo periodo e con un approccio integrato che consenta di intervenire in un ampio ventaglio di ambiti. Inoltre, per essere realmente inclusiva, cosmopolita, fisicamente e digitalmente accessibile deve essere progettata in modo da agevolare la vita di categorie ampie di persone

(stranieri, diversamente abili, visitatori, bambini, anziani,…) perché concepisce ambienti, servizi e prodotti fruibili agilmente da tutti i suoi abitanti e soprattutto cerca di evitare il rischio che essi, paradossalmente, possano diventare più 'stupidi' cedendo una parte della propria intelligenza a controlli e a sistemi di gestione esterni che se pure efficienti, da soli non sono sufficienti a garantire un miglioramento della qualità di vita (Mazzeo, 2013; Pultrone, 2013).

In questa prospettiva, le *smart cities* possono creare le condizioni di governo, infrastrutturali e tecnologiche per produrre innovazione sociale, ovvero risolvere problemi sociali contribuendo alla crescita economica e del capitale sociale, all'inclusione e alla qualità della vita attraverso l'ascolto e il coinvolgimento degli attori locali coinvolti, istituzioni, cittadini, imprese, associazioni (Toppeta, 2010; Correia & Wünstel, 2011; Harrison & Donnelly, 2011; Cittalia-Fondazione Anci Ricerche, 2012a; Cassa Depositi e Prestiti, 2013; Osservatorio Nazionale Smart Cities, 2013). In definitiva, la *smart city* può migliorar la qualità della vita attraverso lo sviluppo economico sostenibile basato su innovazione, ricerca e tecnologia usate come strumento a servizio di nuove, crescenti, migliori aspettative sotto la regia dalla leadership locale all'interno di un processo più ampio di pianificazione integrata. L'approccio *smart* non è però una novità assoluta degli ultimi anni. In uno studio di Cittalia-Fondazione Anci Ricerche, dal titolo *Il percorso verso la città intelligente* (2012), si osserva che l'iniziativa comunitaria *Urban* che a partire dagli anni Novanta finanziò in maniera consistente un processo analogo a quello considerato oggi di *smart city*, con eccellenti esempi concreti di buona integrazione tra pianificazione urbanistica, tecnologia, sostenibilità, ascolto delle persone. Nella stessa sede, si auspica una rilettura e utilizzo delle esperienze di allora nel nuovo percorso *smart* per imparare dalle buone pratiche e dagli errori commessi. Così come Harrison & Donnelly (2011) rilevano che il termine *smart* non è nuovo, traendo origine dal movimento della fine degli anni '90 *Smart Growth*, promotore di nuove politiche di pianificazione urbana e trasporti.

Nell'intenso dibattito alimentato da enti di ricerca, università, istituzioni, imprese e associazioni è stato posto l'accento su uno o più aspetti delle questioni relative agli ambiti di intervento e alla quantificazione del grado di smartness di una città. A questo proposito si richiama il *Report 2013* della Cassa Depositi e Prestiti in tema di *smart cities*, nel quale sono individuate tre differenti accezioni:

- la prima riguarda il numero di domini sociali e tecnologici coperti da iniziative promosse e coordinate da una città;
- la seconda attiene alla capacità di pianificazione e di visione della città necessaria per l'implementazione dei progetti (qualità delle scelte architetturale e di *governance*);
- la terza concerne il miglioramento della qualità della vita dei cittadini e, a tale proposito, il background socio-economico in cui vengono promosse le iniziative costituisce un fattore decisivo per l'accettazione e l'uso delle stesse.

Una delle questioni nodali riguarda poi il passaggio dalla dimensione concettuale alla sua traduzione operativa in termini di costruzione di una *vision* condivisa, di opportuni strumenti di *governance* e strumenti di finanziamento in considerazione della difficile congiuntura economica e finanziare con la quale tutti i Paesi devono fare i conti. E, rispetto a tutte le migliori intenzioni, è pure da considerare il fatto che la complessità degli interventi, la numerosità degli attori coinvolti e la difficoltà di misurarne i ritorni economici rischiano di comprometterne l'effettiva realizzazione. A tale proposito, lo *Smart City Index* di Between (2013) costituisce il primo tentativo, patrocinato dall'Agenzia per l'Italia Digitale e dall'Associazione Nazionale Direttori Generali degli Enti Locali, per andare in questa direzione. Se ogni città è differente dall'altra in termini geografici, demografici, economici, culturali, politici, sociali, è infatti possibile rintracciare una serie di caratteristiche comuni ed elementi ricorrenti nelle buone pratiche da diffondere e calibrare in base alle specificità e complessità dei singoli contesti, fermo restando il concetto che una *smart city* deve essere caratterizzato da una visione organica e lungimirante, come risulta dalle migliori esperienze in atto a livello nazionale e internazionale.

2 COSTRUZIONE DI UNA VISION CONDIVISA E POSSIBILI DIMENSIONI OPERATIVE PER UN NUOVO UMANESIMO URBANO

Con riferimento ai possibili approcci con i quali le città si occupano della dimensione applicativa in tema di *smart city*, nel "Vademecum per la città intelligente" (Osservatorio Nazionale Smart City, 2013) emergono due tipologie: quello verticale, più diffuso, che affronta uno o più specifici aspetti legati alla dimensione urbana come la mobilità, l'energia, i trasporti; e quello sistemico, che si riferisce alla città nel suo insieme, nelle sue diverse dimensioni, considerandola un unico sistema in grado di sostenere e abilitare l'innovazione. In particolare, la capacità di produrre innovazione, requisito centrale del mondo economico contemporaneo, si basa sulla pratica del pensiero critico e creativo, applicato ai processi della vita quotidiana attraverso l'ascolto, l'osservazione, il confronto interculturale, orientandolo verso l'*empowerment* (inteso come sviluppo delle capacità) di persone, cittadini, imprese e pubblica amministrazione.

A tale riguardo è fondamentale il ruolo delle amministrazioni locali che hanno l'opportunità di ridefinire il proprio modello di sviluppo e di valorizzazione delle ricchezze del territorio.

Attraverso l'attivazione di una politica di condivisione delle responsabilità con il mondo economico e civile esse possono compiere quel salto di qualità nello sviluppo di modelli di *governance* efficaci nel conseguire obiettivi di benessere equo e sostenibile, che non possono essere importati ma devono scaturire dalle risorse endogene del sistema.

Le città, tuttavia, indipendentemente dalla loro dimensione, non sono necessariamente in grado di attivare meccanismi di *governance* in mancanza di alcuni prerequisiti che la trasformano in 'attore collettivo': un sistema di decisione collettiva; interessi comuni e percepiti come tali; meccanismi di integrazione; una rappresentazione interna ed esterna dell'attore collettivo; una capacità di innovazione (Pichierri, 2005; Le Galès, 2006). Con particolare riferimento alla *governance* urbana, sono individuabili due differenti dimensioni di integrazione, una interna e l'altra esterna (Tocci).

Nel primo caso, riguarda la capacità di una città di integrare i gruppi di attori, le organizzazioni e i diversi interessi che in essa interagiscono, al fine di elaborare politiche e strategie comuni, a differenza di altre città caratterizzate da conflitti strutturali, politici e sociali che impediscono, pertanto, qualsiasi forma di azione collettiva.

La dimensione esterna della *governance* è riferibile, invece, alla capacità di una città di rappresentarsi al di fuori del proprio ambito, di difendere una strategia, progetti collettivi unificati nei confronti di altre collettività locali e di altre città.

Ne scaturisce, pertanto, il ruolo fondamentale della pratica della concertazione come nuovo modello di governo caratterizzato da un minore controllo gerarchico e da un maggior grado di cooperazione tra gli attori, secondo un processo di *governance* che si afferma in una logica di tendenziale accrescimento del capitale sociale fatto di sinergie e di fiducia reciproca che prende corpo nelle aree in cui convivono obiettivi di interesse pubblico (miglioramento delle condizioni di vita dei cittadini, maggiore occupazione) e vantaggi privati (maggiori utili economici, potenziamento del patrimonio delle imprese).

Il ruolo degli attori pubblici dovrebbe, pertanto, mirare alla creazione di modelli di *governance* che diano alla città uno status di attore consentendo di agire su più livelli fra loro connessi: attuare strategie di posizionamento sulla scena internazionale al fine di attirare investimenti, capitale, risorse umane qualificate; promuovere alleanze e forme di cooperazione con altre città o regioni; mantenere o rinsaldare il capitale sociale territoriale e la qualità urbana.

A livello internazionale, fra le iniziative orientate verso obiettivi di *smartness* urbana, il *City Protocol* (http://www.cityprotocol.org/) si propone come *framework in progress* di riferimento per le città di tutto il mondo, utile a valutare e migliorare le prestazioni nel campo della sostenibilità ambientale, della competitività economica, della qualità della vita e dei servizi della città, innovando e ricercando nuovi modi di

coinvolgimento della società, indicatori di sviluppo concreti e universali, che utilizzino le potenzialità delle tecnologie ICTs.

Il requisito chiave per favorire l'innovazione e la competitività in una logica di sviluppo sostenibile è comunque dato dall'integrazione intelligente su scala urbana di tutta una serie di tecnologie – in gran parte già esistenti ma da sole non è sufficienti a costruire una *smart city* – che conferisce centralità alla dimensione umana, ipotizzando il ruolo attivo di reti di *leadership* (comprendenti le reti civiche e i gruppi della società civile) come capitale sociale in grado di selezionare e guidare l'*hardware* tecnologico, di strutturare e interpretare l'apprendimento, favorendo processi di innovazione realmente efficaci perché *citizen-driven*, oltre che *human-centered* (Campbell, 2012; Marsh, 2013).

In uno studio finanziato dalla provincia canadese dell'Ontario (Intelligent Community Forum, 2013) sono definiti cinque fattori critici per la creazione di Comunità Intelligenti, un elenco di indicatori che forniscono la cornice di riferimento per comprendere, valutare, pianificare e sviluppare i fattori che determinano la competitività di una comunità della broadband economy e la cui interrelazione può creare circoli virtuosi di cambiamenti positivi: connettività alla banda larga; forza-lavoro nel settore della conoscenza; inclusione digitale; innovazione; marketing e attività di supporto.

Comunità che, al di là dei flussi globali nell'economia della banda larga, hanno ovunque lo stesso obiettivo di vivere in un luogo nel quale allevare con serenità i propri figli, offrire loro adeguate opportunità economiche e consentire le stesse opportunità ai propri discendenti.

Attraverso le nuove tecnologie si hanno a disposizione nuovi strumenti per costruire economie competitive ed inclusive anche da parte di comunità insediate in luoghi periferici, per abilitare anche le piccole imprese ad essere esportatori globali di competenze e conoscenze, prima non così facilmente trasferibili, ma anche per usufruire di servizi legati all'istruzione e alla salute.

Assicurando un maggior benessere economico e sociale delle comunità, le ICTs possono ridurre gli stimoli delle generazioni più giovani a trasferirsi altrove in cerca di migliori opportunità e, paradossalmente, giocare un ruolo chiave nel promuovere un futuro sostenibile in un mondo interconnesso.

L'innovazione nelle comunità intelligenti porta assieme affari, governo e istituzioni in forme di partenariato in grado di produrre risultati che vanno da servizi ai cittadini migliori e a costi più bassi, alla nascita di imprese e a nuove istituzioni più vitali.

Soprattutto è fondamentale costruire una cultura innovativa che attragga talenti, investimenti, riconoscimento globale e contribuisca attivamente a migliorare la qualità della vita di tutti i cittadini delle presenti e future generazioni.

Tenendo conto di questi criteri e valutazioni, l'*Intelligent Community Forum* procede annualmente alla Selezione delle *Smart21*, *Top Seven* e *Intelligent Community of the Year*.

A livello europeo, una particolare attenzione al miglioramento della qualità della vita è rivolta dai progetti che contemplano un approccio alla *smart city* che privilegia il fattore umano, come nel progetto *Periphèria* – condotto sotto ICT Policy Support Programme e co-finanziato dalla Commissione Europea (Marsh, 2013) – laddove una *Human Smart City* è una città che apprende come organizzare la propria intelligenza, consapevole del suo ricco capitale umano in grado di spostare le proprie risorse avanti e indietro dal cyber-spazio allo spazio urbano.

È consapevole che i cittadini non sono solo intelligenti ma anche in grado di rendere la propria città un luogo di innovazione sociale con un'infinita varietà di scelte.

La condivisione delle esperienze e la co-progettazione degli spazi urbani e dei servizi caratterizza i progetti pilota condotti nella città europee partecipanti (Malmö, Brema, Atene, Genova, Milano, la Contea di Palmela), per ciascuno dei quali, partendo dal concetto di *people in places* e dai luoghi urbani, aventi ruoli e significati specifici, viene individuata una tipologia di ambiente urbano di intervento (*Smart Neighbourhood* per Malmö, *Smart Square* per Atene, *Smart Street* per Brema, *Smart Museum & Park* per Genova, *Smart Campus* per Milano e *Smart City Hall* per Palmela) e i fattori comuni di impostazione metodologica: l'idea modello del

luogo, lo scenario pilota, i consigli di attivazione riguardanti il tipo di persone da coinvolgere, i luoghi da prendere in considerazione e i desideri da catturare.
È così possibile avviare un percorso virtuoso che conduce dall'individuazione delle sfide, alla costruzione di una visione condivisa, alla realizzazione di servizi *taylor-made* per le esigenze di cittadini, così come illustrato da Jesse Marsh nel suo intervento al Convegno "Human Smart Cities: come realizzarle", in occasione del Forum PA 2013 (http://iniziative.forum pa.it/expo13/convegni/human-smart-cities-come-realizzarle).
MyNeighbourhood costituisce un'altra iniziativa co-finanziata dall'UE (http://my-neighbourhood.eu/concept/) con l'obiettivo di affrontare le sfide della vita urbana ricorrendo alla più grande risorsa innovativa potenziale delle città, le sue persone, quindi con un approccio *human-centred*, consapevole del fatto che le complesse sfide urbane non possono essere risolte solamente dalle tecnologie innovative, ma che è piuttosto necessario un cambiamento del comportamento di massa, raggiungibile attraverso il coinvolgimento, le idee e la passione della gente.
È necessario pertanto ricreare i meccanismi i sociali che appartengono alla tradizione urbana, con comunità urbane fiduciose, alta qualità della vita, senso di sicurezza e di appartenenza.
Metodologie e strumenti come *Urban Living Lab*, *Design Thinking* e *Social Gaming* supportati da piattaforme online favoriscono le relazioni fra i residenti, spingendoli a lavorare in partenariato per creare, innovare e implementare servizi locali basati sui bisogni reali.
I progetti pilota sono avviati nei quartieri di quattro città europee e finalizzati a dare risposte a specifici problemi:

- nel caso di Nørresundby, ad Aalborg (Danimarca), si prevede la rivitalizzazione di un quartiere vicino al centro storico per incoraggiare i residenti a trascorrere più tempo nell'area locale, a co-progettare il proprio quartiere e ad investire su di esso;
- a Ladywood, a Birmingham (Regno Unito), si punta a migliorare il trasporto pubblico, la qualità dell'aria e a spingere i cittadini a scegliere soluzioni di trasporto responsabili;
- a Mouraria, a Lisbona (Portogallo), si intende generare un senso di mutuo supporto all'interno di una comunità caratterizzata da flussi migratori, alta percentuale di anziani e giovani disoccupati, connettendo i residenti con la ricchezza della conoscenza e delle esperienze locali e puntando al miglioramento degli spazi pubblici;
- infine, a Quarto Oggiaro, a Milano (Italia), si mira al coinvolgimento dei cittadini nel migliorare la vita quotidiana di portatori di disabilità, considerati bisognosi di cure, esplorando modalità per farli contribuire a risolvere le sfide di quartiere, accrescendo l'autostima e la soddisfazione per tutti i cittadini, introducendo la piattaforma nella vita quotidiana.

Nell'approccio *human-centred*, i cittadini non hanno l'obbligo di adottare tecnologie che sono state selezionate e acquistate dalle amministrazioni locali, ma vengono incoraggiati a comporre, creare e co-progettare i propri servizi utilizzando le tecnologie disponibili in soluzioni semplici e a creare nuove forme di partenariato PPP (pubblico-privato-persone) sotto forma di alleanze aperte. In un'epoca di crisi politica, finanziaria e sociale la disponibilità delle persone a collaborare alla costruzione del futuro urbano è una risorsa di enorme valore della quale le amministrazioni locali devono far tesoro. È quanto prospettato nel FORUMA PA 2013 di Roma da Jean Barroca, membro della giunta del Comune di Fundao (in Portogallo) e ricercatore presso Alfamicro (http://smartinnovation.forumpa.it /story/73501/fundao-una-piccola-human-smart-city-intervista-jean-barroca-alfamicro). Nella piccola città ubicata nel centro del Portogallo, con il problema di attrarre investimenti e talenti per far fronte alla disoccupazione e per avviare un nuovo processo di sviluppo economico e sociale, si è deciso, infatti, di puntare sugli spazi e le strutture a disposizione e di mettere in piedi progetti di rigenerazione urbana fortemente *community based*.

Fig. 1 Fundao, in Portogallo, punta a divenire *human smart city* attraverso progetti di rigenerazione urbana *community based*

In particolare, il progetto *Cova da Beira Living Lab* consiste nella messa a rete di spazi della città che offrono alla cittadinanza nuovi servizi e opportunità ed realizzato attraverso *Cova da Beira*, un Consorzio patrocinato dall'amministrazione comunale in collaborazione con le imprese, le università, le banche e le istituzioni pubbliche e private.

L'obiettivo è la creazione di un ecosistema aperto, comprendente: la fornitura di aree e spazi per l'incubazione di imprese e per progetti imprenditoriali, la creazione di laboratori per la prototipazione e di centri di ricerca e sviluppo dei prodotti della salute, la predisposizione di servizi che favoriscano l'internazionalizzazione dei prodotti e dell'imprenditoria locale.

Per la sua realizzazione, la città ha negoziato con la banca per creare una linea di capitale di avviamento per un importo di 500.000 euro all'anno per sostenere le iniziative locali con micro imprenditorialità.

In tutti i casi fin qui illustrati, è riscontrabile l'importanza della creazione del senso di comunità per rendere efficace la concretizzazione dei obiettivi che scaturiscono da una approfondita analisi dei fattori di criticità e delle potenzialità dei differenti contesti. È poi essenziale lo scambio e la condivisione delle esperienze fra le città appartenenti al partenariato di progetto e la loro diffusione attraverso piattaforme dedicate, in modo da fornire linee guida e utili indicazioni metodologiche per altre città e territori UE interessati da analoghe problematiche e desiderosi di intraprendere un percorso verso una *human smart city*.

Un ultimo aspetto, ma non per questo meno importante, che si intende considerare è quello relativo agli strumenti, in ambito urbano e non, di diversa natura ai quali è possibile ricorrere per finanziare la *smart city*.Fra questi quelli provenienti dalla nuova programmazione UE 2014-2020 (programmi a gestione diretta come Horizon 2020. COSME, LIFE+, Fondi Strutturali; strumenti BEI). L'utilizzo dei vari modelli e procedure di partenariati pubblico-privato può favorire l'ingaggio di finanza privata; accanto a questi altri strumenti innovativi di finanza privata per interventi più focalizzati o di nicchia quali i *MiniBond*, la *Venture Philantropy* e il *Crowdfunding*.

È comunque opportuno che la PA crei le condizioni per un ambiente il più possibile *business-friendly* che stimoli l'iniziativa privata, con risvolti economici, sociali e ambientali positivi per l'intero tessuto urbano.

A tale proposito, si ritiene particolarmente la matrice strumenti/ambiti, illustrata in un report della Cassa Depositi e Prestiti (2013), che organizza i diversi dati raccolti allo scopo di aiutare i principali stakeholder nel perseguire il percorso di innovazione e nella quale il grado di adattabilità dello strumento nell'ambito è definito sulla base delle considerazioni su tecnologia, contesto di riferimento e modelli di business.

3 CONCLUSIONI

La città non è solo il luogo dei grandi problemi della contemporaneità legati al rapido e intenso processo di urbanizzazione in atto, ma anche e soprattutto il luogo privilegiato delle grandi opportunità di sviluppo economico, culturale e sociale, dove già viene prodotto più del 50% del PIL mondiale. Le grandi aree di innovazione – legati alle ICT, all'energia, alla mobilità, tecnologie digitali, design dei servizi, biotecnologie – vedono proprio nella città il luogo di sperimentazione e applicazione prioritaria di soluzioni e straordinarie opportunità abilitate dalle nuove tecnologie, ambiente propizio per la partecipazione dei cittadini e per modelli di sviluppo di sostenibile. Come sostiene Claudio Forghieri in una recente pubblicazione di CITTALIA-Fondazione Anci-Ricerche (2012), la sfida maggiore è quella integrare in modo efficace il nuovo spazio digitale della città con strumenti e soluzioni in grado di abilitare fattivamente quel *civic empowerment* che è la reale scommessa della città intelligente, dove la misura della *smartness* è data da una diversa percezione della qualità della vita, a cui gli stessi abitanti hanno contribuito attivamente.

Smart city non come prodotto, dunque, ma come percorso-processo continuo, nel quale la ricerca delle soluzioni ai diversi problemi sia l'esito di una governance inclusiva, di collaborazione con le imprese, di azioni di co-progettazione con gli utenti che, fra l'altro, ne decreteranno o meno il successo.

Se l'intersezione delle due dimensioni della sensibilità di una smart city, quella tecnologica e quella sociale, genera i 'sensori antropici' rappresentati dai cittadini che, attraverso tecnologie personalmente gestite possono monitorare, riprendere e memorizzare le caratteristiche di un fenomeno urbano, per il suo funzionamento è fondamentale che i dati raccolti siano elaborati per i successivi opportuni interventi e resi disponibili alla collettività la quale può, di conseguenza, fare delle scelte consapevoli e definire il proprio comportamento nello spazio urbano (Fistola, 2013).

Soprattutto la *smart city* deve essere intesa come spazio concettuale e concreto favorevole all'elaborazione delle nuove politiche pubbliche per le città – con obiettivi finalizzati al perseguimento di una migliore qualità della vita – caratterizzate da un forte contenuto tecnologico e dall'utilizzo su larga scala dell'ingegneria finanziaria, ma soprattutto da una visione strategica di ampio respiro e medio-lungo periodo, da modelli innovativi di *governance* in cui cooperazione e competizione possano coesistere nella sfida di creare beni pubblici competitivi (Pichierri, 2005).

Di particolare efficacia la 'metafora dei binari' come azione-guida per le amministrazioni comunali che Gloria Piaggio (Direttore Progetti Europei del Comune di Genova e Segretario Generale dell'Associazione Genova SmartCity) ha ripreso più volte in occasione della sua partecipazione a iniziative di diverso genere in tema di smart city nell'ultimo triennio: i binari indicano la direzione (la *vision* che deve essere costruita in forma partecipata con il coinvolgimento degli stakeholder territoriali), le traversine che indicano le 'cose da fare', le azioni, i progetti, le iniziative necessarie alla sua attuazione con effetti in termini di concreto miglioramento della qualità della vita, in un'ottica di pianificazione integrata e superando la logica di interventi spot progettati in maniera diffusa e scoordinata senza una cornice di riferimento strategica.

In definitiva, avviare un percorso di *smart city* presuppone la definizione di un processo di pianificazione di medio-lungo periodo da parte delle pubbliche amministrazioni. Partendo dalla definizione di una *vision* condivisa tra i vari *stakeholders*, attraverso l'analisi della situazione urbana, la definizione delle aree su cui è necessario intervenire e soprattutto l'individuazione dei punti di forza della città. La visione strategica deve essere declinata in una serie di obiettivi ambiziosi ma realistici da monitorare in modo costante attraverso indicatori di performance al fine di valutare i progressi e attuare eventuali azioni correttive in itinere. Nella successiva identificazione delle aree prioritarie di intervento è poi importante distinguere i progetti abilitanti alla *smart city* nel suo complesso e quelli specifici di un singolo ambito applicativo, da abbinato allo/agli strumenti di finanziamento più idoneo/i come suggerito dalla matrice, cercando di non incidere eccessivamente sul bilancio pubblico, e considerando che spesso è preferibile far riscorso ad un mix di finanziamenti; una volta avviate le iniziative è necessario il monitoraggio costante in modo da valutarne

tempi, costi e qualità. In questo articolato percorso è dunque centrale il processo di pianificazione, la cui carenza renderebbe insufficiente l'impatto dei soli, pur consistenti, fondi UE (Cassa Depositi e Prestiti, 2013).
Più in generale, una città è davvero *smart* se sa come valorizzare il proprio capitale umano e sociale al fine di creare un contesto creativo e qualificato per lo sviluppo economico, dando il giusto peso a fattori che non siano solo ed esclusivamente legati alla crescita economica (Bencardino & Greco, 2014). Si ritiene, in sostanza, che al centro della smart city ci siano gli essere umani, che la direzione giusta sia quella di lavorare sulle comunità urbane, sui quartieri, sulle reti di città, affinché le ICTs abbiano il significato di strumento di ausilio nella co-progettazione e co-erogazione di servizi. In tal modo si favorirebbe un percorso continuo di innovazione che non può prescindere dal coinvolgimento dei cittadini e delle imprese, principali protagonisti dell'intelligenza urbana: nel primo caso vanno alimentati fenomeni di co-creation attraverso Living Lab o iniziative web, nel secondo caso si può sfruttare la domanda pubblica di beni e servizi in modo intelligente attraverso opportuni strumenti finanziari quali il *Public Procurement of Innovation* (PPI) e il *Pre Commercial Procurement* (PCP) (Cassa Depositi e Prestiti, 2013).
Come viene sottolineato anche nell'Agenda Digitale Italiana, senza partecipazione dei cittadini non esiste *smart city*, anche perché i suoi servizi vivono grazie ai contributi e all'interazione costante con i cittadini. Il coinvolgimento (*engagement*) è altresì fondamentale perché smart city e comunità intelligenti si costruiscono nel territorio, dove i problemi e le esigenze specifiche devono trovare risposte flessibili e dinamiche, con la consapevolezza che l'unica via per mantenere nel tempo un'elevata qualità della vita è quella di procedere su una programmazione che coniughi progettazione e monitoraggio dal basso con infrastrutture e strategie di sistema.

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IMAGE SOURCES

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AUTHOR'S PROFILE

Gabriella Pultrone

Architect, PhD, Researcher in Town Planning at the Department of Architecture and Territory (dArTe), University Mediterranea of Reggio Calabria, where she teaches Urban Planning and is member of the Teaching Body the Research Doctorate in Architecture. Delegate to Guidance and Tutoring of her Department. She passed the National Academic Qualification as Associate Professor. She carries out researches focusing on territorial and urban planning, her areas of interest include: the cultural identity of the Mediterranean Basin, the recognition of the typical expressions of its urban settlements and its territorial organization, with particular reference to the city of Trieste as gateway between Europe and the Mediterranean; Strategies and prospects of sustainable development; Relation between cultural heritage, tourism and local development; Urban policies and governance; Smart Cities.

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SOCIAL MOBILE MARKETING

EVOLUTION OF COMMUNICATION STRATEGIES IN THE WEB 2.0 ERA

STEFANO FRANCO

Università degli Studi di Napoli Federico II
e-mail: stefano.franco@unina.it

ABSTRACT

Increasingly faster communicational streams - that ease interactions and allow agents to considerably enhance their own informational assets - characterize the era in which we live. The research about new media, mobile and social technologies is the driver of this changes that implements a revolution of the content management, of the information accessibility and of the relationships interactivity. These characteristics don't leave the agents unresponsive and it is interesting and fitting to understand the tools available to firms and institutions and the communicational and marketing policies that organizations put to use to achieve their goals. In this context we want to find strategic and operational models to support organizations decisions about markets and territories. The purpose of this article is to understand how small organizations can utilize networks that characterize new trends in marketing. We conclude by providing some thoughts on the future evolution of the research in this field also with reference to the smart city that can exploit social mobile marketing for promotion of the territory and social participation.

KEYWORDS:
Mobile Marketing; Social Marketing; New Media; Web 2.0; Smart City.

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社会移动营销

时代沟通战略的演变

STEFANO FRANCO

Università degli Studi di Napoli Federico II
e-mail: stefano.franco@unina.it

摘要

越来越快的沟通渠道　方便了互动并大大提高代理商对自身信息资产的管理　这是我们生活时代的特征。对于新媒体、移动和社会技术的研究推动这种变化，从而带来了内容管理、信息可达性和人际关系互动性方面的革命。代理商们并没有忽视这些特征，因而有必要适时地研究企业和机构可用的各种工具以及组织能够用以实现目标的沟通和营销策略。在这一背景下，我们希望找到可以支持组织的市场和区域抉择的战略性及操作性模型。本文旨在研究小型机构如何在营销中利用各种代表新趋势的网络。通过进一步参考应用社会移动营销进行区域促销和社会参与的智能城市，我们对该领域未来研究的发展进行了若干思考。

关键词
移动营销；社会营销；新媒体 沟通战略.

1 INTRODUCTION

The technological progress and the birth of new social paradigms are shifting the marketer focus towards a new way of doing business (Gronroos, 1994) and in particular enhance day by day the strategic and operational processes of marketing and communication.
Marketing communication refers to the set of organizations activities that create and maintain the demand and a solid internal culture.
Different types of communication exist:

- institutional;
- external;
- internal.

Institutional communication refers to the influence on the attitude of the target by the organization. It creates a corporate image and adequately positions itself in the actors perceptions. With external communication an organization wants to influence actors behaviors. Internal communication let organizations motivate staff and give operational guidelines. Integration starts from the union of these three aspects that have to be managed in a unique way to build a multiplier effect.
Markets fragmentation and development of new media represent changing factors that characterize the current era and present operators with new communicative possibilities: moving from broadcasting to a communication increasingly more focused on the single user (Hirst et al, 2014).
In this situation it is difficult to manage relationships and integrate different channels: the risk is to generate confusion and disorder that reflects on citizens or consumers. For years administrations have entrusted different divisions with the task of communicating and creating different messages for different media or products.

Nowadays markets and relationships are conversations (Cluetrain Manifesto, 2009) and it is not possible to communicate in a coherent way without unifying messages bidirectionally. The problem is that users who unify all sources in a single message do not perceive the difference made by organizations between new and old channels in the same way. An organization that creates confusion may lose reliability wasting assets. From the territorial point of view, a city could jeopardize the relationship with its citizens. In order to spread a well-defined image on a brand it is necessary to integrate the communication in a distinct function: integrated marketing communication (IMC). This approach represents the first step to create strong, lasting relationships between targets and organizations. There is the need to manage relationships in the best possible way. This is crucial if we consider how new social technologies have changed the way of living and the speed with which information travels. In this context direct marketing and social media represent starting points to manage relations appropriately in an era characterized by mobile technologies. Through the analysis of these factors, this article explains what are the possibilities for organizations to take advantage of the social mobile marketing channel. The first paragraph indicates an instrument that represents the starting point of the relationships interactivity between organization and target: direct marketing. Then an important step is described in the technologies evolution: through the literature review, how context - in which agents work daily – changes is understood. The fourth paragraph exposes models to manage new dynamics and the way in which they define new strategies. In this way the article summarizes a strategy that allows organizations to reach prosperity in the medium to long term. Then we analyse a case study that puts into practice the elements discussed. Finally we debate about the aspects examined trying to understand positive and negative aspects of the experience and if it is applicable in different contexts.

2 THE ORIGIN OF INTERACTIVITY AMONG AGENTS: DIRECT MARKETING

Direct marketing (DM) is a key instrument because it represents the first bidirectional approach between users and organizations. DM allows to interface directly with a single user: communicative approach goes from one-to-many to one-to-one (Peppers et al., 1999). *"Direct marketing consists in the direct contact with carefully selected single consumers in order to achieve an immediate and long term relationship."* P. Kotler (2006). The main instrument to manage customers is the marketing database. It uses the informational assets in order to establish a long term relationship with the target. It includes behavioral information of any single user and his contact history with the organization (De Luca, 2008). Also customer data management has a great importance for organizations (Verhoef et al., 2010). These definitions relate exclusively to the relationship between customer and firms. In a relation between institution and territory there are no great differences: cities, as firms, are performing systems. The task of the institutions is to create the best condition for citizens and companies to invest on the territory and to live it at its best, so it is very important to establish a direct and continuous relation.

Eventually it is possible to summarize the distinctive characteristics of the direct marketing:

- interactivity;
- selectivity of the message;
- capillarity of the action;
- measurability of the efficacy;
- multi-channel approach.

These attitudes have shifted the focus of organizations from the product to the users. Customer relationship management (CRM) is the user-centric approach that firms adopt to better manage relationships.

3 NEW MOBILE AND SOCIAL MEDIA

The opportunity to link CRM to the new social technologies that lead to a more collaborative approach born in a context characterized by the development of new social media (Trainor et al., 2014). In order to engage users in collaborative relationships and increase customer relationship it is necessary to combine CRM tools with new social media (Greenberg 2010). The greater the integration within organization, the greater the ability to manage relationships (Nevo & Wade, 2010). But what possibilities do new technologies give?

The arrival of new social media changed the communication flows. New and interactive digital contents can be modified and reproduced by everyone in every moment. The stream changes creating a bidirectional relationship in which people participate to the making of what they prefer. It goes from a *one-to-one* communication to a *many-to-many* communication. This approach is the main characteristic of Web 2.0 and leads to the emergence of a new figure: the *prosumer*[1] (Toffler, 1980).

Internet isn't a passive experience anymore. Web 2.0 brings two main benefits to its users:

- people can exploit rich services and create digital content;
- organizations can use new tools to research data and to achieve marketing goals.

Web 2.0 is also a low cost asset in comparison with traditional tools. Furthermore, events such as the Arab spring and the election of Barack Obama show the extent of the social media phenomenon. It is not a coincidence that the Internet is the only sector that records a positive variation in advertising investments between 2011 and 2012 (Censis, 2012). In this context organizations become network elements that can directly interact with users (Kietzmann et al., 2011). Integration – in addition to positively influence relationships – develops a strong internal cohesion that improves conditions in the organization.

[1] Producer + consumer

In 2012 Nielsen carried out a research[2] with a cluster analysis that gathered different kind of Internet users in five groups: *the dormants, the not involved, the pragmatics, the fanatics* and *the followers.* It is clear that organizations have to inspire the followers who represent the largest cluster (29% of the sample survey). Consequently it becomes essential to pinpoint influential users who could be strategic assets to trigger processes of word of mouth.

3.1 SOCIAL MOBILE MARKETING

The new mobility paradigm (Sheller & Urry, 2006) analyzes social behaviors in a non-static era, in which technology and economy converge (Mandelli & Accoto, 2011).

In this new mobile society, some characteristics emerge:

- wireless technology endorses people with a greater sense of autonomy;
- mobile communication gives the possibility to be always connected;
- everyone can manage his relationships on the Internet.

Mobile marketing is a multi-way communication of an offer between organizations and users made by a mobile medium, device or technology (Shankar & Balasubramanian, 2009). Kaplan (2011) defines mobile social media as a group of applications that allows the creation and exchange of user-generated content.

Objects such as mobile phone have now learned to understand the environment thanks to sensors and actuators; the spread of internet access on mobile devices creates new possibilities of interaction between individuals and organizations that can distribute their marketing messages for specific locations and time periods (Kaplan, 2011).

Furthermore marketing wants to make and keep promises that allow the stakeholders to have perception of achieving their goals. According to the *service dominant logic* (Vargo/Lusch, 2004) users search for goods and services that provide solutions to complex problems.

The value of goods and services is no more related exclusively to their material characteristics; the value born from perceptions of users related to what they think about the product, the buying and consumption processes: people buy meanings. There is no value if users don't perceive it.

The impact of the social mobile marketing tools allows people to be continuously connected with the community in a high-personalized communication (Kaplan, 2011).

People interpret what they are living by processing the outside input, received with devices that help them to contextualize the experiences. There is no value if no benefit is perceived, without co-creating and without telling stories (process of *storytelling)*: value is a process of *social sense making* (Mandelli, 2011). Organizations get excellent results from a correct process of storytelling. They succeed to manage reputational crisis that represent dangerous risks. Nevertheless social mobile media return to organizations some of the power that social media gave to users (Kaplan & Haenlein, 2010).

There are different companies that base their businesses on the storytelling. At a territorial level Foursquare, for example, is a service that allows its users to tag places and events in the city and to comment and share their experiences. In this way Foursquare works as an interactive guide of cities and territories. Moovit applies the same functions to the urban transports.

3.2 OPERATIONAL POSSIBILITIES

Mobile marketing allows retailers to instantly communicate with costumers who are next to their brick-and-mortar shops in order to induce an immediate action (Shankar et al., 2010). The online activities of the Internet users bring about a reduction of the information asymmetries and, consequently, to a loss of control of brands by organizations. There are two general ideas about the control in these conditions: the first one

[2] Digital Market Trends, 2012

suggests making plans and continuing to influence behaviors as it's always been done. The second one suggests to abandon the planning and to participate to the markets conversations in a process of continuous learning (Mandelli & Accoto, 2012). A correct strategy should probably find its balance in the middle, and organizations should base their choices on both ideas:

- understanding where and how to make plans;
- managing the uncertainty, addressing the unexpected and acting on communicative capabilities.

About the approach to the target, the classic segmentation seems to not be effective with Web 2.0. Mobile marketing needs a thorough comprehension of users and nodes to make a segmentation of networks that allows the development of an efficacious targeting strategy (Shankar et al, 2010). Market fragmentation leads to the definition of small groups of individuals called *tribes* (Maffessoli, 2002). The elements of the tribes focus their attention on a brand or a product using new active channels to communicate with each other. The role of marketing is to find the points on which the interest develops and, again, to understand who are the subjects who contribute to create the contents. The 40th thesis of the Cluetrain Manifesto (2009) says: "*Companies that do not belong to a community of discourse will die*". The change of an organization that communicates with web is the change of the approach to the target: organizations must be tribal, maintaining social relationships that bind the individuals around them. In this way it is possible to pursue the following objectives:

- product differentiation: social media marketing points out the meaning of the aggregation that a product represents beyond its material characteristics;
- customer loyalty: developing confidence based on the sense of belonging of the individuals to the brand;
- brand awareness reinforcement: creating meanings and values shared by consumers.

To understand how to exploit the opportunities arising from innovations is also necessary to list the difficulties that characterize new markets (Alpert, 2010):

- product standardization is increasing;
- innovation cycle of the product is faster;
- lifecycle of the product is shorter;
- the ability to communicate has increased for everyone;
- lack of time for users' decisions;
- competition is strongly increasing;
- reduction of information asymmetries;
- impossibility to hide: a bad experience will soon be told.

According to Hoffman and Novak (2011) strategies should be built on four guidelines summarized by the acronym LEAD (Listen, Experiment, Apply, Develop). LEAD emphasizes on the need of testing solutions starting from a process of mutual feedback. Mandelli and Accoto (2012) propose a model more based on relationships called KCRESE (Knowledge, Capabilities, Relations, Experiences, Storytelling, Evaluation). This model gives greater importance to the communication capabilities, to the understanding that relationships are based on processes of social sense making, to the knowledge that it is possible to control these activities.

The sustainable profitability stays at the center of the strategies. Social mobile marketing is an approach that allows firms to achieve a medium to long term profitability. Every customer contributes through his purchases, repeated over time, and through the positive influence on the behavior of other customers. He adds costs to the organization. These costs tend to decrease over time for loyal customers because of learning curves and scope economies that arise in the relationship. The ability of organizations to convert potential users, first in actual users, and then in loyal users is also of relevance for the efficiency of the operating costs.

It is possible to summarize the basic steps to follow a proper *social mobile* strategy that probably every organization has to follow to gain success in the medium to long term:

1 understand the mechanisms of *word of mouth*;
2 identify influencers and create a sincere and lasting relationship with them;
3 identify the networks through which to meet correctly with users;
4 establish processes of social sense making;
5 prepare emergency and crisis management plans (planning vs continuous learning).

The aspects analyzed, together with the numbers that characterize the market for mobile devices and services, does not leave marketing indifferent. Analyzing the estimated growth of investments in interactive marketing in the U.S. from 2011 to 2016 (data Forrester, 2011), we note that the average annual growth rates appear higher for expenditure for social media and mobile marketing (Figure 1).

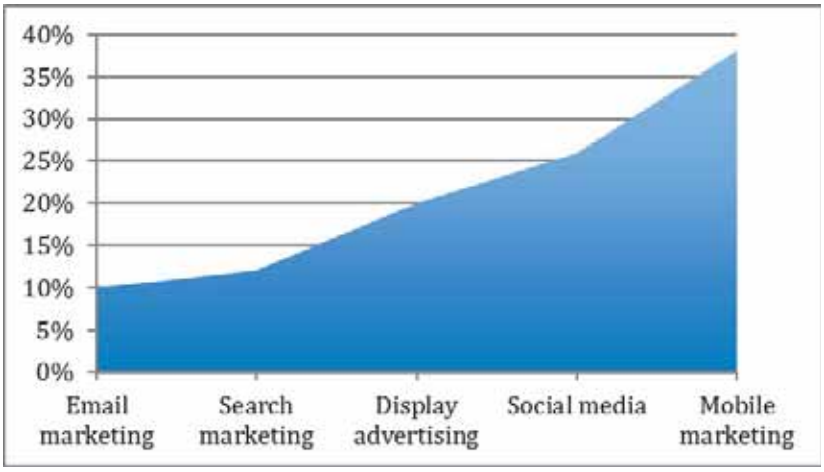

Fig. 1 US interactive marketing spend, CAGR 2011 to 2016; Forrester research (2011)

4 AN EMPIRICAL CASE: GLOCALIZME

About the need to find networks to relate with the target, the study attempts to address and understand the assets the retailers have to exploit the channels of the social mobile marketing. Often small businesses or brands don't have resources and skills required to initiate these processes.

Groupon is a typical example of how organizations feel the need to rely on intermediaries to improve awareness and store traffic (Shankar et al., 2010). We have chosen to describe the case of an intermediary that allows small firms in the territory of the city of Rome to utilize the possibilities offered by social mobile marketing. This analysis is made possible thanks to the availability of Glocalizme to access firm reports. The firm reports also contain the results of customer satisfaction interviews.

The Glocalizme business involves two different kinds of subjects, which can be targeted in two categories: *clients* and *users* (Tab. 1). The end users are the people that use the service with their mobile devices. The clients are organizations who use the service for advertising purposes.

Clients are not only shopkeepers. For example the 15% of them is composed by museums. For simplicity, the description will refer exclusively to retailers.

Clients	Users
198	746

Tab. 1 Glocalizme's customers

4.1 THE PRODUCT

Glocalizme interfaces with each of the two agents in different ways: the website allows the clients to upload promotions and manage their personal space on an application for mobile devices (*app*). The app, characterized by a high quotient of usability, is dedicated to users: thanks to location-based service, it localizes users indicating the retailers around them from the nearest to the farthest; users take advantage of the offer advertised on the app, by showing the screen of the device to retailers.

The check-in gives to users the possibility to indicate that the purchase has been made, and the promotion has been used. Then the possibility is given to users to share their own experiences on social networks; this aspect represents the greatest opportunity for clients that could improve their communication at low costs, communicating directly to the target.

Clients have the possibility to make their presence stronger on the territory. The gaming service completes the product: every user could win special offers - challenging friends or other users - if he ranks high in the rankings relating to the purchase of specific product category.

Recalling the five key points to make a good social mobile marketing strategy, it is clear that Glocalizme represents a network through which organizations can interact with users.

The start-up represent a way through which is possible to take advantage of new market trends. What is new is the possibility for small operators to implement and manage processes of understanding and administration of the behaviors in mobility and the related conversations.

4.2 POSITIVE ASPECTS

Glocalizme is an instrument of direct marketing thanks to the interactive feature, to the selectivity of the message, to the capillarity of the action and to the measurability of the efficacy.

Referring to the characteristics of social mobile marketing, Glocalizme gives the clients the possibility to meet users thanks to social networks, to the location and to the game services that represent the main instruments to create a long term relationship if they are used to understand the word of mouth that naturally takes place thanks to the viral communication engendered by users.

Thanks to the *gamification*, it is possible to identify the influencer without an expensive effort; the influencers should be adequately rewarded since they will become loyal customer and, moreover, they represent the main promotional channels that could enhance incomes of businesses.

Furthermore the shopkeepers will have an effective virtual showcase because of the possibility to have visibility even at a considerable distance.

Coming back to the five steps that outline strategies, we can see that Glocalizme offers the possibility to control the word of mouth, identify influencers thanks to the gaming services, reach the target thanks to a tool of extremely wide diffusion, and establish a permanent contact with users.

The positive elements resulting by the analysis are mainly referred to three aspects: the approach to the target, the capillarity of the action, the ability to identify influencers:

- the service addresses a wide number of clients. The choice is to serve all those organizations that fail to take advantage of social mobile marketing, especially those who want to embrace progress. These clients have seen an increment of their own communication skills adopting a channel, that of mobile devices, which is composed by about 11 million of units in Italy (Audiweb, 2011);
- the action is capillary because the messages go directly on the device screen of the single user who chooses the best offer;
- identifying influencers is quite simple thanks to the gaming services.

4.3 NEGATIVE ASPECTS

Considering the models of LEAD and KCRESE we can see that the logic of Glocalizme better answers to the first one. The limits of the start-up in fact emerge in the impossibility of telling stories, for both users and clients; they could only share experiences without being able to comment, and it's difficult to maintain long term relationships. Some problems have also emerged related to the fact that once first contact is established between client and end user these generally could find convenience in the exclusion of the intermediary from further interactions.

Another problem that has emerged is the control of the check-in process, in fact because the volume of tracked transactions on the servers was lower than the number of transactions recorded by retailers, it's clear that the procedure wasn't always completed correctly; therefore the system couldn't give an effective perception of the volume of transactions that took place, and guarantee reliability of the measurability of the results.

These things have led, after a first step of enthusiasm, to the failure of the start-up. In addition the lack of storytelling has not permitted the creation of a strong relation with the target. Clients have positively accepted the product and understood its potential, but the limited involvement of users has prevented the possibility to overcome the initial phase of the life cycle. The low measurability of the results led, time after time, to the loss of control. The risk was to find many consumers for the retail outlets without being able to maintain a role within the relationship.

5 LIMITATIONS AND FURTHER RESEARCHES

This analysis confirms the importance that some characteristics of social mobile marketing - examined in the previous paragraphs – have to building a successful strategy.

In particular we have observed how the storytelling and the possibilities of beginning a long term relationship are very important tools for social mobile marketing. The experience has also suggested in which way it is possible to widen, even for small firms, the possibilities of using these characteristics. For this reason small organizations need a broker who acts as a social network and allows agents to talk to each other, creating shared meanings and values.

The study presents some limitations. Further analyses are needed to better understand what are the results reported by organizations in terms of effectiveness of investments and customer satisfaction. It would also be desirable to increase the study sample. For these reasons there is still a limited understanding of the best mobile practices for organizations. Furthermore, the experience of Glocalizme suggests some aspects not exclusively related to retailers. The presence of museums as Glocalizme's clients suggests that further studies could focus on public facilities in Smart Cities. The latter consideration lets us imagine future urban settings where social mobile technologies allow interactions between people and organizations (Fistola, 2013). ICT solutions are the most important key of development for cities and allow them to gain competitiveness (Delponte, 2012); the increasing use of ICTs in everyday life has resulted in the need to permanently consider the development of new technologies in urban policies. ICTs should be considered in every institution strategic plan also for the social benefits they guarantee. Peer-to-peer interaction is a phenomenon of sociological and technological interest that allows citizen-generated information affecting work practices in organizations (Palen & Liu, 2007), and in this context social mobile media could represent a strong instrument of social participation to initiate and implement processes of smart governance.

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AUTHOR'S PROFILE

Stefano Franco

He received a master's degree in Economics and Business Management – Marketing at LUISS Guido Carli University of Rome. In February 2014, he started collaborating with the Departement of Civil, Architectural and Environmental Engeneering of the University of Naples Federico II within the project *Smart Energy Master for the energy management of territory.*

Booklet of the energy reduction guidelines. It contains the indications to change behaviors of different types of users and modify energy use and consumption.

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Riceviamo e volentieri pubblichiamo

L'ACCESSIBILITÀ NELLE SMART CITIES

GIUSEPPE TRIESTE[a], SILVIA GABRIELLI[b]

[a] Presidente FIABA Onlus
e-mail: presidenza@fiaba.org
URL: www.fiaba.org
[b] Ufficio Tecnico FIABA Onlus
e-mail: silvia.gabrielli@fiaba.org
URL: www.fiaba.org

ABSTRACT

FIABA is a cultural route for all, its aim is to promote a Global Accessibility and a Universal Usability through the removal of architectural, cultural, psychological and sensory barriers. FIABA is carrying out a real change and a cultural renewal in the name of equal opportunities. Respect for the environment in which we live is also a duty towards the younger generations to whom we must deliver a world in which free movement and the normal use of spaces are goals already achieved. There are millions of citizens who, because of their physical conditions are prisoners in their homes because there isn't any elevator or any elevator maintenance. FIABA project aims at implementing "a Space for all" or "a landscape for all" following the path of the ONU Convention on the Rights of People with disabilities with an emphasis on architectural, cultural, and psychological barriers, the last ones in particular, create barriers to equal opportunities and they are often carriers of discrimination. The principle of accessibility is invoked in Article 9 of the Convention which confirms the principle that people have a right to live independently and participate fully in all spheres of life and thus States are required to take all necessary measures to ensure accessibility to physical environment, transport, information and communications, including systems and technologies of information and communication and other facilities and services open to the public, both in urban and rural areas.

KEYWORDS:
Accessibility; Design for All; Total Quality.

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智能城市的可及性措施

GIUSEPPE TRIESTE[a], SILVIA GABRIELLI[b]

[a] Presidente FIABA Onlus
e-mail: presidenza@fiaba.org
URL: www.fiaba.org

[b] Ufficio Tecnico FIABA Onlus
e-mail: silvia.gabrielli@fiaba.org
URL: www.fiaba.org

摘要

FIABA是面向所有人的文化之路， 旨在通过移除建筑、文化、心理和感官障碍，促进全球可及性 和普遍使用性。FIABA以平等机会之名义，推进实际变化和文化更新。 尊重我们所生活的环境也是我们对于年轻人应尽的义务。 我们必须为他们创造一个自由移动和正常使用空间， 这已不再是梦想的世界。 数以百万计的公民因为身体障碍只能被囚禁于家中， 因为没有电梯或任何电梯维修供他们使用。FIABA旨在遵循联合国 《残疾人权利公约》，实现“所有人的共有空间” 或“共同风景” 。其关注重点在于，建筑、文化和心理障碍（尤其是心理障碍） 阻碍了平等机会的实现，并常常带有歧视意味。 《公约》第9条援引可及性的原则 ，即人们享有独立生活以及充分参与生活各方各面的权利， 因此，国家应采取所有必要措施，确保人们普遍享有获取物理环境、 交通、信息和通信的权利， 包括获取面向城市和农村地区公众开放的信息通信系统和技术以及其他设施和服务的权利。

关键词
管理；人性化智能城市；创新，参与；生活质量.

1 UNA CITTÀ INTELLIGENTE È UNA CITTÀ INCLUSIVA?

La Smart City, nuova frontiera nell'interpretazione degli agglomerati urbani, sembra essere l'orizzonte giusto a cui tendere per rendere più efficiente l'organizzazione delle nostre città. Questa rivoluzione delle strategie di pianificazione delle istituzioni locali si ripromette di utilizzare il capitale umano, sociale e intellettuale, ovvero i cittadini, per migliorare i servizi della città attraverso una migliore comunicazione tra comunità e istituzioni. Il tutto naturalmente accompagnato da un utilizzo diffuso delle nuove tecnologie della comunicazione e dell'informazione (ICT), della mobilità, dell'ambiente e dell'efficienza energetica.

Le Smart City, per coloro che come FIABA si occupano di accessibilità e di abbattimento delle barriere architettoniche, sensoriali e culturali, rappresentano un'ottima occasione, che però rischia di essere sprecata. L'utilizzo di tecnologie per la comunicazione permette ad un qualsiasi cittadino di partecipare ed interagire nella pianificazione delle strategie della città, sia in forma più diretta attraverso una co-progettazione dei servizi, oppure indirettamente con strumenti di valutazione e consultazione on-line da parte dei cittadini. Questo può tradursi nella possibilità che coloro che presentano esigenze particolari o competenze specifiche in tema di accessibilità, abbiano il diritto e dovere di partecipare attivamente ai processi decisionali del governo locale. L'intervento e cooperazione di soggetti diversi (associazioni, progettisti, singoli individui) impegnati attivamente per l'accessibilità globale potrebbero in questo modo influenzare le decisioni governative per la realizzazione di un più alto e diffuso livello di fruibilità degli spazi. Affinché questo sistema funzioni è imprescindibile la predisposizione delle istituzioni locali a lasciarsi influenzare da quanto emerso dai giudizi dei cittadine o dalla mole di risorse informative emerse dal crowdsourcing, considerandole la base per la programmazione degli interventi futuri.

A causa dell'enorme diffusione di smartphone e simili, molto spesso ci si dimentica che gli strumenti necessari per l'accesso ai servizi legati alle ICT non sono disponibili a tutti. Il loro costo elevato e anche il loro non facile utilizzo rischiano di aggravare l'emarginazioni di alcune categorie di persone, consolidando una realtà già evidente nella nostra società. Basta pensare agli anziani, completamente sprovvisti di manualità e dimestichezza nell'utilizzo di smartphone e tecnologie simili, e allo stesso tempo rappresentanti di un ceto sociale in difficoltà per l'esigue possibilità economiche a disposizione.

Il grado di partecipazione dei cittadini alla progettazione della città, quindi, non deve essere affidato esclusivamente ai mezzi di comunicazione moderni, ma anche a quelli tradizionali. Inoltre il governo locale deve occuparsi, qualora voglia realizzare in pieno la sua natura di Smart City, dell'educazione e alfabetizzazione dei suoi cittadini all'utilizzo delle ICT, che devono necessariamente soddisfare il requisito di accessibilità.

Nella Convenzione delle Nazioni Unite sui diritti delle persone con disabilità art. 9 si legge che "al fine di consentire alle persone con disabilità di vivere in maniera indipendente e di partecipare pienamente a tutti gli aspetti della vita, gli Stati Parti adottano misure adeguate a garantire alle persone con disabilità, su base di uguaglianza con gli altri, l'accesso all'ambiente fisico, ai trasporti, all'informazione e alla comunicazione, compresi i sistemi e le tecnologie di informazione e comunicazione, e ad altre attrezzature e servizi aperti o forniti al pubblico, sia nelle aree urbane che in quelle rurali". Per valutare l'efficacia di questa nuova visione, sarebbe fondamentale poter quantificare quanto la dimensione smart possa essere utile al miglioramento del benessere dei cittadini di una città. Per far questo risulta utile il progetto di Cnel e Istat "BES–Benessere Equo e Sostenibile", il cui primo rapporto è stato presentato nel marzo 2013. Il BES si propone di fornire nuovi parametri statistici, non in sostituzione del Prodotto interno lordo ma a completamento dello stesso, in grado di descrivere l'intera completezza della qualità di vita di una persona attraverso 134 indicatori relativi a 12 dimensioni del benessere (Sabbadini 2013).

Il successivo passo necessario per misurazione della qualità di vita dei cittadini di una Smart City è la declinazione del Bes su scala locale. Il progetto UrBES, promosso dall'Istat insieme al Coordinamento dei sindaci metropolitani dell'Anci, nasce con l'intento di sperimentare la misurazione del benessere equo sostenibile sul territorio. Per la rete delle città coinvolte può essere il primo passo per agevolare e stimolare lo scambio di best practice tra le aree metropolitane, così da favorire lo sviluppo di esperienze di partecipazione e di democrazia locale (Brasili e Giannini 2013); una rendicontazione periodica sullo stato di salute della città permetterebbe un giudizio dei cittadini sui risultati ottenuti dall'azione di governo degli amministratori oggettiva e legata a risultati analitici. Questo strumento di misurazione del benessere urbano può rivelarsi fondamentale per valutare quanto la dimensione smart di una città possa influenzare favorevolmente o meno la qualità di vita dei suoi cittadini, perché non avrà senso dirigere sempre più gli sforzi delle comunità verso questa direzione se non ci sarà un innalzamento del benessere dei cittadini.

Fig. 1 Primo rapporto BES-Benessere Equo e Sostenibile

2 LA TOTAL QUALITY PER IL BENESSERE DI TUTTI I CITTADINI

I limiti della misurazione del benessere con riferimento esclusivo alla situazione economica di un Paese sono noti già dal 1934, anno in cui Simon Kuznetz, ideatore della riforma della contabilità nazionale americana e del Pil, avvisava il Congresso degli Stati Uniti che il reddito nazionale non poteva essere lo strumento unico per la misurazione del benessere di un Paese. La questione ritorna all'attenzione della comunità mondiale grazie all'Organizzazione per la Cooperazione e lo Sviluppo Economico (OCSE) che a partire dal 2001 mette in campo una serie di iniziative volte alla promozione di un nuovo modo di misurazione del benessere sociale. Nella "dichiarazione di Istanbul" del 2007, adottata delle più grandi organizzazione internazionali, viene affermata ufficialmente la necessità di "*intraprendere la misurazione del progresso sociale in ogni paese, andando oltre le misure economiche convenzionali come il Pil pro capite*". In questa occasione viene lanciato dall'OCSE il Global Project on measuring progress of societies con lo scopo di individuare dei nuovi indicatori del benessere. Seguendo le iniziative europee Nicolas Sarkozy, allora Presidente della Repubblica Francese, istituisce la "Commissione sulla misurazione della performance economica del progresso sociale", nota come Commissione "Stiglitz-Sen-Fitoussi", nome derivatogli dai tre premi Nobel che l'hanno condotta.

Nel settembre del 2009 vengono pubblicati i risultati dei lavori della commissione e si propone "*uno spostamento dell'enfasi dalla misurazione della produzione economica alla misurazione del benessere delle persone*". Nello stesso anno anche la Commissione europea giunge alle stesse conclusioni; dopo la dichiarazione di apertura alla Conferenza "Beyond Gdp" del Presidente Barroso "*è tempo di andare dopo il Pil*" del 2007, ad agosto 2009 viene prodotta la comunicazione della Commissione Europea "Non solo Pil. Misurare il progresso in un mondo in cambiamento". Nell'autunno 2009 durante il summit di Pittsburgh i leader del G20 richiedono un lavoro sui metodi di misurazione "*che tenesse meglio conto delle dimensioni sociali e ambientali dello sviluppo economico*".

Nel 2010 durante la Conferenza dei presidenti e direttori generali degli Istituti nazionali di statistica europei si stabilisce come obiettivo l'inserimento di indicatori ambientali e sociali per il completamento del Pil costruendo una lista di indicatori per lo sviluppo sostenibile attraverso il "Memorandum di Sofia" e la costituzione dello Sponsorship Group "Misurare il progresso, il benessere e lo sviluppo sostenibile" all'interno del Sistema statistico europeo EES. Gli Stati membri dell'Unione Europea inseriscono così nella Strategia "Europa 2020" la volontà di superare il Pil.

Fig. 2 La pluralità di fattori che possono influenzare il benessere

Per affrontare questo tema in Italia il Consiglio nazionale dell'economia e del lavoro (Cnel) e l'Istituto nazionale di statistica (Istat) costituiscono un "Comitato di indirizzo sulla misura del progresso della società italiana" con l'obiettivo di sviluppare una definizione di benessere della società italiana BES-Benessere equo e sostenibile, i cui risultati sono stati presentati l'11 marzo 2013 presso il Parlamento alla presenza del Presidente della repubblica Italiana Giorgio Napolitano. Lo scopo è quello di rispondere all'ormai crescente necessità di misurare il benessere degli individui non solamente attraverso indicatori economici, ma con indicatori che integrino i valori economici con quelli ambientali e sociali.

Partendo dal concetto che il benessere di una società non può essere rappresentato da un unico indicatore statistico Istat e Cnel hanno deciso di utilizzare una pluralità di misure, raggruppabili in macrocategorie: salute, istruzione, lavoro, benessere economico, relazioni sociali, politica e istituzioni, sicurezza, benessere soggettivo, paesaggio e patrimonio culturale, ambiente, ricerca e innovazione e qualità dei servizi. Misurare il benessere e riflettere sui fenomeni che ne influiscono il livello, permette naturalmente di valutare le azioni necessarie per migliorare la condizione di un città, individuare gli obiettivi da raggiungere e pianificare interventi del governo locale.

In linea con quanto emerso del primo rapporto sul Benessere Equo Sostenibile, FIABA considera la qualità della vita urbana un intreccio di vari fattori come qualità dell'ambiente, degli spazi architettonici, delle condizioni economiche, di benessere e di coesione sociale. Quando una città ha una buona qualità di vita,

significa che la maggioranza della sua popolazione può fruire di una serie di vantaggi politici, economici e sociali che le permettono di sviluppare le proprie potenzialità umane e condurre una vita relativamente serena e soddisfatta. Una città di qualità è una città vivibile per tutti.

Il concetto di qualità ha però assunto nel tempo sempre maggiori significati e nuove implicazioni: da una dimensione esclusivamente "oggettiva" si è passati da una più "soggettiva.

Negli ultimi anni sono molto considerati gli indicatori di tipo sociale in base ai quali la qualità della vita in una città dipenderebbe dalla possibilità che i cittadini hanno di poter usare le risorse e i servizi disponibili e di mantenere quelle relazioni che loro ritengono fondamentali per la propria vita sociale. Considerando valida questa visione individuale, appare ormai evidente la necessità di riferirsi alla qualità con definizioni che ne permettano una misurazione oggettiva. In ragione di ciò risulta molto interessante la definizione secondo cui "*Qualità significa conformità a requisiti*" (Crosby, 1979) o anche "*Qualità: grado in cui un insieme di caratteristiche intrinseche soddisfano i requisiti*" (Norma ISO 9000 del 2005: Fondamenti e Terminologia). Da questo è desumibile che nell'accezione professionale recente, qualità viene intesa come ripetibilità di un processo e garanzia del risultato (Pepino, 2014). In ragione di ciò la Qualità Totale promossa da FIABA si arricchisce di un ulteriore sfumatura: la certezza che l'ambiente risponda in ogni ambito a quanto richiesto dall'utente. Una città di qualità è una città che permette a tutti i suoi cittadini di perseguire la ricerca del proprio benessere, senza creare discriminazioni dovute a disuguaglianze per deficit fisici, sensoriali o intellettivi. In ragione di ciò l'ambiente urbano deve necessariamente rispondere al requisito di accessibilità.

Fig. 3 La misurazione della qualità

L'accessibilità viene definita nel Decreto Ministeriale n. 236 del 1989 come *"la possibilità, anche per persone con ridotta o impedita capacita motoria o sensoriale, di raggiungere l'edificio e le sue singole unità immobiliari e ambientali, di entrarvi agevolmente e di fruirne spazi e attrezzature in condizioni di adeguata sicurezza e autonomia"* , inoltre *"l'accessibilità esprime il più alto livello di qualità dello spazio costruito in quanto ne consente la totale fruizione nell'immediato"* (D.M. 236/89 art. 3.1).

In generale accessibilità viene definita come la caratteristica di un servizio, di una risorsa di essere fruita con facilità da un'utenza ampliata. Uno spazio urbano in grado di rendere facilmente fruibili le proprie risorse e servizi ad un'utenza ampliata garantisce un alto grado di qualità della vita.

L'obiettivo principale dell'accessibilità urbana è, dunque, quello di elevare il comfort dello spazio urbano per tutti i cittadini, eliminando tutti gli ostacoli che discriminano, a favore di un'uguaglianza di opportunità. Se si

riducono le possibilità di scelta anche la qualità della vita si riduce; senza una piena ed effettiva partecipazione ed inclusione all'interno della società, si ledono i diritti umani, il rispetto per la dignità della persona. Le nuove forme di disuguaglianza urbana si basano proprio sull'accessibilità spazio – temporale e quindi non sono solo di carattere socio-economico.

Fruibilità e accessibilità totale devono diventare termini propri del linguaggio di ogni opera pubblica e privata che si vuole realizzare. È importante raccogliere anche l'esigenza di tutti che non è solo quella di vestirsi, mangiare e uscire. Non ci sono solo le esigenze primarie, ma ci sono anche quelle, per esempio, di divertirsi, di andare allo stadio, a teatro, al cinema.

La Convenzione delle Nazioni Unite sui diritti delle persone con disabilità, pubblicata nel 2007 in occasione dell'Anno europeo delle pari opportunità per tutti, riconosce "*l'importanza per le persone con disabilità della loro autonomia ed indipendenza individuale, compresa la libertà di compiere le proprie scelte*". Ecco perché FIABA si propone di abbattere tutte le barriere, da quelle architettoniche a quelle culturali, che precludono la possibilità di godere e vivere l'ambiente in tutte le sue forme. Per questo promuove la fruibilità universale e la progettazione di ambienti totalmente accessibili secondo i principi della Total Quality e dell'Universal Design, la "progettazione per tutti", finalizzata all'inclusione sociale e all'uguaglianza nel rispetto della diversità umana, attenta ai bisogni, alle esigenze e ai desideri delle persone.

La TOTAL QUALITY è la QUALITÀ TOTALE. Un concetto ampio che abbraccia tutti gli ambiti e che ha come obiettivo quello di raggiungere il quanto più possibile una vivibilità per tutti senza nessuna distinzione, ma soprattutto senza privilegiare determinate categorie: a tutti deve essere consentito di vivere l'ambiente in modo confortevole e sicuro. E ognuno, per raggiungere la qualità totale, ha la responsabilità di operare per migliorare lo status quo. Spetta certamente al cittadino comunicare situazioni di difficoltà, ma deve essere principalmente il soggetto che amministra a svolgere un'opera di prevenzione, realizzando un monitoraggio del territorio per renderlo, appunto, di qualità.

La Total Quality deve essere applicata al mondo dei trasporti, a quello dell'istruzione e alla sanità, ambiti fondamentali dove chiunque deve essere libero di muoversi ed e esprimersi in totale libertà e autonomia. La Total Quality è per tutti, perché un ambiente accogliente lo è per chiunque.

Per FIABA non esistono gruppi di persone con caratteristiche da catalogare ma esiste "la persona" con tutte le sue qualità e peculiarità e la disabilità non è il problema di una minoranza né l'unico ostacolo che una persona incontra nel corso della propria vita. Da tempo ormai si è superato il concetto di handicap, e attraverso la dicotomia tra disabile e normodotato, si sta velocemente approdando al concetto di persona con mobilità ridotta (PRM). Le norme europee sottolineano che l'accessibilità è un argomento che interessa un numero sempre maggiore di individui. Nella Decisione della Commissione Europea del 21 dicembre 2007 (n. 2008/64/CE) relativa ad una specifica tecnica in interoperabilità concernente le "persone a mobilità ridotta" nel sistema ferroviario transeuropeo convenzionale e ad alta velocità, vengono definite le persone con mobilità ridotta:

"Per «persone con mobilità ridotta» si intendono le persone che hanno difficoltà a utilizzare il treno o la relativa infrastruttura. La definizione include le categorie seguenti:

- le persone su sedia a rotelle (persone che utilizzano una sedia a rotelle per muoversi a causa di malattia o disabilità);
- altre persone con problemi di mobilità, fra cui:
- le persone con problemi agli arti
- le persone con difficoltà di deambulazione
- le persone con bambini
- le persone con bagagli pesanti o ingombranti
- le persone anziane
- le donne in gravidanza

- le persone con disabilità visive
- i non vedenti
- le persone con problemi uditivi
- i non udenti
- le persone con problemi di comunicazione (persone che hanno difficoltà a comunicare o a comprendere il linguaggio scritto o parlato, compresi gli stranieri che non conoscono la lingua locale,
- le persone con difficoltà di comunicazione, le persone con difficoltà sensoriali, psicologiche e intellettive).
- le persone di bassa statura (compresi i bambini).

Le disabilità possono essere di lunga durata o temporanee, visibili o nascoste. Tuttavia, le persone con mobilità ridotta non comprendono gli alcolisti o i tossicodipendenti, tranne quando tale dipendenza è dovuta a una terapia medica. Il trasporto di oggetti di dimensioni notevoli (per es. biciclette e bagagli ingombranti) non rientra nel campo di applicazione della presente STI. È invece oggetto delle norme, dei requisiti di sicurezza e delle decisioni commerciali del gestore dell'infrastruttura, del gestore della stazione o dell'impresa ferroviaria per quanto riguarda le dimensioni e il peso autorizzato e le disposizioni di sicurezza". Risulta evidente come le disabilità motorie e sensoriali divengano una sottocategoria di un'insieme di persone molto più vasto, che incorpora in se situazioni momentanee che possono coinvolgere qualsiasi individuo.

Fig. 4 Design for all - progettazione per tutti

È per questo che FIABA promuove un dialogo continuo ed un confronto partecipato e comunicativo tra istituzioni, progettisti, specialisti ed utenti reali, al fine di proporre soluzioni unitarie nei vari settori della vita, per una maggiore consapevolezza e visione d'insieme e per fare rete attorno alla necessità di una qualità che sia davvero per tutti. Un nuovo metodo di lavoro che si basa sull'osservazione e lo studio delle situazioni reali, sull'ascolto reciproco, sulla discussione di ciò che i diversi utenti pensano e desiderano per gli ambienti e gli ausili che ritengono veramente utili e necessari. In linea coi principi della Total Quality, FIABA ha promosso l'istituzione di una "Cabina di Regia per la Total Quality" in seno alle amministrazioni regionali, provinciali e comunali. Tale organo ha il compito di coordinare le iniziative locali e individuare le criticità presenti nel territorio per promuovere l'accessibilità e fruibilità, il vivere in modo confortevole e contare su una migliore qualità di vita di concerto con tutte le associazioni di categoria, il terzo settore e le istituzioni pubbliche e private in grado di raggiungere tale obiettivo. Ad oggi la Cabina di regia è diventata realtà presso le amministrazioni provinciali di Ragusa, Catania, Viterbo, Pescara, Chieti, Salerno e presso i Comuni di Pescara, Lariano, Civitavecchia, Caltagirone, Viterbo e Belizzi. Sempre in applicazione dei principi della Total Quality FIABA ha proposto l'istituzione della figura del Total Quality Manager, un tecnico esperto di Qualità Totale, in grado di interpretare il corretto management presso gli enti pubblici e privati e di effettuare scelte ed iniziative che conducano a progettare tutto quello che ci circonda, secondo il criterio guida per cui nessuno dovrà incontrare difficoltà in qualunque momento della vita e per qualunque servizio di cui necessita. Se sarà assolta questa condizione chiunque vedrà ogni difficoltà automaticamente risolta e percepirà migliorata la sua qualità di vita.

Fig. 5 Piazza Colonna durante il FIABADAY 2013

3 SMART CITY, NON SOLO ICT

Molto spesso quando si sente parlare di Smart City, il primo collegamento che si fa è quello con le ICT, ovvero le infrastrutture di comunicazione e informazione moderne. Affinché la vocazione di riduzione delle disuguaglianze della Smart City si realizzi, non va sottovalutata e dimenticata l'importanza delle infrastrutture di comunicazione tradizionali, ovvero i trasporti.

Il cittadino di una Smart City non vanta semplicemente il consueto "diritto alla conoscenza", ma il ben più ambizioso "diritto alla partecipazione" (Vademecum per la città intelligente 2013). I cittadini devono poter prender parte alle scelte per il futuro della loro città. Inoltre fondamentale per l'incremento della competitività urbana è permettere la comunicazione del capitale umano, quindi la trasmissione di informazioni tra i cittadini e le loro relazioni interpersonali. Per far si che queste imprescindibili premesse siano in atto, ciascuno deve poter vivere l'ambiente e accedere alle risorse della città in totale autonomia e libertà.

Un semplice esempio: una persona con disabilità potrebbe con uno smartphone utilizzare l'app per sapere tra quanto passerà l'autobus e se abilitato per il trasporto di persona con mobilità ridotta, ma qualora la rampa del mezzo fosse in disuso o la fermata fosse progettata erratamente e non adeguata al dispositivo oppure le auto ostruissero l'accesso (casi citati non a caso, ma spesso verificabili), l'utilità della tecnologia verrebbe immediatamente annullata.

Per questo FIABA ritiene che l'attitudine della Smart City per lo sviluppo della comunicazione e la condivisione delle idee tra i suoi cittadini non possa realizzarsi solo attraverso le ICT ma anche adeguando e migliorando il sistema dei trasporti, qualora una delle finalità sia lo sviluppo delle reti sociali e relazionali e della propensione all'inclusione e alla tolleranza.

L'accessibilità totale dei sistemi di trasporto è un argomento di difficile trattazione e complessa realizzazione, ma attraverso una più attenta progettazione FIABA ritiene sia possibile raggiungere un livello di fruibilità tale da permettere l'utilizzo in autonomia di qualsiasi persona.

La legge n. 118/71 stabiliva nell'art. 27 "i servizi di trasporti pubblici ed in particolare i tram e le metropolitane dovranno essere accessibili agli invalidi non deambulanti".

Nella legge n. 104/92 nell'art. 26 si legge "1. Le regioni disciplinano le modalità con le quali i comuni dispongono gli interventi per consentire alle persone handicappate la possibilità di muoversi liberamente sul territorio, usufruendo, alle stesse condizioni degli altri cittadini, dei servizi di trasporto collettivo appositamente adattati o di servizi alternativi. 2. I comuni assicurano, nell'ambito delle proprie ordinarie risorse di bilancio, modalità di trasporto individuali per le persone handicappate non in grado di servirsi dei mezzi pubblici."

Nel Decreto del Presidente della Repubblica n. 503 del 24 luglio 1996 nell'art. 1 viene specificato che le norme per l'abbattimento delle barriere architettoniche devono essere applicate anche "ai servizi speciali di pubblica utilità", intendendo mezzi di trasporto tranviario, filoviario e metropolitano.

I problemi connessi con la mobilità richiamando l'attenzione sulla necessità di una progettazione rivolta indistintamente a tutta l'utenza; infatti continuare a parlare di progettazione mirata per la disabilità è come volere continuare a sottolineare una diversità tra i cittadini.

In tale quadro, la mobilità sostenibile rappresenta uno dei punti focali dello sviluppo e della qualità delle nostre città e dell'adeguamento dei trasporti alle necessità di tutta la popolazione. La piena possibilità, pertanto, di fruire dei trasporti, prima di essere un obbligo, in molti casi già normato per legge, deve diventare una prassi per le imprese pubbliche e private del settore, che sulla base delle nuove tecnologie e di un'appropriata progettazione devono migliorare i loro servizi conformandoli alle esigenze dell'utenza.

Appare, quindi, evidente la necessità di adeguare i mezzi di trasporto e le infrastrutture attraverso il rinnovo, la ristrutturazione e il potenziamento dei servizi. Il sistema trasporti, sia su gomma che su ferro, sia via mare che via cielo, inoltre costituisce uno dei pilastri economici del Paese ed in questo momento di profonda crisi rappresenta l'occasione peculiare e determinante per essere di sostegno alla crescita economica ed all'adeguamento del settore alle esigenze di accessibilità di tutti indipendentemente dalle proprie condizioni fisiche. E' necessario, pertanto, non solo allinearsi a quanto previsto dalla normativa europea ed alle sue Direttive, ma soprattutto puntare su un nuovo e più avanzato modo di considerare, concepire e progettare l'accessibilità di ogni singola infrastruttura.

Ogni settore del trasporto urbano presenta criticità differenti e caratteristiche proprie. Il trasporto locale urbano su gomma necessita di una progettazione accurata delle infrastrutture urbane; è comprovato che le fermate a penisola risultano maggiormente funzionali di quelle a golfo, ma purtroppo se ne vede raramente l'utilizzo nelle nostre città. Inoltre i mezzi abilitati alla ricezione di utenti con disabilità sono una minima percentuale rispetto l'intero parco mezzi dei vettori.

Molto spesso la colpa viene imputata alle pessime condizioni economiche in cui versano le aziende di Trasporto Pubblico Locale (TPL); l'indisponibilità di risorse economiche spendibili per l'acquisto di nuovi mezzi obbliga le aziende ad utilizzare quelli ormai vecchi e affaticati dal tempo. Le rampe estraibili, montate sugli autobus, risultano spesso disabilitate e gli spazi interni non sembrano essere progettati per favorirne la fruibilità dai viaggiatori.

Altre sono le specificità del trasporto su ferro; emblematica è l'espressione "salire sul treno", quando in realtà dovremmo semplicemente "entrarvi" (Legnani 2013).

Per quanto concerne l'accessibilità delle infrastrutture e i mezzi del trasporto ferroviario FIABA propone un iter progettuale suddiviso in step successivi, con l'utilizzo di sistemi di transizione, attualmente in utilizzo e riconosciuti dagli organi di controllo, che permettano l'esercizio ordinario anche nelle diverse fasi di sviluppo del progetto di adeguamento.

Fig. 6 Autobus per il trasporto locale con rampa per disabili in funzione

La Decisione della Commissione Europea n. 2008/64/CE ha come obiettivo il miglioramento dell'accessibilità "del trasporto ferroviario per le persone con ridotta mobilità, comprese le aree pubbliche dell'infrastruttura" con particolare attenzione ai problemi posti dall'interfaccia marciapiede-treno.
Nella stessa viene prescritta la presenza obbligatoria di "ausilio per la salita a bordo da utilizzare fra la porta in questione e il marciapiede per consentire al passeggero su sedia a rotelle di salire o scendere dal treno" con l'esclusione di casi particolari esplicitati.
Sono contemplati come dispositivi di ausilio per la salita a bordo riconosciuti, oltre al discriminante elevatore largamente in uso nelle nostre stazioni, la rampa e la piattaforma di accesso, strumenti che rispondono positivamente al diritto di autonomia della persona con disabilità.
Meritevole di citazione è quanto Trenord sta facendo in termini di accessibilità. La società nata dall'unione di esperienza, competenza e strutture di Trenitalia (Divisione Regionale Lombardia) e Gruppo FNM (LeNORD) gestisce il servizio ferroviario suburbano e regionale, il servizio di collegamento aeroportuale Malpensa Express e quello transfrontaliero Como-Chiasso e Malpensa-Bellinzona, per un totale di 2.300 corse al giorno, che in larga misura confluiscono verso il nodo di Milano.
La scelta fatta da Trenord è quella di investire nell'abbattimento delle barriere architettoniche, nell'accessibilità globale delle stazioni e dei suoi mezzi. Allo stato attuale risulta accessibile il 48% della flotta, con un investimento già programmato per il 2015 che innalzerà la percentuale al 70% (Legnani, 2013). Investimenti sono stati realizzati anche nella digitalizzazione dei sistemi di comunicazione nelle stazioni, le cosiddette stazioni smart munite di teleindicatori degli orari e dell'andamento dei treni, monitor di stazione con informazioni sulla circolazione e del servizio ferroviario, digital signage e colonnine Infopoint per comunicazioni dirette anche in caso di pericolo.

4 SMART CITY PER IL SOCIALE

Una delle finalità delle Smart City è l'inclusione sociale attraverso al partecipazione del capitale umano nella progettazione dei servizi pubblici ai residenti.

La città di Southampton, prediligendo questa dimensione di Smart City, si è dotata di un'innovativa smart card in grado di accedere più facilmente ai servizi per i cittadini, permettendo così una gestione più efficiente e meno dispendiosa delle autorità municipali.

Le smart card contengono al loro interno dati personali protetti, tra cui anche dettagli relativi alla presenza di disabilità motorie, sensoriali e cognitive della persona. Dal profilo conseguente all'inserimento dei dati, la smart card abilita i relativi servizi, come pass o esenzioni per i mezzi di trasporto, le biblioteche o le associazioni.

In Italia, dove le città aderenti all'Osservatorio Nazionale Smart City di ANCI stanno sperimentando nuove forme di città intelligente, diversi sono i progetti rivolti all'inclusione sociale e al miglioramento della qualità di vita delle persone con disabilità.

Il Comune di Verona, nel tentativo di trasformare la mobilità urbana in smart mobility, ha realizzato il progetto Citypass aggiudicandosi il Premio Smart City di SMAU Padova 2013.

Il sistema progettato permette il rilascio del pass disabili europeo attraverso una piattaforma applicativa, con una gestione autonoma dei contrassegni "invalidi".

Lo scambio di dati permesso dal sistema scelto produce un maggiore controllo da parte delle amministrazione pubbliche, sia per quanto riguarda le falsificazione che l'uso improprio del permesso. Concretamente, attraverso il Citypass, i veicoli al servizio delle persone disabili possono accedere liberamente alle Zone a Traffico Limitato di tutti i comuni della provincia che hanno aderito al progetto.

Sempre nell'ambito dei servizi alle persone con disabilità il Comune di Genova ha dotato le soste auto per disabili in centro con sensori collegati al centro di controllo della Polizia municipale così da poter sanzionare chi vi parcheggia senza diritto.

Appositi `pass spia´ installati sulle auto dialogando con sensori annegati nell'asfalto indicheranno in tempo reale chi sosta senza diritto nei parcheggi attivando l'intervento dei vigili urbani. Per quanto riguarda l'accessibilità nel tempo libero e nella cultura, positivo è quanto fatto dal Comune di Fabriano con il portale Turismo Accessibile.

L'idea è quella di promuovere l'accessibilità turistica del Territorio e nasce inizialmente a Fabriano con un Progetto dell'Associazione Strabordo denominato "Turismo accessibile: pari opportunità ed opportunità di sviluppo". Tale esperienza viene in seguito sviluppata e condivisa tra i comuni dell'area montana (Arcevia, Cerreto d'Esi, Cupramontana, Fabriano, Genga, Mergo, Rosora, Sassoferrato, Serra San Quirico, Staffolo) e il Sistema Turistico della Marca Anconetana con un secondo progetto

"Turismo accessibile: pari opportunità ed opportunità di sviluppo nella Marca Anconetana". Lo scopo è quello di esaminare i siti di particolare interesse culturale e paesaggistico, individuandone gli itinerari fruibili, le criticità ed i servizi disponibili per persone con mobilità ridotta, così da consentire un agevole reperimento delle informazioni necessarie per vivere appieno il territorio.

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IMAGE SOURCES

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Fig. 2: http://www.comitatoscientifico.org/dati&metodologie/index.htm

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Fig. 5: http://www.designforall.it/

Fig. 6: archivio FIABA Onlus

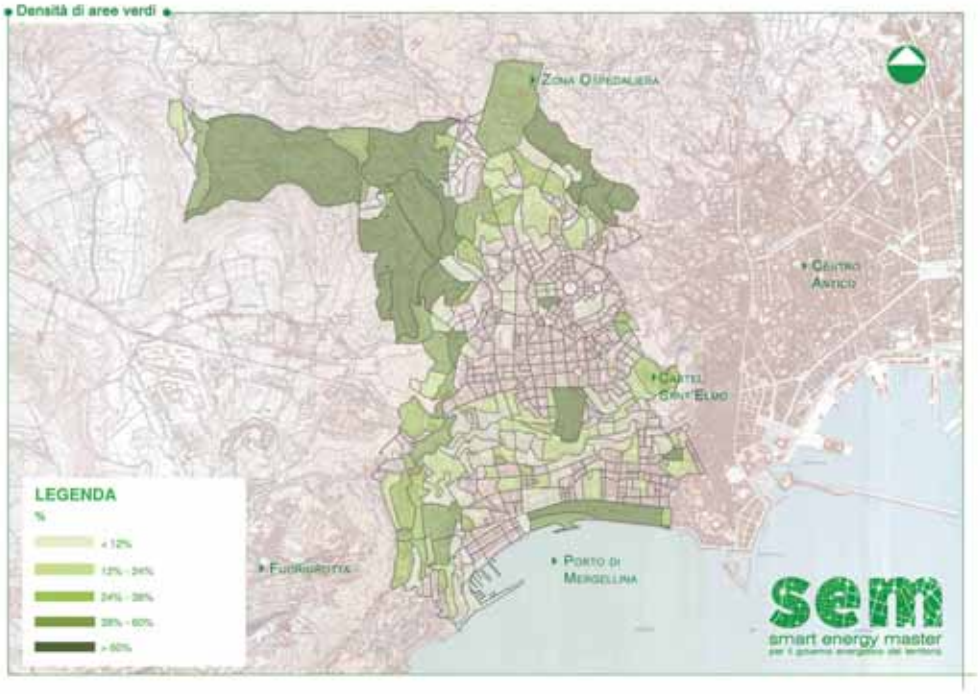
AUTHORS' PROFILES

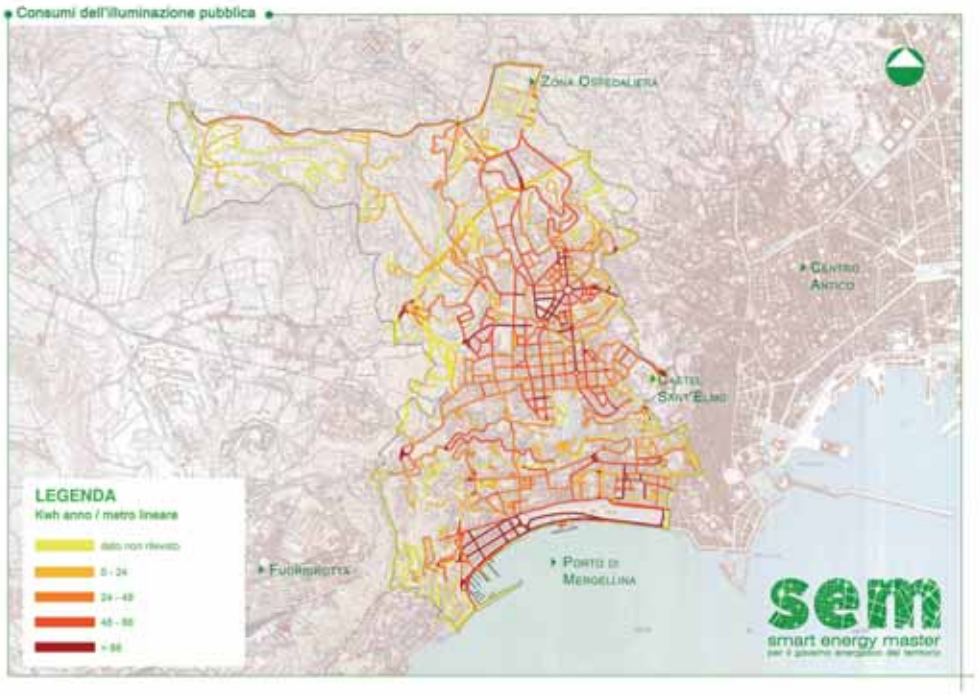
Giuseppe Trieste

Presidente di FIABA (Fondo Italiano per l'abbattimento delle Barriere Architettoniche), ha un brillante trascorso nello sport con la partecipazione a tre Paralimpiadi 1972-76-80 in cui conquista tre medaglie d'oro e tre di bronzo. Cofondatore dello Sport per disabili, nel 1983 costituisce ANTHAI che presiede per i successivi 20 anni. Nel 2000 costituisce FIABA Onlus, organizzazione non lucrativa di utilità sociale che si dedica alla missione di promuovere la fruibilità universale e la progettazione di ambienti ad accessibilità totale secondo i principi dell'Universal Design, per una piena integrazione sociale e per le pari opportunità. Membro dell'Osservatorio Nazionale sulla condizione delle persone con disabilità, è stato nominato componente della Consulta delle Associazioni dell'Osservatorio permanente per l'integrazione degli alunni con disabilità del MIUR e del Comitato per la promozione e il turismo accessibile del Ministero dei Beni e Attività Culturali e Turismo

Silvia Gabrielli

Nata a Roma il 28 maggio del 1985, si laurea in Ingegneria Edile-Architettura presso l'Università degli Studi di Roma "Tor Vergata" all'età di 25 anni. Da due anni lavora presso FIABA Onlus, occupandosi dell'Ufficio Tecnico e affiancando il Presidente presso Tavoli Tecnici e Gruppi di lavoro in seno alle Istituzioni. Sempre per FIABA collabora con gli ordini professionali in iniziative per la sensibilizzazione sul tema dell'abbattimento delle barriere architettoniche, sensoriali e culturali.





Graphical data rendering in GIS of the density of urban green parks and energy consumption of street lighting of the neighborhoods object of the Urban Saving Energy Model.

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THE DETERMINANTS OF TRANSPORTATION MODE CHOICE

IN THE MIDDLE EASTERN CITIES: THE KERMAN CASE, IRAN

HAMID SOLTANZADEH [a], HOUSHMAND E. MASOUMI [b]

[a,b] Center for Technology and Society, Technical University of Berlin, Germany
[a] e-mail: hamid.soltanzadeh@gmail.com
[b] e-mail: masoumi@ztg.tu-berlin.de

ABSTRACT

Having a precise understanding of the determinants of transportation mode choices and decisions can be under the influence of regional and cultural aspects. This paper outlines such determinants in the Iranian city of Kerman as a representative of the similar Middle Eastern cities located in hot-arid climates and Moslem cultures. The descriptive analysis of the results derived from a short survey that was a part of a larger study conducted in the second half of 2013 indicated that adding to accessibility to public transportation and the convenience of using it can persuade people to shift from car driving to public transit use. The main barriers to bicycling are socio-cultural aspects, while for walking the obstacles are physical and environmental. Increasing the quality of pedestrian infrastructure and spaces is a stronger deterrent than personal attitudes against walking. Such findings show slight dissimilarities from the results of some of the western studies that find the built environment more effective. Chi-square tests indicates that the four variables of gender, household size, age, and household car ownership significantly affect modal choice decisions. These findings can be a general guide for the Middle Eastern planners to promote walking, biking, and public transport use.

KEYWORDS:
Sustainable Mobility; Urban Transportation Planning; Transportation Mode Choice; The Middle East; Iran

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中东城市选择交通方式的决定因素

伊朗克尔曼案例研究

HAMID SOLTANZADEH [a], HOUSHMAND E. MASOUMI [b]

[a,b] Center for Technology and Society, Technical University of Berlin, Germany
[a] e-mail: hamid.soltanzadeh@gmail.com
[b] e-mail: masoumi@ztg.tu-berlin.de

摘要

要准确理解选择和确定交通方式的决定因素，必须要考虑地区和文化方面的影响。本文以伊朗的克尔曼作为气候干热兼穆斯林文化的中东城市的典型代表，整体描述了这些决定因素。对 2013 年下半年研究中一份简单调研结果的描述分析表明，通过增加公共交通的便利性和舒适性，可以促使人们放弃驾车，改乘公共交通。自行车的障碍主要来自社会文化方面，而步行的障碍是生理和环境。改变人们对于步行的负面态度，比改善人行道基础设施和空间质量更有效。这些发现与西方一些认为环境建设更重要的研究略有不同 。卡方分布测试 表明性别、家庭规模、年龄及家庭汽车持有量四个因素对出行方式选择有重大影响。这些发现可以为中东规划者们在推动步行、自行车及公共交通方面提供综合指导。

关键词
可持续交通系统；城市交通规划；交通方式选择；中东；伊朗.

1 INTRODUCTION

Identifying the most effective motives behind mobility decisions is essential for planners and decision makers to set transportation policies. The complexity of personal decisions has become more obvious when a wide range of variables including observed and unobserved ones are brought in the analyses. Comparing the significance of different determinants gives the planners the opportunity to distinguish the most influential factors based on which transportation system can be constructed.

Since the dominant factors may be varying in different cultures and climatic conditions, the necessity of stand-alone studies becomes clear. A large body of research about such factors comes from the western countries, while regions with clearly different cultures and climates like the Middle East have been understudied. In case major differences in the affecting factors are seen, the planners and strategists of countries similar to Iran are recommended to make use of the priorities set by this study and the like.

This study tries to explain the factors affecting short-term mobility decisions such as commute and non-work trips by employing a short survey which was conducted in 2013 in Kerman, Iran. The objective is to, firstly, define the factors for personal car, public transportation, bicycling, and walking separately. Secondly, it is aimed to compare the Iranian determinants with the outcomes of the similar western literature.The outcomes are suggested to act as potential generators of mobility behavior change and producers of modal shift through time.

2 DETERMINANTS AFFECTING TRAVEL MODE CHOICE

The determinants affecting modal choice can be divided into two main categories which are physical and personal/societal factors. The physical or environmental factors contain built environment including urban design and transport infrastructure, while the personal/household attributes, personal preferences, lifestyles, income, perceptions, social issues, etc. make up the influential personal/societal aspects. The recent studies have emphasized on the importance of subjective determinants of travel behavior such as life situation and lifestyle as well as environmental factors like urban form. The subjective determinants can include socio-economic and cultural specifications which can have direct or indirect impacts on transportation mode choice. The examples of such works have been conducted on German case studies (such as Scheiner & Holz-Rau, 2010). The weight given to physical issues in the related urban transportation planning literature has been obvious. An example is Zhao et al (2002) who divide the effective factors into five main categories, namely travel mode Level of Service (LOS), accessibility, land use/ urban design, transit users' socioeconomic/demographic characteristics, and finally characteristics of the trips. Only one of the five groups of parameters of this research has been allocated to personal/societal phenomena. Also as Racca and Ratledge (2004) note, the factors which have been frequently examined in the literature are mode travel time, mode costs, income, availability of personal vehicle, parking availability and costs, access to alternative modes, time of the day of transit service and service frequencies, population densities, land use traits, and transit service factors. As a part of physical attributes, urban land use factors such as mix of uses, density, neighborhood design, and job-housing balance have been considered as prominent attributes that determine transportation choices (for example: Holtzclaw et al. 2002; Cervero&Radisch, 1995; Kitamura et al. 1994; Plaut&Boarnet, 2003). A similar category of studies are those that consider the measurable factors related to travel attributes. These characteristics are often other than human-perceived qualities. For example a survey (Neel-Schaffer, 2011) done on Mobile County in Alabama shows that the residents of a typical American county find lack of physical facilities the most important barrier that prevents them from walking/biking. Travel distance/time has also been repeatedly considered as a deterrent to commute bicycle use, for example Antonakos (1994) concluded that trip length in bicycle commute trips is significantly shorter than that of recreational trips. Combinations of social/attitudinal and environmental determinants have also been

studied, such as a research on 7 Czech cities and their suburbs that focused on neighborhood type,accessibility to facilities, socio-economic factors, and individual preferences and lifestyles (Braun Kohlová, 2009)

AUTHOR	YEAR	COUNTRY OR STATE OF OBSERVATION	STUDY TYPE		MODE	STUDIED DETERMINATS
			SURVEY	RESEARCH		
Scheiner&Holz-Rau	2010	Germany		×	General	Socio-economic, Cultural specifications
Zhao et al	2002	USA		×	General	Level of Service, Accessibility, Land use, Urban design, Transit users, Socioeconomic, Demographic Characteristics, Characteristics of the trips
Racca and Ratledge	2004	USA		×	General	Mode travel time, Mode costs, Income, Availability of personal vehicle, Parking availability and costs, Access to alternative modes, Time of the day of transit service and service frequencies, Population densities, land use traits, Transit service factors
Holtzclaw et al.	2002	USA		×	General	Physical attributes, Urban land use factors, Density, Neighborhood design, job-housing balance
Cervero&Radisch	1995	USA		×	General	Physical attributes, Urban land use factors, Density, Neighborhood design, job-housing balance
Kitamura et al.	1994	USA		×	General	Physical attributes, Urban land use factors, Density, Neighborhood design, job-housing balance
Plaut&Boarnet	2003	USA		×	General	Physical attributes, Urban land use factors, Density, Neighborhood design, job-housing balance
Neel-Schaffer	2011	Alabama	×		Walking, Biking	Travel attributes
Antonakos	1994	USA	×		Bicycle	Travel attributes
Braun Kohlová	2009	Czech		×	General	Neighborhood type, Accessibility to facilities, Socio-economic factors, Individual preferences and lifestyles
Krizek	2000	Alabama		×	General	Socio-demographic and individual/household attributes
Scheiner& Kasper	2003	Germany		×	General	Socio-demographic and individual/household attributes
Scheiner	2005	Germany		×	General	Socio-demographic and individual/household attributes
Axhausen et al.	2006	USA		×	General	Socio-demographic and individual/household attributes
Scheiner&Holz-Rau	2013	Germany		×	General	Socio-demographic and individual/household attributes
Johansson et al.	2006	Sweden		×	General	Environmental preferences, Safety, Comfort, Convenience and flexibility
Vredin et al	2006	Sweden		×	General	Flexibility, Convenience, Comfort, Environment important
Steg and colleagues	2001	Netherlands		×	Car	Socio-demographic, Socioeconomic variables account
Bhat	1997	USA		×	Car	Personality traits and attributes, Household/individual socio-demographics
Garvill et al.	2003	Sweden		×	Car	Personality traits and attributes, Household/individual socio-demographics
Bhat&Sardesai,	2006	USA		×	Car	Personality traits and attributes, Household/individual socio-demographics
Creemers et al.	2012	Belgium		×	Light Rail	Socio-economics, Attitudinal factors and perceptions
Chatterjee	2011	England		×	Bus	Socio-economics, Attitudinal factors and perceptions
Murray et al.	2011	New Zealand		×	Public Transport	Socio-economics, Attitudinal factors and perceptions
Goldsmith	1992	USA		×	Walking, Bicycling	Traffic safety, Convenience, cost, Valuation of time, Valuation of exercise, Physical condition, Family circumstances, Habits, Attitudes and values, Peer group acceptance
The Gilmore Research Group	2007	USA	×		Walking, Bicycling	Attitudinal factors and perceptions
TDC	2007	Australia	×		Car	Perceptions
Holzer et al	2013	USA	×		Bus, Rail	Bus and rail travel choices

Tab. 1 Summarization of literature related to the determinants of mode choice

Nevertheless a number of other studies have examined the effects of socio-demographic and individual/household attributes. Such variables should be added to other self-selections and psychological decisions like the transportation choices related to residential location (Krizek, 2000; Scheiner& Kasper,

2003; Scheiner, 2005; Axhausen et al. 2006; Scheiner&Holz-Rau, 2013). A Swedish study has demonstrated the significance of individual preferences such as environmental preferences, safety, comfort, convenience and flexibility in determining travel modes (Johansson et al. 2006). Similarly Vredin et al (2006) find personal attitudes about flexibility, convenience, comfort, and environment important in defining modal choices. Steg and colleagues (2001) showed that socio-demographic and socioeconomic variables account for 21% of the car travels. Personality traits and attributes, household/individual socio-demographics as well as awareness of alternative transportation have particularly been focused in similar researches (Bhat, 1997; Garvill et al. 2003; Bhat&Sardesai, 2006). Socio-economics, attitudinal factors and perceptions have been found to be important in choosing light rail transit in Flanders, Belgium (Creemers et al. 2012), bus in England (Chatterjee, 2011), and public transport in New Zealand (Murray et al. 2011). An older study undertaken by U.S. Federal Highway Administration finds a couple of subjective parameters effective in decisions made for choosing walking and bicycling including traffic safety, convenience, cost, valuation of time, valuation of exercise, physical condition, family circumstances, habits, attitudes and values, and peer group acceptance (Goldsmith, 1992).

Personal reasons affecting walking/biking decisions seem to have an undeniable role in shaping modal split. A survey conducted on Washington State shows that people have chosen the following options as reasons for not walking: disability/other health impairment (39%), too busy (18%), don't want/don't enjoy it (5%), other (15%), and don't know (7%). The personal reasons for not biking are: don't know how to ride/no bicycle (45%), don't want to (12%), too busy (12%), no safe place to ride (6%), age (6%), prefer to walk/jog (4%), bad weather (4%), other (6%), and don't know (2%) (The Gilmore Research Group, 2007).

The first most influential factors are related to parking, car availability, and price. Speed and what people perceive about stress and joy as well as awareness about environment are the other causes of decisions. Every respondent provided more than one reason about their choice reasons. The report also shows that Sydney residents use personal car mostly because of its speed and also the problems and deficiencies of bus and trains systems. They also believe that car is a better mobility mode because it can take them near their destination any time they wish with more comfort (TDC, 2007 cited in Corpuz, 2008). A recent survey undertaken by Holzer et al (2013) from Central Houston Inc. on commute travels in downtown Houston shows that several factors define bus and rail travel choices, strongest of which are to avoid driving in traffic (81%) and saving gas (77%) (Holzer et al. 2013). The above studies are listed in Tab. 1.

3 METHODOLOGY

To partially represent Middle Eastern cities, Kerman is taken as observation area. As a part of a larger study, people in 4 neighborhoods of western Kerman were asked about their transportation choices and preferences. Situated in south east of Iran, the city of Kerman accommodates 527650 people in 11370.86 hectares (2013). The short survey contained 800 questionnaires where 200 were allocated to each neighborhood. The data collection covered 1.5 persons out of 1000 residents of Kerman. Bahonar, Amir Kabir, Motahari, and Pars were the four neighborhoods which accommodate 2722, 1845, 2663, and 3028 residents respectively (Fig. 1). The neighborhoods are selected in a way that the family conditions such as household size and income are near to that of the city averages.The population densities of the four neighborhoods are 80.05, 61.05, 76.08, and 94.62 persons per hectare respectively, which can be compared to the density of Kerman city which is 40 persons per hectare.

Like many cities of the Middle East, the city of Kerman has hot-arid climate which possibly lays affect urban mobility-concerned personal decisions. In 2011 Kerman had a population of 534441 people which is comparableto cities like Ad-Dammam, Saudi Arabia (744.321- 2004), Zahedan, Iran (534.773- 2003), Imbaba, Egypt (523.265, 1996), At-Ta'if, Saudi Arabia (521.273- 2004), Amarah, Iraq (511542- 2012), Ramadi, Iraq (483.209- 2004), and Al Mahallah al Kubra, Egypt (535,278- 2012). 51.4% of Kermanis are and

48.6% are female, while this figure is 50.4 to 49.6 for Iran. In Kerman the average age is about 28, while this figure for Iran and the Middle East are 29.86 and 25.3.

The average monthly income is 11500000 Rial in Kerman which is less than the Iranian average of 13690000 Rial. The daily mean July temperature of Kerman is 28.4 degrees Celsius which is comparable to 28.3 in Cairo, 27.2 in Beirut, 34.3 in Basra, and 29.4 in Tehran. Majority of the residents of Kerman are Muslim such as most of Iranians (99.4%) and Middle Eastern people (95%). In general, the socio-cultural conditions give the case-study area possibility to represent considerable parts of Iran and the Middle East.

The questions concerning decisions for or against non-motorized transportation and public transit were asked in face-to-face interviews in autumn 2013.

Apart from the individual and household attributes, the interviewers asked the respondents about the main reasons and factors behind their transport mode choices. 5 questions were asked to clarify these decisions, including (1) the main reason for personal car use in commute trips, (2) the main reason for commute and non-commute public transportation use, (3) the main factor against public transportation use, (4) the main factor against bicycling as a mode for non-commute trips, and (5) the main factor against walking as a mode for non-commute trips.

Each interviewee was asked to choose one of the options or add a new option. The logic behind choosing one option is that the study sought to find the main motive for selecting or rejecting each transport mode. During the survey it happened that the respondents did not find any relations between the options and their motives and suggested to add new options. The survey was conducted during day time of October and November of 2013.

Among the limitations of this study lie difficulties of doing surveys by mail, email, and telephone in Iran. The mentioned survey techniques are seldom done. People know little about mail surveys and there is little trust to telephone data collections. As a result face-to-face interview was employed as the surveying technique although it might have bias to some extent.

To answer the question about car use, the respondents chose from a variety of options such as price, convenience, safety/security, speed, accessibility, and personal interest. The 11 factors that may influence on public transportation decisions are price, speed, safety/security, personal interest, price of car fuel, unavailability of car, and awareness and interest to improve public transport use culture (awareness of public transportation), convenience of use, distance to stations, accessibility, and social issues. 4 dissuading phenomena such as social problems and security, facilities and routes, price, and personal interest were triggered in question 4. Finally, trip length, environment and routes, safety/security, social problems, and personal interest were asked about as deterrents to walking trips.

Social problems that are discussed in this study refer to the general look of residents or social attitudes that limit others' transport choices. Cultural habits and religious beliefs may restrict some transportation behaviors. For example, bicycling by women can be strange in some sub-cultures, which may cause women not to bike at all. Another example is perception about lack of security which affects walking at night, particularly for women. Also what people perceive about wealth or social class can push other people to use more personal cars. Convenience is a crucial word that needs definition.

Independence of time, reliability and comfort are the main qualities that a convenient transportation mode offers according to Noland and Kunreuther (1995). This study takes this definition to make usage of "convenience" clear. The most important convenience-related element that car use provides is door-to-door mobility that attracts many people (Huey & Everett, 1996).

In addition, what people called "convenient" was a mode that had less waiting time. Also people are asked about two indicators of availability of public transportation; one is accessibility to public transportation, which refers to the distances from the houses to the public transport lines and stations, and the second is distance between PT lines (buses).

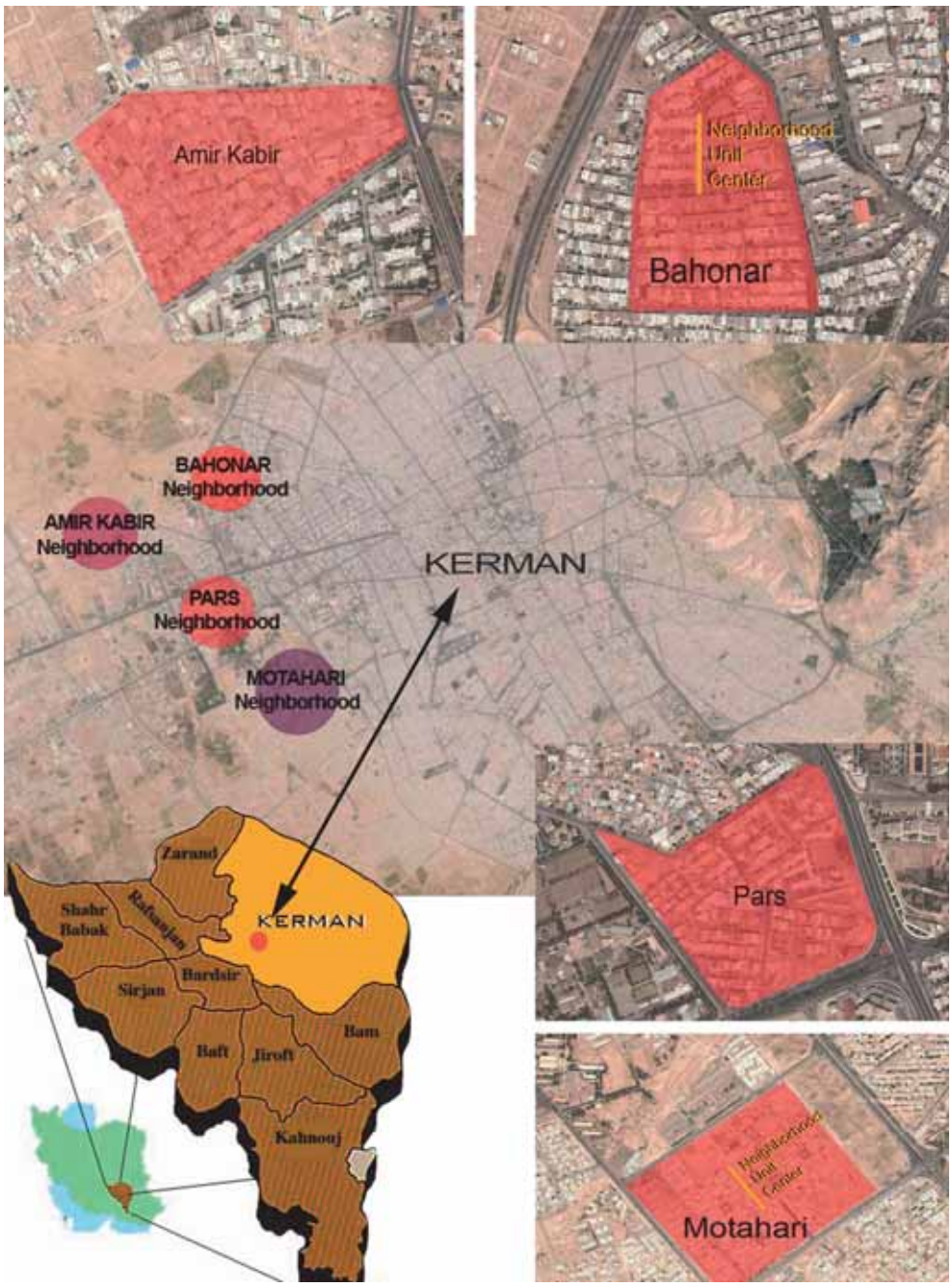

Fig. 1 Location of the case-study areas

The questions are designed to give and understanding of socio-cultural factors versus built environment characteristics. The outcomes are presented in both neighborhood and city levels.

The dissimilarities in case of walking and bicycling are also triggered. The interviewees were taken in a random confrontation in the streets of the target areas in a way that the questions were asked from an equal share of women and men.

Table 4 indicates the demographic and individual specifications of the respondents in general.

	AVERAGE	FREQUENCY	SHARE
1.Gender			
Male		416	52%
Female		384	48%
2.Age	30.75		
3.Daily Activity			
Work		376	47%
Study		368	46%
Housekeeper		56	7%
4.Car Ownership			
Owning Driving License		643	80.40%
Individual Car Ownership		387	48.40%
Household Car Ownership	1.6		
Household Size	4.2		
5.Household Income			
No income		0	0%
Less than 7,000,000 Rial*		44	5.50%
7,000,000 - 13,000,000 Rial		180	22.50%
13,000,000 – 20,000,000 Rial		236	29.50%
20,000,000 – 30,000,000 Rial		243	30.40%
More than 30,000,000 Rial		97	12.10%

*Rial is the official currency of Iran. One US Dollar equaled 28000 Rial at the time of survey.

Tab. 2 Individual and demographic specifications of the sample

In order to find associations between the collected data with the socio-economic characteristics of the study area, four variables including gender, household size, age, and household car ownership with the results of the five mode choice–related questions are statistically tested. Since all the variables are categorical, Pearson chi-square test is taken. Significance is tested via a level of confidence is 95%.

The null hypothesis is that the compared socio-demographic groups do not differ from one another based on their main reason of choosing transportation modes. The null hypotheses are rejected in case p-values are less than 0.05.

The four socio-demographic variables are categorized into different groups so that categorical variables are resulted. Gender is a categorical variable by itself, while household size is divided to "alone & small family" that stands for families 3 and less members. "Mid-sized family" has 4 or 5 members, and "large family" consists of 6 or more members.

Age is categorized to three groups, including "young" with 29 year of age or less, "middle age" referring to people between 30 and 49 years, and "old" that stands for residents with 50 years or more. Household car ownership is divided into 3 categories consisting availability of "0", "1", "2", and "3 or more" car(s) per household.

4 FINDINGS

The observation results are divided into two parts of descriptive analysis of the frequencies of responses in the study areas and statistical analysis of the output raw data.

4.1 DESCRIPTIVE ANALYSIS

During the past decades the car use rate has jumped in the same time that the urban population increased after 1960s and 1970s. This study gives a raw answer based on the end users' opinions. The most prominent is convenience of car use compared to other modes. As seen in Fig. 2, 37.9 percent of the interviewees use personal cars because they find it more comfortable, albeit the residents of case study neighborhoods have different perceptions about the importance of this option. 27 percent of the residents of "Pars" have chosen "convenience" as the most important motif for car driving, while this figure is 53.8 percent in "Bahonar", which is extremely high. "Convenience" been selected far more than "it is faster" with 19 percent, "high safety and security" with 17.3 percent, and "it is cheaper" with 14.5 percent. Individual interest to driving and price are marginal factors.

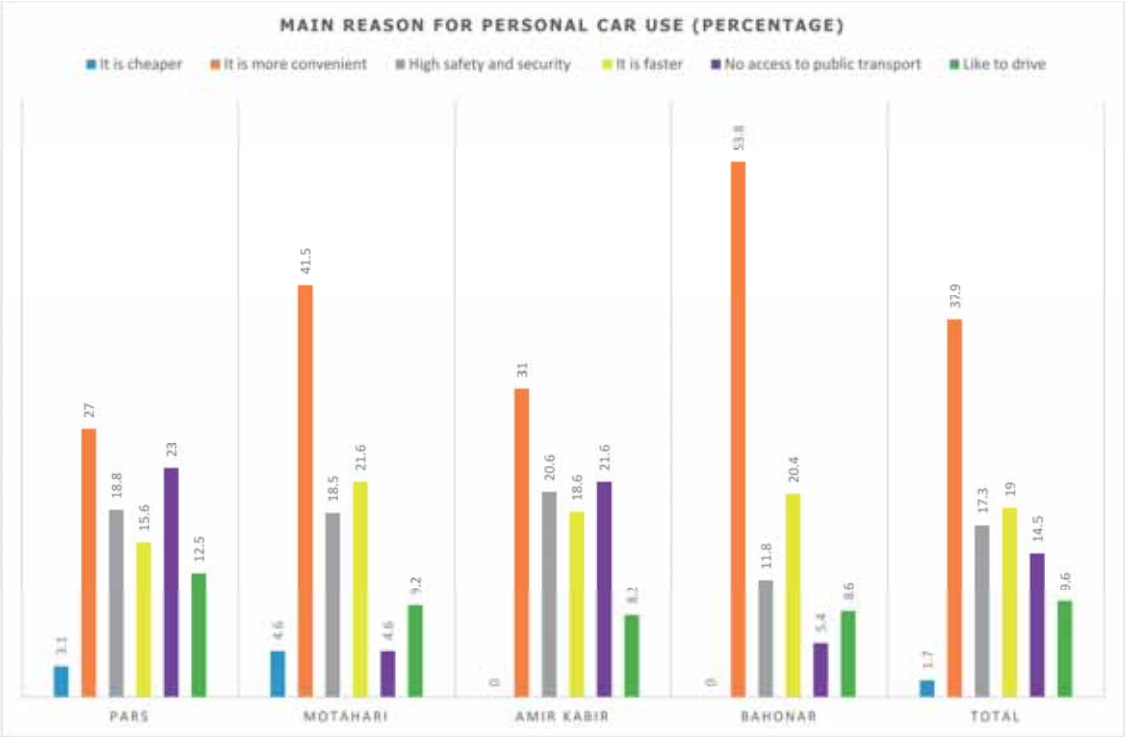

Fig. 2 Main reason for personal car use in studied areas

Fig. 3 indicates undeniable dominance of financial motives for using public transportation. The option "it is cheaper" makes 33.8 percent of the whole responses ranging from 20.4 percent in Amir Kabir and 44.6 percent in Bahonar. "Safety and security" is the second reason for public transport use, which encourages 23.7 percent of the interviewees. 12 percent of the people use public transportation not because of its capabilities but because personal vehicle is not available to them. The only declared reason that is directly related to public transportation specification is "it is faster" that can motivate as few as 10.8 percent.

Question 3 reveals intriguing information about the role of convenience in encouraging people to use public transit. According to Fig. 4, less than half of Kermani residents declare that they do not use bus and taxis, which are the main public transport means, only because of lack of convenience. This amount (48.15

percent) is more or less seen in all four neighborhoods with little deviation ranging from 41.3 to 50.7 percent.

This finding completes the result of Question 2 which already showed that more than one third of respondents use automobiles because they believe it is more convenient than public transportation. In fact 60 persons have declared that car is more convenient and public transport is not. This makes 45% of those who find personal car easier to use and 38% of those who believe using public transport is not easy.

The second and third deterrents to public transportation use are related to accessibility. "Long distance between the stations" and "no or little access to public transport" cause a sum of 41.3 percent not to use buses and taxis. The importance of social problems is less than physical variables (less than ten percent). The individual/socioeconomic issues play a major role in defining the bike trip characteristics in Kerman according to the outcomes of Question 4 which is illustrated in Fig. 5. More than one third (35.8 percent) of the respondents do not have any special interest in using bike for non-commute travels and 32 percent find social problems such as other people look and opinions a barrier to their bike use.

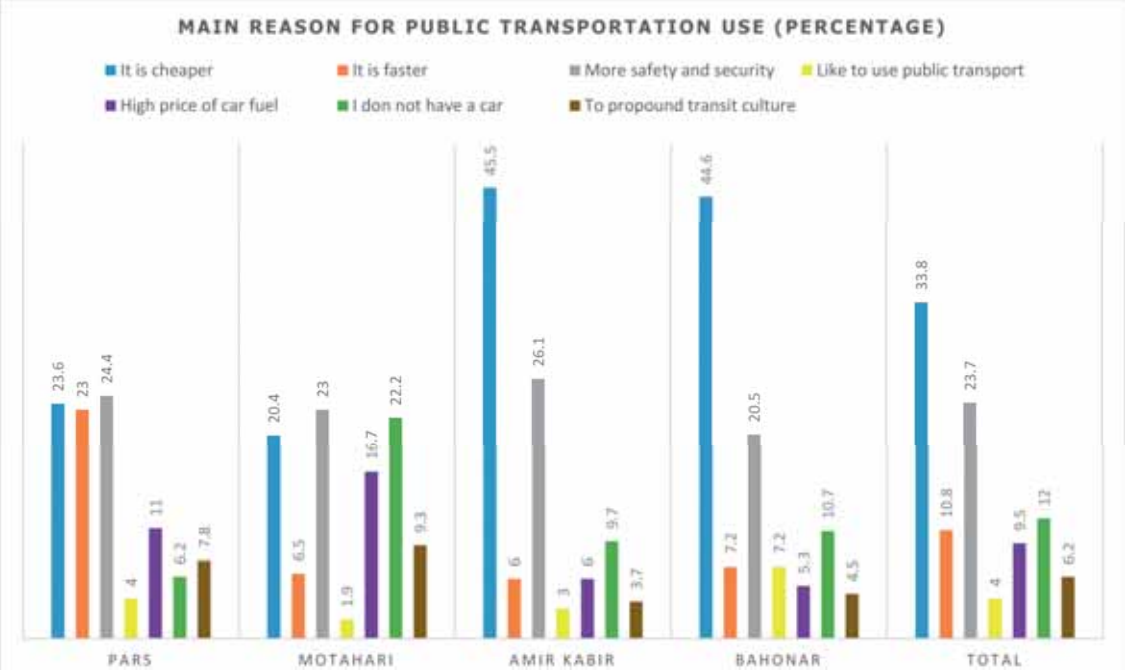

Fig. 3 Main reason for public transit use in studied areas

The responses for these two options are almost equal in the four areas. Lack of facilities and infrastructure as well as financial problems play a minor role in limiting bike use. "Lack of facilities or routes" has been chosen less in the two neighborhoods that have a central urban structure including a neighborhood center with shops within a short distance of the houses. It does not appear that bike use is an obstacle for the residents. Unlike biking, pedestrian trips are limited by a combination of physical and personal factors, while social issues are less effective. As seen in Fig. 6. 25.7 percent have said that "far-away destinations from the house" dissuades them from walking. 24 percent do not show any interest to walking; and again 22.3 percent prefer to walk in more suitable environments. "Lack of safety and security" and "social problems" have little influence on walking activity in the study areas.

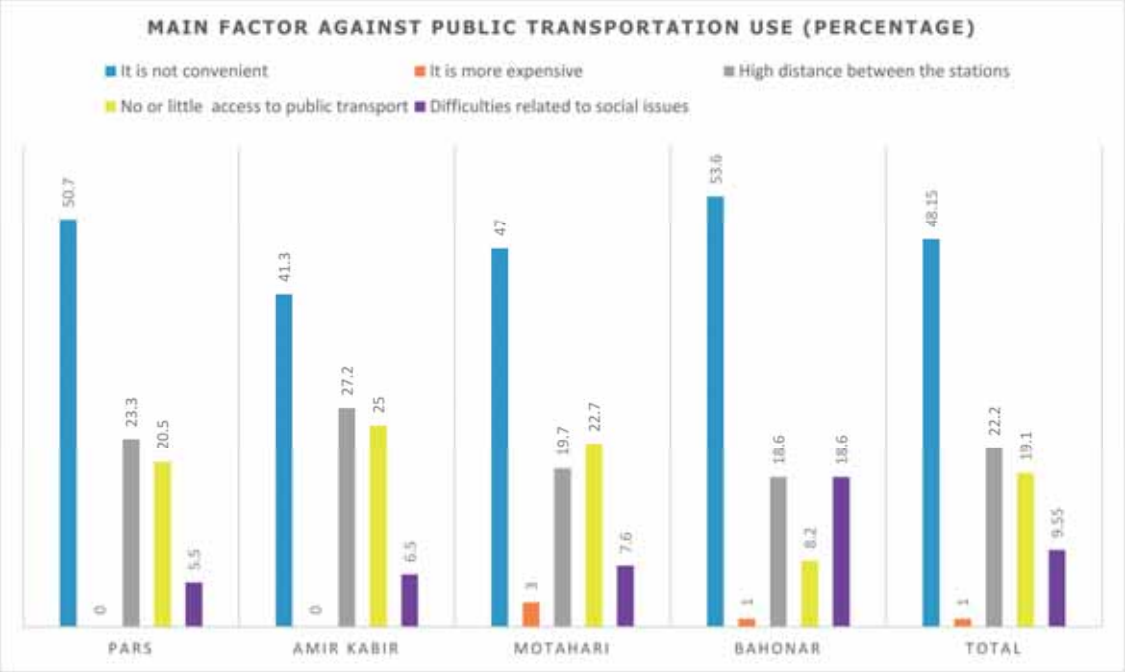

Fig. 4 Main factor against public transit use in studied areas

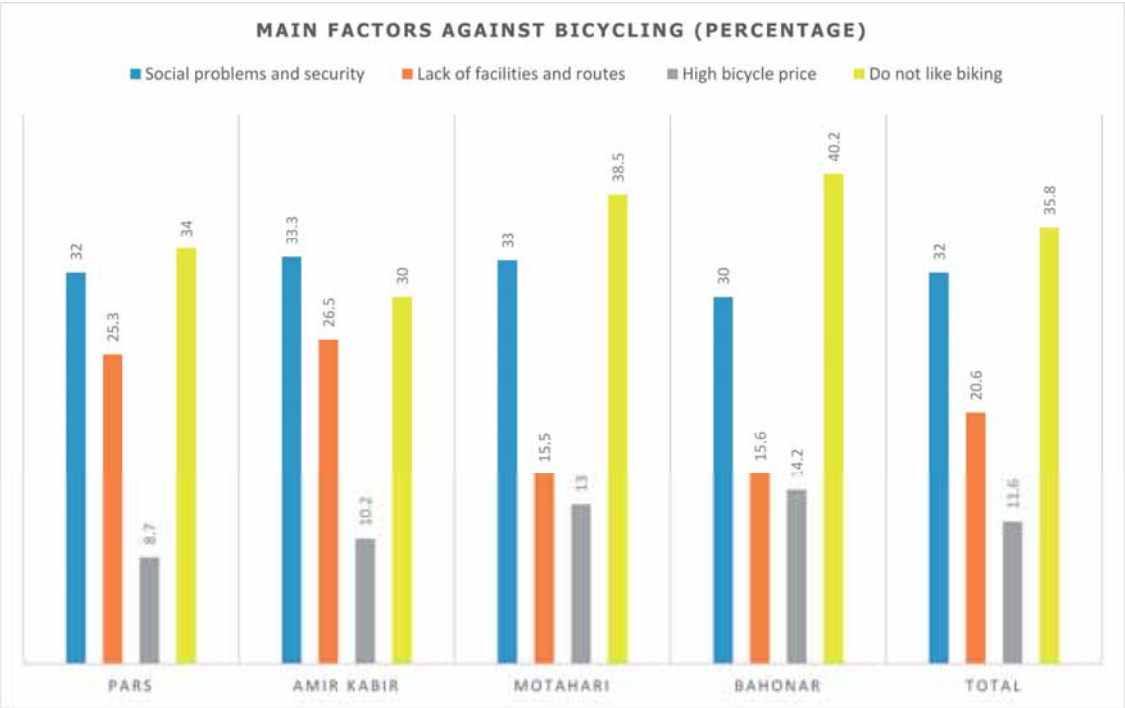

Fig. 5 Main factor against bicycling in studied areas

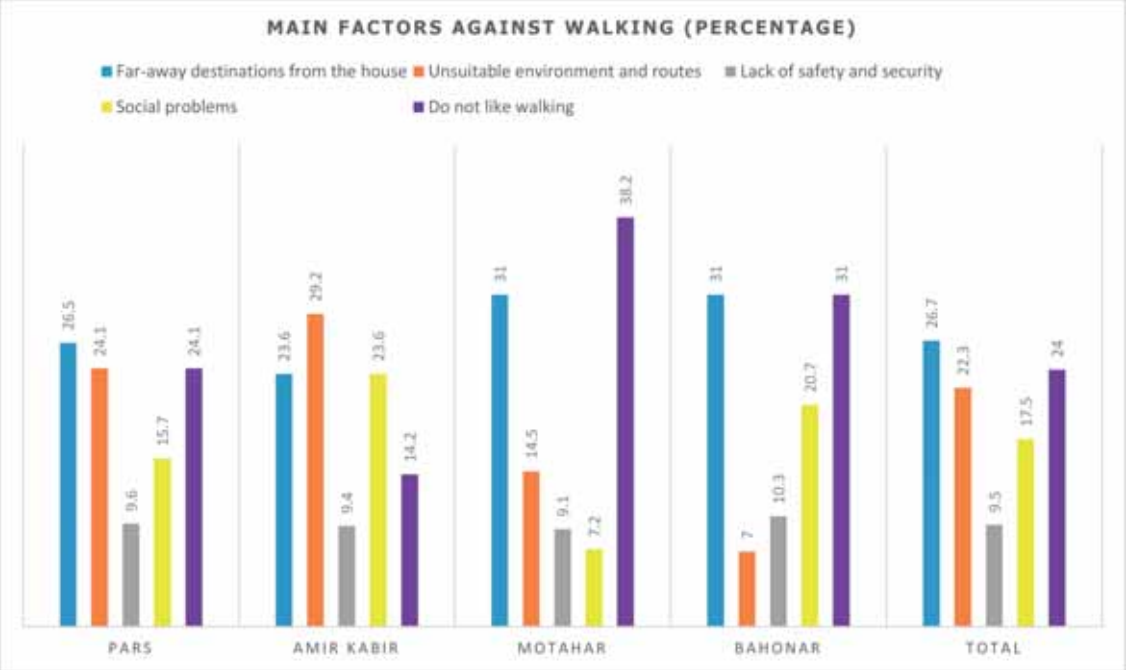

Fig. 6 Main factor against walking in studied areas

4.2 STATISTICAL ANALYSIS

The results of the chi-square association test are shown in Tab.3. According to the analysis, car use is significantly associated with all four socio-demographic explanatory variables (gender, household size, age, and household car ownership). The detailed results including frequencies related to all categories, standardized residuals, and p-values are illustrated in Tab. 4 to 8.

Personal car use: All the four socio-demographic variables very significantly explain reasons for car use (Tab. 3). The reasons given by males and females are meaningfully different. Safety and security is significantly more important for women compared to men, while men use personal car because they find it more convenient, faster, and cheaper. Household size has also significant influences.

Low price of driving has been only stated as a reason by small families. Mid-sized families drive car because it is more safe-secure and faster, or they like driving, or they have little access to public transport (Tab. 4).

Public transport use: All of the four socio-demographic variables significantly affect decisions for or against public transport use. The exception is the role household car ownership in discouraging people from public transport use (Tab. 3). In other words, to own a car necessarily does not discourage people to use public transport. Males use public transport because of its low cost or the high price of car fuel, while women do it for not having a car, personal interest, speed, and safety/security.

Again here we see than the role of safety/security concerns is much more effective for women than men. Mid-sized families (4 and 5 members) have chosen options related to public transport use. Residents of 29 years of age or less use public transport by far more than others because of its lower price and higher safety and security. The other reasons for PT use are not having a car, high speed, promotion of PT culture, and personal interest.

		Gender			Hosehold Size			Age			Household Car Ownership		
MAIN REASON FOR CAR USE		Value	df	Asymp. Sig.	Value	df	Asymp. Sig.	Value	df	Asymp. Sig.	Value	df	Asymp. Sig.
	Pearson Chi-Square	28,851	6	<,0001	38,936	12	<,0001	148,153	12	<,0001	36,572	18	,006
	Likelihood Ratio	31,518	6	<,0001	41,921	12	<,0001	159,451	12	<,0001	44,171	18	,001
	N of Valid Cases	352			352			352			352		
MAIN REASON FOR PUBLIC TRANSIT USE	Pearson Chi-Square	18,215	7	,011	32,254	14	,004	109,178	14	<,0001	36,427	21	,020
	Likelihood Ratio	18,325	7	,011	32,162	14	,004	113,541	14	<,0001	39,295	21	,009
	N of Valid Cases	473			473			473			473		
MAIN FACTOR AGAINST PUBLIC TRANSIT USE	Pearson Chi-Square	27,363	5	<,0001	25,093	10	,005	115,235	10	<,0001	13,874	15	,535
	Likelihood Ratio	29,355	5	<,0001	25,524	10	,004	112,653	10	<,0001	16,176	15	,370
	N of Valid Cases	328			328			328			328		
MAIN FACTOR AGAINST BICYCLE USE	Pearson Chi-Square	156,086	4	<,0001	18,149	8	,020	39,767	8	<,0001	29,830	12	,003
	Likelihood Ratio	168,534	4	<,0001	16,686	8	,034	39,610	8	<,0001	31,666	12	,002
	N of Valid Cases	586			586			586			586		
MAIN FACTOR AGAINST WALKING	Pearson Chi-Square	65,429	5	<,0001	10,803	10	,373	29,566	10	,001	12,104	15	,671
	Likelihood Ratio	70,925	5	<,0001	10,899	10	,365	30,481	10	,001	13,726	15	,546
	N of Valid Cases	284			284			284			284		

Tab.3 Chi-Square Test Results

HOUSEHOLD CAR OWNERSHIP	Total	61		51		34		67		133		6		352
	3 & more	6	-0,8	9	0,8	4	-0,3	10	0,3	23	1,2	0	-0,9	52
	2	22	0,3	18	0,2	18	1,9	31	1,7	50	0,7	0	-1,4	139
	1	33	0,4	23	-0,5	12	-1,2	26	-1,3	60	-0,9	6	1,7	160
	0	0	-1,2	1	-0,1	0	-0,9	0	-1,2	0	-1,7	0	-0,4	1
AGE	Total	61		51		34		67		133		6		352
	Old	4	-0,2	2	-0,9	0	-1,6	9	1,8	16	2	0	-0,7	31
	Middle Age	37	2,3	47	5,6	23	2,4	41	2,5	60	0,7	4	1	212
	Young	20	-2	2	-4,7	11	-1,5	17	-3	57	-1,4	2	-0,6	109
HOUSEHOLD SIZE	Total	61		51		34		67		133		6		352
	Large Family	7	-0,3	1	-2,2	1	-1,6	5	-1,2	14	-0,8	0	-0,9	28
	Mid-Sized Family	35	-0,3	39	1,5	24	0,8	44	0,6	74	-0,6	0	-1,9	226
	Small Family	19	0,6	11	-0,8	9	-0,1	18	-0,1	45	1,5	6	3,4	108
GENDER	Total	61		51		34		67		133		6		352
	Male	25	-1,2	29	0,5	17	-0,2	40	0,9	90	2,5	6	1,6	207
	Female	36	1,2	22	-0,5	17	0,2	27	-0,9	43	-2,6	0	-1,7	145
PROCAR		Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count
		Safty & Security		No Access To PT		Like To Drive		Faster		More Convenient		Cheaper		Total

Tab.4 Main reason for car use

Fuel price is a concern for mid-aged groups. Those who have a car are more likely to use PT than other car ownership groups. Men do not use public transport because they do not find it convenient, or there is little accessibility, or the distance between stations are long, while women do not use it because it is expensive or they have some social concerns (Tab.5 and 6).

Bicycling: All of the four socio-demographic variables significantly affect decisions concerning biking (Tab.3). The effects of lack of social security targets females and discourage them from biking. Men do not bike because of lack of bike facilities, its high price, or lack of interest. Young people may not bike because of social problems, high bike price, or personal interest (Tab. 7).

HOUSEHOLD CAR OWNERSHIP	Total	165		60		52		45		30		19		102		473
	3 & more	25	0,6	5	-1,1	6	-0,4	5	-0,4	5	0,5	1	-1	10	-1	57
	2	42	-1,9	15	-1,2	21	0,8	20	1,2	10	-0,1	7	0,2	32	-0,4	147
	1	90	0,7	36	1	23	-0,6	20	-0,6	15	0	11	0,5	57	0,8	252
	0	8	2,2	4	2,3	2	0,8	0	-1	0	-0,8	0	-0,7	3	0,5	17
AGE	Total	165		60		52		45		30		19		102		473
	Old	8	-1,2	2	-1,2	5	0,6	3	-0,2	3	0,5	2	0,5	3	-1,6	26
	Middle Age	32	-4,4	20	-1	19	-0,5	26	1,7	8	-1,3	6	-0,7	32	-1,6	143
	Young	125	4,4	38	1,3	28	0,3	16	-1,5	19	0,9	11	0,4	67	2	304
HOUSEHOLD SIZE	Total	165		60		52		45		30		19		102		473
	Large Family	36	3,2	9	0,5	7	0,1	3	-1,2	2	-0,9	2	-0,3	18	1,3	78
	Mid-Sized Family	99	0	33	-0,5	32	0,2	26	-0,2	21	0,7	10	-0,4	61	0	282
	Small Family	30	-2,2	18	0,4	13	-0,3	16	1,1	7	-0,4	7	0,8	23	-0,9	114
GENDER	Total	165		60		52		45		30		19		102		473
	Male	84	-0,2	28	-0,6	24	-0,6	27	0,7	15	-0,2	8	-0,6	38	-2,1	416
	Female	81	0,2	32	0,6	28	0,6	18	-0,8	15	0,2	11	0,6	64	2,1	384
PROPULIC		Count	Std. Residual	Count	Std. Residual	Count	Std. Residual	Count	Std. Residual	Count	Std. Residual	Count	Std. Residual	Count	Std. Residual	Count
		Cheaper		Don't Have Car		Faster		High Fuel Price		Propound Transit Culture		Liket to Use PT		Safty & Security		Total

Tab.5 Main reason for public transport use

Walking: Only age and gender affect walking activity, while household size and household car ownership stay neutral (Tab. 2). Men do not walk because of unsuitable urban environment, far away destinations, and personal interest, while women's problems is social problems and lack of security. Mid-aged residents concern against walking is social problems and lack of security. Younger generation do not walk because of personal interests (Tab. 8).

HOUSEHOLD CAR OWNERSHIP	Total	158		61		73		3		33		328
	3 & more	24	0,6	4	-1,5	10	0,1	1	0,9	5	0,3	44
	2	55	0,2	27	1,4	29	0,9	1	0	12	0,2	124
	1	78	-0,2	29	-0,3	34	-0,5	1	-0,4	15	-0,4	157
	0	1	-1,4	1	-0,3	0	-1,3	0	-0,3	1	0,3	3
AGE	Total	158		61		73		3		33		328
	Old	21	2,7	1	-1,6	8	1,1	0	-0,5	8	3,6	38
	Middle Age	75	1,2	45	3,9	47	3,1	2	0,7	17	0,9	186
	Young	62	-2,1	15	-2,9	18	-3,2	1	-0,4	8	-2,2	104
HOUSEHOLD SIZE	Total	158		61		73		3		33		328
	Large Family	14	-1,4	5	-1	5	-1,4	0	-0,6	2	-1,1	26
	Mid-Sized Family	87	-0,8	36	-0,1	52	1,3	2	0,2	17	-0,6	194
	Small Family	57	2,1	20	0,8	16	-0,9	1	0,2	14	1,7	108
GENDER	Total	158		61		73		3		33		328
	Male	91	1	44	2,2	41	0.5	0	-1,2	8	-2,2	184
	Female	67	-1	17	-2,3	32	-0,5	3	1,3	25	2,3	144
CONPUBLIC		Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count
		Not Convenient		Not Access To Pt		High Distance Between Stations		More Expensive		Difficulties Of Social Issues		Total

Tab. 6 Main factor against public transit use

HOUSEHOLD CAR OWNERSHIP	Total	190		121		68		207		586
	3 & more	19	-1,3	14	-0,5	9	0	24	-0,7	66
	2	60	-0,5	51	1,6	20	-0,6	57	-1,6	188
	1	103	0,7	56	-0,7	38	0,6	120	1,5	317
	0	8	1,8	0	-1,7	1	-0,4	6	0,6	15
AGE	Total	190		121		68		207		586
	Old	9	-1,3	11	0,7	1	-1,8	29	3,5	50
	Middle Age	83	0,5	59	1,3	16	-2,3	75	-1,2	330
	Young	98	0,1	51	-1,4	51	2,7	103	-0,3	303
HOUSEHOLD SIZE	Total	190		121		68		207		586
	Large Family	18	-1,3	13	-0,7	17	2,8	28	0,3	76
	Mid-Sized Family	115	0,1	66	-0,8	32	-1,4	131	0,6	344
	Small Family	57	0,7	42	1,6	19	0,1	48	-1,1	166
GENDER	Total	190		121		68		207		586
	Male	27	-7,2	81	2,3	53	3,0	113	0,5	274
	Female	163	7,5	40	-2,4	15	-3,1	94	-0,5	312
CONBIKING		Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count
		Social Problems & Security		Lack Of Facilities & Routes		High Price Of Bicycle		Don't Like To Biking		Total

Tab.7 Main factor against bicycle use

HOUSEHOLD CAR OWNERSHIP	Total	62		48		25		74		75		284
	3 & more	9	0,2	2	-1,7	4	0,4	8	-0,6	14	1,3	37
	2	20	-0,2	14	-0,6	5	-1,2	28	0,6	23	-0,5	90
	1	32	0,1	31	1,4	16	0,9	36	-0,2	37	-0,1	152
	0	1	-0,3	1	-0,1	0	-0,8	2	0,3	1	-0,5	5
AGE	Total	62		48		25		74		75		284
	Old	3	-0,7	3	-0,3	3	0,9	2	-1,5	3	-1,1	14
	Middle Age	30	0,9	30	2,3	14	1,1	36	1	20	-2	130
	Young	29	-0,5	15	-1,9	8	-1,3	36	-0,3	52	2,2	140
HOUSEHOLD SIZE	Total	62		48		25		74		75		284
	Large Family	6	-0,7	3	-1,3	3	-0,1	9	-0,2	10	0,1	31
	Mid-Sized Family	32	-0,8	29	0	14	-0,3	41	-0,5	43	-0,3	159
	Small Family	24	1,7	16	0,8	8	0,5	24	0,9	22	0,3	94
GENDER	Total	62		48		25		74		75		284
	Male	43	1,9	5	-4	10	-0,8	49	1,7	56	2,7	163
	Female	19	-2	43	4,2	15	0,9	25	-1,8	19	-2,8	131
CONWALKING		Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count	Std.Residual	Count
		Unsuitable Environment & Routes		Social Problems		Lack Of Saftey & Security		Far Destinations From House		Don't Like To Walk		Total

Tab.8 main factor against walking.

5 DISCUSSION

The findings of this research gives an understanding of how the Iranian and other Middle Eastern decision makers and planners can stimulate sustainable transportation and change the arrangement of modal split. Also the dissimilarities of the determinants of mobility choices in Iran are compared with the findings of other countries, majority of which come from western countries.

5.1 MODAL SHIFT FROM PERSONAL CAR TO PUBLIC AND NON-MOTORIZED TRANSPORT MODES

It would be useful to consider the survey results of personal car and public transport together. There is a coincidence between reasons behind car use and the deterrents to public transportation use. This common point is convenience. A considerable number of people drive car because it is more convenient than other modes, while almost half of them fled buses and taxis because of their inconvenience. This provides with an opportunity for a modal shift from car to public transport especially traditional buses that offer little comfort. With keeping constant the public transit fares and enhancing consumer quality, it would be possible to attract car drivers particularly when accessibility to public transport systems is promoted. That becomes visible when we take into account that one third of people withdraw from public transit only because of lack of accessibility. People tend to use buses because of its low fares, safety and security. When convenience and accessibility to public transit systems is increased, adding a push factor of increasing costs of car use can be a kick off. During the past 7 years car fuel has been increased dramatically. The authorities claimed that this will lead to less car use. Nevertheless very little (if not zero) impact were observed, because the push was added to the system without any pull factor such as convenience/comfort.

Here, taking stand-alone policies and neglecting diversity has led to such a failure. It is believed that multi-dimensional public policies covering a wide range of consumers can lead to better results in changing mobility behaviors. Different socio-demographic groups may have dissimilar behaviors. Therefore these differences should be accounted for in defining policies and targeting desirable changes. Section 5.3 gives more related details in case of the city of Kerman. Also it is noteworthy that the capabilities of public policies are only "potential" and unobserved and hidden factors can always have unwanted effects on the results.

The most powerful deterrents to biking (at least in Middle Eastern cities exemplified by Kerman) are individual and social concerns. 67.8 percent of the respondents do not bike because of lifestyles and perceptions.

For shifting from car use to biking, the most necessary plan for the future of the country or the whole Middle East can be increasing awareness about bike use as a transportation mode. Informative TV/radio programs and newspaper articles would have an essential role in persuading people to bike as an economic transport mode. Of course in warmer areas, hot climate can be a limiting factor, which should be thought of.

Although there are studies about overcoming cold climate with the purpose of easing commute biking (like Spencer et al. 2013), but in case of warm-arid weather, there is a long road to analyze the problem and identify the solutions. Attractive and accessible destinations together with nearby local centers and jobs can also help to change the perceptions and lifestyles that oppose biking.

Environmental solutions stand in the second place for promoting bicycling in Iran. Bike lanes and routes can attract one fifth of people to bike as commute or non-commute travel mode. Tracks and lanes are not yet developed in Kerman, so making use of the experiences in bike-sharing systems in eastern Tehran can be a strategic move in bicycle planning of mid-large cities such as Kerman.

Unlike bicycle, the largest obstacles against walking are physical and environmental. Lack of accessibility to destinations, leisure, and employment as well as unsuitable environment and routes prevent approximately half of people from walking. The second group of phenomena is social concerns and human perceptions about safety and security that can encourage one third of city dwellers. Anyhow, the personal perceptions

play an effective role in defining the characteristics of slow travels including walking and biking. One person out of four is not willing to walk, while this figure is more than 35 percent for biking.

5.2 DISSIMILARITIES BETWEEN MODE CHOICE DETERMINANTS IN IRAN AND WESTERN COUNTRIES

The findings of this study strongly agree with the western literature that emphasize on the importance of the socio-economic traits and personal perceptions (such as Goldsmith, 1992; Steg et al. 2001; Johansson et al. 2006; The Gilmore Research Group, 2007). The observation results are not in line with a large body of North American studies that find built environment characteristics more important than self-selections and personal preferences (for example: Bhat & Guo, 2007).

However two important points must not be neglected. Firstly, the balance of socio-economic and built environment factors are different in defining the decisions of different modes. This difference catches eye in walking and biking. While social deterrents are very strong in discouraging people especially women from biking, the main obstacles of walking are more physical rather than subjective. It seems that what other people think matters to others, and this impact is shown in their modal decisions about bicycling.

The solutions to overcome this barrier needs more in-depth studies. On the other side, the large share of responses regarding the strong role of lack of physical facilities and accessibility in weakening walking activities provides the opportunity for local governments and planning organizations to change the modal split in a shorter time. The above is based on the belief that providing physical amenities such as facilitated walkways, suitable lighting, designing neighborhood centers, shortening the walking distances, and as a result making walking easier and more pleasant needs less time and energy than changing the socio-economic and cultural attributes of a Middle Eastern society.

The size and scale of the necessary changes in case of physical facilities that can be done in the neighborhood scale versus the nation-wide social and economic conditions make infrastructural improvements easier for municipalities and planners to shift the modal split to more sustainable ways of transport.

Secondly, although the socio-economic factors are obviously more effective in the Iranian society, but the physical infrastructure and urban form including accessibility are also influential, although this effect is weaker particularly in the neighborhood scale. The importance of physical facilities is more in case of walking, according to the findings of this study.

5.3 MODAL SHIFT POLICIES TARGETING CONSUMER GROUPS

The findings of this study may be employed by policy makers to focus on transport mode shift of special groups. Tab. 9.

This summary shows which group of people are more likely to be affected by changes that originate from policies. The cells related to non-significant association have been left blank.

According to this table, change in safety and security of transport systems and urban environment will affect modal decisions of young and middle-aged women who come from mi-sized families and have a car. This influence will happen about all four modes investigated.

If availability of public transport is increased, mid-aged men coming from 4-5-member families will be encouraged to use PT more than others. If promotional programs and advertisements can be successfully implemented to encourage people to walk more, the largest group of people who are capable of changing behavior are young males who come from mid-sized families and have one car. Policies that can potentially limit car speed will trigger middle-aged males of mid-sized families with 1 or 2 cars.

		GENDER	HOSEHOLD SIZE	AGE	HOUSEHOLD CAR OWNERSHIP
PROCAR	Change in safety & security	Female	Mid-sized family	Middle age	1
	Change in access to public transport	Male	Mid-sized family	Middle age	1
	Change in personal interest to driving	_	Mid-sized family	Middle age	1 or 2
	Change in speed	Male	Mid-sized family	Middle age	1 or 2
	Change in convenience	Male	Mid-sized family	Middle age	1 or 2
	Change in price	Male	Small family	Middle age	1
PROPUBLIC	Change in safety and security	Female	Mid-sized family	Young	1
	Change in car ownership rate	Female	Mid-sized family	Young	1
	Change in personal interest to PT	Female	Mid-sized family	Young	1
	Change in speed	Female	Mid-sized family	Young	1
	Change in PT culture awareness	_	Mid-sized family	Young	1
	Change in fuel price	Male	Mid-sized family	Middle age	1 or 2
	Change in PT use price (tickets)	_	Mid-sized family	Young	1
CONPUBLIC	Change in convenient	Male	Mid-sized family	Middle age	_
	Change in access to PT	Male	Mid-sized family	Middle age	_
	Change in distance between stations	Male	Mid-sized family	Middle age	_
	Change in price	Female	Mid-sized family	Middle age	_
	Change in social issues difficulties	Female	Mid-sized family	Middle age	_
CONBIKING	Change in social problems & security	Female	Mid-sized family	Young	1
	Change in biking facilities	Male	Mid-sized family	Middle age & Young	1 or 2
	Change in fuel price	Male	Mid-sized family	Young	1
	Change in personal interest to biking	Male	Mid-sized family	Young	1
CONWALKING	Change in suitability of urban environment	Male	_	Middle age & Young	_
	Change in social problems	Female	_	Middle age	_
	Change in safety& security	Female	_	Middle age	_
	Change in distances to destinations (walkability)	Male	_	Middle age & Young	_
	Change in personal interest to walking	Male	_	Young	_

Tab.9 The most likely socio-demographic group affected by change in decision motives

A point discussed in previous sections is that public policies will be more effective when they include a diversity of approaches. An example is that promoting high quality built environment with walkable, safe, and secure quarters can persuade two groups of people to walk: young and middle-aged men and middle-aged women. Similarly, policies for providing higher quality, accessibility, and at the same time less prices are most likely to influence both middle-aged men and women. The findings presented in this table can be interpreted the other way. If transport plans seek to affect mobility behaviors of a certain demographic group, Tab. 9 suggests focusing on specific transport and environmental characteristics. For instance, to decrease the car use rate of women, the best strategy is to increase safety and security. Similarly, to increase walking in young males, the most effective way is to influence their perceptions about walking.

6 CONCLUSION

This article indicates the most influential determinants of modal choices in Kerman as an example of the Middle Eastern cities. The outcome is presented to planners and decision makers who seek to change the arrangement of their community's modal split and reduce car dependency. Another type of audience are the researchers who would like to quantitatively model the major variables of modal choice. The paper gives a pre-estimation of the effectiveness of the main determinants that should be measured. Since the Middle Eastern cities are less studied compared with the western counterparts, the findings of this paper can outline some dissimilarities that are often neglected. The main outcome of the study is making an emphasis on the importance of socio-economic, cultural, and preferences of the end-users in defining modal split. Although the findings somewhat oppose the mainstream of western [specially North American] studies that gives an extra value to the built environment, but some aspects of urban form such as accessibility to local centers and public transport remain of notable effectiveness. The succession of the importance of the determinants that this paper suggests of the Middle Easters represented by Kerman is as follows:

- Socio-economic and cultural factors;
- Built environment;
- Personal and household preferences and lifestyles;
- Residential self-selection.

As marginal outcomes, this paper shows how an increase in the combination of convenience/comfort and accessibility of public transportation systems can encourage car drivers to shift to public transit use. Social issues are the most powerful barriers to biking, while lack of facilities and infrastructures are the strongest obstacles to overcome for the purpose of stimulating walking.

Finally, the differences among different consumer groups in Kerman were studied. The outcomes show that socio-demographic determinants have effective impacts on mobility choices. Four most influential variables that were observed in this study are gender, household size, age, and household car ownership. The paper suggests improving the diversity of public policy approaches to get remaining modal shift.

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IMAGE SOURCES

Figure in front page (Southern Karegar st. in central Tehran): Houshmand E. Masoumi.

AUTHORS' PROFILES

Hamid Soltanzadeh

Hamid Soltanzadeh hold is M. Sc. in urban management from Technical University of Berlin. His research area includes urban transformations and travel behavior. He acquired part of his research in Center for Technology and Society at Technical University of Berlin. Prior to enrollment in his masters, he obtained his Bachelor degree in "Civil Engineering" and worked in several international construction companies in practical field regarding green structural buildings with sustainability approach.

Houshmand E. Masoumi

Houshmand E. Masoumi is senior researcher in Center for Technology and Society, Technical University of Berlin, where he did a postdoc research on the interactions of land use andurban travel behavior in Iranian cities. He holds PhD in urban planning and development from Technical University of Dortmund. His research interests include the effects of urban transformations on travel behavior, walkable neighborhoods, traditional urban form, sustainable transportation, and urban sprawl.

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RESIDENTIAL LOCATION PREFERENCES

THE SIGNIFICANCE OF SOCIO-CULTURAL AND RELIGIOUS ATTRIBUTES

G.K. SINNIAH [a], M.Z. SHAHI [b], G. VIGAR [c], P.T. ADITJANDRA [d]

[a,b] Department of Urban and Regional Planning, Universiti Teknologi Malaysia
e-mail: sgobi@utm.my, b-zaly@utm.my

[c] School of Architecture, Planning and Landscape, Newcastle University
[d] New-Rail-Centre for Railway Research, Newcastle University
e-mail: geoff.vigar@newcastle.ac.uk[c], paulus.aditjandra@ncl.ac.uk[d]

ABSTRACT

The objective of this paper is to explore residential location preferences and how they are related to travel behavior.
The literature focuses on the preferences in relation to physical and demographic aspects, such as land uses, facilities, transportation facilities, transportation services, car ownership, income, household size and travel accessibility.
However, this study suggests social and cultural issue such as racial diversity which is literally to be a significance context. The case study reported here is based on Iskandar Malaysia's development region.
Reliability Analysis and Factor Analysis are applied to determine that religious and culture are influential in terms of residential location preferences. These findings add a different perspective on travel behavior studies, which are heavily dominated by researches from Western Europe, North America and Australasia.
It is suggested that transport researchers need to reject universal conclusions and be clearer about the contexts in which their findings most applied and in multi-cultural scenarios to consider cultural and religious factors more extensively.

KEYWORDS:
Residential Location Preferences; Travel Behavior; Religious and Cultural Factor.

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择居偏好

社会文化与宗教影响

G.K. SINNIAH [a], M.Z. SHAHI [b], G. VIGAR [c], P.T. ADITJANDRA [d]

[a,b] Department of Urban and Regional Planning, Universiti Teknologi Malaysia
e-mail: sgobi@utm.my, b-zaly@utm.my

[c] School of Architecture, Planning and Landscape, Newcastle University
[d] New-Rail-Centre for Railway Research, Newcastle University
e-mail: geoff.vigar@newcastle.ac.uk[c], paulus.aditjandra@ncl.ac.uk[d]

摘要

本文旨在探讨择居偏好及其与出行方式之间的关系。学界专注与物质环境及人口统计学相关的偏好，譬如土地使用、设施、交通设施, 交通服务、汽车拥有状况、收入、家庭规模以及出行的便利程度。然而，本研究表明，种族多样性等社会与文化因素也是非常重要的背景环境。文中案例以马来西亚依斯干达发展区为依据，综合采用可靠性分析以及因子分析来确定宗教与文化因素对择居偏好的影响。出行方式研究一直为西欧、北美和大洋洲所主导，文本的发现为该研究开拓了新的视角。本文建议，交通研究人员应该拒斥普遍性的结论，更加明确成果适用的环境，并在多元文化环境下，更广泛地考虑文化与宗教因素。

关键词
择居偏好；出行习惯；宗教因素；建成环境.

1 INTRODUCTION

Residential location preferences studies are a focus of attempts to change the travel behavior, to shorten trips by private vehicles and potentially changing mode of transportation. Recognizing the potential of people's preferences, land use and transportation policy will be driven into the new perspective in which policy makers will need to understand the people's needs before proposing any policies. Susilo et al., (2012) explained that in order to propose solution for transportation-related matters, understanding on people's preferences should not be framed solely with physical characteristics, but the inclusion of social aspects will add significance effects on people decision. During the past two decades, the literature has shown that urban form characteristics, such as density, settlement size, land-use mix, accessibility and local streets lay out are cumulatively affecting attitudes towards residential location preferences and travel behavior alongside socio-demographic characteristics, housing location and job location (e.g. Aditjandra, 2012). However, many researchers failed to include the socio-cultural and religious characteristics as potential factors that may influence people's decision in residential location preferences and travel behavior. Furthermore, research by Susilo and Dijst (2009) and Susilo and behavior Waygood (2012) explained that although land use characteristics have some significance in explaining travel behavior, individual's attitude are often more strongly associated with travel behavior than land use policies or others physical oriented policies. Nevertheless, despite identifying these links, there have not been many studies which have developed a comprehensive framework to address connections between this built environment characteristics and travel behavior, taking into account of the fact that individuals may self-select a residential location with specific neighborhood characteristics. Schenier (2010) in his research about social inequalities in travel behavior has highlighted that findings on the social needs on trip distance are very limited. Therefore, this study provides a comprehensive framework to enhance the relationships between residential location preferences and its relation to travel behavior.

2 LITERATURE REVIEW

There are many studies that focus on physical characteristics in residential location preferences and travel behavior. Very less consideration was given to social aspects and therefore many researches have revisited the issues of residential location preferences. The argument by Handy et al., (2005) is that understanding on the built environment should be expanded to gather social needs and preferences as this has to be given fair consideration in order to change travel behavior.This section briefly summarizes some of the relevant literature on built environment and travel behavior as well as its relation to residential location preferences. For more comprehensive reviews, see Handy et al. (2005), Van Acker and Witlox (2005), Susilo et al., (2012) and Aditjandra (2012).

2.1 TRENDS IN TRANSPORTATION SOLUTION

Implementation of solutions based on urban form and structure are usually the focus of policy to solve transportation problems (Abrahamse et al., 2009). Alongside this, in condition of fast urban growth scenarios, supply-side initiative is needed. Building new infrastructures are common in many countries in addressing transportation solution, especially in developing country like Malaysia. Handy (2005), however, questioned on impact, where by, new transportation investments have on development patterns and eventually, effect on travel patterns though. Since the early of 1990s, such studies have appeared with increasing frequency. In response of the studies, many researchers began to examine the effect of specific characteristics of the built environment on travel behavior at a disaggregate level as an effort to test the hypothesis that shape the built environment that can be used to reduce automobile travel (Handy, 2005).

Overtime, however, many countries are facing uncertainty, where past trends not a reliable guide to better future. Many sections of road heavily congested for most of the time and eventually, raise concerns on environmental impacts from traffic, way to reduce usage of cars and increase public transportation. The concern starts to shift on the ways in which people organize their lives, especially where to live (Mahmassani, 2002).

However, this does not provide enough evidence to understand people travel behavior (Susilo, et al., 2012). In the past, there appeared to be a mentality of 'transport is here to serve' (Lyon, 2004). In more recent times, the custodian of the transport system is being forced into recognizing that transport does not merely serve society, instead it shapes society, as in turn society shapes transport.

2.2 RESIDENTIAL LOCATION AND TRAVEL BEHAVIOR

Over the past decade, there has been growing interest in integrating land use planning and transportation. Based on Hensher (2001), land use does not only influence transportation outcome, but the transportation investments also influences the land use decision, potentially undermining the benefits of capacity expansion aimed at relieving urban congestion problems.

Most of the findings and literature are centered on the topic of residential self-selection, where households and individuals locate themselves to support their travel preferences.

Changes in travel behavior may derive from the influence in land use, especially to encourage people to walk or cycling to their destinations. In respond to that, Donaghy et al., (2005) have examined the motives and needs that drive decision have been made, which lead to response behavior over space and time. In comparative studies in Europe and North America, difference in travel and mobility may take the form of income, network densities, transport technologies and social trends.

According to Stern and Richardson (2005), there are issues concerning long-term versus short-term decision making, where by socio-economic determinants and cultural differences are among the issues concerned.

Cram (2005) has further confirmed in his research on residential location and work travel. The researcher explained that one of the reasons for the increase in distance travelled is the growth of long-distance work journeys. This leads people to choose the housing location based on the accessibility- basis to a potential workplace rather than to one particular workplace.

Besides that, Curtis (1996) since then explained that the value of housing is a factor which results in people "trading-off" the cost of living nearer to workplace against the cost of a longer work journey. Table 1 below explains different perspective on land use and transport as follows:

2.3 CHOICES OF RESIDENTIAL LOCATION INFLUENCES TRAVEL BEHAVIOR

The choice of a residential location is actually a cluster of related choices, including the decision to move from existing residence, the choice of housing tenure (rental or owned), neighborhood and housing unit. According to Hensher (2001), households with higher incomes, with children or with two workers, for example, will demonstrate different consumption preferences for housing and location than households of differing income and life cycle characteristics.

This was further explained by Susilo et al., (2012) that it is very difficult to make comparison because the local context plays significant role and it is so critical.

Curtis (1996) explained that accessibility to the workplace is equally important with accessibility to other destinations, but in reasons for eventual choice of area accessibility to the workplace was less important. According to Scheiner (2010), the importance of access to the workplace is used as an indicator of location preferences, while in the maintenance activity model, the importance of proximity to shopping for a location decision is used.

PERSPECTIVES	LAND USE AND TRANSPORTATION
Human activities and purposes	-Human activities and purposes are the ultimate drivers for land use, transport and their planning
Costs and benefits	- Destination activities (land uses) are associated with benefits - Travel is primarily associated with costs
Network	- The separation and distribution of people, activities and land uses gives rise to need for travel - Land uses are represented by zones - Transport network represented by nodes and links
Land value, location and accessibility	- Land uses influenced by location and land value - Transport creates a web of accessibility that stimulates and supports value of land and location
Infrastructure and land area	- Transport seen as 'just another land use' - Transport land uses connect up contiguously and connect all other land uses
The professional dimension	- Land use planning and transport planning are distinct professions - These may be integrated, fail to connect or be in conflict
The policy dimension	- Overall objectives of land use planning and transport planning are often similar with differences in detail or emphasis - Land use planning and transport planning policies may be disparate or integrated

Tab.1 Perspective on Land Use and Transportation

Job location is treated as substitution between market work, household work and leisure based on the relative productivity in market work over the life cycle. Hensher (2001) explains that occupations chosen are more generic and low wage, but where there are more accessible opportunities and lower risk of unemployment or maybe highly specialized and high wage but may involve longer commuters or offer limited mobility.

Urban form has an extremely complex relationship indicating that land use and design proposals will influence the price of travel, travel modes, mixed-use, pedestrian-friendly movement and types of housing especially to support low income workers (Boarnet & Crane (2001), Cervero (2002), Dieleman et al. (2002), Naees (2009) and Cao et al. (2009) suggests that activity participation, location of activities, choices of travel and route choice have a significance says on travel behavior, regardless of any self-selection of residents to particular types of neighborhoods.

Mokhtarian and Cao (2008) explained on individual characteristics, like social-demographic are more straightforward to measure, where these variables added to the explanation of variation in travel behavior by individual characteristics. The inclusion of purpose of trip to different places or destinations is well highlighted by Kenyon and Lyons (2003), where they explained that majority of journeys is made with no choice. Lee (2002) has seen before examined this before where travel habits are formed and indeed car dependence becomes more deeply embedded.

Car availability is measured as an independent variable in order to explain travel behavior (Acker & Witlox, 2010). Scheiner also measured the data as an ordinal variable, which can take on four values; no car in the household, car in the household not available to the respondent, car in the household partly available and

car in the household available at any time. Owing a car enable people to move or travel, which distance does not a matter to consider choosing the residential location.

In the current debate of the choices of residential location preferences, many studies have made efforts to address the self-selection issues by accounting for preferences and attitudes with physical and activities within and outside the neighborhood. Therefore, this study is crucial to include the social aspects of people within the neighborhood. It is possible to explore the relationship or understand such as religious and culture aspects of residents in the neighborhood yet to establish the connection with choices of residential location preferences.

2.4 OVERVIEW OF PREVIOUS TRAVEL BEHAVIOR STUDIES

The majority of the previous researches as reported in journals have been gathered primary data through the implementation of questionnaire survey or a travel diary. However, the complexity of the relationship between the built environment and travel behavior means that there is still considerable gaps and disagreement to some extent, particularly on residential self-selection. Kitamura et. al (1997) discussed on attitudes and travel behavior in which attitude contributes to the explanatory power of regression models, where it explains the number of trips, transit trips and non-motorized trips and the share of auto, transit and non-motorized trips. Besides that, socio-economic factors and neighborhood descriptors of parking space available, distance to the nearest bus stop, and distance to nearest park.

Naess (2005) identified attitudes towards environmental issues are not significant. In his study, the density variable is positively correlated. Furthermore, in addition to socio-economic characteristics and attitudes, residential location also influences travel behavior. In separate study conducted in 2006, (Naess, 2006), the multiple regression analysis have been carried out to explain commuting distance identified the similar results, with again a significant influences of attitudes towards car use and no significant influence of attitudes on environmental issues.

Meanwhile, the first study on residential self-selection included attitudes, which used Structural Equation Modelling, was carried out by Bagley and Mokhtarian (2002). Among the variables that have been used are built environmental variables, the attitudinal factors 'pro-high density', 'pro-driving' and 'pro-transit'.

Besides that, Handy et al. (2005) and Cao et al. (2007) as reported by Bohte (2009) as well, have used quasi-longitudinal data to compare neighborhood characteristics and travel behavior before and after shifted to the new area. Handy et al. (2005) explained vehicle miles driven, travel-attitudes, neighborhood characteristics and preferences and socio-demographic variables, suggests that differences between travel behavior of residents in traditional neighborhood and residents in suburban neighborhood are more a function of travel-related preferences than neighborhood characteristics.

Another important research that has been referred widely was from Abrahamse et al. (2009). The research discussed on factors influencing car use for commuting and the intention to reduce it. The researchers examined whether environmentally relevant behavior would be better explained by variables reflecting self-interest or by moral considerations and whether perceived behavioral control would moderate the relation between personal norms as well as the intention to reduce car use.

There have been many researches on the determinant of travel behavior in general, and particularly, on trip distance, especially for the past several years (Scheiner, 2010). The directions of the research in travel behavior has been dramatically changed, where socio-demographic differential of travel has been challenged by lifestyle-oriented approaches that claim to be more appropriate in individualized, affluent societal contexts where people have more options to choose in their travel behavior (Scheiner and Kasper 2003), (Scheiner, 2010). Table 2 below shows the summary of previous research on built environment and travel behavior studies, which is adopted from Curtis & Perkins (2006).

Authors, Year and Method	Travel Behavior Variables	Neighborhood Spatial Variables	Attitudinal variables	Results
Kitamura et al., (1997); *Multiple regression analysis*	Trip frequency, transit trip frequency, transit trip share, non-motorized trip frequency, car trip share, non-motorized trip share	Distance to nearest bus stop and grocery shop, mixed land use, high density, perceptions of neighborhood quality; good local transit, no reason to move, streets pleasant for walking	Pro-environment, pro-transit, suburbanite, automotive mobility, time pressure, urban villager, TCM, workaholic	Socio-economic and neighborhood characteristics – travel behavior, but attitudes had a stronger influence on travel behavior
Bagley & Mokhtarian (2002); *Structural Equation Modelling (SEM)*	Vehicles miles, transit miles, walk/bike miles	Commute distance, home size, distance to nearest grocery store, average speed limit, grid street system, population density	Pro-alternative, pro-drive alone, pro-environment, pro-growth, time-satisfied, work-driven, pro-high density, pro-transit.	Attitudes and lifestyle – travel behavior, neighborhood characteristics had little impact on travel behavior.
Van Wee et al., (2002); *Multiple regression analysis*	Car trip frequency, distance by car, Public transport trip frequency, bicycle trip frequency, distance by public transport	Commute distance, distance to railway station, distance to social recreation destinations	Preferred travel mode	Travel mode preferences – residentially choice regarding public transportation
Cao et al., (2007); *Quasi – longitudinal, SEM*	Driving, walking, car ownership	Accessibility to various land use activities, perceptions of neighborhood characteristics; accessibility, physical activities options, safety, socializing, attractiveness and outdoor spaciousness	Pro-travel, pro-transit, pro-bike/walk, travel minimizing, safety of car, car dependent, accessibility, physical activity options, safety, socializing, attractiveness and outdoor spaciousness	Attitudes, neighborhood characteristics and preferred neighborhood characteristics influence travel behavior
Scheiner and Holz-Rau (2007); *Structural Equation Modelling*	Modal share	Density of supply, quality of public transport, vehicle kilometers travelled, density and mixed land use	Lifestyle factor out-of-home self-realization, accessibility to city centre, proximity to public transportation	Attitudes, lifestyles and residential location – travel behavior
Abrahamse et al., (2009); *Multiple Regression Analysis*	Gender, age, households size, travel mode, work period, employment, travel mode	travel distance	Intention to reduce car use, attitude toward car use, subjective norm (SN), perceived behavioral control (PBC), personal norm (PN), awareness of consequences (AC), ascription of responsibility (AR)	Car use for commuting was mostly explained by variables related to individual outcomes (perceived behavioral control and attitudes), whereas the intention to reduce car use was mostly explained by variables related to morality (personal norms).

Scheiner (2010); *Standardized household survey; Structural Equation Modelling*	Travel mode choice, car availability, gender, age, number of children in the household, total household size, education level, income, employment	Accessibility, travel preference, mix-land use, compact city, Trip distance; Job trip distance, maintenance trip distance, leisure trip distance	Accessibility, lifestyle (out-of-home leisure preferences), values, life aims, aesthetic taste, individual location preferences	Trip distance is strongly influenced by social status. Subjective side of social status long been neglected in transport studies. Neither lifestyles nor location preferences have a strong impact on trip distances, except for leisure activities.
Aditjandra, P. T. et al., (2012); *Structural Equation Modelling*	Socio-demographics, changes in income, changes in household size, car ownership	Shopping accessibility, travel accessibility	Pro-public transport, pro-walking, dislike-cycling, positive utility of travel	Changes in socio-demographic characteristics are the main contributors to changes in car ownership.

Tab.2 Overview of Previous Research Findings

3 METHODOLOGY

The methodology used in this research responds to the issues and aims to explore the relationships between people's residential preferences and travel behavior with a case study of on Iskandar Malaysia region. The objectives of the study presented here were, first, to confirm the role of attitudes and preferences in explaining the link between residential location selection and travel behavior. Secondly, to directly construct the factors that influence people decision on residential location selection preferences (Fig.2).

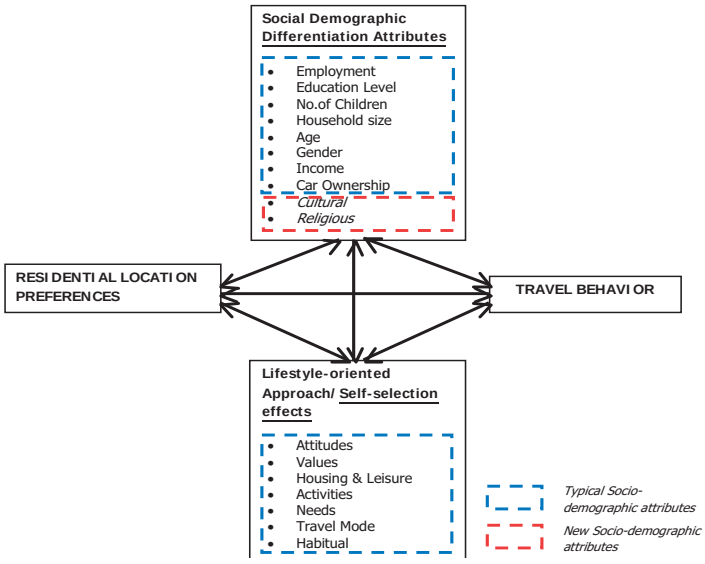

Fig.2 Methodology framework: the inclusion of cultural and religious aspects

3.1 SURVEY METHOD AND STUDY AREAS

Survey techniques are based on the use of structured questionnaires given to a sample of population. According to Hair et al. (2003), survey method have several advantages, such as the ability to accommodate large sample sizes and distinguish small differences, the increased generalizability of results, the convenience of managing and recording questions and answers, the capability of using statistical analysis and the ability to tap into factors and relationships not directly measure. The data used in this paper were collected in a standardized household survey within the objectives of this research. The survey was carried out in 2 study areas in the region of Iskandar Malaysia, which is in Pasir Gudang Municipal Council (PGMC-Eastern Gate Development flagship) and Johor Bahru Tengah Municipal Council (JBTMC-Western Gate Development and Nusajaya flagships) (Fig.3). The selections of these areas are based on three dimensions, which are, neighborhood type, land use and economic activities. Neighborhood type was differentiated as Johor Bahru Tengah Municipal Council area built more recent, while Pasir Gudang Municipal Council area mostly cover residential area built in the early 90's. While for land use and economic activities, PGMC mostly involve in industrial and services activities, which provide more job opportunities and for JBTMC are very much related to government offices and commercial. Nonetheless, spatially or socially 'extreme' areas were not purposely targeted.

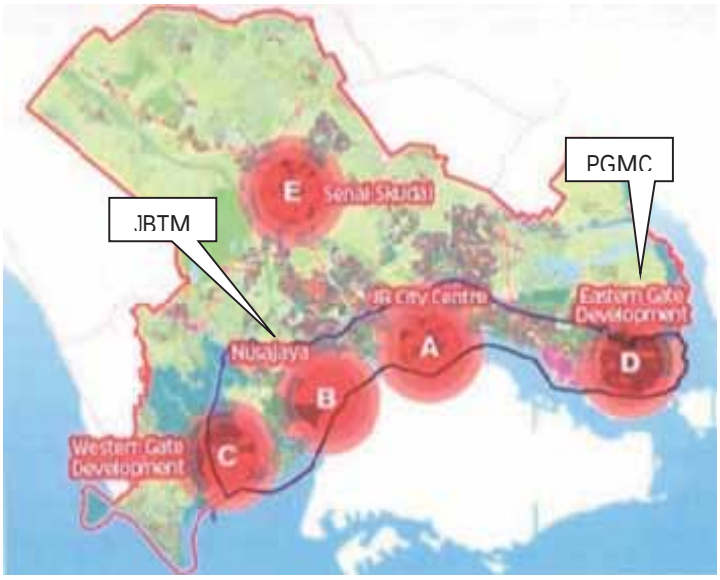

Fig.3 Flagship zones within Iskandar Malaysia

3.2 SAMPLE POPULATION

In this research, cluster and stratified sampling were used in order to ensure sample characteristics are representative of the total population, where attention is paid to the group belongs to working group with the minimum age for attitudes research is 18-years old and above or considerably as an active working group. The questionnaires were only distributed to the head of household who are working, be in the government, non-government or self-employed and was carried out for a month in both study areas. This paper studied 384 respondents (PGMC-19% & JBTMC-81%) who are an active working group. When working with samples, it is desirable to identify the sample represents the population to understand whether results might be generalized to that population or geographical background.

However, since the focus of the study is on explaining the relationships of social variables on residential selection preferences towards travel behavior, these differences are not expected to materially affect the results.

3.3 QUESTIONNAIRE DEVELOPMENT AND VARIABLES

The questionnaire was constructed largely using the findings from previous research on travel behavior, among others, are from Handy (2005), Aditjandra (2012), Acker & Wiltox (2010), Scheiner (2010) and Anable (2005). Besides that, feedback from focus group discussion that have been carried out with a group of people working with private and government sector are also taken into consideration. Input from them involved matter related to current neighborhood environment and also their preferences or choices of selecting residential area. The questionnaires captured respondents' socio-demographic data, namely, gender, age, races, religion background, length of stay, economic status, education background, household income, household size, number of children, tenure status, possession on vehicles and also mode of transportation to activities related to work and non-work trips. Likert-type answer scales were measured for 87 statements. The statements were divided into two sections which are current neighborhood characteristics (39 statements) and also attitudes and preferences for residential location (48 statements).
Variables used in the analysis include characteristics of the current residential or neighborhood area and also respondents' residential location preferences. Travel behavior was variously measured through a series of questions on work trips, non-work trips and also distance travelled to workplace. In addition, respondents were asked to list vehicles currently available in their house or to the household. Detail of variables used can be referred in the results section.

3.4 STATISTICAL ANALYSIS

This paper used Reliability Analysis and Factor Analysis to identify the correlated variables and to create a set of factor constructs. The reliability of the scales is considered in connection with measurement models. Reliability was assessed using Cronbach's alpha coefficient (α), which is the commonly used measure of reliability. 87 statements or items were subjected to reliability analysis and, eventually, only 72 statements were found to have sufficient internal reliability *(α>0.7)* to be subsequently used in the Factor Analysis. Thus, Factor Analysis identified the latent variables or constructs underlying the 27 statements or items on current neighborhood characteristics and the 33 statements or items on attitudes and preferences of residential locations. This is called as latent constructs or latent variables. The criterion *"Eigenvalue>1"* was used to determine the number of factors. Through this analysis, several factors were extracted and are shown in the next section of this paper.

4 RESULTS

The data for the analyses were collected in MPPG and MPJBT. These areas were chosen because they were assumed to differ in terms of their spatial or physical environment, economy activities, and status of housing areas in terms of year of built. Furthermore, the land use activities are more varied and these were assumed to be best area for data collections. Table 3 below shows the distribution of ethnics group in the study area and also the district statistic data. Overall, the data has been represented by ethnic group.

Characteristics	**Study Area**		**District**	
	MPPG	MPJBT	MPPG	MPJBT
Size Population	73	311	46,571	529,074
Ethnic group (%)				
Malay	78	54	91	39
Chinese	11	32	3	47
Indian	10	13	5	13
Others	1	1	1	1

Tab.3 Sample characteristics of population

4.1 MODEL CONSTRUCTION ISSUES

The factor analysis concluded that several factors or constructs in current neighborhood characteristics and preferences for residential location shows that new perspective in determining the factors with latent variables that never been covered before in the Western country as well as other Asia countries.

By virtue of the factors construct procedure and its use of latent variables created by the factor analysis, each of the factor group or matrix has been given a name to represent its characteristics. These labels are revealed in Table 4 and Table 5 together with the latent factors loading.

Previous research has well documented that residential choices are mainly made with consideration heavily given to physical aspects of the built environment, including activities, socio-demographic background as well as car availability (Aditjandra, 2012) (Acker & Witlox, 2010).

It was proven in this research that to certain aspect of society in certain areas, culture and religious aspects influenced their decision on selecting residential location.

NEIGHBORHOOD CHARACTERISTICS FACTORS	STATEMENTS	FACTOR LOADINGS*
Pro-culture within neighborhood	Respect different languages within neighborhood	0.773
	Accept the smell of neighbor cook and meals	0.670
	Low racists remarks	0.613
	Less misunderstanding with neighbors regardless of races	0.607
	Less attendance in religious activity	0.481
	'Guarded and gated' in mix-racial community area	0.504
		0.383
Safety and security	Comfortable to walk within neighborhood area	0.676
	Safe for children to play outdoor	0.573
	Low crime rate within neighborhood area	0.571
	Low level of car traffic on neighborhood streets	0.569
Built-environment accessibility	Local shops within walking distance	0.602
	Easy access to shopping centre	0.601
	Easy to workplace	0.539
	Easy access to public transport facilities	0.465
Neighborhood Attractiveness	Green environment	0.536
	Less environment conflict	0.485
	Well-kept properties	0.476
	Away from busy streets	0.470
Religious practice	Respect neighbor from different religion listening to religious songs	0.780
	Respect prayers performing by neighbor from different religion	0.667
Social status	Religious centre nearby	0.698
	Diverse religious practice among residents	0.609
	Diverse neighborhood	0.351
Neighborhood choice and involvement	Variety of house	0.550
	Visit neighbor functions	0.489
Neighborhood Facilities	Parking facilities	0.566
	Bicycle lane facilities	0.531
	Recreational area nearby	0.418

**Factor loadings represent the degree of association between the statements and the factors. Extraction Method: Principal Axis Factoring (PAF. Rotation Method: Varimax with a Kaiser Normalization Rotation converged in 19 iterations.*

Tab. 4 Factors of current neighborhood characteristics

NEIGHBORHOOD CHARACTERISTICS FACTORS	STATEMENTS	FACTOR LOADINGS
Religious Practice	Diverse religious practice	0.756
	Many religious practice nearby	0.754
	Don't mind with prayers performed by neighbor from different races	0.689
	Frequent religious preaching	0.688
	Don't mind with neighbor from different religion listening to religious songs	0.587
Residential Location	Local shops within walking distance	0.714
	Easy access to workplace is an important factor Easy access to worship or religious centre	0.633 0.626
	Easy access to shopping centre	0.519
	Easy walking routes throughout the neighborhood	0.480
	Sufficient parking facilities are the main priority	0.432
	Prefer park and recreational area	0.377
Neighborhood Attractiveness	Adequate house space	0.771
	Affordable house	0.708
	Green environment	0.547
	Mix-land use	0.454
Travel Behavior	Prefer to walk rather than drive whenever possible	0.917
	Prefer to cycle rather than driving whenever possible	0.719
	Walking is easier than driving	0.653
Pro-Public Transport	I prefer to take public transport rather than driving	0.727
	Most of the time, I will travel by public transport	0.719
	Public transport operate on regular basis	0.560
	Public transport routes cover my residential area	0.447
Safety	Safe for children to play outdoor	0.789
	Comfort to walk	0.707
	Low level of car traffic	0.455
Socio-culture	Less conflict among races are an important consideration	0.696
	Do not mind with different language within neighborhood	0.490
	Interaction among neighborhood are very good	0.435

**Extraction Method: Principal Axis Factoring (PAF) Rotation Method: Varimax with a Kaiser Normalization Rotation converged in 6 iterations.*

Tab.5 Factors for residential location preferences

5 DISCUSSION

5.1 THE NEW PERSPECTIVE ON RESIDENTIAL PREFERENCES

Neighborhood characteristics and residential location preferences indicates and reflects fundamental differences from the previous research or studies. The comparison of respondent's perceived neighborhood characteristics for their current residence and their preferences for neighborhood characteristics indicates how well their current neighborhood meets their preferences.

Nevertheless, the findings have shown that culture and religious plays such a significant role in respondent's decisions in residential location selection.

This study, though, enhance our understanding of the complicated and comprehensive relationships among residential location preferences, attitudes toward land use, travel and transportation.

We have investigated to what extent respondent's preference differs not only by residential neighborhood, but also by the present and level of mismatch their preference on neighborhood environments and surroundings.

The survey largely indicates that consideration on religious practice was among the important factor that has been considered in respondent's decision on residential location selection. In the previous studies, physical formed of consideration have been given importance.

However, in this study, social status is considerably among the highest and correlated with residential location selection preferences. These findings add a different perspective on travel behavior studies before, which are heavily dominated by researches from Western Europe, North America and Australasia.

The factor analysis produced many undiscovered issues in social context by other researchers. This, perhaps, will bring new perspective of travel behavior studies where transport researchers need reject universal conclusions and be clearer about the contexts in which their findings most apply.

So far, the findings generally confirm standard knowledge and findings in residential location considerations and travel behavior studies. Turning our attention to social status and aspects, it was found that social contexts to be the major impact for residential location preferences. In Malaysia context, social contexts among Malaysian appear to be very strong preference.

The findings add new knowledge to the previous research that found land uses, facilities and accessibility are much correlated with residential location selection preferences (Schwanen and Mokhtarian (2005), Handy et al. (2005), Scheiner (2010), Aditjandra et al. (2012).

Travel behavior studies shows that the importance to understand the local context should be extended to the difference perspective, such as their cultural values, religious practices, lifestyles and even food that they consumes.

These have been proven through this empirical study, which identified that religious preaching, language spoken and also religious center will be taken into consideration.

Hence, the research indicates that residential location preferences choices requires a unique, expanded of existing version of travel behavior studies incorporating social aspects to improve and enhance the current framework in this context.

More sophisticated analyses of these data, such as structural equations modelling (SEM), will help to establish the strength and direction of residential location preferences and its relationship with travel behavior. For instant, the factor analysis helps to identify the relevant latent constructs on current neighborhood characteristics and eventually, on their preferences (Aditjandra et al., 2012).

Future studies that adopt research designs that more or less resemble this study will provide more evidence on this empirical result.

Further studies and experimentation like relationship between latent variables and further exploration on how these latent variables relates to travel behavior decision process are needed to illuminate the complex and comprehensive relationships and their implications for policy and planning. Nevertheless, this study has seen the difference context of residential location and travel behavior studies.

The results presented here provide some encouragement that land-use policies designed to put residents closer to destinations will actually need to be given more considerations and deep understanding on people's social status and preferences.

What lessons for policymaking can be drawn from this study? Policies that could attract people to shift near to their workplace, especially in the new areas including mix-religious institutions that allow people to move within or closer to their respective residential area.

Although this study does not discuss on the policies aspects context, though it provides evidence that such considerations are very significance in multi-racial countries.

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IMAGE SOURCES

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AUTHORS' PROFILES

Gobi Krishna Sinniah

Ph.D. candidate in Transportation Planning, Department of Urban and Regional Planning, Faculty of Built Environment.

Muhammad Zaly Shah

Senior Lecturer in the Dept. of Urban and Regional Planning, Faculty of Built Environment, Universiti Teknologi Malaysia
Head, Logistics and Transportation Laboratory, Faculty of Built Environment.

Geoff Vigar

Professor of Urban Planning at Newcastle University.

Paulus Teguh Aditjandra

Research Associate with NewRail-Centre for Railway Research, School of Mechanical and systems Engineering, Newcastle University.

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REVIEWS PAGES

SMART CITIES CHALLENGES
SMART COMMUNITIES BETWEEN E-GOVERNANCE AND SOCIAL PARTICIPATION

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. During the last two years a particular attention has been paid on the Smart Cities theme and on the different meanings that come with it. The last section of the journal is formed by the Review Pages. They have different aims: to inform on the problems, trends and evolutionary processes; to investigate on the paths by highlighting the advanced relationships among apparently distant disciplinary fields; to explore the interaction's areas, experiences and potential applications; to underline interactions, disciplinary developments but also, if present, defeats and setbacks.
Inside the journal the Review Pages have the task of stimulating as much as possible the circulation of ideas and the discovery of new points of view. For this reason the section is founded on a series of basic's references, required for the identification of new and more advanced interactions. These references are the research, the planning acts, the actions and the applications, analysed and investigated both for their ability to give a systematic response to questions concerning the urban and territorial planning, and for their attention to aspects such as the environmental sustainability and the innovation in the practices. For this purpose the Review Pages are formed by five sections (Web Resources; Books; Laws; Urban Practices; News and Events), each of which examines a specific aspect of the broader information storage of interest for TeMA.

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author: Laura Russo
Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

02_BOOKS
The books review suggests brand new publications related with the theme of the journal number.

author: Floriana Zucaro
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@unina.it

03_LAWS
The law section proposes a critical synthesis of the normative aspect of the issue theme.

author: Valentina Pinto
Tema Lab -Università degli Studi di Napoli Federico II, Italy
e-mail: valentina_pinto@hotmail.it

04_URBAN PRACTICES
Urban practices describes the most innovative application in practice of the journal theme.

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Tema Lab - Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

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author: Gerardo Carpentieri
Tema Lab- Università degli Studi di Napoli Federico II, Italy
e-mail: ger.carpentieri@gmail.com

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评论页面

介于治理与社会参与之间的智能社区

TeMA 从城市规划和流动性管理之间的关系入手，将涉及的论题逐步展开，并始终保持科学严谨的态度进行深入分析。在过去两年中， 智能城市课题和随之而来的不同含义一直受到特别关注。
学报的最后部分是评述页。这些评述页具有不同的目的 ：表明问题、趋势和演进过程；通过突出貌似不相关的学科领域之间的深度关系对途径进行调查；探索交互作用的领域、经验和潜在应用；强调交互作用、学科发展、同时还包括失败和挫折（如果存在的话）。
评述页在学报中的任务是，尽可能地促进观点的不断传播并激发新视角。因此，该部分主要是一些基本参考文献，这些是鉴别新的和更加深入的交互作用所必需的。这些参考文献包括研究、规划法规、行动和应用，它们均已经过分析和探讨，能够对与城市和国土规划有关的问题作出有系统的响应，同时还对诸如环境可持续性和在实践中创新等方面有所注重。
因此，评述页由五个部分组成（网络资源、书籍、法律、城市实务、新闻和事件），每个部分负责核查TeMA所关心的海量信息存储的一个具体面。

01_WEB RESOURCES
网站报告为读者提供与主题直接相关的网页。

author: Laura Russo
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: laurarusso88@hotmail.it

02_BOOKS
书评推荐与期刊该期主题相关的最新出版著作。

author: Floriana Zucaro
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: floriana.zucaro@unina.it

03_LAWS
法律部分提供主题相关标准方面的大量综述。

author: Valentina Pinto
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: valentina_pinto@hotmail.it

04_URBAN PRACTICES
城市的实践描述了期刊主题在实践中最具创新性的应用。

author: Gennaro Angiello
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: gennaroangiello@yahoo.it

05_NEWS AND EVENTS
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author: Gerardo Carpentieri
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: ger.carpentieri@gmail.com

01

SMART COMMUNITIES BETWEEN GOVERNANCE AND SOCIAL PARTICIPATION

REVIEW PAGES: WEB RESOURCES

LAURA RUSSO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: laurarusso88@hotmail.it

In this number
SOCIAL PARTICIPATION FOR THE SMART CITY

Engaging citizens in the management of urban space has recently become one of the main strategies for creating a smart city and promoting social equity, because cities can no longer be considered as mere container for human actions, places of consumption or just spaces to be exploited.
Active citizenship concerns the involvement of people to enable knowledge and innovation generation processes, allowing the creation of new knowledge and making citizens more aware of the city they live in.
Today, the participation of urban communities is favored by new technologies, which allow different ways of interaction within the urban context making communication and spread of information easier and immediate.
In this issue of TeMA, the three websites proposed below – kickstarter.com, smartcitizen.me, campusbubble.com – relate with the broad theme of social participation, each of them from a different perspective.
Kickstarter is the most famous crowdfunding platform that thanks to a widespread private monetary action funds creative projects; crowdfunding can be considered one of the most innovative way of promoting social engagement because it makes creators and bakers feel like they are part of a larger global community built around an idea, a project.
Smart Citizen is a platform that uses geo-referenced data provided by citizen to map cities and create new knowledge. This project, born in Spain and worldwide supported, is based on the idea that social participation can make the difference for building a better city: open source platforms allow people to get involved and informed about the management of cities and also help decision makers to define more targeted and reliable actions.
Campus Bubble is a private social network for educational institutions that provides a cross-platform to make the exchange of information between university groups easier, so to increase collaboration and student engagement. In this case the issue of social participation is approached at a smaller scale: the campus can be considered a minor part of the city and the academic community is nothing more than a community of citizens; from this perspective, Campus Bubble aims to involve people in the organization of campus life.

KICKSTARTER
http://www.kickstarter.com

Crowdfunding can be defined as the practice of collecting many small amounts of money from backers over the internet to finance a project and/or idea; maybe not surprisingly, it has exploded in the US in 2009, at the beginning of the financial crisis.

Its "mission is to help bring creative projects to life", as stated by Kickstarter, the gorilla among crowdfunding platforms, in line with Obama's recommendation "to be makers of things, not just consumers of things".

Since its first launched five years ago, Kickstarter's funders have pledged over 1 billion dollars, successfully financing over sixty-four thousand creative projects, coming from all seven continents.

One basic rule makes the funding platform work: "every project creator sets their project's funding goal and deadline. If the project succeeds in reaching its funding goal, all backers' credit cards are charged when time expires. If the project falls short, no one is charged". Projects cannot last longer than sixty days.

People pledging money can "choose from a variety of unique rewards offered by the project creator. Rewards vary from project to project, but often include a copy of what is being produced (CD, DVD, book, etc.) or an experience unique to the project".

Kickstarter applies a 5% fee to the money raised by each funded project and creators retain 100% ownership of their idea. The website is the only interface of Kickstarter company, which involves 81 people based in Brooklyn. All projects – funded, not funded, in progress – can be explored in the *Discover* page of the platform, divided into fifteen categories, from art and crafts to music and technology. Projects can also be sorted by popularity, launch/end date or just by "magic", choosing a location that can be the entire earth, or your city. Each project has its own page where creators share with backers as more information about their project as possible: although videos are not mandatory, Kickstarter team recommend project creators to include one, because "projects with a video succeed at a much higher rate (50% vs. 30%), and they also raise more money". Furthermore, in the project page there are information about the number of supporters that have already funded, the amount of money collected, the project deadline, and the list of rewards for the backer community, together with a detailed description of what the creator is trying to do and why.

The more the project page is clear and inspiring, the more potential supporters will appreciate it.

The section *Creator Handbook* on Kickstarter's website provides creators instructions for getting started with shaping their projects; the guide aims at helping creators to build their project page, choose the most appropriate rewards, set the funding goal and the project deadline, plan the best strategy to promote the project and find support, update backers on their progress and finally achieve the fulfillment getting their rewards to supporters and communicate with them.

Kickstarter is one of the earlier platforms for crowdfunding and one of the most successful, but it is not the only; in fact, depending on your crowdfunding goals and needs, there are several crowdfunding sites that have different models and focuses.

If in 2012 the overall crowdfunding industry has raised $2.7 billion (Crowdfunding Industry Report) and in 2013 the industry return was projected to grow to $5.1 billion, we expect that the phenomenon will continue to increase in importance in the next years.

SMART CITIZEN
https://www.smartcitizen.me

"Smart Citizen is a platform to generate participatory processes of the people in the cities. Connecting data, people and knowledge, the objective of the platform is to serve as a node for building productive open indicators and distributed tools, and thereafter the collective construction of the city for its own inhabitants." These words open the *Homepage* of smartcitizen.me, the website dedicated to the project born within Fab Lab Barcelona and the Institute for Advanced Architecture of Catalonia with the goal of mapping cities using data from their citizens.

In a time of global economic instability, the Smart Citizen system connects people, knowledge and data trying to jump start economy from the bottom, engaging citizens in the management of the city the live in. Many different types of environmental information are provided on the platform, such as levels of air pollution, humidity, temperature and noise.

The project got founded thanks to two crowdfunding platforms – kickstarter and goteo – where backers donated over eighty thousand dollars. At now, the community of citizens participating in the project counts more than 340 people and 283 sensors distributed worldwide; each citizen as a personal panel on the website that includes information about geolocation, last update and data sensors.

In the *News* section of the website visitors keep updated on the new citizens joining the network and on the new sensors added.

Furthermore, on the platform it is also possible to pre-order the Smart Citizen Kit (SCK), designed by E. Perotti and M. Kukucka and called *The Ambient Board,* which "carries sensors that measure air composition (CO and NO2), temperature, light intensity, sound levels, and humidity" and "is able to stream data measured by the sensors over Wi-Fi". European potential buyers can choose between three different models, with a minimum price of 99 € up to 244 € for the complete kit, while not-Europeans can just order one model for 175 $.

Additional information on how to use the SCK is included in the *Docs* section, where several tutorials help new users to getting starter with the kit; moreover, a community forum is available for all different types of questions and doubts.

The project is very recent and after the big crowdfunding success it seems to continue attracting the interest of people looking for a better city; most probably, we will hear more about it in the future.

CAMPUS BUBBLE
www.campusbubble.com

Campus Bubble (CB) is a private social network that connects academic communities within universities, from students to faculty members and administrative staff.
In order to overcome a common problem for academies respect the way they share information, often fragmentized and hardly accessible, Campus Bubble provides a cross-platform to "centralize and simplify" the exchange of information between university groups so to promote collaboration and student participation.
The idea of Campus Bubble was born at Emory University, in Atlanta, where a small group of friends – coming from six different countries and with different backgrounds – share a common objective: "impact student engagement and retention"; today, three years after the founding of CB, this team of eleven people is supported by the work of "the ambassadors", which help to spread the network to other universities, and of the "trusted advisors", i.e. leading personalities in the education and business sectors that contribute to build the long-term strategy of the company.
The initiative is becoming more and more popular and not just in the U.S., where it has been founded, but also worldwide.
Campus Bubble is already active at Emory University, its incubator, but other educational institutions are now approaching the new private social network and among these there are also elementary, middle and high schools, where young students and their parents will benefit from the safety and ease of communication in a private environment.
A meticulous description of CB and its functionalities can be found on campusbubble.com, where it is also possible to sign for "getting Bubble for your campus" or just scheduling a demo. Bubble is available on the web, as well as a mobile app, and it allows students to easily access the system just using their school credentials.
Once an educational facility chooses to adopt CB, the implementation process starts, including marketing events for promoting Bubble among students, product demonstrations for every level of the administration and also a 24/7 support.
Campus Bubble provides an alternative, private and reliable, to Facebook; let's hope it has the same success.

IMAGE SOURCES

The images are from:

http://sweetclipart.com/diverse-people-raising-hands-968; http://www.containsmoderateperil.com/kickstarter-and-the-myth-that-everything-is-awesome/kickstarter-logo-www-mentorless-com_/;http://www.cities.io/news/; http://waag.org/en/news/smart-citizen-kit-next-steps; http://www.thinkinnovation.org/campus-bubble-arriva-il-social-network-per-le-universit%C3%A0/

02

SMART COMMUNITIES BETWEEN GOVERNANCE AND SOCIAL PARTICIPATION

REVIEW PAGES: BOOKS

FLORIANA ZUCARO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: floriana.zucaro@unina.it

In this number

OPEN GOVERNMENT DATA AND SMART COMMUNITIES INITIATIVES

Within the wide debate about smart cities the issue of social participation and innovation has been spreading quickly. As the Italian Digital Agenda states, without the participation of citizens smart city cannot exist, according to the fact that the urban smartness needs a social capital who knows how to operate, in order to prevent that a lack of expertise by users in the field of ICT could be an obstacle to the development of its economic and competitive potential (Gargiulo, Pinto, Zucaro 2013). Beyond the several definitions and outlooks provided by scientific research (Phills et al. 2008; Hoogendoorn et al. 2010; Murray, Caulier-Grice, Mulgan 2011), social innovation should be intended as a collaborative process in which communities are directly involved so as both to solve a problem and generate new opportunities. In this perspective, the active involvement of citizens led to a high and positive impact for society estimable in terms of social and economic capital, as well as governance. Nevertheless social innovation requires infrastructure and education and with regards to the first one we should not only think about the hardware part, but also about the software that, in a broader view, means applications, services and data. According to IBM, about 2.5 quintillion bytes of data are created every day (enough to fill about 57.5 billion 32 GB iPads daily) and this huge increase in the amount of data, combined with openness and technologies, has dramatically changed the nature of data from a closed proprietary resource to a common shared resource. A large number of governments have started to make their data available on the web through Open Government Data (OGD) portals that provide statistics, reports and geo spatial information. The OGD refer to government data, defined as "data and information produced or commissioned by government or government controlled entities" (OKF, 2012), that are opened up for use and re-use by public and private agents alike. Different challenges related to policy, technology, financing, organisation, culture, and legal frameworks may be associated with the implementation of OGD initiatives which, if not properly tackled, might obstruct or restrict the capture of benefits of national efforts aimed at spurring OGD.

According to these brief considerations, this section proposes three documents related to how technology can strengthen good government (for instance by enabling greater transparency of government actions through open data) and how participation processes can improve the quality of everyday life.

Title: Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives
Author/ editor: Ubaldi B.
Publisher: OECD Publishing
Download: http://www.oecd-ilibrary.org
Publication year: 2013
ISBN code: n.d.

The OECD Open Government Data (OGD) project is oriented to evaluate the international efforts made until now to challenge their implementation. Indeed OECD aims at setting up a knowledge framework of OGD policies, strategies and initiatives in order to develop a methodology to assess the impact of OGD on the improvement of government performance. For this purpose the first step is represented by this report which collects the main principles, concepts and criteria of OGD initiatives around the world and the related chances that can be given to policy makers.

Even though the OGD is still a term used as an umbrella for a lot of concepts, the author of this report explains the difference among the Public Sector Information, which is related to "information disseminated, or funded by or for a government or public institution", the Big Data that are a "collection of datasets so large and complex that it is difficult to use on-hand database management tools, or traditional data processing applications" and the OGD that are characterised by two main elements: they are elaborated or accredited by public bodies and open data are can be freely used and distributed by anyone, on condition that users attribute the data and that they share their work.

Thanks to these characteristics, the potential benefits of their use are not only considered in monetary and economic terms, but also from social and good governance perspectives. In addition to the income that can be generated by commercialising government data, OGD initiatives allow also to people both to make decisions that can enhance the quality of their lives and to increase participation in public affairs. Nevertheless the achievement of all these advantages depends on overcoming the challenges related to policy, technology, financing, organisation, culture, and legal aspects.

Data accessibility and sharing between public authorities and the users requires a consistent legal framework to ensure transparency and controlling information. For instance, the Open Data White paper published in the UK (2012), aims at explaining how the Government intends to put data and transparency at the heart of government and public services. In order to facilitate and coordinate the work of public agencies in the transition towards OGD provision, it should be defined when and which kind of data can be published in readable formats and how to deal with approved publishing formats. To this aim guidelines, handbooks and benchmarking activities represent useful measures a government may chose; European countries as Norway, Spain and France have already published them.

In addition to all these key issues that are worth being debated and addressed by governments, the last section of the report focuses on the methodological framework for evaluating OGD initiatives with the purpose of "developing a common set of metrics to consistently assess impact and value creation within and across countries". The author suggests a methodology to perform empirical analysis of OGD initiatives, to be applied both to ex post and ex ante analysis, based on questionnaires and interviews.

This framework represents just a first step towards a quantitative assessment of OGD quality, in order to start defining the necessary phases to design and implement OGD initiatives, and it does not provide a set of well-defined indicators.

Title: Future of Government – Smart Toolbox
Author/ editor: AA VV
Publisher: World Economic Forum
Download: http://www.weforum.org
Publication year: 2014
ISBN code: n.d.

The World Economic Forum's Council on the Future of Government, in cooperation with the United Arab Emirates (UAE) Government, developed this report in order to analyse how technology has impacted governments and their work. The UAE has been in the forefront of technological innovation to improve government services, and it has been ranked second in the Government Usage of ICT index, within the Global Information Technology Report (2014) by the World Economic Forum.
The starting point is that technology can help government re-build trust through several channels, such as e-participation, or social media, and allows to create a synergistic relationship between leaders and followers. Nevertheless technology on its own is not enough to build smart governments; according to the report, trust and leadership have to characterise the input variables for a good government, whose performance can be enhanced by the mix of soft and hard power elements used in a smart way. Hence the title of the report. Measuring trust can help government to benchmark progress, identify gaps and learn from best practices across the world. Building leadership in the technological era will occur through information technology, big data, and disruptive and exponential technologies ("governments as well as the world's top enterprises will need to employ exponential technologies and innovation to dramatically accelerate their objectives"). The question the authors attempt to answer is how technology can help governments get better at dealing with eight key government priorities: anti-corruption, political representation, delivery of services, trust, leadership, security and innovation. In each one of the eight chapters that describe the main elements, the potential application of ICT and the examples of good government in the eight core areas, the authors highlight that governments need to review the plans and strategies to reach to the citizen expectations, especially with the current massive technical developments. Pointing out that governments have the largest base of customers in the world, offering their services to seven billion people, technology can strengthen good government such as by enabling greater transparency of government actions through open data, or empowering citizens to have faster and more accurate access to online services. The Chinese government, in the Eastern area of the country, launched some open and e-commerce platforms providing data and one-stop access to public services to help businesses in the region better compete in the global market. In Norway, one of the world's leaders in public sector innovation, a centralized platform that allows its users to search and request documents at all levels of government and service (taxation, prescription medication, pension and so on). As part of the toolbox, the last chapter describes three scenarios on how the world of governance could evolve by 2050, on the basis of interviews Council Members, to understand their perceptions of the main forces of change that will impact the role and forms of governments in the future. Indeed the aim is twofold: making this smart toolbox as forward-looking as possible and facilitating the dialogue on the options we have now to shape desired governance systems of the future. City State refers to a world where authority is decentralized to the city level; e1984 is characterised by the spread of Big Data is realized; Gated Community where all these services are entirely managed by private companies.

Title: Smart communities: how citizens and local leaders can use strategic thinking to build a brighter future
Author/editor: Morse W. S.
Publisher: Jossey-Bass
Download: n.d.
Publication year: 2014
ISBN code: 978-1-118-42700-2

Susanne Morse, the author of this book, is the president of the Pew Partnership for Civic Change, a civic research organization providing consulting to governments and foundations to identify and implement solutions to make communities stronger. Thanks to the results of more than a decade of research by this organization, this book describes the key strategies used by thousands of leaders that have been able to create successful communities, giving to leaders from both the public and private sectors the tools they need to create a better future for the community's citizens.

The author stresses the complexity and connections of community problems, referring always to the two main themes that are at the basis of the book: the awareness and the need to act with a bottom-up approach, because, as the author states, "to be citizens who feel connected to our communities, and thereby creating better lives for ourselves and for our neighbors, we must be aware of the critical issues in our communities". Morse's research led to the identification of seven high leverage points that are all necessary to manage changes in the communities and to build successful ones:

- investing right the first time: identifying the main elements that allow to obtain the greatest return, by using the "triple bottom line" concept that means budgeting, investing and decision making;
- working together: developing the vehicles that communities can use to organize themselves for more collaborative approaches (for instance partnerships necessary to create new opportunities for success) and overcome the barriers that prevent them;
- building on community strengths: focusing on what is right, by experimenting new ways of thinking to lead to better results;
- practicing democracy: developing ways for citizens to actually decide the future, rather than always just reacting to it;
- preserving the past: using history, buildings and culture to inform and catalyze the future, in order to create different scenarios that contribute to the economic and quality of life indices;
- growing leaders: getting citizens prepared, activated and encouraged to get involved, to develop their capacities and3 to take action together;
- investing in a brighter future: encouraging risk-taking and entrepreneurship in dealing with community issues.

Each one of these seven key issues is described in a different chapter that follow a general pattern of identifying the issue, discussing it, reporting several case studies, briefly described, and framing the lessons learned.

Summarising, this book, as the author states in the title, is aimed at citizens and local leaders who are committed to their community and it differs from the other community-building books in different aspects: it describes both practices and results related to smaller cities and rural areas and highlights that in the next future successful communities will have adapted to change, reinvented their economy and redefined themselves through public processes. The question is not what they will be like, but who will they be?

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03

SMART COMMUNITIES BETWEEN GOVERNANCE AND SOCIAL PARTICIPATION

REVIEW PAGES: LAWS

VALENTINA PINTO
TeMALab - Università degli Studi di Napoli Federico II, Italy
e-mail: valentina.pinto@unina.it

In this issue

THE EU E-GOVERNMENT ACTION PLAN 2011 – 2015

In recent years, the European Union has started a process of radical reforms that call for a revolution in the structure and in the functioning of Public Administration. These changes concern in particular the process of computerization of the public administration, renamed "eGovernment" (from Electronic Government), which should allow to manage the documentation and administrative procedures with digital systems, and could provide a wide variety of benefits including more efficiency and savings for governments and businesses, increased transparency, and greater participation of citizens in political life.

E-government is defined as «the employment of the Internet and the world-wide-web for delivering government information and services to the citizens» (UNDESA 2012); so, it implies the use of the Information and Communication Technology (ICTs) in order to improve and streamline operations and services offered by the Public Administration, aimed at:

- improving operational efficiency within each Administration;
- computerizing the delivery of services to citizens and businesses that often involve integration between the services of different administrations;
- allowing an on line access to the government services and information.

In this context, the new information technologies play a crucial role as they represent the operational tool to improve delivery of digital services both for citizens and businesses, in a number of domains such as in procurement, justice, health, environment, mobility and social security, and respond to an innovation request more and more widespread and demanding. Thanks to ICTs, citizens can benefit from the services provided by the public sector in an innovative, efficient and economical way.

ICTs are already widely used by government bodies, as it happens in enterprises, but eGovernment involves much more than just the tools. It also involves rethinking organisations and processes, and changing behaviour so that public services are delivered more efficiently to people (ec.europe.eu). As a matter of fact, to get to be "smart", a city not only has to face a technological challenge but has to make organizational changes at administration level, ensuring the involvement of all stakeholders.

CONTENTS, PRIORITIES AND ACTIONS OF THE PLAN

Formerly, it was the Malmo Ministerial Declaration in 2009 that defined the priorities for all European public administrations over the next 5 years, setting out that by 2015 European public administrations should be «recognised for being open, flexible and collaborative in their relations with citizens and businesses. They use e-Government to increase their efficiency and effectiveness and to constantly improve public services in a way that caters for user's different needs and maximises public value, thus supporting the transition of Europe to a leading knowledge-based economy» (EC 2009).

With the European e-Government Action Plan 2011-2015, European Commission is committed «to developing and promoting more useful and better ways, relying on ICT solutions, for businesses and citizens to participate in public policy consultations, debates and policy-making processes» (EU 2010).

On this basis relies the European e-Government Action Plan 2011-2015 "Harnessing ICT to promote smart, sustainable and innovative Government", aimed at increasing the capacity of citizens, businesses and other organisations to be pro-active in society through the use of new technological tools.

Published in December 2010, it forms an integral part of the 2020 Digital Agenda of which contributes towards fulfilling two key objectives:

- by 2015, a number of key cross-border services will be available on line – enabling entrepreneurs to set up and run a business anywhere in Europe independently of their original location, and allowing citizens to study, work, reside and retire anywhere in the European Union;
- by 2015, 50% of EU citizens will have used e-Government services.

Since e-Government services are also of great importance for businesses, this Action Plan also aims that by 2015, 80% of enterprises will have used e-Government.

The European Commission's main responsibility is to improve the conditions for development of cross-border eGovernment services provided to citizens and businesses regardless of their country of origin; while each Member State should set their own targets and show how to achieve these targets by means of measures such as adopting legal instruments, setting standards, etc..

Through the implementation of this Plan, then, the European Union is trying to move towards a more open model of design, production and delivery of innovative online services able to allow the European governments to provide better public services with fewer resources.

In order to achieve this aim, the Commission sets out 4 political priorities for all European public administrations that fits with the priorities defined in the Malmö Declaration:

Priority 1: User empowerment

User empowerment aims at «increasing the capacity of citizens, businesses and other organisations to be pro-active in society through the use of new technological tools.[…]. Empowerment also means that governments should provide easy access to public information, improve transparency and allow effective involvement of citizens and businesses in the policy-making process» (EU 2010)

In order to empower users, the Commission will support Member States to:

- develop services designed around users' needs, and inclusive services: this involves, for example, to track allocation of allowances or benefits, enroll in schools or universities, request and receive online civil certificates, submit online tax declarations.

- introduce collaborative production of services: in order to enable users to play an active role in the design and production of public services; to do so the Commission will assess how to involve users actively in design and production of eGovernment services and further elaborate recommendations/guidelines with and for the Member States;
- re-use public sector information (PSI): this action is linked to the re-use of data (such as geographical, demographic, statistical, environmental data etc…) gathered by public authorities and in many cases not used anymore. The release of this kind of public data probably will allow citizens and businesses to find new ways to use it and to create new innovative products and services.
- improve transparency: the action aims at allowing users to trace their personal data stored by public administrations, enabling users to check who accessed their administrative files and giving users insight in the process of decision making;
- foster the involvement of citizens and businesses in policy-making processes: Member States are committed to developing and promoting more useful and better ways for businesses and citizens to participate in public policy consultations, debates and policy-making processes.

Priority 2: Strengthening the internal market

In order to strengthen the internal market so to apply for services from one country when in another EU country, the Commission proposes various initiatives to develop:

- seamless business services: through these action, the Commission intends to put in place a cross-border infrastructure which will enable businesses to sell and provide services and products all across the EU, through easy electronic public procurement;
- personal mobility: the Commission will provide cross-border and interoperable eDelivery services for citizens, e.g. so that they can study, work, reside, receive health care and retire anywhere in the European Union;
- implementation of cross-border services at EU level: the Commission will support and coordinate the efforts of Member States to roll out a number of key cross-border public services between 2012 and 2015 and identify appropriate life events/stages.

Priority 3: Improving the efficiency and effectiveness of Governments and administrations

The actions on this priority is oriented at improving the efficiency and effectiveness of Governments and administrations by using ICT, which would enable:

- organisational processes to be improved: the Commission wants to rationalise administrative processes by transforming the ePractice portal and mainstreaming online public procurement procedures; in order to do so, the Commission, in close cooperation with Member States will set up a programme for staff exchanges between administrations in different Member States and will implement an ambitious eCommission Action Plan for 2011-2015, including full electronic procurement, a public sector information strategy and a transparency policy.
- administrative burdens to be reduced: this action aims at the simplification of administrative processes, e.g. through smart use by public authorities of citizens' available information and by applying the principle of 'once-only' registration of data whereby the information needed from citizens is only collected once, on condition that data and privacy protection requirements are met;
- green administration to be prioritised: this involves reducing the carbon footprint of administrations in Member States. To this end, the Commission intends to collect best practices in order to develop indicators and evaluation procedures specifically for government.

Priority 4: Creating preconditions for the development of eGovernment

In order to implement the actions that will enhance eGovernment services in Europe, a number of technical and legal pre-conditions need to be put in place, such as:

- promote interoperability: in order to enable collaboration between administrations in Europe. In particular, standards and open platforms offer opportunities for more cost-effective use of resources and delivery of services.
- Rely on key enablers: such as the development of electronic identification (eID) technologies and authentication services that are essential for the security of electronic transactions (in both the public and private sectors). In addition, the Commission intends to propose a revision of the eSignature Directive to enhance security;
- Benefit from innovative technical approaches: the new generation of eGovernment services will need to rely on and benefit from innovative technical approaches, such as clouds of public services and service-oriented architecture (SOA) to build open, flexible and collaborative eGovernment services while at the same time lowering ICT costs. In particular, this action aims to identify and disseminate tested and safe solutions for clouds of public services, SOA and transition strategies for converting from IPv4 to IPv6.

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IMAGE SOURCES

The image of page 2 is taken from ec.europe.eu.

04

SMART COMMUNITIES BETWEEN GOVERNANCE AND SOCIAL PARTICIPATION

REVIEW PAGES: URBAN PRACTICES

GENNARO ANGIELLO
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: gennaroangiello@yahoo.it

In this number

ICTS IN PARTICIPATORY PLANNING: THREE CASE STUDIES

The desire to build sustainable and inclusive societies has come with the recognition of the value of involving the public in planning and decision-making processes (Rinner and Bird, 2009). Several initiatives word-wide have demonstrate that, if done effectively, participatory planning may have different positive social outcomes. Indeed, local governments can use participatory planning methods in order to develop policies based on shared values and trust, achieve common goals and encourage two-way communication with citizens (Yetano et al., 2010). At the same time, participatory planning process may educate citizens about the rationale and complexity of policy-making, legitimize government decisions, and provide opportunities for mutual learning (Phang and Kankanhalli, 2008). In this contest, the Information and Communication Technologies (ICTs) are believed to provide a valuable tool to enhance proactive citizen participation and collaboration, as well as foster openness and transparency (McDermott, 2010). As technology has become more advanced, an increasing number of ICT-based participatory planning initiatives have been developed around the globe.

In this paper, we present three European case studies:

- The use of 3D city models in the contest of two regeneration initiatives in the city of Bologna;
- The development of a ICT based platform in the context of the Hérault river basin water management plan;
- The application of a Public Participation Geographic Information Systems (PPGIS) in the context of the Helsinki Master Plan.

This contribution aims to analyze, through a case-study approach, the currently emerging opportunities offered by Information and Telecommunication Technologies in addressing social participation challenges and to identify common successful factors. In this regard, a strong collaboration between key players (i.e. local governments, policy makers, local communities and scholars) has emerged as important common conditions for the successful implementation of a participatory planning process. A second common successful factor consists in the development of a planning support tool that takes into account the complexity and the diversity of the social, environmental and economic context of reference. With different strategies and different solutions, the case studies analysed have shown how ICTs can be key factors to support collaborative dialogue between policymakers and citizens and create results more readily accepted and relevant within communities by incorporating local knowledge and opinions into decision-making.

THE USE OF 3D CITY MODELS IN THE CONTEST OF TWO REGENERATION INITIATIVES IN THE CITY OF BOLOGNA

Urban planning and renewal is a very complex process consisting of tasks that require joint decision making. In such tasks, methods that allow a clear communication of design and planning options between policy makers and citizens are considered of critical importance (Rabino et al., 2014).

Transition from paper-based planning process to developing 3D city models using digital maps has simplified and expedited the decision-making process by facilitating communication between professionals and citizens about a number of issues pertaining to design and planning (Zyngier et al., 2014).

The urban API tools represent a valuable example of the use of visual 3D city model in participatory urban planning process. The project has been funded by the European Commission in the context of European initiatives to improve policy as a more transparent and understandable process.

It is a three-year, multi-partner collaborative project involving a number of European Universities and local governments. The aim of the project is to develop ICT tools to support urban governance and spatial planning.

The City of Bologna is one of the local partner that is currently pursuing urban API solutions for both urban planning as well as environmental objectives. A pilot area of the city centre has been chosen for the application of the "3D Scenario Creator", a tool developed within the API project aimed at addressing the issue of stakeholder engagement in the planning process through the development and provision of enhanced virtual reality visualisations of neighbourhood development proposals.

Since 2013, the tool have been applied within two municipalities programs ("Ambiente Vitale" and "Di nuovo in centro") aiming to improve pedestrian and bike accessibility within the city centre as well as meliorate the quality of the public space for its inhabitants.

The application of the tool allows urban planners to present their plans to a wide audience and hence raise the awareness among citizens about future developments. 3D visualisations of the district's routes has been realised and presented during workshops and seminars.

The 3D Scenario Creator is currently helping planners to better visualize urban transformations in the district, improve interdepartmental collaboration and coordination in decision-making, and take account of citizens' opinions and suggestions, in line with the community participation processes already started with the many citizen committees and cultural associations.

Through the 3D Scenario Creator, citizens are able to interact with the Municipality. They can suggest, for example, the localization of bike and car sharing points, or public transportation and cycle track routes.

They can also provide inputs concerning the management of pedestrians' route ways or the rubbish collection system. The use of enhanced virtual reality helps citizen in understanding and express their opinions regardless different planning options of rehabilitation of public spaces.

The tool helps planners to take easily in consideration citizens' suggestions and feeds, in order to better take care of interests and needs of the community, and come to an agreement with environmental sustainability issues.

The Bologna example demonstrates the ways in which the complexities of the policy modelling process can be facilitated by ICT tools. 3D visualisation itself provides a major advance in communication between the policy-making community (urban planners and the political domain) and urban stakeholders, including citizens.

THE DEVELOPMENT OF A ICT BASED PLATFORM IN THE CONTEXT OF THE HÉRAULT RIVER BASIN WATER MANAGEMENT PLAN

The complex and dynamic nature of environmental problems requires flexible and transparent decision-making that reflects a diversity of values and knowldeges (Reeds, 2008). Emerging discourses on environmental management recognise the need for new approaches that encourage stake-holders participation in order to enhance adoption and practice change.

The European Union has recently recognised this need by adopting a number of directives such as the EU Water Framework Directive (WFD). The WFD provides a common approach across Europe to address many of the entrenched problems in water policy and to engage stake-holders during the planning process.

One interesting example of the possible uses of ICTs in participatory planning concerning with environmental issues has been developed in the context of the Hérault river basin water management plan, where a multi-media ICT based platform to inform the debate on water resource management has been developed.

The Hérault river basin is a small Mediterranean river basin, covering an area of approximately 2500 square kilometres. In 2003 the local authorities have initiated a formal concertation where the key stakeholders interacted to design a river basin water management plan. Parallel with the preparation of the concertation process, a ICT-based platform was developed to address different types of audiences (citizen, farmers, representative of the industrial sector and of representatives of public bodies) both in terms of visualisation and contents.

The platform consists of several modules witch can be accessed by the users through an interactive multimedia interface.

The first module introduces the user to the region of concern. Then, through a menu, the user can access to several types of base information such as the uses of water and hydro system services, georeferenced spatial information, governance issues, relevant social actors involved in the planning process, etc.

Through a second module, the user can explore different scenarios by generating them through a scenario generator of plausible futures. Each scenario is the result of different driver factors that can be selected by the user (e.g. regulation or constraints imposed on agricultural uses, further exploitation of the aquifer, etc). Once the user has generate one or more scenario, it can assess each scenario, selecting between several performance indicators.

The definition of the driver's factor as well as the criteria to asses different options has been defined trough a set of 70 semi-structured interviews with representatives from various categories of users and with municipalities, environmental protection associations, actors involved in tourism activities and civil servants from various government agencies. The information collected during these interview has been also used to the identification of a number of conflicts between stakeholders.

After these interview, the platform has made accessible by a number of stakeholders involved in the planning process that explored its potentiality individually.

According to the users of the platform, the tool was likely to have a strong impact on potential users and influenced the outcome of the debate. The stakeholders found that the tool have the potential to improve inclusiveness by providing a shared ground where exchange of knowledge is possible (Pereira et al., 2003).

THE APPLICATION OF A PUBLIC PARTICIPATION GEOGRAPHIC INFORMATION SYSTEM IN THE CONTEXT OF THE HELSINKI MASTER PLAN

Citizens' knowledge provides a rich source of updated information that helps planners to improve the quality of the analysis, leading to different solutions than when using traditional forms of data (Bugs et al., 2010). In the last decade, advances in Geographic Information Systems (GIS) and Web 2.0 technologies provide new ways of incorporating local knowledge into urban planning using online GIS tools. The term "PPGIS" (public participation geographic information systems) refers to the possibility of engaging local communities is the public hearing by creating sophisticated Web applications that strengthen social interactions based on comments on online maps (Gordon et al., 2011).

An interesting application of PPGIS can be found in the Helsinki city master Plan. Finland has a long democratic tradition involving citizens in the plan making process. The city of Helsinki is currently drawing a new City plan, which will guide the development of Finland's capital until 2050. The City plan, named Vision 2050, is founded on the idea of Helsinki will be an urban, rapidly growing rail transport network city with expanding central areas coupled with other developing centres. In 2012 the Helsinki City Board launched a programme to promote local civic participation with the help of democracy pilot projects. The pilot projects were intended to increase resident participation and resident opportunities to influence City decision making. People can participate in the preparation of the City plan in various ways throughout the planning process: by participating in information sessions and in discussions on the City plan website, contacting the planners or leaving an opinion during the official display periods.

The City Planning Department has also opened a map-based survey to chart the views of residents to support the development of the new city plan. The web-based survey has been developed by Mapita, a Finnish company spawned from the research group Land Use Planning and Urban Studies of the Aalto university, working closely with City Planning Department.

The web survey allows Helsinki residents to express their thoughts on the city's future. The survey attracted some 4,700 respondents and allowed respondents to mark locations on the map to indicate where they would like to see residential development and where the city's key recreational areas should be located. Respondents to the map survey also indicated many locations where new or improved transport connections are needed, approximately 4,000 locations in total. The survey was available in three languages: English, Swedish and Finnish. It produced nearly 33,000 notifications about possible sites for new construction, valuable recreational areas and transport connections that residents are in dire need of. Due to this project, Helsinki became the first major world city to use PPGIS to inform its comprehensive city planning process. The map-based questionnaire also provided city planners with information on which proposals garnered more wide-spread support.

The city of Helsinki published all the survey data online and organized a competition for software developers with the aim of developing new and interesting methods for utilizing the data collected during the survey.

The Helsinki example demonstrates how PPGIS could be a cost-effective tool for exploiting the local knowledge as well as enhancing effective participation and communication among experts and non-experts via an easy-to-use and interactive exchange platform.

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IMAGE SOURCES

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05

SMART COMMUNITIES BETWEEN GOVERNANCE AND SOCIAL PARTICIPATION

REVIEW PAGES: NEWS AND EVENTS

GERARDO CARPENTIERI
TeMALab – Università degli Studi di Napoli Federico II, Italy
e-mail: gerardo.carpentieri@unina.it

In this number
URBAN SMARTNESS

One of the most important aspects in the study of smart city is that of the human component. Thanks to the diffusion of Information and Communication Technology, citizens will have the opportunity to participate actively in decision-making processes of local development. In fact, there are many solutions or tools that offer both citizens to be able to express their needs and those who are in charge of the urban development plan to be able to know the socio-economic and environmental needs of those who live in the area. So the solutions related to smart city can facilitate communication and the exchange of information between the various actors that contribute to urban development. In addition to the positive effects on the process of urban planning ICT has also enabled an improvement in the economic and social conditions of the inhabitants. In fact, thanks to the development of these new technological networks have made it much faster and economic interactions between the different actors in the area, developing new types of economic activities.

In this issue have been selected some international events that will take place in the coming months and that highlight the importance of paying particular attention to the analysis of social phenomena in the development of new solutions and in the application of technologies related to smart city planning.

ICISS 2014

SMART SYSTEM PLATFORM DEVELOPMENT FOR CITY AND SOCIETY, GOESMART 2014

Where: Bandung – Indonesia
When: 24 - 25 September 2014
http://iciss2014.stei.itb.ac.id/index.html

The School of Electrical Engineering and Informatics Institute Technology Bandung (Indonesia) and Institute of Electrical and Electronics Engineers (IEEE) organize this international conference to put in evidence the advancement of smart system research and study on Information and Communication Technology (ICT).

The development of ICT is now able to connect, monitor and control various human resources, objects, the humans and objects and with other natural components. These new solutions allow an improvement process more effective, easy, inexpensive and efficient. The main topics that are covered in this conference are the concept of smart village, smart city, smart community, smart transportation, smart education, smart health, etc., in order to improve the quality of life in rural, urban and community.

SMART CITY EXHIBITION

Where: BOLOGNA – ITALY
When: 22 - 24 October 2014
http://www.smartcityexhibition.it/

The SMART City Exhibition is the result of a partnership between FORUM PA and Bologna Fiere whose third edition will be held in Bologna. The event offers a new vision of the concept of the city as a set of information flows and networks of relations and communications, physical and digital, characterized by the ability to create social capital, well-being for individuals, better quality of life. Also novelty is the formula, centered on participatory and collaborative moments of work on the presentation of large international scenarios, on the construction of new shared culture that helps the transform the country with the project-a series of initiatives are not always coordinated. The main objectives of the SMART City Exhibition are to highlight the basic steps for a strategic and holistic urban ecosystem, offer moments of awareness and training for political and administrative leadership to confronting on the new models of procurement and public-private partnership. The event is organized to promote dialogue between executives, political and administrative ministries, the academia and research, individual professionals, technicians working in all fields that connect to urban living, representatives of technology companies, small and medium-sized enterprises, innovative young "makers" creative, citizenship and organized individuals interested in pursuing policies to improve the welfare and quality of life in cities

THE FIRST INTERNATIONAL CONFERENCE ON IOT IN URBAN SPACE

Where: ROMA
When: 27 - 28 October 2014
http://urbaniot.org/2014/show/home

The First International Conference on Internet of Things (IoT) in Urban Space (Urb-IoT 2014) is a new conference that aims to explore the dynamics with the scope of the IoT and the new science of cities. The growth creates of urban population an unprecedented urge for understanding cities to enable planning for the future societal, economical and environmental well being of their citizens. The increasing deployments of Internet of Thing (IoT) technologies and the rise of so-called "Sensored Cities" are opening up new avenues of research opportunities towards that future. The urban spaces are the man made microcosms where a number of entities interact with each other to offer citizens a variety of services, for instance, buildings and infrastructure, transportation, utility, public safety, healthcare, education. The conference is uprising to technology experts, researchers, designers, urban planners, architects in academia and industry, and promises to offer a perfect forum to share knowledge, experiences, and best practices primarily in the area of Citizen Awareness and Engagement, Urban Analytics and IoT Applications and Services in Urban Context. The event is endorsed by the European Alliance for Innovation, a leading community-based organization devoted to the advancement of innovation in the field of ICT and will be co-located with the IOT360 Summit.

SOCIAL INNOVATION/SMART CITY WEEK – INTERNATIONAL CONFERENCE

Where: YOKOHAMA – JAPAN
When: 29 - 31 October 2014
http://expo.nikkeibp.co.jp/social/english/

The three days of Conference and Exhibition at Pacifico Yokohama are organized by Nikkei Business Publications (Nikkei BP). The conference is designed to provide a seat for stakeholders in Japan and other countries working to address social issues to forget new partnerships with corporations and to identify possible new technologies and solutions that can facilitate resolution. In this edition are expected some 50,000 participants with 3000 plus visitors from 80 countries. In particular the representatives of emerging nations of Asia and Africa, where business opportunities are ample, come to this event to seek out the knowledge, technology, and solutions of Japanese corporations and local governments.
The conference was divided into several thematic events that aim to deal with the different aspects related to the use of new technologies for improving the quality of life, which are:

- Smart City Week, a vision for society and the role of cities;
- Energy security / management, optimal solutions to securing independent energy sources;
- Infrastructure renovation, reducing the impact of disasters and facilitating recovery through prediction and collaboration;
- Disaster prevention, technology-powered medicine, health, and nursing care for the future;
- Impact of technology, new means of forging our future.

OPEN WORLD FORUM

Where: Paris – France
When: 30 October - 1 November 2014
http://www.openworldforum.paris

The Open World Forum is the first European summit to gather political representatives, decision-makers and experts, in order to debate the technological, economic and social impacts that the Free and Open-Source technologies bring to market. The forum is now organized annually in Paris, with more than 200 speakers coming from 40 countries and a global audience that was 2200-people strong in 2013. The Open Source Forum The Open World Forum is held in partnership with all the major international communities and the main French Open Software organizations, with the support of local government. The event bringing together decisions-makers, developers and users from all over the world to cross-fertilize open technological, business and social initiatives, to shape the digital future. The main objective will be to illustrate the major role of Openness (Free and Open-Source Software, Open Data, Open Hardware, Open Design, etc.) in the digital society, understand and leverage the key subjects that are transforming the open source ecosystem (Web, mobile phones and tablets, Big Data, cloud infrastructure, software quality, emerging languages and platforms) and the advantages to use the Free and Open Source software in the day-to-day life

SMART CITY EXPO WORLD CONGRESS 2014

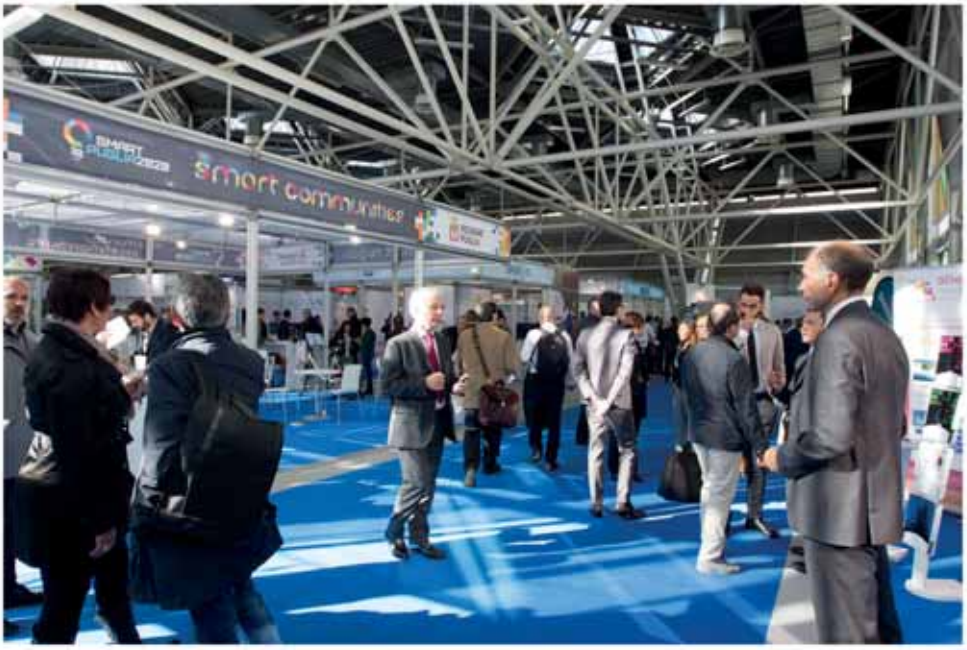
Where: Barcelona - Spain
When: 18 - 20 November 2014
http://www.smartcityexpo.com/

The Smart City Expo World Congress (SCEWC) is the leading event where representatives of cities, institutions, universities and industry meet together to showcase and discuss the best ideas and solutions for the smart cities of the future.
Barcelona's SCEWC 2014 will continue to investigate the most innovative developments transforming our cities, happening in the worlds of technology, energy, governance, sustainability and mobility while always maintaining the society and the citizens at the centre of the debate. The Smart City Expo World Congress is a meeting point for companies, public administration, entrepreneurs and research centres to show, learn, share, network and gather inspiration to support the development of cities of the future. The topics of the conference are Smart Society, Technology, Governance, Energy, Mobility and Sustainable City.

3RD ANNUAL WORLD INTELLIGENT CITIES SUMMIT 2014

Where: Istanbul – Turkey
When: 10 - 11 December 2014
http://www.wicsummit.com/

The Third Annual World Intelligent Cities Summit and Exhibition is one of the most important forum on future development of cities and regions will require the intelligent integration of communications technology, coupled with changing behaviour in how use this technology, to make our cities and regions smarter and more energy efficient. The main research topics that will be discussed during the conference are the drive innovation, boost efficiency, leverage data, upgrade service delivery and achieve economic prosperity.
This forum is an international platform for the transfer of knowledge, allowing leaders of municipalities to learn from the pioneers of smart city concepts and technologies.



Smart City Exhibition 2014, Bologna.

AUTHORS' PROFILES

Gennaro Angiello

Engineer, Ph.D. student in Civil Systems Engineering at the Federico II University of Naples. His research interests are in the field of accessibility analysis and modeling, land-use and transport interactions and sustainable mobility. He is currently involved in the research project Smart Energy Master and in the COST Action TU1002 accessibility Instruments for Planning Practice in Europe.

Gerardo Carpentieri

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. He received a master's degree in Environmental and Land Engineering with a thesis on the integrated government of land use and mobility for environmental sustainability in the metropolitan areas. In July 2013 he won a scholarship within the PRIN project on the "Impacts of mobility policies on urban transformability, environment and property market". He is currently involved in the research project "Smart Energy Master" at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II.

Valentina Pinto

Engineer, Ph.D. student in Hydraulic, Transport and Territorial Systems Engineering at the University of Naples Federico II. Her research activity at DICEA department of the University of Naples Federico II is aimed at studying the relation among city, mobility, and environment and consists in setting up a support tool for the public decision-maker in individuating the possible influences of the urban planning policies on mobility tools.

Laura Russo

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. She received a master's degree in Architecture and Building Engineering with a thesis on urban expansion and the sprawl phenomena, with particular attention for Campania. Since 2014, she works at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II – within the European project "Smart Energy Master" and her research activity is focused on the complex and multidimensional relationship between the city and energy consumption.

Floriana Zucaro

Engineer, graduated in Environmental and Territorial Engineering at the University of Naples Federico II with a specialization in management of urban and territorial transformations. Since 2012 she has been a PhD student in Hydraulic, Transport and Territorial Systems Engineering at the Department of Civil, Building and Environmental Engineering – University of Naples Federico II. Since 2014 she has been a scholarship holder within the Project Smart Energy Master for the energy management of territory financed by PON 04A2_00120 R&C Axis II, from 2012 to 2015. Her research activity is focused on the integration of land use planning, sustainable mobility and energy saving policies in urban contests.

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SMART CITIES CHALLENGES

PLANNING FOR SMART CITIES.
DEALING WITH NEW URBAN CHALLENGES

3 (2014)

Hong Kong urban landscape at night.
“Digital Love” , author Coolbiere A.

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EDITORIAL PREFACE:
SMART CITY CHALLENGES
PLANNING FOR SMART CITIES. DEALING WITH NEW URBAN CHALLENGES

ROCCO PAPA
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples Federico II
e-mail: rpapa@unina.it
URL: www.roccopapa.it

The role of urban planner is changing: ICT and big data availability, enabling them to monitor and analyze large amount of data and information, may contribute to better understand and plan the city, improving efficiency, equity and quality of life for its citizens and its capacity to face future challenges. Big data availability is shifting our focus away from the long to the very short term, affecting urban planner's efforts on generating an effective knowledge base for planning.
This third issue of the volume 7 of TeMA Journal of Land Use, Mobility and Environment focuses on this theme with a specific focus on the new urban challenges.
In the FOCUS section two articles have been selected. The first article is named "The role of tourism in planning the smart city" by Rosa Anna la Rocca starts from the consideration that tourism, for the size it has assumed and for its role in the economies needs adequate governance processes, politics and tools in order to reduce impacts on urban quality of life. The emerging paradigm of "Smart City" is an opportunity to reconsider the current urban planning means, but it needs a holistic approach. Nowadays, the technological component of Smart city prevails mainly because of the ease of diffusion of the instruments, rather than an innovation of the processes. Promotion initiatives concentrate exclusively on the city branding, rather than on initiatives to make cities able to support an additional urban load expressed by the tourism demand. Yet, potentialities of the application of new technologies could strengthen the decisional role in defining adequate urban policies to manage urban tourism. However, urban smartness for tourism seems to be concentrated on the amount of apps available to enhance the use of specific resources or, more rarely, of the urban mobility systems. Both the "big data" and the "open data" revolution, in Italy, do not yet seem to have achieved the hoped results, and the availability of data to allow appropriate management actions, is still one of the main difficulties for those involved in the analysis and quantification of the phenomenon.

In addition,the numerous rankings on urban smartness refer to the prevalence of one component on the others, failing to consider the complexity of the urban system and of tourism, in particular. The second article titled "Politiche 'Smart' e Visione Metropolitana: la Dimensione Territoriale nell'Esperienza Progettuale della Amsterdam Smart City Platform" by Giulia Fini e Salvatore Caschetto aims at presenting the main projects and policies recently developed by the Municipality of Amsterdam in the field of energy policies, with particular reference to the projects promoted in the context of the ASC - Amsterdam Smart City Platform. The paper analyses projects and policies which are relevant for at least three aspects and for the matters raised by them: I. for the aim to connect policies and projects of the Amsterdam Smart City with the definition of a territorial vision for the Amsterdam metropolitan area; territory and the management's choices related to urban planning and urban design; III. the experience is relevant in relation with the consolidation of the ACS's platform as a place where several individuals are directly involved in the management of public services and where all requests and peculiarities contribute to define a common planning process on the energy and environmental fields of action in the metropolitan area. Based on the latest, most significant information of the activities performed by the Amsterdam Smart City Platform, the paper focuses on the results after four years since the projects and tests have been carried out, on the basis of a network structuring actions, energy-saving targets and space-related choices regarding the whole territory as well as ASC's policies.

The section Land-use, Mobility and Environment LUME collects two articles of the broader theme of integration between mobility, urban planning and environment. The article "Urban Taxing Alternatives for Private Vehicles as an Urban Mobility Management System" by Marins, Orrico and Nascimiento reflects on proposals for the use of urban tolls on private vehicles as a form of urban mobility management. The methodology used exploratory research for the development of a theoretical basis and a table was drawn up showing the experience in various countries. The conclusion is that toll fees are economic viable, the social and environmental benefits are considerable and this can be considered an important sustainable mobility strategy. The second article of the LUME section, titled "Centro Direzionale of Naples. A "Smart" Concept" by Fabrizio Canfora and Fabio Corbisiero, highlights the results of a research conducted in Naples on the empirical case of the "Centro Direzionale". The design and construction of the Centro Direzionale of Naples is, in fact, an archetype of the smart city; a primal testing of "urban intelligence" in terms of transport systems, infrastructure, logistics, systems for energy efficiency and technology. More generally, a good practice of city administration and of exploitation of strategic spatial planning. Finally the Review Pages define the general framework of the theme of Smart City Environmental Challenges with an updated focus of websites, publications, laws, urban practices and news and events on this subject.

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THE ROLE OF TOURISM IN PLANNING THE SMART CITY

ROSA ANNA LA ROCCA

Department of Civil, Architectural and Environmental Engineering (DICEA) – University of Naples Federico II
e-mail: larocca@unina.it
URL: www.dicea.unina.it

ABSTRACT

The article starts from the consideration that tourism, for the size it has assumed and for its role in the economies, can be considered an "urban phenomenon"; as such, it needs adequate governance processes, politics and tools in order to reduce impacts on the organization of cities and urban livability in general. The emerging paradigm of “Smart City” is an opportunity to reconsider the current mechanisms of government and planning of the cities, but it needs a holistic approach that goes beyond the one applied per parts that still seems to prevail in the declination of the components of urban smartness. At present, the technological component seems to prevail probably due to the ease of diffusion of the instruments, rather than an innovation of the processes. Promotion initiatives concentrate exclusively on the city branding, rather than on initiatives to make cities able to support an additional urban load expressed by the tourism demand. Yet, potentialities of the application of new technologies could strengthen the decisional role in defining adequate urban policies to manage urban tourism. However, urban smartness for tourism seems to be concentrated on the amount of apps available to enhance the use of specific resources or, more rarely, of the urban mobility systems. Both the “big data” and the “open data” revolution, in Italy, do not yet seem to have achieved the hoped results, and the availability of data to allow appropriate management actions, is still one of the main difficulties for those involved in the analysis and quantification of the phenomenon. In addition, the numerous rankings on urban smartness refer to the prevalence of one component on the others, failing to consider the complexity of the urban system and of tourism, in particular. With these premises, this article tries to underline how tourism could be the object of urban policies and strategies aimed at reducing impacts on the city.

KEYWORDS:
Smart City; Tourism; Urban Planning.

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旅游在规划智能城市中所起的作用

ROSA ANNA LA ROCCA

Department of Civil, Architectural and Environmental Engineering (DICEA) – University of Naples Federico II
e-mail: larocca@unina.it
URL: www.dicea.unina.it

摘要

本文设定可控的旅游业规模，并且旅游业在经济中所扮演的角色可归为“城市现象”；进而，它需要充分的治理过程、政治和工具以减少其对城市组织以及城市宜居性的影响。“智能城市”的兴起，为我们提供了一个重新思考当前政府机制和城市规划的契机，但需要进行整体的研究，超越目前仍在智能城市（经济、流动、环境、人、生活、治理）组件中流行的单一组件适用于每一部分的方式。

目前，技术组件的流行可能源于其工具的易于扩散性而并非过程的创新。促销举措似乎专注于城市品牌，而非促进城市成为能够支撑由旅游业带来的额外城市负载。但新技术应用的潜力可以加强城市政策管理城市旅游、优化城市服务与设施供应的决策作用。然而，智能城市的旅游业似乎集中在提高特定资源的使用，或者更为少见的城市流动系统的应用程序上。“大数据”和“开放数据” 的革命，在意大利似乎还未能达到希望的结果。允许适当管理行为的可用数据，仍然是参与分析和量化现象所面临的主要困难之一。此外，许多智能城市的排名参考某一组件在其他组件的流行度，未能考虑到城市系统、尤其是旅游业的复杂性。在上述前提下，本文试图阐述旅游业，如何成为城市政策和策略旨在减少其对城市影响的对象。

关键词
智能城市、智能旅游、大数据

1 INTRODUCTION

This article considers tourism as an urban activity that can transform urban organization. The connection between tourism and urbanity is complex: the city is the physical place where tourist desires and inhabitants needs intersect. This means that cities must to face different demands by offering adequate services and facilities. In this sense, tourist load on the city can compromise its balance, affecting urban quality of life. Nevertheless, present cities aim to promote themselves as tourist destination to increase their competitiveness, and tourism is seldom studied as an intrusive activity because of its indisputable positive economic effects. Since the 80s, the sustainability paradigm has been applied at the tourism sector too, affirming a new tourist model, being more responsible and respectful to hosting communities.

Meanwhile, in the last decades, cities have become one of the preferred tourist destination (Page and Hall, 2003) generating a new form of tourism that can be defined as urban tourism). The presence of cities into the "tourist experience" shows the change that has been increasingly affecting the tourist demand. Indeed cities have become the "object of tourist desire" as they are the place where more experiences can be lived contemporarily. Urban tourism has developed during the 70s and refers both to travels towards cities or places with high levels of population density and to the time spent, that is shorter than time normally spent for vacation before. In this period, in tourists' opinion cities become "a perfect destination for a short holiday" (Van Der Borg, et al. 1993) where a large number of attractive factors are concentrated. According to Tourism Towards 2030, UNWTO's recently updated, long-term outlook and assessment of future tourism trends, the number of international tourist arrivals worldwide is expected to increase by 3.3% each year on average from 2010 to 2030. This represents some 43 million more international tourist arrivals every year, reaching a total of 1.8 billion arrivals by 2030. Based on available data, UNWTO describes that tourism's contribution to GDP ranges from approximately 2% (for countries where it is a comparatively small sector) to over 10% (for countries where it is an important pillar of the economy). Therefore, the competition among cities is more and more based on their capacity of attracting tourist flows, because of the undeniable positive effects on economic development. In Italy, for example, tourism contribution to the gross national product is 130 billion euro (about 9% of national production) and it is assumed as one of the leading sector of investment (WTTC, 2013). In the last few years, due to the internet spread and the accessibility to the use of new technologies, tourist demand has rapidly changed again1. Tourist cities have been called to review their strategies to maintain their attractiveness and to promote their image in a "virtual" dimension too. On the other side, tourists have become more conscientious and active in their role of visitors and city-users. In this period, the "smart city" paradigm arises asking for a model of city based on efficiency, resilience, sustainability and social equity. The perspective of sustainability, indeed, seems to call for a change or, at least, to a re-visitation of the present models of socio-economic growth, which cannot be defined "sustainable" at all. The concept of "smart city", although more recent, is not less controversial than the sustainability one. It seems to widen the application of sustainability principles to the urban competitiveness, by referring both to the use of information and communication technologies (ICTs) and to the quality of "social capital". Indeed, the presence of a high quality level of social capital represents one of the main factor of territorial competitiveness and attractiveness. Caragliu, Del Bo, Nijkamp (2009) stated that a city can be defined smart if «investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance» (p. 178).

[1] Some scholars date at the end of the 90s the beginning of e-Tourism, at first, based on the use of internet to promote cultural heritage of a city. After this first period, the use of internet has radically transformed the phase of travel planning, and then the way to communicate and share information and experiences (Maguer 2011; Kennedy-Eden and Ulrike 2012).

Since when in 2011, EU has launched the program "Smart Cities and Communities" to finance European cities that will stand out for cutting consumptions and planning a sustainable development, all the cities aimed to become smart, making the scientific researchers wonder about what urban smartness could really be (Fistola, 2013).

What stands out clearly, is the need of contrasting our present development model to assure a better quality of city-life. Nevertheless, the possibility of realizing the "smart city" model seems to be mainly based on the capacity of deeply changing both the administrators and users lifestyles (La Rocca 2011).

Through these premises, this article by analyzing the relation between tourism and city, try to underline the key-role that urban planning, grounding on a holistic approach to cities' development, should play in coordinating and integrating urban policies addressed to building up a Smart City.

In the first part, the article focuses on the definition of smart city and smart tourist trying to point out what are the changes occurred.

In the second part, referring to Italian situation, the article briefly tries to highlight how some difficulties still arise in collecting tourist data even though "Big and Open Data Revolution" is already started. In the third part, the article attempts to highlight the leading role that tourism activity could assume in the transition to urban smartness.

2 SMART CITY AND SMART TOURISM: WHAT IS CHANGING?

"Smart City" seems to be the new dimension towards where every city would like to go. From an urban planning point of view, it is not very clear what is the way to get this new dimension and what actually a "smart city" is. Nowadays, the questions very spread among cities are: how is it possible to become a smart city? Which are the strategic factors to drive the city towards this new dimension? How to promote urban smartness?

To answer these question, the way to drive the urban system towards this "new dimension" (the smartness) a renewal in the urban planning processes and in the present urban tools seems to be needed and reducing urban entropy should be the main target of urban planning (Fistola and La Rocca 2013).

Referring to the systemic approach, cities can be assumed as complex and dynamic systems (Bertuglia e Vaio, 1997) and to minimize their entropy production[2], they must be properly addressed and governed during their development trends.

Cities affected by high levels of entropy cannot produce an appropriate potential of urban smartness nor support sustainable processes of urban planning. The emergent "smart city" paradigm seems to highlight that, from a town planner point of view, the actual challenge consists in making cities more efficient as regards better quality of services, reduction of environmental impacts (polluting emissions), and control of energy consumption, by means of innovating technologies (ICTs) capable of supporting the management, monitoring and functioning of cities.

Smart City approach bases on the assumption that technology is part of the system and it is not an additional element in performing urban activities at different levels (economic, social and physical). In this vision, an intelligent city is the one that, using technological innovation, spends less and in the best way without reducing the quality and quantity of services for citizens and firms. It is able to monitor the phenomena that occur, arise, develop, move and end inside it, because it is a sensitive city (Ratti 2011). Indeed, definition and approaches to the Smart City have not yet reached a common vision and smart city seems to be more an urban label then an alternative approach to the urban themes (Holland 2008).

[2] Entropy has to be considered as a widespread negative condition of the system, which hinders the positive processes to achieve sustainability and tends to move the system towards trajectories totally different from those expected. For more detail see Fistola R., La Rocca R. A. (2013), "Smart City Planning: a systemic approach", in proceedings of: The 6th Knowledge City World Summit, Istanbul, September 2013 .

As stated by Giffinger et al. (2007), "the term is not used in a holistic way (…) but it is used for various aspects, which range from Smart City as an IT-district to a Smart City regarding the education (or smartness) of its inhabitants".

Smart city definition		
Hardware centered definition	Emphasis on ITC infrastructures and apps	(Cairney and Speaks, 2000; Washburn and Sindhu 2010)
Social centered definition	Human Capital as core factor	(Partridge, 2004; Berry and Glaeser, 2005);
Technological capabilities and social innovation are combined each other	Smarter communities support the well-being of all citizens	Kanter, R. M., & Litow, S. S. (2009). Campbell, T. (2012), Beyond Smart City: How cities network, learn and innovate, Earthscan, NY.

Tab. 1 Table tries to synthetize the main typologies of smart city definition during the last decade in literature

Even though the combination between the technological component and the social one is coming to catch on, still now two different groups of interest can be identified in defining of the smart city: the industrial and the scientific one. The first one has major interest in equipping the city by sensors; the second one should point out methods and techniques able for governing urban system (planners should be in this second group).

Currently, contributions in literature are mainly oriented to define urban indicators to "measure" whether and how a city is "smart". Rarely contributions refer to a holistic vision of urban smartness, a partial vision applied per parts of the system (smart building, smart district, smart street, smart infrastructure, etc.) seems to prevail. On the contrary, a holistic vision should allow positive effects both by technologies and by social capital (Papa, Gargiulo e Galderisi 2013; Fistola 2013).

Indeed, more and more often the availability of a good level of human capital is considered as a factor of competitiveness and territorial capacity of attraction (Florida 2003). The active role of the human factor (the anthropic system: the urban actors, residents, city users, tourists) is becoming increasingly important also because it can significantly affect the "destiny" of a city, for instance in terms of success or not of a tourist destination.In this sense, tourism could represent one of the main fields where the real achievement of the possibilities given by the paradigm of smart cities can be tested.

On the other hand, the competition among cities has to compare also with the ability that each city (at the administrative level) has in attracting tourist flows and investments in order to improve the supply system (services and infrastructures), by supporting this via the employment of new technologies.

Big Data and Open Data revolution, if they were real, could represent an indisputable occasion to impose a rapid acceleration within the valuation and interpretation of urban phenomena. However, they still seem far from being tools actually usable and available, at least in Italy and especially for the tourist sector. While there are yet some difficulties in sharing data to manage tourism phenomenon in urban areas, the smart city paradigm has also encouraged the Smart Tourism Destination (STD).

Connected to the smart city, this new concept has not been so investigated as to get a shared definition (Buhalis 2014) but, as for the urban smartness, some emerging typologies can be identified as follow:

- apps "information-centered" where the main attention is focused on the number of application that tourist can utilize in visiting the chosen destination (QR codes, virtual guides, interactive maps, etc.);
- apps "tourist-centered" aimed at emphasizing "tourist experience" (Augmented Reality);
- apps "tourist-engaging" that allow tourists to have an active role as "urban sensor" in monitoring urban inefficiency regarding specific services or situation (social media, big data).

All the three typology highlight the leading role of technology, especially social and mobile, in the tourism sector referring to both the supply of specialized services and the ability of tourists to be involved in the urban life. “Smart city” and “smart tourism” (tab. 2), then, are two strictly connected concepts, if we stress the technological component.

Nevertheless, the UNWTO Assistant Secretary-General, Geoffrey Lipman, introduced smart tourism concept in 2009, during the first Meeting of the UNWTO Tourism Resilience Committee. It was defined as “clean, green, ethical and quality at all levels of the service chain. A type of tourism able to satisfy the needs for the short-term responses to the economic crisis as well as those one of long term as sustainable development, poverty alleviation and mitigation climate change”.

In the common sense, instead, as for the smart city, smart tourism refers to the use of technology applied to tourism, as already underlined before where preference is given to the number and maybe to the quality of apps available for the tourist use of the city.

On the contrary, smartness paradigm for tourism has to consider the temporary dimension of tourist that are not residents. It has to refer both to their behaviors and to their consumptions that have to be sustainable and restrained, in order that the urban system does not exceed his threshold of carrying capacity[3], (fig. 1) falling down into the entropy zone (Fistola and La Rocca 2014).

Furthermore, as tourism is a complex activity, smartness applied to tourism has to consider also the supply component that is availability of services and efficiency of destination as a whole. The spread of technologies like the Internet of Things (IoT), cloud computing, high performance information processing and intelligent data digging, surely has transformed the various sectors of tourism, but there is still a lack of coordination among the various sectors (for instance the public administrative level and private industry).

Tourist cities, still now, “suffer” from the excessive charge generated by tourist activity (Venice in Italy could be the most significant example) and on the side of management of this phenomenon.

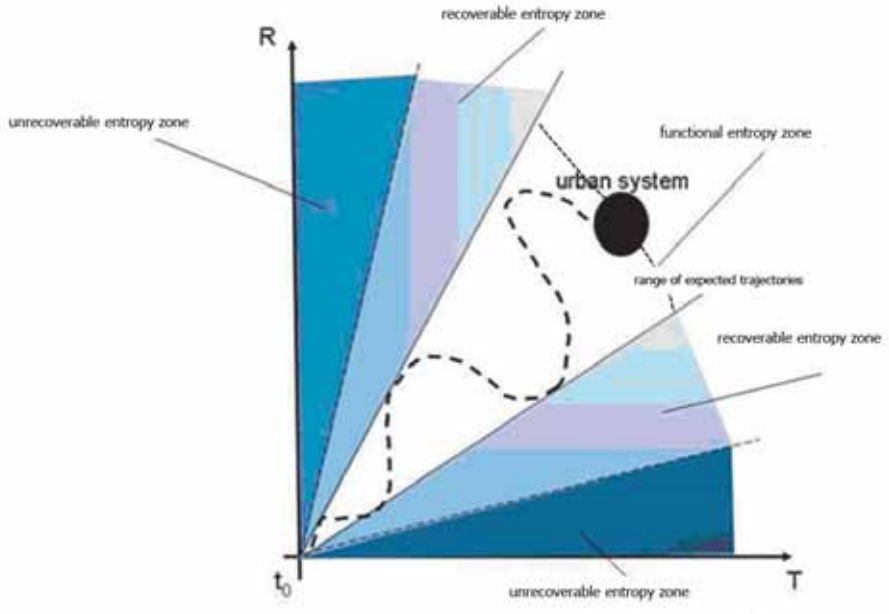

Fig. 1 The evolution trend of the urban system can be diverted by external forces (tourism uncontrolled load for instance) that could make it falling into entropy zone. The process of government of the urban system aim at maintaining it within the angular range of trajectories expected

[3] Carrying capacity refers to the “the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and socio-cultural environment and an unacceptable decrease in the quality of visitors' satisfaction” (UNWTO 1981).

Smart tourist profile	Smart tourist city characteristics
- Cultured - Connected - Media expert - Media equipped - Informed - Active - Critic - Demands high quality level of personalized services - Shares sentiment and impression by social media - Dynamical - Contributes to create his personal tourist experience - Utilizes the end-user devices in multiple modes - Prosumer (promoter + consumer) - Multisensory - Real time connected - Sustainability supporter - Careful about energy consumptions - Desire to be involved in local life - More careful towards host population - Sense of responsibility	*Organizational level*: - coordinates all relevant information to make it accessible in real time; - engage with local communities, tourists and government in cocreating tourism experience; - Organizational agility, speed decision making and responsive to customers' needs based on just-in-time insights *Government level*: - Engagement in data openness process; - assurance of data privacy; - coordination among administrative levels; - activation of public-private partnership; - integration of tourism in governmental urban processes and tools; - safeguard and promotion of heritage and culture; - active involvement of residential and local population in promoting urban culture and - provide for network infrastructures; - planning of sensor network and its feature; - disposing of interoperable social platform; - control of energy and resources consumptions; - balance between integrating information for the common good and protecting privacy; - capability of create sustainable solutions that reduce costs; - reduction of social conflicts.

Tab. 2 Smart tourism and smart tourist city characteristics (re-elaborated from Buhalis et 2014)

Smart tourism, thus, concerns both demand and supply and has to consider tourist behaviors as well as private sector (tourist operators) and public administrators (decision makers).
Tourist demand has change faster than tourist supply especially as concern the administrative level. The Smart Tourist Destination should be the place where these three aspect will merge being supported by technology to both enrich tourist experiences and enhance cities competitiveness (Buhalis 2000 and 2014).

2 STATISTICAL DATA VS BIG DATA

The aim of this part is to underline that transition towards urban smartness also bases on availability of appropriate tools and methods. If this condition can be registered at theoretical level it is not enough applied at practical level, at least as it concern Italian situation and mainly the tourist sector.
The main difficulty in the pursuit of objectives aimed at managing the tourist activity in urban areas is the limited availability of data to "measure" the phenomenon in all its components (supply, demand, preferences, behaviors, spending, productivity, etc.). Available data are elaborated by national istitution (Istat, Chambers of Commerce, Banca Italia, Enit, Censis, ecc.).
In Italy, the main surveys on tourism are elaborated by ISTAT (National Statistics Institute) in conformity with the EU Regulation 692/2011 of the the European Parliament.
Reffering to survay site, Istat carries out two surveys on tourism:

- capacity of tourist accommodation establishments;
- occupancy of tourist accommodation establishments.

The first one collects each year, at municipality level, the number of establishments, bed places, bedrooms and bathrooms for hotels and similar accommodation (classified with stars from 5 to 1 or hotel-tourism residences) and the number of establishments and bed places for other collective accommodations (tourist camp-sites, holiday villages, farm houses, youth hostels, holiday dwellings, B&B, etc.).
The second one collects each month, at municipality level, data on arrivals and nights spent by residents and non-residents at tourist accommodation establishments, divided by category of hotels and similar accommodation, and by type of the other collective accommodation establishments. Data are broken down by country of residence in the case of non-residents, and by region of residence for Italian residents. Moreover, it also provides information to calculate the occupancy rates of bed places and bedrooms for hotels and similar accommodation.
In collecting data, Local Authorities play the role of Intermediate Bodies (Provinces or Regions or other Local Authorities responsible for tourism) according to the regional organizational structure, currently referred to three levels (regional, provincial and sub-provincial).
In Italy, in fact, Regions have competence and administrative function in tourism sector since 2001 (Reform of Title V, Part 2, of the Constitution and Constitutional law of 18 October 2001 n. 3, Art. 117). Regional administrative organization can vary as they work in autonomy, so data collection, recording, processing, checking and transmission to Istat involve different entities.
For these reasons, the process is very long in time and has a "variable geometry" pointing out a dispersive and heterogeneous situation both at administrative and technical level. The impact on disposability, utility and maybe on updating of tourism data is high.
In 2013, Italy endorsed the G8 Open Data[4] Charter and committed in starting action to activate open data availability for all citizen at all social level. At present, this availability is very different among Italian regions and does not contemplate tourist data.

[4] Open data refers to both a philosophy and a practice consisting in the free accessibility to information without copyright or other restriction.

Thus, at least referring to tourism, the announced revolution by the Open Government Data Movement in Italy is late to come.

Nevertheless, nowadays, this is still the Italian framework of the official statistics in spite of large opportunities that the "Big Data" revolution seems to offer in moving from "data scarcity to data abundance that is the "data deluge" phenomenon (Heerschap et al. 2014).

Big Data are changing radically and rapidly the statistical methods: phenomena are no more the object of the statistical studies needed to be understood by data support, they are "data producer" in the new dimension of the "real time".

From the initial difficulty in collecting data, the new challenge consist in the capability of processing and extract the desired information and converting them into useful information.

Tourism is not out of this revolution. Big data revolution comes from some milestones (Beinart 2014):

- digital transaction, i.e. everybody's (resident, tourist, workers, city users, scholars, etc.) daily and usual actions can be tracked because they are associated with a digital apparate (pc, tablet, smartphone, GPS, electronic card, etc.);
- social media: i.e. everybody is on the net in real time sharing opinion each other's (Facebook; Tweeter; Google+,ecc.);
- internet of people i.e. net of people sharing opinion on some experience, facilities or services (Tripadvisor, Trivago, Airbnb, Booking.com,etc.);
- internet of thinks i.e. our common daily use objects are connected each others and can be able to manage themselves.

Big Data refer to multiple contextualized transactions: not only information but context's description and impression. Residents, city users, tourists are "anthropic sensor" both sharing information in the functional space and describing a phenomenon in the physical space. In this sense, private ITCs operators are radically changing their role, becoming "holders" of customers' behaviors.

Researchers of the Collective Sensing associated to the Department of Geoinformatics - Z_GIS and the Doctoral College GIScience at the University Salzburg, Austria elaborate methods combining traditional data with social data from (Vodafone and Tweeter) to elaborate information about tourist preferences (Beinart 2014). The experimentations refers to tourist flows in Italy during the period November-may 2013 (fig. 1). Elaborations allow to describe tourist preferences (i.e. where they prefer to go and visit, where they prefer to make shopping, how much long will they stay in a destination; if they will stay in more than one destination) and their characteristics (i.e. where they come from, transport chosen, etc.).

Tweeter based statistics allow to elaborate a "sentiment analysis" consisting in associating to the tweet a *sentiment* expressed and shared in the net by the tourists during their visit.

Models and application of massive new data developed by the group of research Collective Sensing aim at reconstructing the dynamics of complex systems and cities. In this sense, the Big Data challenge could support the decisional phase in the process of governing urban transformation, even if some alarms seem to come by the researchers in statistics and data elaborations.

The arrival of Big Data presents new opportunities for official statistics, but also it needs some definition being yet an arbitrary concept for a rather heterogeneous set of new data and information sources coming from many different guises and having many different characteristics.

Some other Big Data application to define the characteristics of tourist demand and to use them in supporting the decisional phase in tourism planning refer to "semantic analysis". This consists in classifying and interpreting some "no structured text " (i.e. posts in Facebook, Tweeter and other social media) using technology to elaborate the information. Technology associate a mood to each post and valuate the level of positive or negative sensation expressed by tourist during his experience.

This analysis allow to value tourist satisfaction while visiting a monument or taking a lunch or having a walk through the city by considering their sentiment (enthusiasm, fear, security, expensive, and so on).
In the Report on Italy tourist perception, edited in July 2014 by Sociometrica and Expert System using Cogito technology, authors examine about 600.000 post of foreign tourists visiting Italy from April to July 2014. The target of the study is to evaluate the level of perception of Italy trying to individuate the sensible areas where it is necessary to intervene to promote tourism.
The analysis points out a positive global score for Italy (more than 70, setting 60 as the minimum threshold for the positive value) but also allows making consideration about the quality level of services.
The Report confirm also the general opinion concerning the paradox between the high level of Italian historical heritage and the low capacity in promoting and protect it. (Pompei is perhaps the best-known example, but Agrigento or Paestum such as other archeological Italian areas that would need better planning in promoting their singularities). The innovative contribution of this analysis maybe consists in transforming from a passive to active the role of tourists and get information by their sensations.
The transition from "scarcity to abundance" of data while on one hand seem to offer the solution to the knowledge of complex phenomena acting inside the urban system; on the other hand calls for paying large attention in the interpretative phase such as in the phase of selecting information.
What really could be pointed out is the lack of being able to get these technologies inside the process of governing the urban system (Fistola e La Rocca 2013).
The major challenge is not collecting the data from the internet, but converting them into useful tools to understand the complexity of urban phenomena like urban tourism.

3 THE ROLE OF TOURISM FOR THE SMART CITY: CONSIDERING ACTUAL CHALLENGES

The Smart City approach might necessarily consider potentialities committed to urban development and tourist promotion according to the physical, functional and social aspects of the urban system. Being a transversal activity, tourism is affected by economic conditions as well as by climatic ones.
Tourism paradox consists in being contextually development factor and element which produces negative effects on urban livability.
The challenge that tourist cities have to face consists exactly in their ability to find a balance between promotion and safeguard of their (historical, cultural, architectural, territorial, environmental) resources. From a town planning point of view, this condition requires intervening through actions and policies targeted to the optimization of urban livability
The new way to share experiences and sensations that is radically changing the way of promoting tourist cities must necessarily be considered as part of urban strategies.
According smart city paradigm, tourism can play an active role in:

- promoting resources and attractiveness as system;
- implementing sustainable system of services and infrastructure (energy saving, soft mobility, slow food, etc..).

As stated before, Big Data revolution enables the achievement of the objectives identified in the first action. It may support the decision-making both in the drafting of the strategies to be pursued both in the identification of sensitive areas inside the urban system with priority of intervention in order to improve levels of enjoying city's attractions and to promote unknown urban sites.

The Travel Appeal Index, for instance, has been pointed out to value tourist attraction inside the city or referring to a specific structure. The target is double: benchmark among destinations, and strategy to solve weakness of destination (http://www.travelappeal.com).
In this field, some scientific in-depth have been developed by the group of research DICAR - University of Cagliari, in South Italy, try to investigate the opportunities of social media analysis and its georeferentiation in supporting urban planning especially referred to Sardinia territorial context.
Referring to the second group of objectives, it is necessary to point out urban policies able to reduce environmental impact generated by tourist activity, according to the Horizon 2020 indications.
Sustainability in tourist destinations and their monitoring is one of the main lines of action of European policies. The European Tourism Indicator System for Sustainable Management at Destination Level is one of the key initiatives to improve sustainable management of tourist destination. The System is composed by a toolkit, a database and a set of indicators intended to support planning of policies of management of a tourist destination. The indicators are part of an integrated approach to destination management that stresses the importance of collaboration, cooperation, on-going assessment, effective communication, and a holistic perspective (tab. 3).
In the first pilot phase, about a hundred of tourist destinations have been interested (Belgium, Bulgaria, Estonia, Finland, Italy, Latvia, Ireland, Romania, Slovakia, Slovenia, Spain, Greece, Scotland, the Netherlands, Lithuania, Croatia, Sweden, UK, Portugal, Turkey) it ended the last April; the second phase will be ended in the next December including also not UE destinations (Montenegro, Serbia, Albania).

Section of Indicators	Objectives for each indicator
Section A: Destination Management Core Indicators	Destination management Indicators emphasize important decision -making and communication issues that contribute to sustainable tourism management in the destination
Section B: Economic Value Core Indicators	Economic value indicators help track the contribution of tourism to economic sustainability in the destination.
Section C: Social and Cultural Impact Core Indicators	Social and cultural impact indicators focus on the effects of tourism on the residents and cultural heritage in the destination.
Section D: Environmental Impact Core Indicators	Environmental impact indicators focus on those elements that are critical to the sustainability of the natural environment of the destination.

Tab. 3 Core Indicators of the European Tourism Indicator System

Referred to a specific component of tourist supply, in 2011, the UNWTO has developed the Hotel Energy Solutions (HES) in collaboration with a team of United Nations and EU leading agencies in Tourism and Energy. The project is aimed at supporting Small and Medium Enterprises (SMEs) in the tourism and accommodation sector to increase their energy efficiency and renewable energy usage.
If these initiatives, on the one hand, show the commitment undertaken at Global and European level to reduce the impacts of the tourism sector on the environment; on the other hand, they invite some reflection about the need for coordination between different actors involved in promoting tourist development.

CONCLUSION

This article has tried to put in evidence how tourism is becoming an urban phenomenon and in this sense, it should be integrated within the process of govern the urban system.

The emerging paradigm of "Smart City" can be an opportunity to reconsider the current mechanisms of government and planning of the cities, but it needs a holistic approach that goes beyond the one applied *per parts* that still seems to prevail in the declination of the components of urban smartness (economy, mobility, environment, people, living, governance).

At present, the technological component seems to prevail, probably due to the ease of diffusion of the instruments, rather than an innovation of the processes. Tourist promotion initiatives seems to concentrate chiefly on the city branding, rather than on plans to make cities able to support an additional urban load expressed by the tourism demand.

Yet, potentialities of technologies are still weak in supporting the decision-making phase of the definition of appropriate plans of actions aimed at optimize the effect of an well-oriented and sustainable urban tourist development that could implement the "urban smartness". The urban tourist dimension seems to be still considered as "other", namely not integrated in the urban processes to drive the evolution trend of the urban system towards compatible states of development.

Although tourism plays a major role in the management of cities as both instrument and outcome of policy (Ashworth and Page 2010), its planning and management is far to be considered as part of town planning objectives.

What this article tries to underline, maybe in a critical vision that should be further investigated beyond this limited context, refers to the observation that neither the new emergent smart city paradigm has overtaken the partial vision that privilege the vision of tourism as economic activity. In this sense the smartness achievement remain closely relied to the capacity of promoting cities (its cultural heritage, its historical resource, its monuments, etc.) rather than to provide for adequate measures enabling the city to contain tourist fluxes according adequate town planning design.

Difficulties in availability of tourist data, even though open and big data era is already started, hamper any control on tourism phenomenon and its dimension in urban areas, especially referred to fluxes activated by occasional events or periods.

The characteristics of smart tourism destination that have been listed in the previous pages represent the attempt of individuating some "fields of application" that could permit to reach urban smartness for the whole system.

Present cities, besides, are expected to become megalopolises with millions of inhabitants and to govern the inevitable change of these large urban systems, it will be necessary to have more direct administrative powers. The coordination among local authorities, thus, will represent one of the core factors for finding solutions capable of coping with these urban dimensions. What stands out, maybe in hidden way yet, is the assertion of a society model that is more exigent about the procedures of the decision-makers.

Nevertheless, such a social dimension should be ready to modify its lifestyles in order to reach "smart" livability. The transition to smart city, therefore, needs the integration between policy goals and common lifestyles. Furthermore, urban systems being in entropic states cannot develop urban smartness (Fistola La Rocca, 2013). This consideration should push to evaluate the copious number of initiatives labelled as "smart" that did not lead to any improvement of urban life.

A first attempt to define preconditions for the development of smart city could refer to the systemic approach considering city into three subsystems: physical, functional, and socio-anthropic. Each subsystem could contain structural elements that may allow the evolution of the urban system into smartness conditions (Fistola 2013).

Smart dimension necessarily involves a review of the processes for the governance of the urban system. Within this dimension, ITC technologies play a primary role that need to be supported, optimized, improved and integrated with urban process of government. In the transition toward the smartness, technology has to be adopted and not added up in the urban evolution process, this means that technologies have to be integrated into the development process towards the urban smartness, they have not to be intended as an additional equipment (like detectors) to the physical system of the city. In this sense, technology is meant as one of the key-factor for the smart city.

By the use of ICTs technologies, residents, tourists and city-users can act a dynamic role in monitoring urban functioning permitting to reduce the lack of efficiency if properly integrated with decisional levels that should be well structured to adopt and elaborate information into action plan.

The concept of "smart city" has large potentialities: it is also a challenge for those cities living in structural levels of crisis. Academics, technicians, administrator must work hard not to let it be just a slogan. This could be a good starting point to reflect about smartness of present cities. But, further research is needed to expand the theoretical contributions of this research as well as to validate its findings.

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IMAGE SOURCES

Cover image is from https://www.flickr.com; other images, tables and schemes have been elaborated by the author.

AUTHOR'S PROFILE

Rosa Anna La Rocca

Architect, PhD in Urban and Regional Planning, researcher at the Department of Civil, Architectural and Environmental Engineering (DICEA) - University of Naples Federico II. Her research activities refer to the analysis of phenomena that can change urban organization and they are focused on the study of three main relationships: tourism and town planning; land use and mobility, innovation technologies and urban transformations.

Photo-realistic views of the Energy Efficiency Center, a prototype that will inform and engage citizens, technicians and administrators on the themes of energy efficiency.

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POLITICHE 'SMART' E VISIONE METROPOLITANA:

LA DIMENSIONE TERRITORIALE NELL'ESPERIENZA PROGETTUALE DELLA AMSTERDAM SMART CITY PLATFORM

GIULIA FINI [a], SALVATORE CASCHETTO [b]

[a] Politecnico di Milano,
DAStU - Dipartimento di Architettura e Studi Urbani
e-mail: giulia.fini@polimi.it
[b] Comune di Milano,
Assessorato Politiche per il Lavoro, Sviluppo Economico, Università e Ricerca
e-mail: s.caschetto@gmail.com

ABSTRACT

The paper aims at presenting the main projects and policies recently developed by the Municipality of Amsterdam in the field of energy policies, with particular reference to the projects promoted in the context of the ASC - Amsterdam Smart City Platform. The analyzed projects and policies seem to be relevant for at least three aspects and for the matters raised by them:
I. for the aim to connect policies and projects of the Amsterdam Smart City with the definition of a territorial vision for the Amsterdam metropolitan area;
II. for the strong connection characterizing this experience between energy-management policies on the territory and the management's choices related to urban planning and urban design;
III. finally, the experience is relevant in relation with the consolidation of the ACS's platform as a place where several individuals are directly involved in the management of public services and where all requests and peculiarities contribute to define a common planning process on the energy and environmental fields of action in the metropolitan area. Based on the latest, most significant information of the activities performed by the Amsterdam Smart City Platform, the paper focuses on the results after four years since the projects and tests have been carried out, on the basis of a network structuring actions, energy-saving targets and space-related choices regarding the whole territory as well as ASC's policies.

KEYWORDS:
Smart City Platform; Area Metropolitana; Energy Network; Dimensione Spaziale; Politiche Energetiche.

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智能化 政策与都市愿景

阿姆斯特丹智能化城市平台设计经验中的地域规模

GIULIA FINI [a], SALVATORE CASCHETTO [b]

[a] Politecnico di Milano,
DAStU - Dipartimento di Architettura e Studi Urbani
e-mail: giulia.fini@polimi.it
[b] Comune di Milano,
Assessorato Politiche per il Lavoro, Sviluppo Economico, Università e Ricerca
e-mail: s.caschetto@gmail.com

摘要

本文旨在阐述阿姆斯特丹市政府在能源政策方面最新推出的主要项目和政策， 并特别提到被提升到“阿姆斯特丹智能化城市， 简称平台”经验内部的各项目。所分析的这些项目和政策至少在三个不同的方面与由此引出的问题向我们呈现出其相关性： 一、 旨在把 “阿姆斯特丹智能化城市”的政策和项目引回到阿姆斯特丹都市区建设的愿景构建上；二、在这一经验下，旨在在该区域的能源管理政策与由政府选择的空间规划、城市设计之间取得紧密的联系；三、最后，旨在巩固ASC平台， 使其成为在公共财产管理方面不同主体直接参与和互动的地方，当中各方都有自己的需求和特色。本文通过重述“阿姆斯特丹智能化城市平台”活动的最新最重要的数据，从网络结构、预设的节能减排目标，以及对该区域内部和ASC政策本身的一些空间选择的固定的角度来反思三年来各项目和各试验的启动所取得的结果。

关键词
阿姆斯特丹智能化城市平台；智能化城市；能源网络；空间影响；都市愿景.

1 LE POLITICHE DI GESTIONE DELL'ENERGIA NELLA CITTÀ DI AMSTERDAM: SIGNIFICATIVITÀ DEL CASO E PECULIARITÀ

La Municipalità di Amsterdam, l'Amsterdam Metropolitan Area e la piattaforma della Amsterdam Smart City (ASC) rappresentano un caso significativo di tre soggetti istituzionali impegnati nella costruzione di un progetto, di politiche e di una vision per il territorio in grado di coniugare lo sviluppo della regione urbana olandese con l'investimento in energie alternative e con le risposte alle domande di resilienza che la regione deve affrontare[1]. I progetti che analizziamo, riconducibili alle attività della ASC Platform, ci appaiono rilevanti per almeno tre diversi aspetti e per le questioni che questi sollevano: I. per l'obiettivo di sviluppare le politiche e i progetti della Amsterdam Smart City alla costruzione di una visione territoriale per l'area metropolitana di Amsterdam; II. per il forte nesso fra le politiche di gestione dell'energia e le scelte di pianificazione spaziale e di disegno urbano, alle scale urbana e territoriale, compiute dall'Amministrazione; III. per l'intento di consolidare la piattaforma della ASC come il luogo dove diversi soggetti sono direttamente coinvolti nella gestione del bene pubblico, ciascuno con le proprie istanze e peculiarità[2]. L'interpretazione qui proposta dell'esperienza dell'Amsterdam Smart City è volutamente selettiva e tematizzata rispetto alle tre questioni sopra richiamate. E' volta cioè a sottolineare alcuni aspetti che riteniamo cruciali ed innovativi di questa esperienza, mentre è solo in parte ricondotta a una letteratura e a un dibattito più ampi, ma spesso altrettanto imprecisati, sul tema delle smart cities. Le diverse esperienze di smart city (Amsterdam, Copenaghen, Barcellona ed Helsinki solo per citarne alcune) sono infatti riconducibili a programmi e obiettivi diversificati e a un concetto che si è rivelato 'strumentale', quindi differentemente declinato a seconda dei contesti e delle politiche ad esso associate[3]. Le attività della ASC sono riconducibili, come vedremo, ad azioni e interventi di diversa natura: dal risparmio energetico nelle abitazioni alla definizione di spazi di condivisione lavorativa quali i coworking, dalla mobilità elettrica allo sviluppo di un'economia collaborativa e condivisa. Tutte le azioni ed i progetti contribuiscono al raggiungimento di un obiettivo comune e di una visione di lungo termine: la riduzione del 50% delle emissioni di CO_2 entro il 2025.

Rispetto all'obiettivo di coniugare lo sviluppo della regione e le risposte a nuove domande di resilienza è interessante sottolineare che la Municipalità olandese e la sua area metropolitana si pongano infatti tutt'ora

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Il presente contributo e la sua impostazione sono frutto di una riflessione congiunta dei due autori. Tuttavia la redazione delle parti 1, 2 e 4 è da attribuirsi a Giulia Fini; la redazione delle parti 3 e 5 a Salvatore Caschetto. La riflessione proposta è stata presentata in forma non definitiva e non aggiornata in occasione della XVI Conferenza Nazionale SIU, "Urbanistica per una diversa crescita. Aporie dello sviluppo, uscita dalla crisi e progetto del territorio contemporaneo", Napoli, 9-10 Maggio 2013, come frutto dell'attività di ricerca di entrambi gli autori.

1 I soggetti istituzionali richiamati si caratterizzano per diverse scale di azione e per le attività che promuovono all'interno della regione di Amsterdam, oltre che per il differente ruolo dei soggetti pubblici e privati coinvolti. La Municipalità di Amsterdam presenta due livelli amministrativi: i quattordici distretti in cui il territorio si divide e il livello Municipale, «responsible for matters that extend beyond the boundaries of a single city district, or exceeds it power» (DRO, 2008: 12). La Metropoolregio Amsterdam comprende oltre alla città di Amsterdam, altre 36 Municipalità appartenenti alle province del North Holland e delle Flevoland. La Amsterdam Smart City, per la quale si rimanda alla Parte 3, si presenta come «a unique partnership between businesses, authorities, research institutions and the people of Amsterdam. Together, our goal is to develop the Amsterdam Metropolitan Area into a smart city» (AIM-ASC, 2006: 9).

2 Si sottolinea come il tema delle reti tecniche sia spesso gestito in modo quasi unicamente settoriale, senza cogliere la dimensione 'fisica' e spaziale dei progetti delle reti, e come questa dimensione possa costituire uno spazio di confronto e coinvolgimento per i cittadini. L'articolazione dei progetti della ASC nei campi del *Living*, *Working*, *Mobility*, *Public Facilities* e *Open Data* sin dall'inizio della sua istituzione evidenzia invece come le politiche smart abbiano ricadute dirette nello spazio fisico della città (si veda al riguardo la Parte 3).

3 Le esperienze richiamate declinano in modo diverso il concetto di 'smart city' riconducendolo a progetti legati al risparmio energetico (Amsterdam), alla mobilità sostenibile (Copenaghen), allo sviluppo di tecnologie ICT (Edimburgo), al miglioramento dei servizi e alla condivisione dei dati (Helsinky). Sul tema più ampio di progetti e politiche 'smart' si rimanda a Campbell (2012), Hatzelhoffer *et al.* (2012), e per i diversi casi ai testi di Caschetto (2012) sul sito www.smartinnovation.forumpa.it.

l'obiettivo di accogliere nei prossimi decenni una crescita demografica ed economica consistente (DRO, 2011a: 6-7). All'interno dei documenti e dei piani più recenti[4], l'area metropolitana di Amsterdam è presentata come il luogo all'interno della Randstad dove realizzare soluzioni innovative, secondo l'obiettivo istituzionale, per gli spazi dell'abitare, per il lavoro terziario e per la produzione, per gli spazi della logistica e dei trasporti. Una regione urbana all'interno del *Green and Blu Delta* caratterizzata da un'elevata connessione globale, pur senza perdere gli elementi di abitabilità e tutela delle risorse naturali che la caratterizzano.

Il territorio urbanizzato di Amsterdam e delle vicine Municipalità si trova infatti delimitato dalle aree protette rurali del Green Heart a sud, e da quelle delle Waterland e dal bacino del fiume IJ a nord. La necessità di coniugare le scelte della pianificazione con la protezione delle risorse naturali, e il rispetto per la conformazione di un territorio per larga parte sotto il livello del mare, hanno costituito la dimensione caratterizzante dello spatial planning olandese e della programmazione della Municipalità di Amsterdam in particolare. Nel corso degli ultimi venticinque anni sono invece state le presenze dell'aeroporto internazionale di Schiphol (con le aree riservate alle attività aeree e di logistica ad esso collegate) e del porto, ad aver ulteriormente determinato i confini e la direzione della crescita dell'urbanizzato della regione[5]. Inoltre, in tempi più recenti, questioni ambientali emergenti quali l'innalzamento delle maree e il cambiamento climatico, unite alla storica scarsità di suolo e alla conseguente competizione fra le attività, hanno spinto l'Amministrazione a rafforzare la collaborazione con le vicine Municipalità della Metropoolregio Amsterdam. Questa pianificazione di livello metropolitano riguarda la definizione delle poche nuove aree di sviluppo della regione (come gli interventi strategici di IjBurg o quelli nel territorio di Almere), la riqualificazione dei tessuti esistenti, le possibili forme di crescita sostenibile del territorio, fino alla gestione delle risorse naturali e del risparmio energetico. Rispetto a queste politiche, e a questi obiettivi, è possibile individuare rapporti e sinergie fra i diversi enti istituzionali alla scala urbana e metropolitana e la piattaforma della Amsterdam Smart City, come nei paragrafi successivi illustreremo con riferimento sia alle principali aree tematiche di azione della ASC sia a specifici progetti e interventi.

2 UN APPROCCIO INTEGRATO PER LE POLITICHE SETTORIALI E GLI OBIETTIVI DI RISPARMIO ENERGETICO

Rispetto ai temi del risparmio energetico, e a come questi sin dalla loro definizione possano necessariamente dialogare con le scelte spaziali, il caso di Amsterdam è peculiare perché l'influente DRO - il Physical Planning Department della città - ha storicamente svolto un ruolo cruciale nell'interazione delle politiche settoriali, nella loro applicazione e nella definizione delle ricadute di quest'ultime sul territorio. Rispetto a queste stesse intersezioni, altre riflessioni di grande interesse potrebbero essere condotte indagando il rapporto fra le scelte spaziali della regione e le reti della mobilità, o ancora osservando le scelte di regolazione delle attività commerciali nei tessuti urbani ed extraurbani, essendo l'attenzione alla dimensione fisica nella pianificazione territoriale un elemento caratterizzante questo specifico contesto.

All'interno della Municipalità è quindi il DRO a rimarcare la necessità di una transazione verso una 'post-fossil fuel era' all'interno di un contesto generalizzato di 'energy transition' della regione (DRO, 2011b: 26). L'obiettivo cui tendono le diverse azioni della Municipalità in tema di risparmio energetico è quello di una

[4] Il riferimento principale è all'ultimo piano strutturale, Structuurvisie Amsterdam 2040, elaborato dal DRO (DRO, 2001a) e (DRO, 2001c): «Amsterdam continues to develop further as the core city of an internationally competitive and sustainable European metropolis (...) The area in question, with 2.2 million inhabitants at present and a projected 2.5 million in 2040, boasts the scale and diversity that are necessary to remain competitive internationally» (DRO, 2011a: 6-7).

[5] L'aeroporto internazionale di Schiphol è il quarto aeroporto in Europa per traffico merci e passeggeri. In confronto alla *catchment area* di un paese di dimensioni ridotte come i Paesi Bassi, ha un impatto fortissimo sul territorio circostante (Fini, 2010). Oltre agli spazi riservati alle attività aeree e allo stoccaggio delle merci ulteriori restrizioni sono determinate dai contorni del suono e dell'inquinamento dell'aeroporto.

riduzione del consumo di energia e di emissioni di CO_2 in riferimento alla 'trias energetica' come principio guida per la politica di gestione dell'energia sul territorio (Fig.1) (*Ivi*; Covenant of Major, 2008).

Tra le implicazioni spaziali collegate a questi obiettivi il DRO sottolinea come sia la rete elettrica l'infrastruttura per la quale sono in corso i maggiori cambiamenti. Questi risultano determinati dalla crescita di strumenti di generazione di energia elettrica decentralizzati, dalla presenza di nuovi e differenziati sistemi di generazione (Fig.2), dall'avvento e dall'ascesa di mezzi di trasporto elettrico, e infine dall'aumento del settore delle applicazioni ITC.

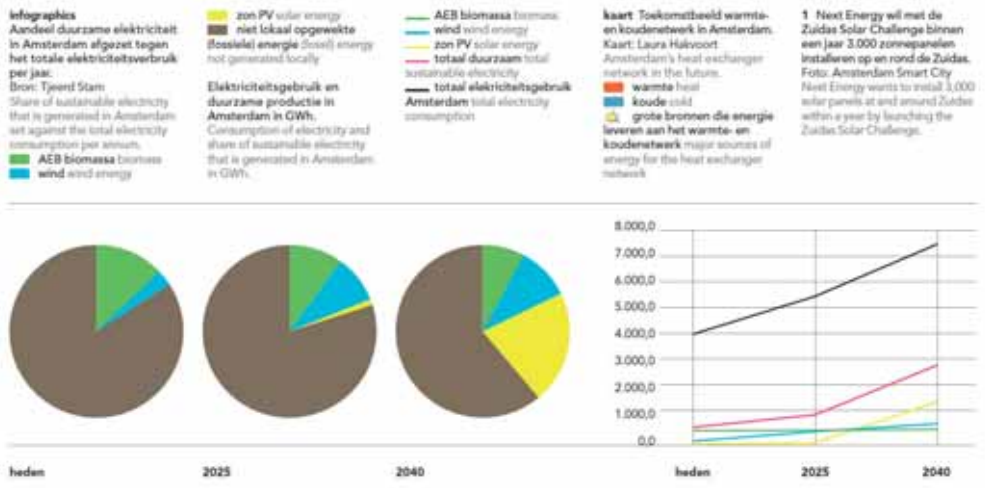

Fig. 1: Le quote di energia sostenibile generate ad Amsterdam sul totale del consumo di elettricità annuo e obiettivi al 2025 e 2050. Con il colore verde è indicata la produzione di energia tramite biomassa, con l'azzurro l'energia eolica, con il giallo l'energia solare.
Fonte: DRO, 2011b.

Fig. 2: Diverse realizzazioni di produzione di energia alternativa nel territorio della Municipalità. In senso orario: pannelli solari collocati sul tetto di un'abitazione privata ad Amsterdam East; un sistema di pannelli solari comunali realizzati a IJBurg sull'edificio della Homeowners Association; un turbina a vento privata nel suburbio di Osdorp; pannelli solari sul tetto di una houseboat a

Il rapporto fra spazio e reti tecnologiche - che possono quindi propriamente essere considerate 'infrastrutture' nel senso più ampio del termine[6] (Fig.3) - è ulteriormente definito attraverso la collocazione di turbine per la produzione di energia alternativa; il disegno di nuovi quartieri quali IJ e Houthavens dove i

[6] Il richiamo a una concettualizzazione ricca di significati del ruolo delle infrastrutture e a un loro progetto più articolato è, tra gli altri, presente in Viganò (a cura di, 2001: 118-120) e in Gabellini: le infrastrutture «costituiscono l'indispensabile supporto delle relazioni e degli scambi (...) a cui è affidata la possibilità di rompere isolamenti e diffondere effetti positivi» (2010: 68).

temi energetici trovano definizione sin dalla fase iniziale del processo di pianificazione e disegno urbano (DRO, 2011b: 26) e attraverso i progetti che investono l'ambiente naturale e costruito a più livelli: il sottosuolo, il livello di superficie, il livello dei tetti e del cielo, il sistema della acque; la definizione di sistemi di stoccaggio sotterraneo di energia geotermica con la relativa 'underground physical planning policy'. Ci sembra quindi rilevante come sia nella dimensione comprensiva sia negli interventi specifici, le scelte relative al risparmio energetico siano gestite con un ruolo significativo del Department of Physical Planning della città: sottolineando con forza anche la dimensione fisica che queste scelte hanno e come queste possano concretamente contribuire al disegno dello spazio urbano e delle politiche di pianificazione territoriale.

Fig. 3: Le infrastrutture e le reti tecniche della città in una rappresentazione schematica per layers. Si riconoscono le fonti di acqua sotterranea; le reti di distribuzione dell'acqua, dell'energia e le reti tecnologiche, gli spazi funzionali e i servizi; la rete stradale; le fonti fuori terra; infine sull'ultimo layer il costruito. Fonte: DRO, 2011b.

3 L'AMSTERDAM SMART CITY PLATFORM: CARATTERISTICHE DELLA PIATTAFORMA E PRINCIPALI AMBITI DI INTERVENTO

Il raggiungimento degli obiettivi in campo energetico delineati sinteticamente nel paragrafo precedente e l'approccio che caratterizza il DRO di 'integrazione' fra le diverse politiche settoriali trovano nei progetti della Amsterdam Smart City Platform realizzazioni concrete.

La piattaforma è definita come una 'partnership' tra soggetti privati, università ed enti pubblici e la cittadinanza. Rappresenta il campo d'interazione e sperimentazione privilegiato per lo sviluppo dell'area metropolitana di Amsterdam verso una Smart City, attraverso azioni, progetti e politiche che contribuiscono

a raggiungere la sostenibilità urbana indicata nella strategia Europa 2020[7]. I progetti della ASC ci appaiono innovativi non solo perché si legano strettamente alle scelte di pianificazione urbana e di sviluppo economico compiute dalla Municipalità, ma anche perché sono perseguiti e si consolidano attraverso il coinvolgimento attivo di un numero ampio di soggetti; si considera inoltre interessante la gestione della piattaforma, che avviene attraverso una Public-Private-Partenership, condizione che accomuna numerose esperienze legate al tema smart city. Gli attori che compongono il processo della ASC costruiscono una visione integrata di più competenze, alla base di progettualità complesse legate ai diversi interventi che saranno descritti di seguito[8].
La nostra tesi è che l'esperienza della ASC - composta da una piattaforma come luogo di confronto e da progettualità puntuali realizzate sul territorio - contribuisca direttamente alla definizione di pratiche di produzione sociale dello spazio pubblico e alla valorizzazione dei beni comuni primari (in questo caso la gestione delle risorse energetiche). Andando oltre la sua dimensione tecnica, ma per le implicazioni e per la capacità di attivare soggetti ed interessi, contribuisce inoltre alla costruzione di prefigurazioni progettuali e visioni per il futuro di questo territorio (Fig.4).
La piattaforma, inaugurata nel 2009, si compone oggi di circa 70 soggetti differenti. Costituisce un acceleratore per la promozione di progetti pilota, con l'obiettivo di replicare le iniziative e i progetti su tutta l'area metropolitana. In questo caso il concetto di "scaling up" rappresenta un obiettivo di sostenibilità ed economico. Attraverso le partnership istituite per la realizzazione dei progetti, e ai soggetti privati che prendono parte alla piattaforma, è garantito un ritorno economico dell'investimento iniziale e la diffusione della buona pratica e/o del progetto sul territorio.
Un altro elemento divenuto necessario per i progetti legati al tema delle smart city, è la misurazione dei risultati raggiunti. Per questa ragione, vengono costantemente monitorati i processi, i risultati e la fattibilità economico-finanziaria dei progetti promossi dalla piattaforma ASC.
A partire dalla sua fondazione il principale soggetto promotore della ASC è stato l'AIM - Amsterdam Innovation Motor, un ente esterno alla Municipalità che ha l'obiettivo di coordinare la strategia generale della Amsterdam Smart City. A questo si affiancano i partner principali quali Liander, prima società fornitrice di energia dei Paesi Bassi; KPN, azienda produttrice di servizi internet e fibra ottica; la Municipalità di Amsterdam e il TNO, istituto di ricerca indipendente chiamato a dare il suo contributo per rafforzare il valore scientifico dei risultati previsti, in termini di riduzione di CO_2 per progetto sperimentato.
Le diverse azioni e progetti della vision di ASC sono suddivisi in otto macro ambiti di intervento di cui si introducono sinteticamente gli obiettivi. Questi ambiti costituiscono un'evoluzione rispetto alle iniziali aree di intervento in cui la Piattaforma ASC si articolava (*Living*, *Working*, *Mobility*, *Public Facilities* e in seguito *Open Data*) segnando il consolidamento e al contempo un'articolazione dei progetti:
Smart Living: secondo gli studi condotti, un terzo delle emissioni di CO_2 della regione sono provocate dalle abitazioni private. Introdurre nuove tecnologie, ma soprattutto rafforzare la consapevolezza tra i cittadini della propria impronta in termini di consumo energetico in base alle proprie attività e all'uso di dispositivi, è indicato come uno strumento significativo in termini di riduzione delle emissioni;
Smart society: la piattaforma svolge un ruolo essenziale nel coinvolgimento degli abitanti della Municipalità di Amsterdam e delle aree limitrofe, attraverso informazioni sui processi, sui progetti e con strumenti di formazione. Oltre allo sviluppo dei processi di partecipazione, la piattaforma promuove in senso più ampio lo scambio e il rafforzamento dell'interazione sociale tra le persone. In questo campo di applicazione specifico il ruolo della piattaforma è quindi di quello di promuovere forme di attivazione sociale nelle aree definite, in accompagnamento alle altre azioni;

7 Per approfondire la strategia decennale "Europa 2020" si rimanda al sito dell'Unione Europea: http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/index_it.htm

8 Per una descrizione dei numerosi progetti afferenti alla ASC si rimanda alla documentazione presente sul sito della piattaforma (www.amsterdamsmartcity.com) e alla pubblicazione *Smart stories* pubblicata nel 2011.

Infrastructures: la mobilità rappresenta per Amsterdam un terzo delle emissioni di CO_2. Per questa ragione si stanno avviando progetti di gestione delle aree con maggiore congestione, di uso di mezzi alternativi in città, di punti di ricarica elettrica per permettere una maggiore facilità nell'usare i mezzi elettrici e/o ibridi quali autovetture, scooter e battelli. In aggiunta ai progetti legati alle infrastrutture della mobilità rientrano in questa area anche i progetti di altre reti, quali la *smart grid* nel distretto di New-West, le reti Wifi, le fibre ottiche;

Smart Economy: le azioni dedicate alla Smart Economy sono relazionate al potenziamento della regione di Amsterdam come territorio attrattivo e competitivo a livello internazionale, contribuendo ai processi di innovazione, imprenditorialità, produttività e agli scambi internazionali già in corso;

Smart Areas: questa strategia sviluppa un approccio comune per lo sviluppo di più progetti all'interno della stessa area, individuando le opportunità e relazioni fra interventi prossimi.

Essendo la Municipalità è il principale partner della vision della Amsterdam Smart City, con l'obiettivo prioritario di diventare una municipalità *climate neutral* entro il 2025, numerosi progetti tesi a ridurre il consumo di energia sono stati previsti per attrezzature e servizi, quali scuole, ospedali, centri sportivi, biblioteche e strade, attraverso un approccio condiviso e replicabile nei diversi interventi.

Big & Open Data: Amsterdam, come altre numerose città, ha pubblicato i propri dati con due obiettivi principali: anzitutto per rendere i dati della pubblica amministrazione quanto più possibile trasparenti e accessibili ai cittadini, come secondo elemento per agevolare lo sviluppo da parte di operatori o cittadini di applicativi e piattaforme potenzialmente utili per lo sviluppo delle tecnologie urbane.

Le azioni della ASC si muovono rafforzando questa direzione: "data fuels the information society. Publicly-available data that can be used and combined to provide Amsterdammers with new insights and the chance to make decisions based upon actual facts and figures" (sito web della ASC, sezione 'Projects')[9];

Living Labs: i Living Lab costituiscono un'esperienza peculiare della ASC: aree dedicate alla conoscenza e alla prova dei dispositivi, delle nuove tecnologie e dei servizi della piattaforma, sia da parte dei cittadini che delle imprese. Sono proprio l'intervento di IJburg e i distretti di Nieuw-Ovest e Zuidoost, di seguito presentati, che sono stati individuati come 'living labs' luoghi dove sperimentare e creare le maggiori sinergie fra un numero ampio di progetti.

Le otto macro famiglie, pur rappresentando la complessità di interventi e di azioni che si sta sviluppando nella città, convergono in un unico obiettivo comune: la riduzione attraverso diversi campi delle emissioni di CO_2 e la consapevolezza dell'energia utilizzata o risparmiata.

Le sperimentazioni dei numerosi progetti, sia puntuali sia areali, della piattaforma ASC sono strettamente connesse con l'intera area metropolitana di Amsterdam che risulta quindi essere un laboratorio urbano dove poter testare i progetti con cui ridurre le emissioni di carbonio: non in modo astratto o teorico, ma attraverso progetti ideati a partire dall'ambiente, e rafforzati nella loro concezione e sviluppo dalle pratiche degli abitanti.

Alla scala dell'area metropolitana, i tipi di spazi ricorrenti dove sono attualmente compiute le sperimentazioni riguardano i parcheggi dei centri sportivi, le aree dedicate allo shopping, l'illuminazione delle aree comuni, il vasto campo delle leggi e delle regolamentazioni di questi spazi, le reti di connessione internet e la definizione degli ambienti di lavoro.

[9] Una spiegazione dettagliata dei dati disponibili, e su che cosa si intenda per 'Open Data' è presente sul sito web della ASC. Sono Open Data i dati pubblici, non soggetti a copyright o a diritti di terze parti, finanziati da fondi pubblici e secondo uno standard o formato aperto, che non presentano restrizioni d'uso o consultazione, un altro aspetto molto sensibile: "these preferably meet 'open standards' (no restrictions regarding use by ICT users or ICT providers) and are preferably computer readable so that search engines can find information in documents" (sito web della ASC, Sezione 'Projects').

Fig. 4: Alcuni dei progetti promossi dalla ASC. In senso orario: il progetto 'Energy Management Haarlem' teso a favorire la consapevolezza degli abitanti dei propri consumi energetici; una realizzazione del progetto 'Ship to grid' nel porto di Amsterdam. In basso, momenti di discussione collettiva degli attori e partecipazione degli abitanti ai progetti della Platform: gli esercenti della Utrechtsestraat, nel centro di Amsterdam, per il progetto 'Klimaatstraat' e un momento di partecipazione degli abitanti all'interno del quartiere New West per il progetto 'Geuzenveld - Sustainable Neighborhood'. Fonti: AIM - ASC (2011) e Sito web istituzionale della ASC.

4 LE SVOLTE PIÙ RECENTI DELLA ASC: LA DEFINIZIONE DI TRE MACRO AREE DI SPERIMENTAZIONE E L'ALLARGAMENTO ALLA DIMENSIONE METROPOLITANA

Nel corso degli ultimi due anni sono stati compiuti dalla Piattaforma ASC alcuni cambiamenti importanti relativamente al numero di progetti seguiti e alla loro collocazione, insieme al rafforzamento del ruolo di tre aree specifiche di intervento. Seguendo lo sviluppo delle sperimentazioni, i progetti della ASC non sono più solamente collocati all'interno dei confini municipali di Amsterdam, ma nella più vasta area metropolitana: la piattaforma si è infatti ampliata ad alcuni interventi nelle Municipalità di Aarleem (con il progetto *Watt for Watt*) e di Almere (con i progetti *Almere Smart Society* e *Health Lab*)[10] che costituiscono parti dell'area metropolitana nelle quali il rapporto con il cuore della conurbazione è forte.

I progetti della ASC sono pertanto riconducibili ad una visione più ampia, che dai confini della città passa ad una dimensione metropolitana. Il concetto di 'Scaling up' dei progetti sul territorio rappresenta inoltre un'opportunità per allargare il campo di azione, direttamente collegato agli obiettivi di riduzione delle emissioni di CO_2.

Parallelamente a questo ampliamento le tre aree del Nieuw West, di Zuidoost e di IJburg sono divenute le aree di sperimentazione più innovativa ed estensiva dei progetti, più recentemente ricondotte al concetto di *Living Labs* (Fig. 5):

«Amsterdam Smart City has established the Amsterdam Metropolitan Area as an 'urban living lab' that allows businesses the potential to both test and demonstrate innovative products and services. Three areas in the Amsterdam Metropolitan region *play a significant role*» (Sito web della ASC, Section 'Three areas').

[10] *Watt for Watt* si compone di una serie di progetti alla scala del quartiere per aumentare l'efficenza energetica delle abitazioni e la consapevolezza dei residenti. *Almere Smart Society* «is a vision of living and working in Almere, in all its facets supported by ICT and technology». L'Healt-Lab si caratterizza per una collaborazione «between companies, government, care and research institutes to stimulate ICT & Care developments». Le citazioni sono prese dal sito della piattaforma ASC (www.amsterdamsmartcity.com, Sezione 'Progetti').

E' attraverso questo allargamento compiuto dalla Piattaforma che sono stati rafforzati il confronto con le scelte di spatial planning della città e il ruolo che la Piattaforma ricopre nella costruzione di una vision metropolitana a cui ricondurre i singoli progetti.

Le tre zone rappresentano infatti luoghi importanti per l'intera regione, sebbene per motivi diversi: aree di 'cerniera' fra la città e il territorio circostanze o al centro delle strategie spaziali e dei progetti di trasformazione della città.

Stilizzandone i caratteri, si tratta di un nuovo intervento (l'area di IJburg), di un quartiere prevalentemente residenziale realizzato fra gli anni 50' e 60' (il Nieuw West) e di un distretto con importanti funzioni commerciali, terziarie e di intrattenimento realizzato a partire dagli anni '90 (Zuidoost). Sebbene Nieuw West, Zuidoost e IJburg presentino caratteri spaziali e morfologici molto diversi, tutti i progetti della ASC mirano a rileggere in chiave sostenibile i tre insediamenti, testando progetti e sollevando risposte differenziate.

Nel distretto Zuidoost l'obiettivo è ridurre l'impronta ecologica dell'area compresa fra lo stadio Arena e l'ospedale AMC, con l'obiettivo di ridurre le emissioni come parte del progetto europeo 'Transform'. Due importanti strumenti sono sperimentati in quest'area. Il primo è la *Zuid Oost - Laws and regulations free zone*: una zona laboratorio, libera da regolazioni e vincoli di legge validi invece sul resto del territorio, dove le soluzioni innovative possono essere applicate:

"It is important that regulation does not limit innovation. Therefore Amsterdam smart City puts effort in realizing a freezone for sustainability: a district where innovation can really be tested, with the smallerst limitations by rules and regulation. Why? Technology changes fast, sometimes faster than the context it operates in" (sito web della piattaforma ASC, Sezione 'Progetti').

Il secondo strumento è costituito del progetto *Stakeholders in the drivers seat*, che ha previsto l'inventariazione dei bisogni e delle idee degli stakeholders già presenti (molto numerosi, considerando i caratteri dell'area); la creazione di una Energy Service Company per il distretto; il supporto dei workshops coordinati dal Service Design Thinking, tesi a favorire lo sviluppo di nuovi progetti, l'interazione e il disegno dei nuovi spazi[11].

Una potenzialità importante dell'area Zuidoost è costituita dalla possibilità di raggiungere con i progetti sperimentati centinaia di persone, come gli utilizzatori della stazione di Arena-Bijilmer, i lavoratori e i pendolari dell'area, i residenti e i numerosi visitatori delle attività commerciali e di intrattenimento (AIM-ASC, 2011).

Per la Municipalità: «la presenza di uffici vacanti, dei datacenters, del grande ospedale e l'abbondanza di tetti piani sono una promessa per l'area di diventare un *energy production landscape*» (Sito web della ASC, 'Section Zuidoost', descrizione del progetto specifico). Oltre agli interventi da testare sui singoli edifici, è quindi il progetto dello spazio in-between a diventare l'infrastruttura per un nuovo progetto sostenibile e al contempo occasione per un ripensamento complessivo dell'area.

Il distretto del New West pone invece condizioni differenti. Caratterizzato da una solida rappresentanza demografica e da un mix di edifici residenziali ed uffici, è una zona con un consumo di energia superiore alla media della città, per le tecnologie edilizie e tecniche in parte datate con cui sono stati realizzati gli edifici. Il quartiere è la prima aerea in tutti i Paesi Bassi in cui è stata realizzata la nuova *Smart Grid* di Alliander, che delle 40.000 famiglie residenti ne serve 15.000 (Fig. 6).

Si tratta di una 'rete elettrica intelligente', contenente computer e sensori aggiuntivi, con l'obiettivo di fornire funzioni di monitoraggio e controllo più accurate rispetto agli usi degli abitanti del quartiere e ai loro bisogni.

[11] Tra le iniziative preliminari promosse dai Service Design workshop vi sono l'utilizzo del calore prodotto dal Data Center e dall'ospedale; un sistema di gestione del traffico nei momenti di punta; l'utilizzo di energia solare a livello distrettuale; investimenti nello spazio pubblico con la collocazione di display e wi-fi, etc. Per una lista completa dei progetti schedati si rimanda al sito della Piattaforma ASC.

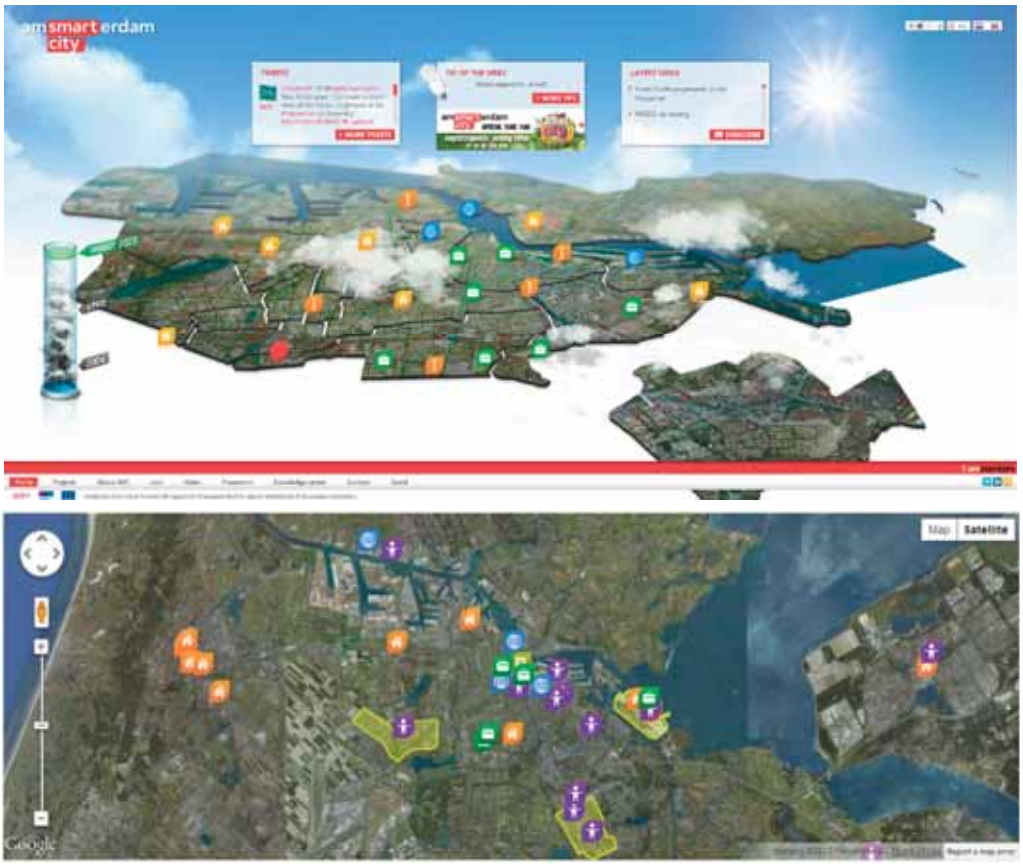

Fig.5: La presentazione dell'area su cui si applicava la Piattaforma di Amsterdam Smart City e i relativi progetti all'inizio della sua attività (in alto) e l'estensione del territorio attuale con la collocazione dei nuovi progetti. Si nota l'individuazione delle tre aree specifiche, con il colore giallo, e l'allargamento all'area metropolitana verso Aarleem e Almere.
Fonti: AIM - ASC (2011) e Sito web istituzionale della ASC

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Un ulteriore progetto testato nel New West è il *Geuzenveld - Sustainable Neighborhood*. Più di cinquecento abitazioni sono state dotate di contatori intelligenti e di display informativi aggiuntivi, che consentono ai residenti di diventare più consapevoli del proprio consumo energetico, rispetto agli usi, ai dispositivi e agli apparecchi casalinghi utilizzati. In questa area gli obiettivi del risparmio energetico si concretizzano quindi nella fornitura di una rete innovativa, in azioni puntuali ma estensive realizzate nei singoli edifici e si misurano al contempo con il tema della gestione collettiva dell'infrastruttura come elemento che può contribuire al rafforzamento della comunità e alla gestione consapevole del bene pubblico. Infine IJburg - quartiere di nuova realizzazione costruito su un'isola artificiale all'interno del bacino del fiume IJ e collegato attraverso un ponte al resto della città - che costituisce l'intervento residenziale di maggiori dimensioni promosso dalla Municipalità negli ultimi dieci anni. In quest'area i progetti della ASC si innestano su un tessuto urbano in cui i principi per la costruzione degli edifici e per la definizione degli spazi pubblici si dichiarano sostenibili. ASC promuove la dotazione in tutto il quartiere di una connessione internet pubblica, in fibra ottica a banda larga. Per la Municipalità «IJburg è un'area di straordinario interesse per lo sviluppo di nuovi prodotti e servizi: una popolazione giovane e attiva, un alto livello di connettività e un ambiente moderno circostante». Amsterdam Smart City insieme con i residenti di IJburg promuove lo sviluppo di nuovi prodotti e servizi tesi a migliorare la qualità della vita dei giovani abitanti in settori che comprendono il trasporto, il lavoro, la fornitura di energia e le connessioni internet. Tra i progetti realizzati gli *SmartWork@IJBurg* (spazi per il lavoro, ad alta connettività ed attrezzati, tesi a favorire il telelavoro e a diminuire gli spostamenti pendolari con mezzi privati, Fig. 7) e *Jburg: YOU decide!* una piattaforma di partecipazione attiva per i progetti sostenibili di IJBurg.

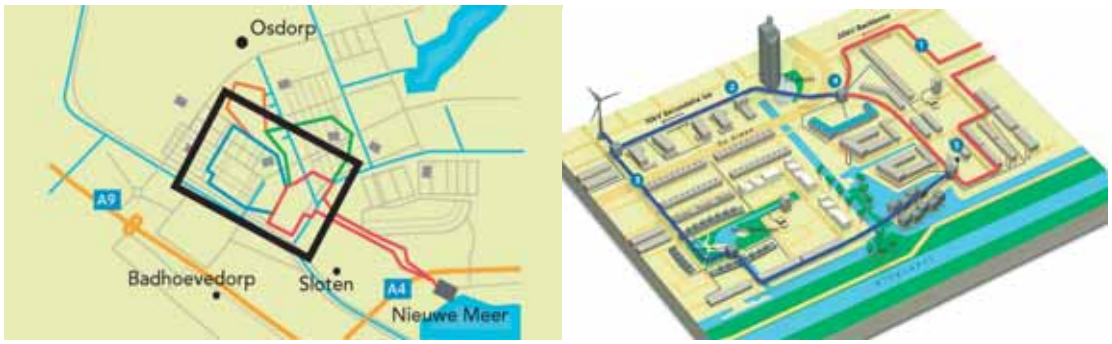

Fig. 6 Il progetto della 'Smart Grid' di Alliander realizzata nel quartiere New West: schema generale e assonometria della rete intelligente. Fonte: Sito web istituzionale della ASC.

Fig.7 Alcuni degli spazi per il lavoro ad alta connettività ed attrezzati, parte del progetto 'SmartWork@IJBurg', all'interno del quartiere residenziale IJBurg, tesi a favorire forme di telelavoro e a diminuire gli spostamenti pendolari con mezzi privati da/verso Amsterdam. Fonti: AIM - ASC (2011) e Sito web istituzionale della ASC.

5 I RISULTATI RAGGIUNTI DALLA ASC PLATFORM E CONCLUSIONI

I progetti della Amsterdam Smart City e le più ampie politiche energetiche promosse dalla Municipalità di Amsterdam, permettono di riflettere in modo integrato sulle questioni legate alla transazione energetica che devono affrontare i contesti urbani. Le conclusioni che l'esperienza solleva sono di due ordini differenti: le prime riguardano i risultati tecnici raggiunti nei termini del risparmio energetico e della promozione di energie alternative; le seconde l'interpretazione che dell'esperienza può essere data, rispetto alle questioni sollevate in apertura del contributo (cfr. la Parte 1).

Rispetto al primo ordine di interrogativi, quali sono ad oggi i risultati raggiunti dalla piattaforma? I dati forniti dalla ASC, aggiornati al 2011 (momento della prima condivisione dei risultati raggiunti) sono incoraggianti, pur cogliendo il carattere *in fieri* della strategia di Amsterdam Smart City. L'ambizione della città è quella di ridurre del 50% le emissioni entro il 2025: un obiettivo che costituisce il riferimento a cui i diversi progetti devono tendere. Nell'aprile 2011 i 32 progetti sperimentali parte delle cinque aree tematiche originali, avevano prodotto una riduzione delle emissioni dello 0.9% annui rispetto al totale. La previsione dello *scaling up*, ovvero dell'applicazione dei progetti a tutta l'area metropolitana di Amsterdam (già in corso) prevede una riduzione di 171 kton di CO_2 annui pari al 7% del totale (AIM-ASC, 2011: 143). Da questi primi esiti, risulta come la strategia attuata dalla piattaforma sia un segno tangibile verso la sperimentazione di politiche energetiche e di scelte di pianificazione che incidano sul modo di vivere la città, attraverso la sensibilizzazione nell'uso efficiente delle risorse energetiche.

Con queste prospettive, la possibilità di replicare i progetti puntuali e le azioni su larga scala costituisce l'elemento indispensabile per avere una capillare diffusione della strategia generale e raggiungere risultati significativi. Su questo aspetto, la Municipalità sta puntando in modo particolare anche grazie alla piattaforma online (www.amsterdamsmartcity.com), che favorisce la comunicazione e lo scambio di

informazioni sia all'interno dei singoli progetti sia fra le diverse esperienze. In questa fase risulta infatti indispensabile informare i cittadini in merito ai progetti in corso, agli obiettivi da raggiungere e al network dei soggetti sperimentatori. Questo processo può potenzialmente produrre un consenso ed una maggiore consapevolezza diffusa, mentre la presentazione collettiva dei numerosi progetti in corso e dei loro esiti contribuisce ad attirare cittadini, enti, imprese pubbliche o private interessati alla sperimentazione[12].

Se i risultati raggiunti dalla Amsterdam Smart City sono ancora in evoluzione dal punto di vista del risparmio energetico, rispetto all'interpretazione avanzata all'inizio del contributo riteniamo che questa esperienza ponga importanti apporti di riflessione ed alcuni elementi innovativi. Le progettualità che oggi popolano la strategia della ASC nel suo insieme, non sono tutte considerabili come interventi strategici di tipo risolutivo e al contempo emergono nella piattaforma anche elementi di marketing territoriale che hanno l'obiettivo di incentivare investimenti privati e consolidare opportunità di finanziamento europee, tuttavia l'esperienza della ASC è considerata significativa in Europa, fra esperienze simili, grazie al consolidamento di una piattaforma che funge da facilitatore di processi di gestione tra diversi attori.

In aggiunta a questi elementi più generali, l'esperienza della Amsterdam Smart City permette di riflettere appieno non sul senso dei progetti legati all'energia in modo settoriale, ma piuttosto sulla dimensione integrata che un progetto sostenibile e resiliente deve avere e può contribuire a creare. Il caso mostra con forza come il progetto dell'infrastruttura energetica - apparentemente solo tecnica - possa diventare progetto per la collettività, attraverso l'interazione con un numero ampio e differenziato di soggetti, (cfr. le Parti 2 e 3); sottolinea la necessità di costruire e condividere anche rispetto ai temi energetici una strategia collettiva proiettata verso il futuro (cfr. la Parte 3) e mostra come questi progetti possano contribuire alla costruzione di una visione territoriale per l'area metropolitana e al disegno di nuove parti della regione urbana (cfr. la Parte 4).

[12] La schedatura di tutti i progetti sperimentati, la spiegazione per ciascuno di essi dei soggetti coinvolti e delle diverse quote di coinvolgimento degli attori pubblici o privati, accompagnati da una grafica chiara ed intuitiva, sono elementi importanti che contribuiscono a mettere in valore le singole attività, favorendo la conoscenza, il confronto e le nuove adesioni.

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IMAGE SOURCES

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AUTHOR'S PROFILE

Giulia Fini

Giulia Fini, architetto (2006, Università IUAV di Venezia), PhD. (2010, Politecnico di Milano), insegna presso il Master in Urban Planning and Policy Design della Scuola di Architettura e Società del Politecnico di Milano, dopo esperienze di collaborazione in diverse Università e workshop internazionali. E' dal 2011 editor in chief di *Planum. The Journal of Urbanism* |www.planum.net e dal 2013 è tutor dei corsi di dottorato del Dipartimento di Architettura e Studi Urbani del Politecnico di Milano. E' stata assegnista di ricerca dal 2010 al 2014 presso il DAStU - Dipartimento di Architettura e Studi Urbani del Politecnico di Milano e ha sviluppato negli anni diverse collaborazioni professionali. I suoi interessi di ricerca si concentrano intorno alla dimensione spaziale del progetto urbanistico, con particolare interesse verso le aree periurbane, le aree di frangia e le polarità periferiche specializzate. Svolge inoltre ricerca sulla tradizione italiana del progetto urbanistico attraverso importanti figure di riferimento.

Salvatore Caschetto

Salvatore Caschetto collabora dal 2014 con l'Assessorato Politiche per il Lavoro, Sviluppo Economico, Università e Ricerca del Comune di Milano. Precedentemente ha collaborato con ForumPA, e dal 2012 con il Comune di Milano, Settore Sviluppo Economico, Smart City e Università, dove ha seguito in particolare il processo strategico di Milano Smart City ed i progetti di innovazione finanziati da partnership pubblico-privato che hanno visto il Comune di Milano come ente sperimentatore. I suoi interessi professionali e di ricerca si concentrano sull'innovazione tecnologica applicata agli ambienti urbani, temi su cui ha sviluppato la tesi di laurea specialistica (Politecnico di Milano, 2012), ha scritto articoli e condotto confronti con enti e municipalità in diverse città europee. E' dal 2011 redattore di *Planum. The Journal of Urbanism* | www.planum.net.

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ALTERNATIVE CHARGES ON PRIVATE VEHICLES AS A WAY OF MANAGING URBAN MOBILITY

CRISTIANO SOUZA MARINS [a], RÔMULO DANTE ORRICO FILHO [b]
WELLINGTON NASCIMENTO SILVA [c]

[a,b,c] Universidade Federal do Rio de Janeiro - UFRJ
[a] e-mail: cristianosouzamarins@yahoo.com.br
[b] e-mail: romulo@pet.coppe.ufrj.br
[c] e-mail: wn.silva@uol.com.br

ABSTRACT

In this article, we reflect on proposals for the use of urban tolls on private vehicles as a form of urban mobility management. The methodology used exploratory research for the development of a theoretical basis and a table was drawn up showing the experience in various countries. The conclusion is that toll fees are economic viable, the social and environmental benefits are considerable and this can be considered an important sustainable mobility strategy.

KEYWORDS:
Urban Taxing Alternatives; Private Vehicles; Urban Mobility Management.

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城市交通管理系统
城市私家车征税方案

CRISTIANO SOUZA MARINS [a], RÔMULO DANTE ORRICO FILHO [b]
WELLINGTON NASCIMENTO SILVA [c]

[a,b,c]Universidade Federal do Rio de Janeiro - UFRJ
[a] e-mail: cristianosouzamarins@yahoo.com.br
[b] e-mail: romulo@pet.coppe.ufrj.br
[c] e-mail: wn.silva@uol.com.br

摘要

本文就对私家车征收通行费作为城市交通管理的一种方式进行了思考。文中采用了探索性研究的方式对这一领域的理论成果和在不同国家中的相关经验进行了详尽阐述，并由此得出结论：征收通行费在经济上是可行的，并能产生巨大的社会和环境效益，可以视作一个重要的可持续交通战略。

关键词
城市征税方案；私家车；城市交通管理

1 INTRODUCTION

Transport plays a significant role in environmental problems, mainly due to it being the largest and a growing consumer of non-renewable energy and a pollution generator. Furthermore, means of transport as mobility agents have a direct impact on people's quality of life, allowing them to come and go and access to goods and services, leisure, study and work. One of the main causes of environmental problems has been the excessive use of the automobile as the main form of urban transport. It will be difficult to change this in the short or even medium term, mainly due to the advantages and significance that the automobile presents and represents to society.

To Banister (2005, 2008), the features that cause the automobile to be a global icon are: they are goods manufactured by companies that are themselves icons of industrialization and world capitalism; they give their users status; it is a complex product that makes use of numerous accessories and, for that reason, feeds a broad and varied sector; it provides individual mobility that is superior to other means of getting around (public transport, bicycle and walking); and it shapes and organizes the lives of people (work, leisure, study, etc.). Another important aspect is the flexibility and freedom that the car represents, allowing the users to come and go as they please, while the transport alternatives (public and non-motorized) have lost their ability to attract and retain users. Taking the city of Rio de Janeiro as an example, in the last two decades, the population growth was approximately 5%, while the growth in the automobile fleet was 50% and that of motorcycles was 300%. As shown in Table 1, there is one automobile for every four people. The big problem is not the ownership of automobiles, but the fact that they are in everyday use for short, medium and long distance travel. The ideal would be to use the public transport system, in any of their combined modes, and non-motorized transport. The trouble with this is the lack of quality and investment in these forms of transport, which makes them less attractive than utilizing the automobile. (Orrico et al. 2012).

	Year	**Number**
Population	1999	5,814,750
	2010	6,323,037
Automobiles	1999	1,062,190
	2010	1,521,716
Motorcycles	1999	40,903
	2010	161,306

Tab. 1 Population, automobiles and motorcycles in Rio de Janeiro, from 1999 to 2010.

Within this scenario, it is necessary to seek alternatives that allow for the management of mobility and the control of automobile use, so as to minimize its impact on the environment and on people's quality of life. In this respect, urban toll fees have become an important strategy for sustainable urban mobility, as they help to offset the impact by generating a source of revenue that can be invested in improving the public transport and the transport infrastructure in general, as well as discouraging automobile use as the principal means of transport (Wu and Shang, 2014). The methodology of this study was to examine the use of the urban toll system as a form of urban mobility management. For this purpose, qualitative and exploratory research was conducted, for the development of a theoretical and descriptive basis for presenting some models that have been adopted by the world's major cities. The overall objective was to analyze the urban toll system as a form of management of urban mobility and incentive to sustainable transport and to analyze and compare the different urban toll models adopted in different countries, as well as to reflect on the importance of urban tolls as a way to manage automobile use and encourage the use of public and non-motorized transport.

In addition to the present section, this work is organized in the following manner: in Section 2, the theoretical basis for sustainable mobility and urban tolls is presented, while in Section 3, we show the analysis and reflection on using urban tolls as a form of mobility management, and the last section presents the final considerations.

2 THEORETICAL BASIS

2.1 SUSTAINABLE URBAN MOBILITY

Sustainable mobility is one of the most central and complex aspects in public transport planning, especially with regard to infrastructure, utilization of renewable energy sources, vehicles, non-motorized transport and improved land use.

Originally, papers and discussions about mobility, transport and sustainable development were restricted to environmental factors, dealing with matters such as climate change, pollution, the use of natural resources and sources of non-renewable fuels, etc. A more up-to-date approach incorporates other dominant aspects for achieving a sustainable transport system, such as social, economic, cultural and technological factors, while the term "sustainable" now embraces a set of interacting and interdependent elements.

The term mobility involves a set of elements that permeate public administration and involve the planning, management and regulation of public transport, urban freight logistics, land use and accessibility. Mobility has a direct impact on people's quality of life, allowing access to the means of production, leisure and education. As a consequence of the lack of planning, there has been an increase in the pollution from gas emissions, increased traffic congestion due to the use of private automobiles, centralization in the use of land, etc. (BRAZIL, 2007, 2012). Another definition offered by the National Urban Mobility Policy, presented by SEMOB (BRAZIL, 2007, p.41) is:

(...) "an attribute associated with people and goods; it corresponds to the different responses of individuals and economic agents to their transportation needs, considering the dimensions of the urban space and the complexity of the activities carried on within it", or, more specifically, "urban mobility is an attribute of cities which refers to the ease of moving people and goods around within the urban space". Such movements are made using vehicles, roads and the entire urban infrastructure (streets, sidewalks, etc.)" (…) "It is the result of the interaction between the movement of people and goods and the city itself."

Given the need for a reformulation of the current paradigms involving mobility and public transport, some concepts and sustainability models, applicable to urban mobility, have become necessary. According to Richardson (2005) and Ramani (2008), sustainable transport can be defined as the capacity to meet the demand for transport without compromising future generations. This definition is based on three key areas: economic, environmental, and social. Also based on these three areas, according to those authors, is a set of variables that can be used as sustainability indicators: safety, traffic, fuel consumption, vehicle gas emissions and accessibility. Moreover, according to Richardson (2005), each transport system is complex and its complexity derives from the multiplicity of the infrastructure, people and organizations involved. This is intensified by the different legislation and regulations, service providers, financing systems, technologies, land use strategies and consumer behavior.

According to Litman (2008, 2012), a sustainable transport system must:

- meet the basic needs of the people, businesses and society in a manner that is safe, consistent and healthy, while protecting the ecosystem and the interests of future generations;
- be accessible, seeking to be efficient and effective, operating as fairly as possible, offering choices of transport, and stimulating economic competition and balanced regional development;
- recognize the planet's limited ability to absorb the waste and pollution generated by the current model, utilize renewable resources at below their regeneration capacity and non-renewable resources more

slowly than the rate of development of renewable alternatives, while minimizing the impact on land use and generation of pollution.

According to Banister (2005, 2008), every form of transport is unsustainable, as it consumes non-renewable resources, and the non-motorized means of transport are closer to being sustainable, since they consume little non-renewable energy, even while consuming other types of resources, such as space. Banister presents a hierarchy of energy consumption and external effects generated by the different forms of transport.

A study carried out in 2008, in 168 European cities, by the European Conference of Ministers of Transport, identified the main barriers to a sustainable urban transport policy. Among them are: "weak integration and coordination policies, counterproductive institutional roles, unsustainable regulatory frameworks, pricing deficiencies, bad data, limited public support and lack of political will". It also considered as critical factors in sustainable transport strategies: improvements in public transport, charging for automobile use and controlled land use. (May and Ison, 2008). Douglas et al. (2011) relates the use of the automobile as the main form of transport to public health problems, connecting human health and global sustainability. The authors argue that the use of the automobile should be compared to the use of tobacco, due to its health-endangering effects. Furthermore, the use of bicycles or walking lead to a decrease in obesity, the reduction of air and noise pollution and in the number of accidents, as well as enabling greater interaction between people and helping to mitigate climate change. They also point to the efforts of the automotive industry, just as with the tobacco industry, in lobbying for increasing consumption and use of private automobiles. The dependency on the use of the automobile occurs at the individual and social levels.

2.2 AUTOMOBILE USE AND TRAFFIC CONGESTION

In the last few decades there has been an exponential increase in the use of automobiles in urban centers and what used to be a problem exclusive to great metropolis' has now spread to medium and small sized urban centers. The problem has become particularly acute in developing countries, due mainly to economic growth and the social rise of the less favored classes. Linked to this are the government incentives (tax reduction and extension of financing lines) for the automotive industry, and subsidies and exemptions on fuels, which make the acquisition and use of automobiles cheaper. Litman (2002) states:

"Automobile dependency is defined as high levels of per capita automobile travel, automobile oriented land use patterns, and reduced transport alternatives. Automobile dependency increases many costs: higher vehicle expenses, reduced travel choices, increased road and parking facility costs, congestion, accident damages, and a variety of environmental impacts. Beyond an optimal level, excessive automobile dependency may reduce economic productivity and development. A more balanced transportation system can provide many benefits to consumers and society."

The automobile has become an important symbol in modern society and has a considerable influence on people's lives and the redefining of society, urbanization and land use. It provides freedom and enhanced mobility, but its effects entail high social costs, making it one of the biggest problems and challenges for public administrators today (Toralles and Paulitsch, 2010). Despite the transport benefits, the burden is excessive, generating operational (accidents, noise and atmospheric pollution, congestion, etc.) and infrastructural costs that fall upon the population as a whole. According to Litman (2002), in the USA, parking costs are estimated to represent as much as 30% of transportation spending. The use of the automobile generates external factors (indirect or external costs) that fall upon all of society and, as Button (1993) and Torres (2007) state, they come about when there are negative effects from one group affecting another without any compensation. Litman (2012) argues that for each amount invested in expanding the road network, parking and traffic control, an equal amount must also be invested in alternative means of getting around, such as bicycles, walking and public transport. A study carried out by the ANTP (2010, apud Gomide and Morato, 2011) presented data on urban mobility between 2003 and 2009 and it was possible to verify that the increase in the number of vehicles, by around 7%, was greater than the increase in roads, of

2%. It was also greater than the population and income growth. The consequence is an increase in traffic congestion on the roads and in a low level of sustainable mobility. According to Gomide and Morato (2011), the period between 2009 and 2010 saw an even bigger increase in the number of automobiles, at 8.4%.

	2003	2004	2005	2006	2007	2008	2009	Growth Rate
Population (million)[1]	108	111	113	115	117	120	121	2.5%
Breadwinner Income (R$)	1034	1025	1044	1091	1128	1270	1310	4.0%
Roads (thousand km)	294	304	309	314	319	328	332	2.0%
Public transport (thousand)[2]	93	95.2	97.6	97.1	100.6	102.3	103.4	1.8%
Vehicles (million)[3]	18.4	19.3	21.2	21.2	24.0	25.9	28.0	7.2%

The 437 municipalities with 60,000 inhabitants or more in 2003
Includes urban and inter-city buses and rail passenger vehicles
Includes automobiles, vans, trucks, buses, micro-buses, motorbikes and motor-scooters

Tab. 2 Data progression in selected municipalities that comprise the ANTP1 mobility data system (2003-2009)

The same study also presents an estimate of the internal (fixed and variable) and external (social) costs for each type of transport. The automobile has the highest overall cost, compared to other types of transport. However, it should be noted that the ANTP study (2010, apud Gomide and Morato, 2011) includes accidents and air pollution, but doesn't include costs such as lost time, excessive use of public areas for the expansion of roads and public parking lots, fragmentation of urban space, energy consumption and other problems deriving from excessive urban traffic.

	Buses	Motorcycles	Automobiles[5]
Fixed cost[1]	R$ 0.00	R$ 0.84	R$ 2.88
Variable cost[2]	R$ 0.00	R$ 0.74	R$ 2.31
User cost (A+B)[3]	R$ 2.17	R$ 1.58	R$ 5.19
Social cost[4]	R$ 0.20	R$ 1.87	R$ 0.50
Total cost (C+D)	R$ 2.37	R$ 3.45	R$ 5.69

1. Buses: includes ticket price. Motorcycles and automobiles: depreciation, maintenance and taxes.
2. Buses: includes ticket price; Motorcycles: fuel; Automobiles: fuel and parking.
3. Buses: ticket price. Motorcycles and automobiles: sum of A plus B. Represent internal costs.
4. Accident (greater for motorcyclists) and pollutant emission costs. Represent external costs.
5. Average of gasoline and alcohol powered automobiles.

Tab. 3 Fixed, variable, social and total cost per capita for each type over a 7 km urban journey

According to Torres (2007), the external factors could be immediate (as with traffic congestion), cumulative (CO2 emissions), local or global. From an economic perspective, they can be intra-sectorial or inter-sectorial. According to Freeman (1997, apud Torres, 2007), the external factors can be divided into four categories: damage caused by transport services (congestion, accidents); pollutant gas emissions; infrastructure investment; and vehicle and fuel production impacts. On the other hand, Button (1993, apud Torres) defines the external factors as technological (production or transport use) or pecuniary (produced by other parties). And in the transportation process there are five types of external factors: atmospheric and noise pollution, accidents, additional energy consumption and traffic congestion. Litman (2012) characterizes as indirect costs investment in infrastructure (road network, traffic services and parking). Traffic congestion is one of the main external factors and it causes harmful effects on drivers, pedestrians and public transport users, as well as increasing the atmospheric, noise and visual pollution and journey time.

According to Torres (2007, p. 22) congestion may be categorized as:

- Circulatory: related to the excessive number of vehicles in relation to the road capacity;
- Destination: related to the time wasted in searching for a parking space;
- Recurrent: repeated and possibly seasonal occurrences in cycles;
- Non-recurrent: random occurrences that are caused by contingencies such as accidents, special events or weather conditions;
- Arterial: restricted to a section of the network, on a structural or arterial road that does not compromise the rest of the network;
- Network: occurs in a part of the network, or all of it.

According to Torres (2007), the classifications and typologies are not mutually exclusive, but they can be interdependent. Some examples mentioned are the circulatory and destination congestion being related, since the increase in the number of vehicles results in a decrease in the number of parking spaces available and an increase in demand.

According to Litman (2002), the dependency on automobile use leads to an increase in infrastructure costs, creating the need to expand the road network by up to three times the size that would be required under a more balanced model. This generates greater occupation of physical and symbolic space, depending on the means of transport, speed and idle (parked) time (Torres, 2007). Figure 1 shows the occupation of road space, by means of transport.

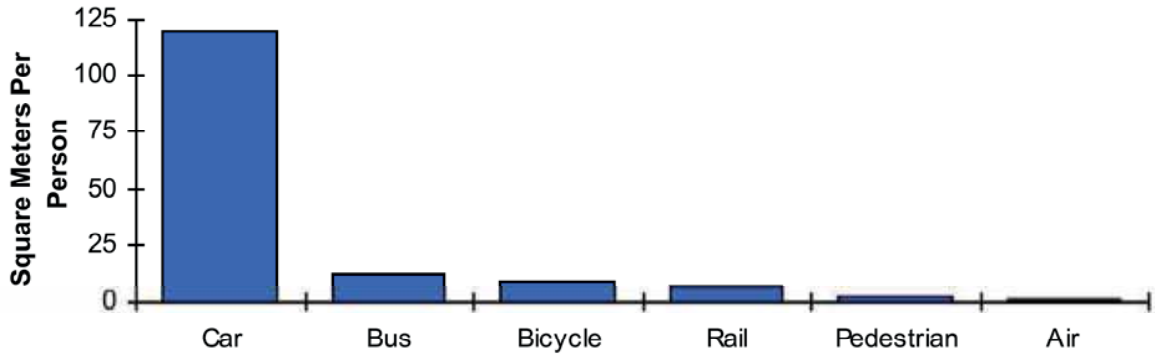

Fig. 1 Road Space By Mode

It is clear that the car is by far the transport mode that occupies the most road space, followed by buses, bicycles, trains, pedestrians and air travel. According to Torres (2007), what causes traffic congestion is people's need to move from one place to another, or the need for mobility. However, it is the concentration of automobiles and the limited road space that determines the congestion. The author also notes the space-time aspect of congestion, whereby "journeys with great time elasticity can be transferred to other less heavy hours, thereby avoiding traffic jams". However, it is the objectives or activities to be performed that impose limits on reorganization. Consequently, it is the rush hours (time for going to work, school, etc; lunch time; coming home from work, school, etc.) that will determine when and where the traffic jams will occur. The annual cost of congestion in São Paulo has reached R$ 350 million and in Rio it is R$ 70 million (IPEA/ANTP, 1999; Torres, 2007).

According to Torres (2007, p. 28) there are two approaches for dealing with the problem of congestion:

- Traffic Engineering: treats the phenomenon as an inadequacy in the ratio between the supply and demand for road capacity and studies vehicle circulation based on the relations between the three main variables: speed, flow and density;

– Economics: treats congestions as a failure by the market mechanisms to achieve a balance between supply and demand. It states that congestion is caused by the fact that the road transport products and consumers do not consider the external costs that are borne by others. They consider only the internal costs in their transportation decisions.

IPEA (Institute for Applied Economic Research) and the ANTP (National Public Transport Association) conducted a study in 1999 aimed at evaluating the impact of congestion in terms of cost. The main effects identified were: excessive time spent on main and tributary roads, fuel consumption, air pollution, direct operational costs, cost of establishing and maintaining the road network, and the urban space occupied by automobiles and buses. The study provided an analysis of the diseconomies (costs) generated by congestion in ten Brazilian cities and Table 4 shows the results.

City	Additional time lost (million passenger hours)		Additional fuel consumption (million liters))		Additional pollution emissions (t)						Road network	
					Cars		Buses					
	Cars	Buses	Cars	Buses	HC	CO	HC	CO	NOx	MP	For circulation (m^2)	For parking (m^2)
Belo Horizonte	6,06	40,54	5,57	0,55	252,59	2.851,91	22,66	55,44	39,88	1,98	246.318,75	61.579,69
Brasília	0,50	2,41	0,57	0,11	20,40	178,58	3,06	7,48	5,38	0,27	457.800,00	114.450,00
Campinas	3,51	2,45	4,10	0,20	181,92	2.012,79	8,05	19,69	14,17	0,70	193.687,50	48.421,88
Curitiba	2,82	2,37	2,50	0,06	115,07	1.309,74	2,92	6,56	4,72	0,23	14.347,50	3.586,88
João Pessoa	0,77	1,21	0,60	0,05	27,46	310,70	1,84	4,51	3,25	0,16	122.910,00	30.727,50
Juiz de Fora	0,18	1,69	0,14	0,05	6,68	76,24	2,11	5,16	3,71	0,18	-	-
Porto Alegre	3,00	3,42	2,57	0,18	116,10	1.309,78	6,93	16,96	12,20	0,60	79.031,25	19.757,81
Recife	1,79	3,67	1,36	0,11	66,38	759,62	5,42	14,22	9,53	0,82	117.750,00	29.437,50
Rio de Janeiro	33,03	80,41	35,85	2,11	1.605,43	17.884,39	86,44	209,75	150,89	7,48	206.100,00	51.525,00
São Paulo	198,43	117,87	198,53	3,65	8771,38	95.992,53	157,65	385,76	277,50	13,75	5.551.496,25	1.387.874,06
Total	**250,09**	**256,03**	**251,79**	**7,06**	**11.163,42**	**122.686,26**	**297,08**	**725,53**	**521,22**	**26,17**	**6.989.441,25**	**1.747.360,31**

Tab. 4 Summary of total annual costs caused be severe traffic congestion in ten cities

As the table above shows, the cities of Rio de Janeiro and São Paulo present the worst results, mainly due to being the largest and most populous cities in the country. Two important details are that in the ten cities there is additional time wasted totaling over 500 million passenger hours, due to the congestion in these cities, and the amount of space devoted to parking totals 1,747,360.31 m^2. Taking into account that this study is from 1999 and that, in the last 14 years, it is estimated that the automobile fleet has grown by more than 50%, one can imagine how much worse these numbers would be today. According to Torres (2007), there are three possible steps that can be taken by the administrators:

– Non-intervention: involves letting congestion reach its saturation peak. This is based in the concept whereby congestion is a natural phenomenon and a normal consequence of road traffic. In other words, with the increase in congestion there will be a tendency for some drivers to stop using the automobile and turn to other means of transport, or at least to take alternative routes;
– Supply Side: involves increasing road capacity by building new roads or widening and duplicating existing roads. The increase in road space will involve employing Traffic Engineering techniques in road expansion and the regulation and coordination of traffic lights. This is the main emphasis given to traffic management and planning in Brazil and it can generate increased demand (generated traffic and induced demand), due to the increase in the supply of road space. According to Litman (2012), "generated traffic and induced demand" can be defined as the increase in journeys resulting from an increase or improvement of the road system. While congestion can lead to migration or displacement of journeys to alternative routes or to a changing of travel time, the improvement of the roads can lead to an expansion in the number of automobiles. According to Toralles and Paulitsch (2010), "the increase in road capacity creates space for new automobiles and also for those that were not previously circulating, because their drivers were put off by the state of saturation". Meanwhile, Downs (1992, *apud* Litman, 2012 and Torres, 2007) introduces the concept of "triple convergence", which is the transfer of users from other roads (spatial convergence), times (temporal convergence) and other

types of transport (modal convergence), due to, among other reasons, the increase in capacity and improvement of the road system. According to the author, a solution to "triple convergence" would be regulation through "urban tolls", which would bring about "triple divergence" (transfer of journeys to other roads, times and types of transport);

– Demand Side: According to Torres (2007), demand management will have the objective of inducing demand, be it in a coercive manner or by developing awareness, to alter its travel behavior and seek more sustainable means of transport. It involves acting to minimize the use of the automobile through regulation, which is achieved through public sector intervention on three fronts: physical, institutional and pricing.

Physical intervention involves the prohibition and restriction of the circulation of vehicles on specific roads, in certain locations and at certain times, following defined criteria. An example of this occurs in São Paulo, with the "license plate rotation" and "rush hour operation" and in Mexico City, with "*Hoy no circula*". This type of restriction can lead to the acquisition of a second vehicle or to fraud (Torres, 2007; Toralles and Paulitsch, 2010). Economic regulation involves the reduction or prohibition of circulation on specific roads or in certain locations, subject to payment of a fee, such as an urban toll. Examples of this are the toll on the "*Linha Amarela*" express highway and on the Rio-Niterói bridge, as well as London's "Congestion Charge", which started in 2003 and was the pioneer for this type of intervention. According to Kelly and Clinch (2006), for transport demand management (TDM), the urban toll is the best alternative, followed by parking policy and charges.

Quoting Torres (2007), there are a few strategies that can be utilized in demand management:

– Regulating the ownership and use of private automobiles: restrictions on the ownership of vehicles and parking spaces, with a system of acquisition quotas;
– Limiting parking space: physical control by suppression of parking spaces, reservation of spaces for certain user categories and charging parking fees.;
– Controlling moving vehicles: Segregated traffic and selective access;
– Regulating through taxation: taxation of vehicle ownership, paid parking, fuel taxation and fees for distance traveled.

3 ANALYSIS AND REFLECTION

Gomide and Morato (2010) state that, according to economic theory, the most effective measure for discouraging the use of the automobile and canceling out the external factors would be through toll fees, based on the costs generated by automobile use. The resources raised could be utilized for improving the public transport and the development of non-motorized transport.

Urban charges would be aimed at limiting the circulation and use of vehicles in specific areas and locations. The main form of urban charge is the urban toll fee, which was first used successfully in 1974, in Singapore, and remains in operation to this day (Toralles and Paulitsch, 2010).

In Brazil, the main examples of urban tolls are the on the "*Linha Amarela*" and the "Rio-Niterói bridge". The best known case and a successful example of an urban toll is in London, which was implemented in 2003 and innovated by linking urban traffic management and fund raising for improvement and expansion of public transport and non-motorized transport.

The toll can be classified as: a financing or concessionary toll, aimed at raising funds for investment in infrastructure and not for regulating demand; or regulatory or environmental.

According to Torres (2007), there are three types of urban toll, according to the method of application:

	Arterial Toll	ALS Toll	Zonal Toll
Main purpose	Infrastructure financing	Traffic control in a specific area	Traffic control in a specific area
Scope	A single highway, bridge or tunnel	All roads within the specific area	All roads within the specific area
Fee-generating trigger	Going through the road billing point (toll plaza)	Crossing the limit for access to the restricted area	Entering, circulating or parking within the specific zone
Form of inspection and billing	Manual or automatic at the toll plaza	Electronic inspection and automatic billing	Electronic inspection and automatic billing
Billing period	Every day (24/7)	Morning and afternoon on business days	Morning and afternoon on business days
Rate flexibility	Fixed fee	Variable: higher during rush hour	May be fixed or variable
Effectiveness in fee collection	High	Low	Low
Effectiveness in reducing congestion	Low	High	High
Examples	Rio-Niterói bridge	Singapore	London

Table 5: Main types, characteristics and examples of congestion fees.

The urban toll has shown itself to be a viable and efficient alternative for regulating and managing urban mobility. In London, for example, since its introduction in 2003, it has brought about a 30% reduction in congestion, diminishing the circulation of vehicles and increasing the use of non-motorized transport. It provides an incentive to other types of more sustainable transport.

Many cities in the world, besides those already mentioned, have implemented or are planning to implement the urban toll fee as a way of regulating urban traffic, and among them are Milan, in Italy, Stockholm, in Sweden, San Francisco, in the USA, Manchester and Cambridge, in the UK, and Barcelona, in Spain. In Brazil there have been moves along these lines in São Paulo, Campinas and Salvador (Torelles and Paulitsch, 2010). Table 6 presents some of the experience with the implementation of urban toll fees in various countries, along with the benefits and forms of application. As can be seen, the urban toll systems provide considerable benefits and are economically viable.

However, their efficiency depends on the use of intelligent traffic control systems and investment in public and non-motorized transport. In fact, the use of these systems should be aimed at encouraging the use of means of transport other than the automobile.

According to Hau (1992) and Torres (2007), the following driver behavior is likely to occur when faced with the implementation of a toll system: pay the toll fee; use toll-free routes; change the time of journeys (outside billing hours); change to other types of transport; change the destination or cancel the journey.

Care must be taken not to cause congestion on other roads outside the toll zone. This can be done through traffic monitoring on all roads. To obtain the desired success, significant investment is necessary in sustainable mobility alternatives, giving priority to non-motorized transport. Some cities around the world have developed successful educational and even prohibitive campaigns.

In Bogotá (Colombia), a network of bicycle lanes was built that was integrated with the BRT (*Bus Rapid Transit*) system and there was a "Car-Free Sunday Program" that combined to reduce the automobile traffic by 40%. It is recommended that the toll system be directed towards promoting and economically supporting more sustainable urban mobility systems. Some precautions should be taken to ensure the success of the

toll system, among which is the matter of popular approval. This is possible when there is transparency regarding the expected results (social, environmental and economic benefits), the collecting of funds and investment of economic resources. Moreover, it is necessary to seek political approval and support, so that it can become integral to a larger long term program for urban mobility.

It is important to emphasize that the urban toll fee should be part of an overall mobility program, including expansion of the public transport network and improving its quality.

This would provide options and would meet the extra demand of automobile users who opt for public transport due to the urban toll. In other words, there is no point introducing the toll without first offering mobility options, especially for those who are unable to pay the toll fee.

As noted by Kottenhoff and Freij (2009), the urban toll model introduced in Stockholm, Sweden, was a good example, as part of a three-part public policy package: the congestion fee, the expansion of public transport and improvement of the roads and access areas.

Moreover, it was an inter-sectorial action plan involving six phases, starting with the expansion of public transport and the subsequent introduction of the fee. And it was precisely the improvement of the public transport that contributed decisively to the popular acceptance of the urban toll fee. The improvement and expansion of the public transport network and non-motorized transport help to justify the introduction of the fee and facilitates its acceptance by the population.

Different configurations can arise from the proposal to introduce an urban fee, as shown by Ieromonachou, Potter and Warren (2007), who compared the introduction of a toll at cities in the UK (Durham and London) and Norway (Bergen and Oslo). It was found that there were different levels of popular acceptance, forms of investment, technologies used, public sector performance and needs met. The important thing is that in all cases, the efforts were successful.

The urban toll is not the only form of urban charge aimed at managing the traffic and the transport demand. Although, for decades, parking was treated as just a part of the fixed cost of travel, many studies have been carried out that highlight the use of parking fees as a strategy that offered an alternative or was complementary to the urban toll for regulating urban traffic, including those of Barata, Cruz and Ferreira (2011), Caicedo and Diaz (2013), Kelly and Clinch (2006) and Ieromonachou, Potter and Warren (2007).

In their study, Kelly and Clinch (2006), for example, examined how different price bands can affect the behavior of demand, in a study carried out in Dublin, Ireland.

As shown by Ieromonachou, Potter and Warren (2007), an urban toll is not always sufficient to bring about a reduction in motor vehicles. In Bergen, Norway, after the introduction of the urban toll, the number of motor vehicles actually went up, but the traffic management involved a mix of toll fees and control of the quantity and prices of parking spaces. Parking fees went up 20 times faster than the toll, leading to a diminishing of traffic within the city.

Caicedo and Diaz (2013) emphasized that, in developing countries, it is common for illegal use to be made of urban space for parking and that the control and billing, as well as being a source of funds for investment to meet social demands, also increases the level of control over the circulation of vehicles.

The free supply of parking, whether legal or illegal, encourages automobile use and consequently increases the demand. In some cases, according to Murray (2001), charging for parking can be used to balance the use of the public transport system with automobile use, especially when use of public transport has been rejected.

Moreover, different agents, such as public and private institutions, can be used in this strategy, both in the planning and the execution. The operation of parking areas can receive public and private resources, directly or indirectly. In Brazil, for example, it is common for the state to make improvements in infrastructure and subsequently grant and regulate a concession to a private company or consortium. In any case, it is an interesting and effective strategy.

In Brazil there are major barriers to the introduction of urban tolls, among which is the low quality, variety and efficiency of the public transport.

Furthermore, most of the political decisions on mobility are taken in a disorganized manner and the country has a strong tendency to make inefficient use of public resources. Long-term policies are always tied to keeping a particular group or political party in power, otherwise decisions only last until the end of the political term, leading to a lack of continuity in the development and implementation of public policies. There is still no tradition of organizing mobility policies along with other important sectors, such as housing, education, health and administration, which hinders their effectiveness.

An example of this was the license plate rotation introduced in São Paulo in 1997, with the aim of curbing automobile use and encouraging the use of public transport.

However, since there was no significant improvement or expansion of the public transport to meet the likely increase in demand, it ended up stimulating the purchase of a second vehicle with a license plate that could be used on different days.

The result is that São Paulo became the only city in Brazil in which the use of private transport is greater than that of the public transport.

4 FINAL CONSIDERATIONS

This paper was aimed at demonstrating the effectiveness of the urban toll as a system for mobility management and reducing congestion and automobile use. It was possible to ascertain that there are significant operational and environmental gains. It also leads to improved transport efficiency a changing habits in the movement of people. It was also possible to verify in the examples that the system is economically viable and can be the principal means of financing more sustainable mobility. A limitation of the work is the lack of models and examples in Brazil that would have allowed a broader and approach that compared local examples with other models adopted around the world. In future work, other approaches may be developed, such as the matter of determining the ideal price for the fees, operational aspects, and the use of information and communication technology in the toll systems, among others.

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IMAGE SOURCES

Tab. 1: Orrico et al. (2012, p.8) (Adapted)

Tab. 2: ANTP (2010, apud Gomide and Morato, 2011)

Tab. 3: ANTP (2010, apud Gomide and Morato, 2011)

Tab. 4: (IPEA and ANTP, 1999)

Tab. 5: Gomide and Morato (2010, p. 22)

Fig. 1: Litman (2002, p. 15)

AUTHOR'S PROFILE

Cristiano Souza Marins

Phd in Transportation Engeneering at Federal University of Rio de Janeiro

Romulo Orrico Dante Filho

Professor of Transportation Engeneering at Federal University of Rio de Janeiro

Wellington Nascimento Silva

Phd in Transportation Engeneering at Federal University of Rio de Janeiro

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CENTRO DIREZIONALE OF NAPLES A "SMART" CONCEPT

FABRIZIO CANFORA [a], FABIO CORBISIERO [b]

[a]Dipartimento di Scienze Umane e Sociali
Università degli Studi di Napoli "L'Orientale"
e-mail: fcanfora@unior.it

[b] Dipartimento di Scienze Sociali
Università degli Studi di Napoli Federico II
e-mail: fabio.corbisiero@unina.it

ABSTRACT

The topic of urban planning linked to the growth of smart cities is now quite common also in the urban-sociological debate. Recent studies (Besselaar, Koizumi, 2005; Fistola, 2010) identify the main focus of the smart city no longer exclusively in the strategic role played by I.C.T. infrastructures, but above all in the factors enabling urban growth, defined as the ability to stimulate innovative urban developments, along with an increasing attention to the environment, eco-design, improved living levels, as well as the "bio-socio-environmental capital" (Corbisiero, 2013). Based on this theoretical background, the paper highlights the results of a research conducted in Naples on the empirical case of the "Centro Direzionale". It is an intervention of urban design of considerable impact on the city. The design and construction of the Centro Direzionale of Naples is, in fact, an archetype of the smart city; a primal testing of "urban intelligence" in terms of transport systems, infrastructure, logistics, systems for energy efficiency and technology. More generally, a good practice of city administration and of exploitation of strategic spatial planning.

KEYWORDS:
Urban Planning; Smart City; Centro Direzionale; Bio-socio-environmental Capital.

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那不勒斯迪雷佐纳莱中心

"智能"概念

FABRIZIO CANFORA [a], FABIO CORBISIERO[b]

[a]Dipartimento di Scienze Umane e Sociali
Università degli Studi di Napoli "L'Orientale"
e-mail: fcanfora@unior.it

[b] Dipartimento di Scienze Sociali
Università degli Studi di Napoli Federico II
e-mail: fabio.corbisiero@unina.it

摘要

如今， 城市规划与智能城市发展相关的主题在城市社会辩论中也习以为常。 近期的研究表明，智能城市的重点不再局限于ICT基础设施战略角色的扮演，最重要的是促进城市经济增长， 即刺激创新城市发展的力，同时越 来越注重环境问题、生态设计、改善生活水平以及" 生物-社会-环境资本"问题 。基于这一理论背景，本文重点突出了那不勒斯有关 "迪雷佐纳莱中"实证案例的研究结果。 这是一种对城市设计对所在城市影响的干预。事实上， 那不勒斯迪雷佐纳莱中心的设计和构造，即智能城市的原型；是对"智能城市" 在运输系统、基础设施、物流、能源效率和技术系统的基础测试。普遍而言， 是战略空间规划和城市管理的一种有效实践。

关键词
城市规划；智能城市；迪雷佐纳莱中心.

1 INTRODUCTION

In many cities in Europe, between the sixties and the nineties, new urban planning procedures were experimented, designated as “strategic territorial planning” (Martinelli, 2005). They belong to the trend usually called participatory planning, where the “centralization of authority” is removed and decisions are not imposed “from above” (Healey, 1997).

The objectives of the strategic planning can be analyzed from a dual perspective. On the one hand there are the specific goals of the plan; they are usually structured according to the specificities of the area and of possible future scenarios: reconversion, relaunch, internationalization, recovery, innovation, decongestion, quality of life, etc... From another point of view, the strategic plan should be understood as a partly or mainly social process (Fera, 2005).

Over the years the way cities are planned has been changing and planning has taken on new dimensions. In fact, planning is oriented toward the realization of smart cities. The principle of environmental sustainability, also related to the natural environment, is given a stronger emphasis and a broader meaning. Within this principle, the “cultural environment” is considered as an element of the planning action and as a resource to be protected and to be used creatively to meet the needs of life quality as well as of cultural and socio-economic development.

The cultural environment is thus considered as a category including both the preservation of landscape and nature and the protection and enhancement of cultural heritage as well as the promotion and development of the human activities established in the territory. The goal is to create a reference paradigm for the development of the territory not only in financial terms, but also in terms of creativity and participation in cultural, social and political development (Carta, 1996).

These new models of urban planning should be supported by such new technologies that can “help” the cities to be “smart”, turning them into “intelligence laboratories” capable of finding clever and ingenious solutions (Granelli, 2012).

Another central theme in plannin in recent years concerns the use of the territory, the questions about investments to make, the use of public resources and governance processes. The concept of “smart planning” is based on the dimensions of “smart economy”, “smart environment”, “smart people”, “smart mobility”, “smart living”, “smart governance”... (Villa, 2011).

The first signs of change are observed between the seventies and the nineties, when in several European cities - Paris, Liverpool, Copenhagen, Rome, Milan, Naples... - attention is focused on the question of re-distribution of tertiary activities in the urban setting. At the same time, the redevelopment of city centers, saturated by the concentration of activities related to trade and services, was discussed.

The planning of the business districts (it. Centri Direzionali), in this scenario, is viewed by the international city-planning culture, and the Italian one in particular, as “the keystone of the new city: heart of urban renewal, but also a mediating element between planning and architecture” (Tafuri, 1964, p.27). The principle guiding the design of business districts is to create tertiary-oriented neighborhoods, designed mainly in order to place offices and political-administrative, economic and financial activities in a specific part of the city. The aim is to define a new dimension of urban space and the relative design methods.

In this regard, the business districts foreshadow the new principles of city planning in recent years, when cities become home to the “new challenges” that mankind is called to face. The achievement of environmental sustainability, social and cultural integration of billions of people, economic development, new forms of welfare state are just some of the goals which urban planning focuses on nowadays.

Although “smart planning” is oriented towards the development of I.C.T. (Information Communication Technology) infrastructures, it can also be viewed as a trigger of urban growth and innovative evolution. That’s a reason why “smart planning” takes care of environment, eco-design, living quality and in general of human and social capital (education, culture, etc.).

On the basis of these assumptions, this paper presents the results of an empirical study, whose object is the Centro Direzionale of Naples (CDN) as a case study. This district, especially in its ongoing extension or "step two", recalls the planning logic of smart cities.

Although smart cities are based both on I.C.T. and human and social capital (De Luca, 2012), the CDN concept insists mainly on the latter and focuses on eco-design.

CDN actually appears as an institutional and business center as well as a residential area, planned after jacobs' concept (1961) of "planning for vitality", that is of a city based on a "smart capacity" to mix urban and social types. The center hosts, in a wise distribution of spaces, the Courts, the region's administration, universities and other institutions. The planners also left much space to private uses: trade, shops, "communication" towers (Wind and Telecom Italia) projecting towards the sky as vertical silos. Cdn also hosts many inhabitants, mainly middle-class and employees.

At the time when CDN was planned, the connection of the smart city concept to I.C.T. was just being conceived, but its planning includes the core idea to use the new communication technologies to link administration and urban infrastructures. The CDN concept does indeed include the innovative and sustainable criteria for a smart city in its structural and social planning.

The reasons for starting the research arise from the will to understand the impact of this operation, notably in relation to the socio-morphological context in which it is inserted. It is, in fact, an intervention of urban, social and economic planning of major importance for the reorganization of the metropolitan system, which produces inevitable effects on the local context.

The research aims to reconstruct the project's history and the developments leading to the creation of the district, in order to describe the current state, to identify the elements of support and contrast in the planning phase and thus to highlight the peculiarities and the criticalities of this experience.

With respect to what has been already built we will try to answer two main questions: what planning principles was the project stage based on? How does the district appear today?

As for future prospects, the questions addressed are: what scenarios should be assumed in view of the completion of the Centro Direzionale expected in the coming years? Can we speak of a "smart Centro Direzionale"? Will it represent a starting point to define the city of Naples as a smart city?

2 SMART PLANNING

Among the components of the economic and environmental crisis that struck the western world in recent years, some aspects concern the "quality of the development" (Vianello, 2011).

It is apparent that this crisis is imposing patterns of production, consumption and life quite different from those so far known, and urban areas represent the scenario in which these transformations are being tested.

The development process which starts from the Second World War, and lasted until today through "new forms of development", aims to ensure the welfare of the people. In this direction the technologies I.C.T. are oriented, ie the tools that support citizens and authorities in the processes of government and participation in an innovative way.

The information and communication technologies began to spread in the sixties. In those years techniques of "contamination" between IT and telecommunications were first tested. These two sectors had hitherto progressed independently of each other because the telecommunications industry was mostly based on an analog technology. In the seventies and eighties, the spread of personal computers starts a digital revolution that applies to the audio-visual field. Only in the nineties, thanks to the web, a path is completed that determines the multimediality and the interconnection; millions of people are able to share information through audio-visual devices to the point of encouraging dialogue and communication. In recent years, several local authorities in Europe decide to start using these tools experimenting with new models of urban planning,

managing new technologies in support of participatory processes to an extent which they had never reached before.

But who governs these processes in a globalized world? In the social imaginary it is the sum of the national states and international organizations (eg the UN).

In reality, these competitive and aggregation processes occur between the cities.

The competition for attracting manufacturing facilities and generating knowledge and learning takes place between the urban areas. The protection guaranteed by the welfare systems, the quality of life, the environmental sustainability are issues that are being discussed more and more at a city level.

Today, when it comes to development of the city reference is made to specific development parameters including “economic strength”, “physical capital”, “financial maturity”, “institutional effectiveness”, “human capital”, “environment and natural risk", etc... Therefore, in order to be competitive and to grow in an intelligent way it is necessary to fulfill the above criteria through synergy, putting aside particularism: to grow avoiding to “consume the territory” by generating environmental unsustainability.

Thus, in the design of urban environments one should not waste environmental resources, as space is an asset which can not be reproduced. The logic of the plan should be “smart”, subject to the capacity to attract capital, to develop specific economic activities and stimulate the establishment of valuable human resources in the area. To be competitive, cities need to become “cities dreaming the future and practicing innovation” (*Ibid.*, p. 16) Following these principles, planning should foster social inclusion and the promotion of innovative activities. The cities must be first and foremost “able to detect and gather information through a system of sensors, from the most innovative, which perceive the characteristics of the environment, to the more traditional” (Farioli, 2011).

The value of these sensors plunged into the city is tested to the extent in which citizens are enabled to interconnect all the information, to make it interact in the network and then take it to the “intelligence engine”. The “intelligence engine” has as its center the local administration, which generates the government and the planning of an urban system.

Being an intelligence engine means to gather this information and integrate it through systems of data analysis and governance (*Ibid.*,2011). The organization and the government of cities is undergoing profound changes and therefore also “smart policies” are needed whose scope has not yet been completely understood. The speed and pervasiveness of innovation of I.T. technologies that “change” the knowledge, transforming it into value added, undermines the strategic planning of urban development (Fistola, 2013).

3 NEW MODELS OF THE CITY: THE SMART CITIES

In recent years, city planning seems entirely oriented toward the horizon of smart cities. This is mainly due to a strong thrust of the European Union which has allocated substantial funds as an “investment” towards urban innovation and formalization of the “smart city model”. It is difficult to achieve a clear definition of this concept that describes an intervention on the city proposing definitions only partially convergent, but often not related to each other. In the socio-economic field, for example, it is fundamentally related to the existence of I.C.T. districts with a high degree of employee training and capabilities. The idea of smart city also refers, however, to the use by the public administration of the new communication channels to interact with citizens, by focusing on e-governance and e-democracy. Very often it signals a significant use of information technologies in the daily life of a city in terms of transport systems, infrastructure, logistics and systems for energy efficiency. In other cases, the term smart city will emphasize softer factors of urban development such as good practices of participation, high levels of security and enhancement of cultural heritage.

In the scientific community the concept of smart city also evokes aspects of quality of life, paying more attention to the aspects of urban life such as housing, or the development of sustainable energy platforms...

The European institutions, on the other hand, mainly connect this concept with the fight against pollution, and in general to the “Europe 2020” strategy. In this respect, in Europe there is a growing interest in the themes of “smartness” so as to induce the EU to make them a central part of its financial planning.
The tendency of the European Union is to interpret “smartness” from the point of view of the environment and energy, and this is confirmed by some of the main instruments of this strategy: “The Strategic Plan for Energy Technologies” (European Commission, 2007) and “The Technology Road Map” (European Commission, 2009) where the reference to the smart city, and the budget allocated to it, appear clearly.
Therefore, it is possible to say that a smart city is a city where all the resources become accessible thanks to an efficient online network that allows the citizen and the municipality to dialogue (Fistola, La Rocca, 2001).
The term “smart” implies being able to get the resolution of a problem “operationally”, indicating what may be the “tools” to be used, designed for this purpose. In other words, choosing the reference models and “operating” through specific “devices”.
The smart city is the place where the planner effectively uses available structures, spaces and technologies or invents new ones.
The smart city can therefore represent a physical space in which a widespread and inclusive technology supports the growth of social capital and enables the development of functional systems that virtualize activities (*Ibid.*,2001). This saves space and time and helps to raise the quality of living in the urban system. This is the theoretical basis of the case study presented here.

4 THE BUSINESS CENTRE AS THE ARCHETYPE OF SMART CITY. THE CASE OF NAPLES' CENTRO DIREZIONALE

In the full development of strategic planning, in the period between the sixties and the nineties, in Europe and especially in Italy, several so-called “business centers” were created.
One of the earliest in Europe was the “Secteur de la Défense” in Paris. In Italy, a first example is in Rome with EUR, Rome Universal Exhibition, designed as a structure for housing exhibitions, which has become over the years a true Centro Direzionale. Another example is represented by the Centro Direzionale of Milan, who was meant as a new “center”, not only for Milan and its hinterland, but for the entire Lombardy Region.
Its goal was to create a new administrative and financial core, easily accessible because close to the railway stations and major highways.
In those years, the debate on the “city-region” started (city region) (Scott, 2001), considering the possibility of vast territories with the function of “urban joints” between the cities of the same region. The complexification of the services of the tertiary sector, the transformation and the uncertainty of industrial processes, the importance of rapid economic transactions, are factors that lead to a reconfiguration of the urban context in “multiple administrative districts” (Corbisiero, 2013), rooted in second-generation metropolises (Martinotti, 1999, p. 56). The birth of the Business centers not only responds in full to the new Italian territorial morphology - whose structure is defined by the complementarity of functions between centers and peripheries of the metropolitan complexes - but promises to be a platform for “smart urban development”.
In fact, the business center is defined as an “architectural element, able to test critically the growth potential of whole parts of cities” (Ferrari, 2005, p. 54). It must, in short, take on the role of financial-economic pivot of big cities, but at the same time of a “smart district” such as to represent the symbol of territorial innovation. So business centers should represent places where the planner “exploits” the space and technological innovations for the benefit of the area.
While following the basic principles of the construction of the Business centers in Europe, the CDN seems to overcome the limitations that characterize the centers of Milan and Rome assuming that “elastic form” that would revitalize the entire metropolitan area and connect it with satellite towns (Cavola, Vicari, 2000).

It is not possible to establish with certainty a beginning and an end of its story, for we can still consider it as a “work in progress”.

The debate on the establishment of the CDN dates from the early sixties. In 1964 the Commission for the New General Plan of Naples, conceived in response to the nefarious speculation of the post-war period, reflects the initiative of Mededil S.p.a. (Mediterranea Construction Company) which is assigned the task of “promoting urban renewal and the creation of new districts in the city of Naples” (Cerami, 1994). An area suitable for the establishment of a “Centro Direzionale” is selected in Poggioreale, an industrial neighborhood in the east-central part of the city (fig. 1).

Fig. 1 Site boundaries, undergoing executive urban plan

The urban project, which covers an area of about 110 hectares near the Central Station, divides the district into two macrozones put to different use: one for the buildings of the tertiary sector (courts, Local authorities, public offices) and another intended for residential use. Its location was meant to favor the decongestion of the entire coastal line. The construction of the new CDN was also a response to the speculation that plagued Naples in the fifties. The first project was entrusted to a team of Neapolitan architects, coordinated by Giulio De Luca's, in the early seventies (*Ibid.*, 1994).

In 1980, due to ongoing disagreements between architect De Luca's team and the city administration, the implementation of the complex is entrusted to a starchitect, the Japanese Kenzo Tange, an emblematic figure in the international scene, in the hope of a “touristic-culturalistic turning point” of the project.

The choice of Tange is mainly political and is the expression of a radical change, a genuine technological innovation. The basic concept of Tange's project is to obtain a design concept that offers the city a of “multifunctional complex”, competitive on several fronts: urban, economic, financial, cultural. The

attention to the "cultural" dimension is just one of the most interesting and innovative of "Tange's project", one that can be called the "humanization of urban spaces" (*Ibid*.).
The Japanese designer reads the urban space as an agora in which the constituent element is the human relationship: even the space in front of a building must be characterized to encourage the phenomena of social life, allowing people to move freely, away from vehicles.
The project somehow anticipates the basic principles of urban planning as concerns innovation and the awareness of environmental, economic and social-relational factors. The Japanese architect wants to "put the man and not the machine to the center of the city scene... Make the Centro Direzionale as a place for socializing, integrated with the territory" (Tange, 1995). This produces a number of aspects that characterize the center as a real prototype of the smart city.
The designer suggests an urban structure articulated around three symmetrical "Axes", along which the whole complex is spread: 1 "Green Axes", in east-west direction, about 900 meters long and 70 wide, is designed exclusively for pedestrian traffic , below which is a two-story parking lot with two driveways around; 2 "Public Axes", with two squares, where public buildings and advanced services will be placed; 3 "Sport Axes", dedicated to green spaces and sport and *leisure* (fig. 2).

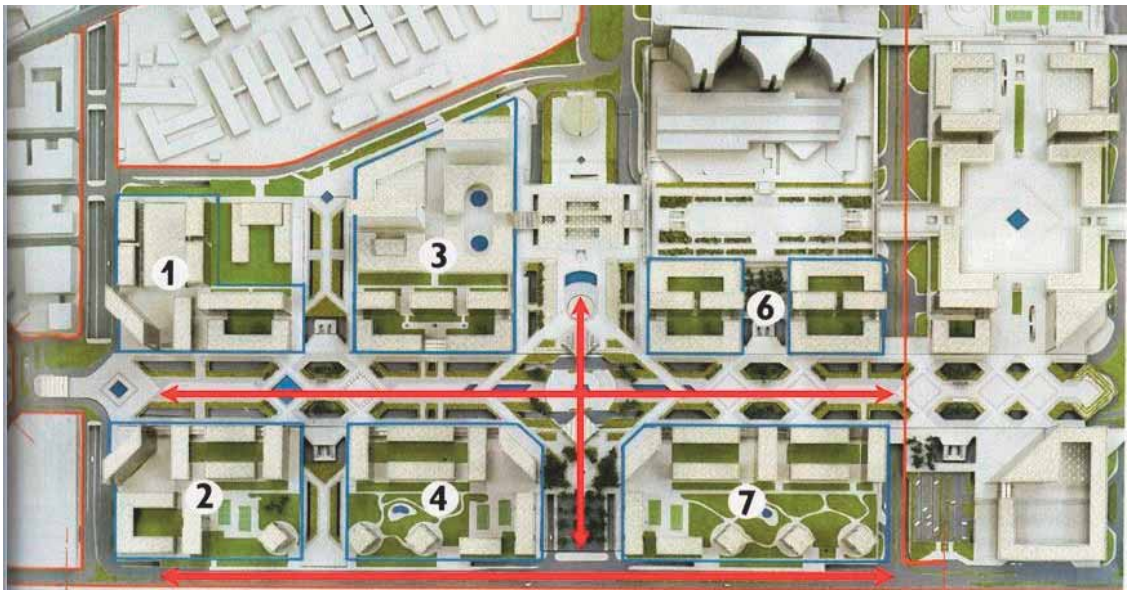

Fig. 2. Diagram map of Business District according to Kenzo Tange

Within a "smart logic", the idea of a public transport system to connect CDN to the city center is also very relevant: "I believe that the completion of the transport system will harmonize CDN and the city center, certainly favoring the urban development" (*Ibid*., 1995).
Tange's basic concept was to achieve a unitary project enriching the city with a multi-function complex linked in innovative ways to the city's historic area and the surrounding region.
Since the nineties, the presence of an "advanced tertiary" is strengthened, which provides a further boost to investment in the area by various public and private entities.
Below we discuss some results obtained from the survey conducted in the field and showing what it looks like today at CDN.

5 AN "EMPTY BOX"?

The research is carried out in quali-quantitative approach, combining ethnographic observation, interviews with qualified and questionnaires submitted to city users and residents. The interviews were

conducted following different tracks (history of the CDN, mobility, security, future planning), and according to them a number of specific questions have been asked. The topics were placed in non-rigid order, a form of "targeted" interview, leaving the interviewee the opportunity to manage the conversation.

The semi-structured interview revealed the point of view of several qualified witnesses. Among our tools we also used a semi-structured questionnaire with mainly closed questions, to be administered on a non-probabilistic sample of fifty city users. The questionnaire focused on socialization, security and accessibility. The decision to include closed- and open-ended questions is to provide greater uniformity to the information collected. The former allowed a univariate analysis while open-ended responses produced richer meanings and nuances.

The questionnaire was especially useful for the emergence of the perception of residents and city users compared to the goals of planning and of "Tange's project".

The analysis of the security issue was particularly interesting because the perception of the subjects who live a public place is considered of fundamental importance for the reliability of the same place and for the improvement of quality of life.

5.1 A SMART IDEA, BUT NOT TOO SMART AFTER ALL

Strolling down the CDN in the morning hours, you will come across a fast-paced flow of people moving in every direction, workers, visitors, athletes that populate the district, as it happens in global cities (Sassen, 1997).

The CDN, as interpreted by Tange, has among its functions to harmonize the use of space with the times of human connection. However, over the course of two decades, the emphasis on CDN, as a device for socializing and binding the administrative function with the social and cultural life, has been lost. The research shows that the spaces of the CDN do not fulfill the relational functions assumed, but correspond to a plurality of actors in motion along trajectories and interests not necessarily compatible, and all this does not go beyond office hours (fig. 3).

> "In addition to a few bars and restaurants, here there are no more shops; because everything closes early. On Saturdays and Sundays all is closed, there is no business. Once the offices are closed, the Centro Direzionale is dead". (T.Q. 11, man, porter).

Fig. 3 A coffee shop at Centro Direzionale, Sunday morning

The predominant category of workers are the operators of the service sector, which flock to the area in a specific time slot, mainly early in the morning (fig. 4).

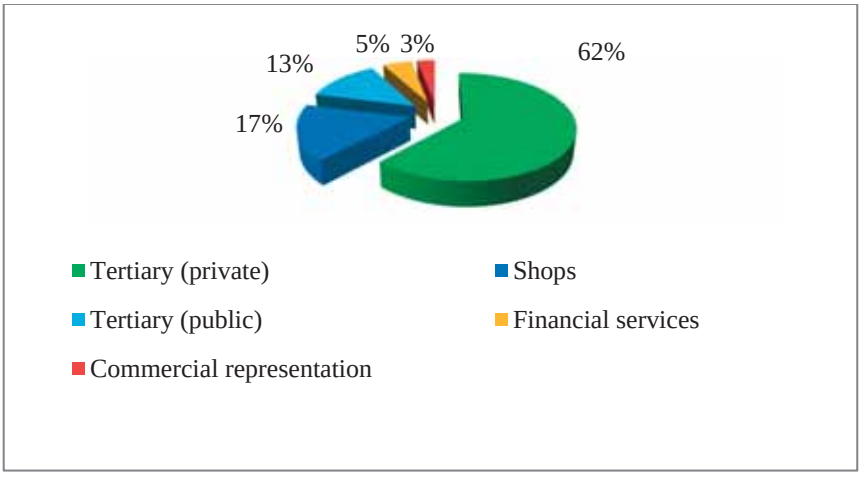

Fig. 4 Economic sectors in the Business District. Macro-categories

The majority of the commercial activities of the Centre follows those same working hours, since the number of potential buyers is drastically reduced after 6 pm. This have an impact on local residents and, more specifically, on the residents of the Centro who work outside the area. In fact, coming home from work late in the afternoon, residents can not take advantage of the (few) shops that exist:

> "When I come home from work at seven in the evening, I have to go shopping in Vasto, because here in the Centro, after six they are all closed" (I. 8, female, resident CDN).

The CDN has turned into a complex with a tertiary connotation, separated from the historic city and the rest of the territory. This problem is increased by an inefficiency of the transport system that serves the area badly. For this reason, users who need to reach the Centro choose mostly private forms of transport rather than opting for the "sustainable choice" of rail transport (Metro-Circumvesuviana), currently the only option that connects the CDN and other parts of the city (fig. 5).

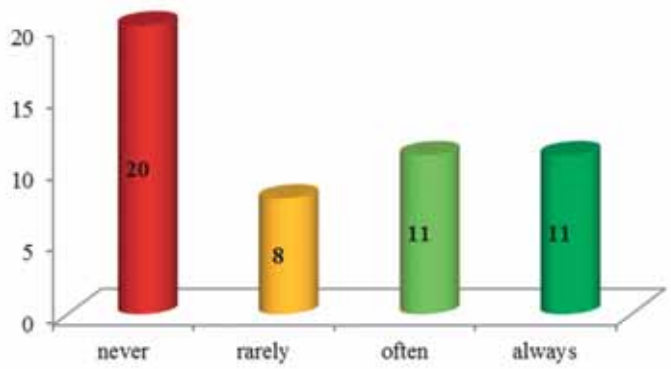

Fig. 5 Use of Public transport (from city center to CDN) - time frequency

The Centre is experienced by different categories of users that alternate in space and time, interact primarily through relationships among peer groups: workers, residents, foreigners, sportsmen, homosexuals. In this interweaving the behavior of social actors and the manner of their relationships

are defined (Mela, Belloni, Davico, 2000). All this determines the presence of individuals not always definable as a group; rather they are "situational urban formations", in which relationships are random and unpredictable; situations marked by "civil inattention" of subjects (Goffman, 1971). Through the analysis of some dimensions - socialization, accessibility, security - we have identified the "relational" features and the meanings given to the spaces at CDN. In particular, they have been called "not-homogeneous spaces":

> "...Because here you see the building in perfect condition, but you also see the floor completely disconnected or other buildings in a state of neglect". (I. 8, woman, city user).

And "segregation spaces" (fig. 6):

> "...Because you see only employees or professionals in suits who eat at the tables of pizzerias and taverns for lunch..." (I. 10 man, city user)

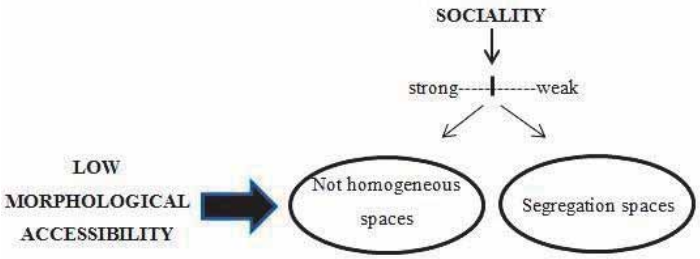

Fig. 6 Not-homogeneous and segregation spaces

In fact, the spaces of the CDN express the lack of strong relationships, and produce only transient relationships between people who meet by chance: one primary use is ineffective as a creator of urban diversity; but a primary use that is combined with another primary use is equally ineffective if they bring in the streets an alternating flow of users in the same hours (Jacobs, 1961; Piselli, 2009). In addition, the categories of persons present are distinct and do not appear to interact with each other. The residents are physically located in an area not too far from the offices, but spatially isolated, and live the spaces they inhabit even after 6:00 pm. Employees pass through the Centro in the morning, meet with colleagues in their offices, or at most in takeaways during the lunch break. The sportsmen perform their exercises when the Centro is preferably semi-desert in the late afternoon or Sunday morning very early (fig. 7).

Fig. 7 Mapping of the Centro Direzionale

* Red rimmed are residential buildings. There is a big distance to other buildings

Some groups of foreigners use the CDN as a meeting place, mostly on Sunday mornings. Therefore many categories of visitors, who take turns in space and time, but mainly by interacting with those who belong to the same "group".

It may be useful to borrow the concept, developed in the context of urban sociology, of "refunctionalization of public space" (Mela, 1996, p. 195).

This is what happens in some blocks of the CDN, where the streets and squares lose, for city users, any experiential meaning. The same streets and squares regain their original meaning of "space for humans" when they are frequented by immigrants or by homosexuals (fig. 8).

Fig. 8 A wall in the underground car parks. Now used as a board for private announcements.

The CDN is, therefore, the expression of a public space lived by a plurality of actors which are not connected to each other, pursuing divergent trajectories and targets, often placing their own points of interest and attraction elsewhere. A place of transition and exchange.

The speed with which the different categories of users interface, the poor accessibility of the structure and a low degree of perceived safety are all factors that do not enhance the social and territorial capital of the district.

In this respect, without pretending to draw a systematic framework of the state of the question, we want to point out some lines of reflection starting from the perception of safety as reported by users. As is clear from the questionnaires and from the information gathered, there is a clear perception of a safety problem.

For respondents security is perceived as problematic. A total of 31 of 50 users say they feel unsure: of these, 13 feel very unsure, and 18 feel rather sure. This has consequences for the sense of belonging of the majority of users who identify themselves less and less with such a structure judged as unsafe.

In fact, among the 18 subjects who feel rather sure, 17 assess the structure between insufficient and mediocre and adding another 11 expressing the same assessment and feel unsure, a total of 28 users feel not to be safe in relation to the limits of the structures (building condition) (fig. 9).

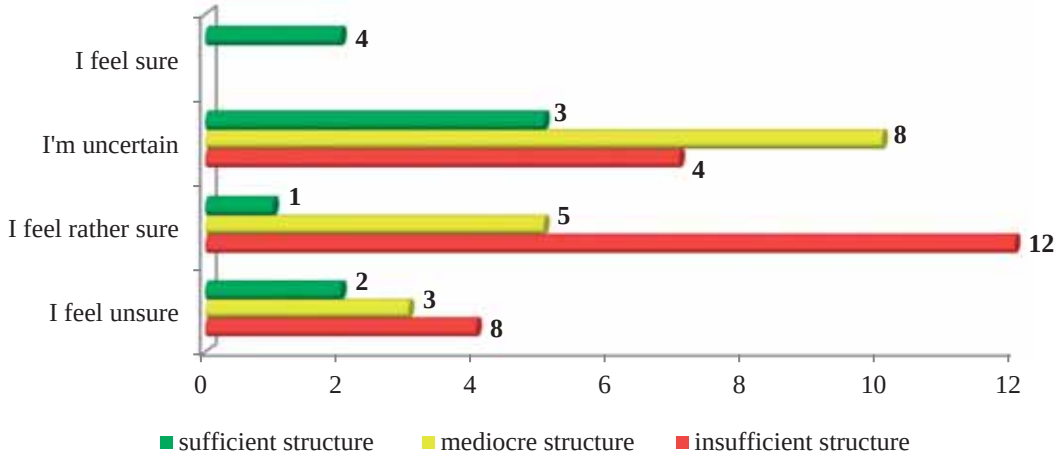

Fig. 9 Building condition Evaluation-security degree

The CDN is designed as a neighborhood divided along levels, axes, towers, etc.; the separation of functions is restored in the large partition of space and time: the urban material on one side and, on the other hand, work time, leisure time, public and private time.

From its large openings to the tall towers CDN includes all the reasons why it was planned: services, administration, communication and leisure.

A social-urban synthesis of post-industrial tertiarisation. The morphology is now a place of instability, heterogeneity, fragmentation and discontinued transformation, does not have a discernible structure as an organic whole, but is an expression of an "unusual" appropriation of space.

The porticoes around the buildings also represent a linkage between public and private life, favoring the socialization between city users.

As to its structural aspects, CDN is planned to minimize the impact on environment. Several buildings are realized in fact with eco-compatible materials such as *curtain wall*, a special anti-seismic structure resistant to wind gusts and fire. Surveillance and maintenance avail themselves of small electric cars and motorbikes.

As mentioned above, one of the bases of "smart planning" is the presence of social-relational capital in urban structures. Under this regard CDN represents an unusual kind of neighborhood, where the "smart idea" can be compared to an agora where urban intelligence is made up of human relations.

The main idea of this forward-looking insula is to "offer the people of Naples a comfortable, healthy environment, with a high social and cultural value" (*Ibid.*).

A business center anticipating the smart city concept inverting its issues, by putting people first and then technology in the center of the urban stage. In this regard CDN attracts intensely some social groups: immigrants and homosexuals.

Paradoxically, the separation of CDN from the city center and the empty streets after dark favors a "spontaneous takeover of space" (*Ibid.*, 2000).

A mix of different styles and uses of the space defining behaviors, goals and stories of these groups, who never even meet along their paths in space and time.

CDN spaces represent important points of reference for the sociality of either group. Immigrants use squares within it as gathering places if the different ethnic groups. Places and paths of CDN mirror different kinds of social relations. Each part of it recalls a particular sociality or maybe vice versa, it's the particular sociality which symbolically connotes a particular area.

The ethnic connotation is assigned to each square by the immigrant groups, youths, adults and elderly who gather especially in their free-time (Sunday mornings and Thursday afternoons) to meet, chat, eat, relax and

enjoy the free spaces. Away from the mixed spaces where their daily activities take place in the city, some immigrant groups found in CDN an urban place to express themselves more freely.
Although it is just a make-shift solution, practiced within a "spare" area, it allows them to live their own social practices and their relationships with no outer interference.
Gay men, on the contrary, chose peripheral and underground areas of the complex, which assume for them the symbolic value of masculine homo-eroticism. Walking or standing in their own CDN paths male homosexuals enjoy all advantages of privacy and tolerance, guaranteed by the isolation and the anonymity of the center. Many streets and squares of CDN perform therefore for city users a function totally independent from its original business-aimed meaning and regain a more universal utilization as a place for human relationships when they are crowded with immigrants or gays.
CDN was certainly no perfect example for a sustainable planning, but it sure was a pioneering case of "smart district" in terms of "bio-socio-environmental capital" (*Ibid.*, 2013).

6 A SMART PERSPECTIVE

With the approval of the new Master Plan of Naples in 2004, the debate was resumed on urban planning with the focus on the principles of protection of the physical and cultural identity of the area, the restoration of the old city center and enhancement of green areas.
The aim is to redevelop brownfield sites into new settlements characterized by sustainable urban parks. At the heart of the new programming is the redevelopment of the suburbs, the historical centers, the improvement of services in the neighborhoods, the transformation of the mobility system reorganized around a modern rail network. So there is a trend towards that "sustainable use" of the city that provides for a "zero footprint" on the territory.
In this new frame of urban planning in Naples, an opportunity is represented by "Agora 6", a project implemented since 2007, which seems potentially capable of enhancing a "bio-socio-environmental" capital (*Ibid.*, 2013) as a resource to revitalize the area and starting point for planning into the future in accordance with the "smart logic" of planning.
The resolutions approved by the City Council and the official acts of the Company "Agora 6" S.p.a. reveal that the project involves an area of 50 acres and plans to build public and private works intended to modify the urban context, providing it with modern facilities and a road system that integrates it with the rest of the city. Metronapoli S.p.a. will also build a subway line between the district and the central station in Piazza Garibaldi, where it will connect with all lines of rail transport in the city (fig. 10).

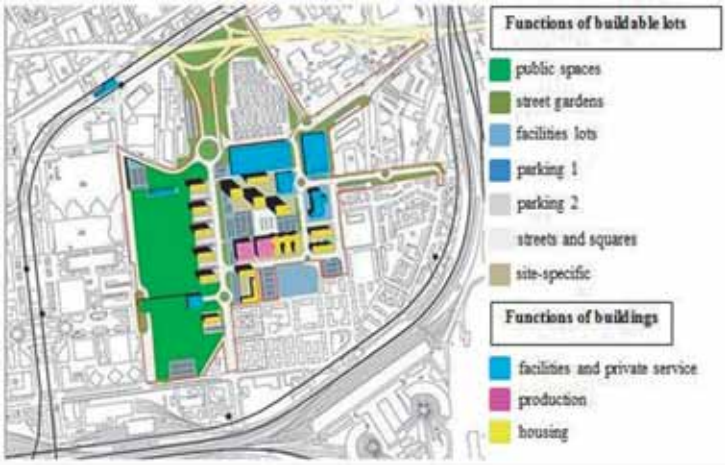

Fig. 10 Business District of Naples. New Planning

“Agorà S.p.A”. is also committed to provide the area with an urban park, in order to overcome the separation between the two levels, now only reserved for pedestrian and cars, respectively.
It is a large urban park located between the section currently existing and the new area, and it will feature a grid of pedestrian walkways and bicycle paths.

> “Our project is completely new, and its concept is the smart city. We rely on the principles laid down by the city Administration who does not want to repeat the same town planning scheme as Tange, because it did not work in the management of the territory” (T.Q. 8, “Agorà 6” project manager)

Facilities for leisure (cinemas) Sports (gyms, indoor and outdoor pools, soccer and basketball courts) will be built, as well as a school and several green areas, 1,500 car parking spaces at ground level and covered, apartment buildings and finally an area for social housing, with facilities for the disabled.
A system of wireless internet coverage will allow free access to the network in the perspective of smart cities. Finally, a computer network will ensure efficient information services for the dialogue between citizens and the administration.
The idea is to start a new model of relations between the internationally branched I.C.T. companies’ supply and the demand of the stakeholders who are well acquainted with local issues.
With such a project, the aim is to “catch” the delay and to “heal the rift” formed between the current CDN and the territory.
The project seems likely to be able to ensure a better integration of the area with the existing urban fabric, leading to a change in the direction of some of the needs of residents and visitors to the CDN who now complain about the lack of infrastructure and services especially for the leisure and fun.
The success of such an attempt would also improve the already existing portion of the Centro. The collaboration between the municipal administration and the team of designers will be essential.

7 FINAL CONSIDERATIONS

Clearly to complete the CDN you need to include those components which, although expected, were never really taken into account in the first stage of planning.
As mentioned above, one of the innovative aspects of Tange's project is to have “put man at the center of the scene” so that during the first phase of the project there is a tendency for a “smart design”. At present, however, the CDN looks like an exclusively architectural project, unable to capitalize on social and territorial public space.
It was welcomed as an opportunity given to the city by locating “new and rare functions”, and creating an opportunity for the recovery of the surrounding areas, mainly residential. In fact, this “giant” did not trigger any process of redevelopment of the eastern end of town or the neighborhood (Poggioreale) where it was built. The result is evident in the urban and social consequences of which we are witnesses. You may not think to make a smart city through top-down directives; when you draw up the urban and territorial plans you need to enable tools that leverage the practices and principles of governance.
It will be necessary to start again from the impulse towards technological innovation of the original concept of CDN and to relate it to the most advanced principles of participated planning and “smart governance”.
It is therefore necessary to consider the vocation of our cities, their specificity - for example, the presence of historical centers and a widespread cultural heritage - and give shape to the vision of the future just mentioned.
An efficient and sustainable city must ensure large pedestrian areas and pollution control.
The “smart governance” is accomplished through defined objectives, clear plans, actions with a clear financial plan, ongoing monitoring that accompanies all phases of planning and design and divulgation of results.

Unfortunately there is still a rift between the scientific resources (urban planning, sociology, architecture) and the local administration anchored to old principles of planning, too heavily regulated.
If only for a short time, “Tange's project” was for Naples an innovative breakthrough in the field of urban planning; however it was not followed by a phase of “smart relaunch” of the city, due to several structural and political constraints that prevented Naples to fulfill the principles and best practices of a smart city.

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IMAGE SOURCES

Cover image: photo by Fabrizio Canfora

Fig. 1: is from Campania Region, June-July 1998

Fig. 2: is from Mededil S.p.a. Elaborated by the authors

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Fig. 4: is from Ge.Se.Ce.Di. (2011). Elaborated by the authors

Fig. 5: is from Fabrizio Canfora

Fig. 6: is from the authors

Fig. 7: is from Ge.Se.Ce.Di. (database 2011). Elaborated by the authors

Fig. 8: photo by Fabrizio Canfora

Fig. 9: is from Fabrizio Canfora

Fig. 10: is from Municipality of Naples-Department of Urban Planning

AUTHORS' PROFILES

Fabrizio Canfora

PhD student at the Department of Human and Social Sciences at the University of Naples "L'Orientale". He is currently dealing with business history and geography of local development. Graduated in Social and Territorial Policy (Sociology) at the University of Naples Federico II – Social Science Department, he wrote a dissertation on "Territorial Planning and Sustainable Development".

Fabio Corbisiero

Ph.D. He holds the established Chairs of "Urban Planning" and "Social Network Analysis" at University of Naples. His area of research is planning and urban sociology. He has been Visiting Professor in different international universities. He is author, editor and member of different national and international works, conferences and editorial boards as well. He's been Marie Curie Fellow since 2013.

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REVIEWS PAGES

SMART CITY CHALLENGES
PLANNING FOR SAMRT CITIES.
DEALING WITH NEW URBAN CHALLENGES

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. During the last two years a particular attention has been paid on the Smart Cities theme and on the different meanings that come with it. The last section of the journal is formed by the Review Pages. They have different aims: to inform on the problems, trends and evolutionary processes; to investigate on the paths by highlighting the advanced relationships among apparently distant disciplinary fields; to explore the interaction's areas, experiences and potential applications; to underline interactions, disciplinary developments but also, if present, defeats and setbacks. Inside the journal the Review Pages have the task of stimulating as much as possible the circulation of ideas and the discovery of new points of view. For this reason the section is founded on a series of basic's references, required for the identification of new and more advanced interactions. These references are the research, the planning acts, the actions and the applications, analysed and investigated both for their ability to give a systematic response to questions concerning the urban and territorial planning, and for their attention to aspects such as the environmental sustainability and the innovation in the practices. For this purpose the Review Pages are formed by five sections (Web Resources; Books; Laws; Urban Practices; News and Events), each of which examines a specific aspect of the broader information storage of interest for TeMA.

01_WEB RESOURCES
The web report offers the readers web pages which are directly connected with the issue theme.

author: Laura Russo
Tema Lab - Università Federico II di Napoli, Italy
e-mail: laura.russo@uinina.it

02_BOOKS
The books review suggests brand new publications related with the theme of the journal number.

author: Floriana Zucaro
Tema Lab - Università Federico II di Napoli, Italy
e-mail: floriana.zucaro@unina.it

03_LAWS
The law section proposes a critical synthesis of the normative aspect of the issue theme.

author: Valentina Pinto
Tema Lab - Università Federico II di Napoli, Italy
e-mail: valentina.pinto@unina.it

04_URBAN PRACTICES
Urban practices describes the most innovative application in practice of the journal theme.

author: Gennaro Angiello
Tema Lab - Università Federico II di Napoli, Italy
e-mail: gennaro.angiello@unina.it

05_NEWS AND EVENTS
News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

author: Gerardo Carpentieri
Tema Lab - Università Federico II di Napoli, Italy
e-mail: gerardo.carpentieri@unina.it

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评述页

智能城市挑战 规划智能城市。应对新的城市挑战

TeMA 从城市规划和流动性管理之间的关系入手，将涉及的论题逐步展开，并始终保持科学严谨的态度进行深入分析。在过去两年中， 智能城市课题和随之而来的不同含义一直受到特别关注。
学报的最后部分是评述页。这些评述页具有不同的目的 ： 表明问题、趋势和演进过程；通过突出貌似不相关的学科领域之间的深度关系对途径进行调查；探索交互作用的领域、经验和潜在应用；强调交互作用、学科发展、同时还包括失败和挫折（如果存在的话）。
评述页在学报中的任务是，尽可能地促进观点的不断传播并激发新视角。因此，该部分主要是一些基本参考文献，这些是鉴别新的和更加深入的交互作用所必需的。这些参考文献包括研究、规划法规、行动和应用，它们均已经过分析和探讨，能够对与城市和国土规划有关的问题作出有系统的响应，同时还对诸如环境可持续性和在实践中创新等方面有所注重。
因此，评述页由五个部分组成（网络资源、书籍、法律、城市实务、新闻和事件），每个部分负责核查TeMA所关心的海量信息存储的一个具体面。

01_WEB RESOURCES
网站报告为读者提供与主题直接相关的网页。

author: Laura Russo
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: laura.russo@uinina.it

02_BOOKS
书评推荐与期刊该期主题相关的最新出版著作。

author: Floriana Zucaro
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: floriana.zucaro@unina.it

03_LAWS
法律部分提供主题相关标准方面的大量综述。

author: Valentina Pinto
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: valentina.pinto@unina.it

04_URBAN PRACTICES
城市的实践描述了期刊主题在实践中最具创新性的应用。

author: Gennaro Angiello
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: gennaro.angiello@unina.it

05_NEWS AND EVENTS
新闻与活动部分让读者了解与期刊主题相关的会议、活动及展览。

author: Gerardo Carpentieri
那不勒斯菲里德里克第二大学民用建筑与环境工程系 TeMA 实验室 e-mail: gerardo.carpentieri@unina.it

01

SMART CITIES CHALLENGES: PLANNING FOR SMART CITIES. DEALING WITH NEW URBAN CHALLANGES

REVIEW PAGES: WEB RESOURCES

LAURA RUSSO
TeMALab – Università Federico II di Napoli, Italy
e-mail: laura.russo@uinina.it

In this number
PLANNING THE NEW SMART CITIES

With over half of the world population living in urban areas, cities have become the place to address the major challenges of our century. Today, ICT and big data are the main themes which are brought up when talking about smart cities, but although it is evident that the mere use of new technology is not sufficient to build better cities (Barresi, Pultrone 2013), it is undeniable that it provides new approaches not just to plan the city of the future but also to re-think existing cities.

This issue of TeMA focuses on these topics and, here in this section, the three websites proposed can be a very interesting source of inspiration for those who want to study the smart city, project it or work on it.

We start presenting the website of The Centre for Advanced Spatial Analysis (CASA), which is one of the leading research centers in the application of new technology for investigating, modeling and controlling the city; a mix of different expertise collaborate in order to develop new ways of representation of space in time, exploiting the potential offered by new technologies, especially in the field of big data.

The content of the second proposal of this issue isn't focused on the research aspect but more on the best practices is: the website dedicated to the exhibition Reprogramming the City: New Opportunities for Urban Infrastructure. Once again the chances provided today by new technologies take center stage, but, this time, for the tangible re-use of existent infrastructure in a smarter and more sustainable way that takes into account another of the most debated issues of our times, that of the soil sealing; the exhibition, in fact, presents several projects in different cities around the world where urban infrastructures have been repurposed with success, providing significant results both in terms of sustainability and energy saving and in terms of recycle of unused urban spaces or facilities, without land consumption.

Then, the third and last proposal presents an Italian research project, co-financed by EU, where new technologies leave the leading role to the boarder theme of the integrated planning of the smart city: the research project Smart Energy Master (SEM), carried out by the Federico II University of Naples, aims at developing a decision support system based on the different aspects that shape the city (physical, anthropic, functional, technological, etc) in order to identify the actions to improve energy efficiency and correct social behaviours that influence energy production and use.

In the following pages each proposal is described in detail

THE BARLETT – Centre for Advanced Spatial Analysis

http://www.bartlett.ucl.ac.uk/casa

The Centre for Advanced Spatial Analysis (CASA) is part of the UCL's global faculty of the built environment (The Barlett), which includes ten amongst schools and labs.

The Centre can be considered one of the most dynamic examples in the science of cities, promoting *new knowledge and insights for use in city planning, policy and design and drawing on the latest geospatial methods and ideas in computer-based visualisation and modelling.* One of the main innovation of CASA is its focus on multidisciplinary method: a great variety of experts works for the Centre, including architects, geographers, mathematicians, physicists, archaeologists and computer scientists that share their skills in order to build a new approach which is able to better understand and model the complexity of our cities.

CASA's website provides all the necessary information about the research centre, organized in six main sections: Programmes, Research, Partnership, People, Latest and About Us. In addition to that, almost weekly, the newsworthy CASA Blog Network offers updates about the research carried out by the Centre; it counts a wide number of contributors and contributions, collected in an easily accessible archive.

In the *Programmes* section you will find information on how you can get involved with CASA. The Centre offers two Postgraduate Programmes – MSc Smart Cities and Urban Analytics, MRes Smart Cities, MRes in Advanced Spatial Analysis and Visualisation – and the PhD research degree.

Short skills-based courses, open to everyone, can be a different opportunity to be involved in the Centre, even tough they are not offered on a regular basis but run at various times throughout the year.

The *Research* section includes the description of current and past projects carried out by CASA, nationally and internationally.

CASA's research is focused on the application of computer models, data visualisation techniques, innovative sensing technologies, mobile applications and urban and regional theory linked to city systems. Spatial analysis, geographic information systems, computer aided design technologies and custom tool-kits are used as basic forms of representation for space-time data. These are explored via a wide range of methods from social physics, scaling to econometric and statistical models, augmented reality and hyper-local sensing.

CASA collaborates with different companies and organizations from diverse sectors, both for Research & Development and Consultancy; a list of examples can be found in the *Partnership* section.

Moreover, within the section *People,* the staff and students profiles involved in CASA are described: the Centre currently includes nineteen Research Associates and ten PhD students. In addition to this number, two or three excellent international Academic Visitors participate in the activity of the Centre for 2 – 12 months every year. The Centre aims at being a point of reference for the science of smart cities, integrating different expertise to promote a new approach for city planning in its widest perspective.

REPROGRAMMING THE CITY
http://reprogrammingthecity.com/

Reprogramming The City: Opportunities for Urban Infrastructure is a global overview of ways in which existing urban infrastructure is being re-imagined, re-purposed and re-invented to do more in the city.

The promoter of the exhibition is the American urban strategist Scott Burnham, who launched the initiative in Boston in June 2013 with the goal of collecting *ideas of how cities can do more with the structures and systems they already have.* After the incredible success of the first edition, a new expanded version of Reprogramming the City has opened at the Danish Architecture Centre, in Copenhagen, in October 2014.

The exhibition at DAC offers a great number of new projects mainly located in Denmark and Scandinavia, with a particular attention to those aiming at repurposing urban infrastructure for food production, such as the *BuzzBuilding* project, by Belathew Labs in Stockholm, that wants to use different infrastructural elements, such as traffic roundabouts, for producing food, or *Growing Underground,* in London, which aims at transforming not-used underground tunnels in safe environment for the future production of food; if we think at Expo Milano 2015, whose title is *Feeding the Planet, Energy for Life*, it seems that the theme of nutrition is exceptionally fashionable at the moment. The US version of the exhibition is scheduled to open at the Virginia Center for Architecture in Richmond at the beginning of 2015. The website dedicated to the exhibition collects a description of ten international projects – subdivided in structures, surfaces, systems – that have modified present urban infrastructures in order to re-use them in a smarter way. Those are the projects presented in the first exhibition, that of Boston, while the ones offered these days at DAC will probably be part of the website in future. The projects illustrate how today sustainability can be reach just re-thinking existing infrastructure, using new skills, new technologies and new materials. They provide very interesting ideas that can be proposed in different contexts with a relatively small investment. For example, in Cambridge, the large gray metal boxes often found on street corners have been used to install retractable seating that people can use to rest and observe what's going on around; in Swedish city Umea, instead, with the *Light Therapy* project, the city's energy company replaced the existing lights in some of the city's bus stops with phototherapy anti-SAD (Seasonal Affective Disorder) bulbs, so to mitigate the negative effects on mood due to the dark winter months; in New York, the nowadays rarely used public phone boxes will be transformed in touch screen cabins for all kind of information, both for transportation news, emergency, tourist assistance, etc. In this time when sustainability has become a necessity and it is important to start using what we already have instead of realizing new urban projects, Reprogramming The City represents a very interesting inspiration for those who want to collaborate for transforming our cities in better place to live in, because much can be done just re-thinking the existent heritage of our urban centres.

SEM – SMART ENERGY MASTER
http://smartenergymaster.unina.it

The project *SEM – Smart Energy Master for the energy management of territory* is carried out by the Department of Civil, Architectural and Environmental Engineering (DICEA) of Federico II University, in Naples, and it has been financed by PON 04a2_E R&C Axis II.

It addresses the ever present theme of energy efficiency using an integrated approach which takes into account the different aspects of the city: urban activities, mobility, environmental sustainability and citizens behaviours. The aim is to identify and propose best practices inclined to energy saving and efficiency and to create a mathematical model that correlates the built environment, natural context, user behaviours and energy consumption to develop a decision support system for local administrations that wish to promote strategies, actions and operations to improve the energy efficiency of urban systems and correct social behaviours that influence energy production and use.

A dedicated website describes the project in details; the navigation through the website differs depending on the profile of the user: you can choose between five different profiles (Professional, Institution, Company, Researcher and Family).

Once you have selected your profile, you can surf the site picking one of the four areas of interest corresponding to the main activities within the project, which are Research, Experimentation, Dissemination and Education.

Each activity has its own products; for example, the Energy Efficiency Database is one of the Experimentation's products and it collects over seven hundred documents, including scientific publications, international and national datasets, laws, best practices and much more about the issues of energy efficiency, smart cities, urban sustainability and resilience. It represents a useful tool for those who are interested in these topics and want to know something more.

The section Diary describes the evolution of the project by showing the video of the meetings attended by all members of the research group, which counts almost forty senior and junior researchers. The group's structure is presented in an organizational chart followed by a brief biography of each researcher.

One more interesting section of the website is the Mediateca, the Audio-visual library, a collection of tv videos, interviews, events and press review attesting the work done by SEM's researchers in Italy and outside the national territory for the dissemination of the results of the project.

SEM officially started in February 2014 and it will end in May 2015, little more than a year to meet ambitious targets in the field of energy sustainability.

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IMAGE SOURCES

The images are from: http://commons.wikimedia.org/wiki/File:Singapore_Skyline_at_Dusk.jpg; https://www.flickr.com/photos/re_birf/69485977/; http://www.ucl.ac.uk/cpc/?p=35; http://reprogrammingthecity.com/; http://smartenergymaster.unina.it/index.php.

02

SMART CITIES CHALLENGES: PLANNING FOR SMART CITIES. DEALING WITH NEW URBAN CHALLANGES

REVIEW PAGES: BOOKS

FLORIANA ZUCARO
TeMALab – Università Federico II di Napoli, Italy
e-mail: floriana.zucaro@unina.it

In this number

SMART CITY PLANNING: WHICH APPROACHES AND TOOLS

The targets set by European Union for 2050 are almost ambitious: about 90% reduction in greenhouse gas emissions and the achievement of a near-zero carbon energy system. As assumed in several documents and debates, urban areas, responsible for most total energy demand, are the strategic places for intervention, in order to transform them into resource efficient and low carbon systems.

Therefore, such a demanding and important transition requires changes in planning and decision making process and this approach is encouraged by the European Commission that pushes for the integration of the environmental, energy and climate change policies with land use ones. The problems generated by the current urban population growth and rapid urbanization processes cannot by tackled by a sectoral approach, but it is rather useful adopting an holistic one, considering cities as urban energy systems whose production and consumption of resources can become more sustainable and efficient by implementing synergic strategies and actions. In this building process of more efficient and sustainable cities, the paradigm of smart city has been developing, meaning as a city capable of integrating different dimensions of development, managing carefully natural resources and ensuring a greater transparency and participation to decision-making processes (Papa, Gargiulo, Galderisi, 2013).

The smart city approach could provide the possibility of a new understanding and management of the city problems, on the one hand, and define new tools for the city transformation government, intended as a laboratory for innovation, on the other. In other words, the topic of smart city should be considered as an opportunity to reflect on the basic concepts of urban development, through a conscious use of ICT, supported by an urban community capable of revising its lifestyles, according to the sustainability and energy saving targets.

According to these brief considerations, this section proposes three documents that help to better understand and plan the city: the first collects the latest experiences and knowledge on smart city, as a smart city should inevitably require contexts able to support its realization; the second benchmarks the future competitiveness of cities, as a city needs to improve its smart quotient in order to be more attractive and so more competitive (Papa, Gargiulo, Franco, Russo, 2014); the last one analyses the rules and codes that allow to facilitate the implementation of ICT in the smart cities.

Title: Towards Smart City – a scientific approach
Author/ editor: AA VV
Publisher: ARACNE
Download: n.d.
Publication year: 2014
ISBN code: 978-88-548-7024-6

The publication of this volume has been driven by the aim of deepening the content, the opportunities and the potentialities that the new paradigm of the smart city is able to provide. The building of smart cities is a process still in progress and requires, therefore, the development of researches, reflections and experimentations, through which defining the context in which policy makers, planners and technicians have to operate. This volume collects a selection of the papers published in the TeMA Journal in the period 2011- 2013, as well as some unpublished studies that deal with the relationship innovation-city within the perspective of smart city. Although there is not a univocal and shared definition of smart city yet, nor is possible to decline the urban dimension of this concept, there is a broad consensus that smart cities are characterized by the use of ICT to improve the quality of life. In this perspective, the volume can represent an important point of reference in order to offer a multidisciplinary framework paying special attention to the four components of the smart city: mobility, energy, security and sustainability, any of which is described from different points of view. The papers about transport aim at studying, on the one hand, how the use of ICT can help improve the efficiency of this sector, and on the other, what strategies and actions should be put in place to increase sustainability. If thanks to new technologies several benefits in terms of safety, viability and productivity can be achieved, it is also necessary to inquire how and to what extent the change of behavior and travel patterns contribute to the environmental sustainability and energy goals established by the EU. In addition to mobility, the building sector is another area responsible for a significant share of consumption in urban areas (40% according to EU data) and energy management for the built environment, building and architecture continues to be a theme of great interest in both research and practice in urban planning. The papers related to the energy component of the volume tackle the different levels of actions (the building element, the entire building, the neighborhood) and possible integration between urban planning and energy issues, through the description of some Italian best practices. Urban resilience is the underlying theme of the papers about the safety component. These contributions compare the different theoretical approaches for the study of urban resilience and the different strategies and actions implemented at national and local level, in order to identify the main properties and adaptability capacities that should characterize an urban resilient system. The last component of the smart city described within the volume is the sustainability and it has been studied in relation to the cultural heritage as a public good, to the urban evolution models and to the possible changes in lifestyle. The summary of the main contents of the papers that make up the volume allows to assert that the paradigm of the smart city is characterized by a holistic approach that allows to deal with the recent urban challenges, on the one hand, and to know how to exploit the advances offered by ICT on the other. Therefore, if the components and development opportunities can be defined, the effort required should be to create a «real shift in the balance between the power of ICT use by business, government, communities and ordinary people who live in cities» (Hollands, 2008).

Title: Hot spots 2025 Benchmarking the future competitiveness of cities
Author/ editor: AA VV
Publisher: The Economist
Download: http://www.citigroup.com/citi/citiforcities/pdfs/hotspots2025.pdf
Publication year: 2012
ISBN code: n.d.

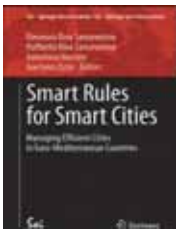
The 2025 City Competitiveness Index benchmarks the competitiveness of 120 cities across the world at today and in 2025 to identify those cities that best embody a growing economy, good infrastructure, a good legal system, an inviting and productive culture and good policy that determine long-term stability and success and, based on projections, where they will at the quarter-century mark.

This EIU's (Economist Intelligence Unit) latest report examines 32 indicators for each city and these indicators are grouped into eight thematic categories and assigned weights: economic strength (including GDP), physical capital (infrastructure equipment), financial maturity (the strength of a city's financial institutions), institutional character (including the fiscal autonomy), human capital (e.g. education), global appeal (including quality of higher education), social and cultural character (including crime rates), and environment and natural hazards. The eight category scores are calculated from the weighted mean of these indicators and scaled from 0-100, where 100 is the most favorable. The City Competitiveness Index includes a total of 27 qualitative and five quantitative indicators.

According to the report, North American and European cities are among the world's most competitive ones and are likely to retain their advantage until 2025. These cities will continue to attract capital, tourists and talent, despite concerns over aging populations, infrastructure, and lingering impacts of the financial crisis. However, the Eurozone crisis will impact cities in Southern and Eastern Europe, creating a <<competitiveness divide' in the region>>. For instance, Madrid (joint 46th), Rome (68th), and Bucharest (80th) fall in the rankings from 2012 to 2025.

Among the top 25 most improved no Chinese city is ranked and, according to the report, it is due to the progress that many Chinese cities made during the first decade of this century. By 2025, China will have surpassed the United States as the world's largest economy, thanks to strong growth, rapid urbanization and rising productivity. China and India are fast growing countries and their combined GDP is expected to exceed that of the major seven (G7) economies by 2025. The cities that top this list (e.g. New York, Tokyo, Paris) are among the wealthiest ones, because tend to be economically strong: in fact, five of the top 10 most competitive cities in both 2012 and 2025 are in the top ten for GDP. Most top ten cities have high scores in terms of both international attractiveness and accessibility, in addition to a rich and socially diverse culture. All these factors are important to attract talented people who often value working in a city that is different from the other ones in terms of entertainment and opportunities.

There is much greater change among cities outside of the top 10: much of the competitiveness growth in the next 13 years is expected to take place in Asian cities, such as Doha (Qatar) and Mumbai (India). Meanwhile, cities such as Madrid and Rome are expected to fall significantly from 2012 to 2025, mostly due to a weakened European economy. Summarising, this EIU research helps both enhance understanding which factors are driving urban competitiveness and illuminate how the highest performing cities continue to create competitive advantages.



Title: Smart Rules for Smart Cities: Managing Efficient Cities in Euro-Mediterranean Countries
Author/editor: Riva Sanseverino E., Riva Sanseverino R., Vaccaro V., Zizzo G.
Publisher: Springer
Download: n.d.
Publication year: 2014
ISBN code: 978-3-319-06421-5

This book proposes a methodological approach to provide local administrations with a smart building code, taking into account the current European regulatory framework (directives and technical norms) and evaluating the economic feasibility of the suggested measures, by studying as case study a large Mediterranean city in Italy. It is assumed that modern cities need new rules and codes dealing with environmental and energy issues and that should be characterized by an integrated and bottom up approach.

In this perspective Italy is considered as a paradigm of the evolution of cities, between historical heritage and bureaucracy. The first two chapters are oriented to deserve an overview of the meaning and the key features of the smart city and of some smart experiences developed in European cities Smart governance, smart mobility and smart energy are defined as the main pillars of a smart city, because a smart city means a city where the participation is the requirement for all decision processes, where there are public, innovative, low environmental impact and efficient transportation modes and where energy efficiency and saving characterize all the activities.

Even though these three components represent the conditio sine qua non a city cannot be smart, the authors point out that the smartness involves the change of people's habits towards sustainability and sharing and saving resources.

The importance of the energy issue is remarked since the very first pages of the book, endorsing the need to integrate energy and climate policies with the planning and management territory ones.

According to the authors and to the aim of the book, the municipal building codes can represent an efficient tool for achieving the goals both of reduction of energy consumptions and increase of renewable energy.

The building sector is a central point in the energy policy of Sicily region (the case study region analysed within the book) where more than 80% of buildings show a very low energy performance and where the existing building codes are not updated to the new quality control system.

In order to improve the energy performance of buildings, through the revision of the municipal building regulations, the guidelines for the definition of the energy annex to the municipal building codes are described.

These guidelines are articulated into four areas that are composed of different articles: environmental sustainability and context appraisal, energy performance of building envelope, energy performance of technical systems and renewable energy systems.

After illustrating this concrete example of the definition of guidelines, the authors analyse the economic impact of some measures for energy efficiency, both active (Building Automation Control, Technical Building Management) and passive measures (passivhouse standard), in a single-family house located in Palermo.

Definitively this book, on the one hand explores rules, codes and the economic impact of building automation and passive measures for energy efficiency, providing an evaluation both at Italian level and regional one, but only for Sicily region; on the other, offers some brief causes for reflections on what should be the urban smartness: the joint point among innovation, sustainability, participation and governance.

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03

SMART CITIES CHALLENGES: PLANNING FOR SMART CITIES. DEALING WITH NEW URBAN CHALLANGES

REVIEW PAGES: LAWS

VALENTINA PINTO
TeMALab - Università Federico II di Napoli, Italy
e-mail: valentina.pinto@unina.it

In this issue

MEASURES ON TRANSPORT, BUILDINGS, ENERGY AND ENVIRONMENT TO CORRECT ITALIAN MACROECONOMIC IMBALANCES

The European Union's economic governance framework set up in 2011, named "Six Pack", has placed a greater emphasis on prevention and correction of macroeconomic imbalances for the European Member States. With the Regulation N.1174/2011, "on establishing enforcement measures to correct excessive macroeconomic imbalances in the euro area", and 1176/2011 "on the prevention and correction of macroeconomic imbalances", the European Union established an alert mechanism for detecting and correcting macroeconomic imbalances and provide for sanctions applicable if a Member State repeatedly fails to comply with the recommendations made at European level.

Each year, usually in November, the Commission prepare "the Alert Mechanism Report" comprising an economic and financial assessment based on a scoreboard that contain specific economic indicators for the detection of macroeconomic imbalances. The Alert Report identifies the Member States who are at risk of macroeconomic imbalance and that are expected to be subject to a more detailed analysis (the so called In Depth Review - IDR). If the IDR reveals that there is a country in serious economic imbalances, the Council adopt a recommendation asking the Member State to submit the "Correction Action Plan" with the identification of specific policy actions and specific terms of implementation.

On Novembre 13th 2013, adopted the third Alert Mechanism Report (EC 2013) adopted by the European Commission, recommends an in-depth review of economic developments in 16 Member States, including Italy, which have different challenges and potential risks that could spill over to the rest of the euro area and wider EU. As the European procedure stated, on 5 March 2014 the Commission published the results of its in-depth review for Italy concluding that Italy is "experiencing excessive macroeconomic imbalances, which require specific monitoring and strong policy action. In particular, the persistently high level of the public debt coupled with weak external competitiveness on account of sluggish productivity growth, and further exacerbated by protracted dismal growth, warrant decisive policy action and attention" (EC 2014a). Above all, the Commission stressed that the major impediments to the materialization of reforms' beneficial effects on the economy are represented by the bottlenecks of institutional nature and that the effective implementation of policy measures adopted recently and in previous years remains the country's Achilles' heel.

In April 2014, Italy submitted its Stability Programme and National Reform Programme (NRP), respectively outlining updated fiscal targets and planned policy measures to restore economic growth and help unwind imbalances (EC 2014 b).

In July 2014 the European Council published eight specific recommendations for Italy (the so called CSRs), targeted at the correction of the imbalances identified (high public debt and weak external competitiveness). The CSRs addressed to Italy concerned a wide range of policy domains: public finances, taxation, public administration, financial sector, labour market, education and network industries. Here the main content:

1. Reinforce the budgetary measures for 2014 in the light of the emerging gap relative to the Stability and Growth Pact requirements,
2. Further shift the tax burden from productive factors to consumption, property and the environment, in compliance with the budgetary targets;
3. As part of a wider effort to improve the efficiency of public administration, clarify competences at all levels of Government.
4. Reinforce the resilience of the banking sector and ensure its capacity to manage and dispose of impaired assets to revive lending to the real economy;
5. Evaluate, by the end of 2014, the impact of the labour market and wage-setting reforms on job creation, dismissals' procedures, labour market duality and cost competitiveness, and assess the need for additional action;
6. Implement the National System for Evaluation of Schools to improve school outcomes in turn and reduce rates of early school leaving;
7. Approve the pending legislation or other equivalent measures aimed at simplifying the regulatory environment for businesses and citizens and address implementation gaps in existing legislation. Approve the pending legislation or other equivalent measures aimed at simplifying the regulatory environment for businesses and citizens and address implementation gaps in existing legislation. Foster market opening and remove remaining barriers to, and restrictions on, competition in the professional and local public services, insurance, fuel distribution, retail and postal services sectors. Enhance the efficiency of public procurement, especially by streamlining procedures including through the better use of e-procurement, rationalising the central purchasing bodies and securing the proper application of pre- and post-award rules. In local public services, rigorously implement the legislation providing for the rectification of contracts that do not comply with the requirements on in-house awards by 31 December 2014;
8. Approve the list of strategic infrastructure in the energy sector and enhance port management and connections with the hinterland (EC 2014 c).

A first step to reach these goals, and in particular the seventh one, is represented by the Decree law 133/2014, the so called "Unlock Italy", “Urgent measures on the opening of construction sites, the execution of public works, the digitalization of Italy, bureaucratic simplification, the hydrogeological emergency and the recovery of production” recently converted with amendments by Law no. 164 of November 11th, 2014.

This regulatory provisions, representing the effort put in place by Renzi's Government to revive the Italian economy, after it returned to its third recession in five years, is examined in depth in the next paragraph.

THE “UNLOCKED ITLAY” LAW: MEASURES AND FINANCIAL FUNDS TO REACTIVATE ITALIAN ECONOMY

The measures contained in the Law no. 164 of November 11th, 2014 are aimed at relaunching Italian economy simplifying procedures and releasing financial resources to restart sectors such as: infrastructure, transport, construction, environment and energy, as well as support business and territorial authorities. The main measures introduced by the "Unlock Italy" law are explained below according to the first five sectors previously identified.

Measures on Infrastructure and transport (art. 1 - 16)

This first group of measures are aimed at promoting the implementation and the completion of public infrastructures, providing on the one hand administrative and procedural simplifications and, on the other hand, allocating funding for the projects.

In the period 2014-2020, the resources allocated to the development of public infrastructure and transport networks works amount to 3,9 billion. The initiatives implemented concern:

- The use of derogatory mechanisms than the ordinary rules governing the award and the appointment of special commissioners for the realization of high-speed railway axis such as the railway Naples – Bari, the rail axis Messina-Palermo-Catania, the rail axis Verona-Padova, and so on;
- The allocation of about 5,000 million euro for the development of the national railway network in addition to 220 million euro for the existent railway network's extraordinary maintenance. Additional resources for 335 million euro are allocated for unlocking works ready to start within certain dates including: the completion of the railway of Turin and of the metropolitan Line 1 in Naples;
- The exclusion from the Stability Pact in relation to some unfinished work by the municipalities;
- The investment of 200/250 million euro in ultra-wideband telecommunications networks in the next 5 years;

As observed by the Commission of the Chamber of Deputies, the conspicuous use of derogatory mechanisms, such as the appointment of special commissioners and special procedures for interventions for prevention of seismic and hydrogeological risk only on the basis of the "extreme urgency", was not always fully effective in the past, with negative impact on time and cost in the phase of execution.

A lot of transparency is then required (Cemera dei Deputati 2014).

Measures on on building stock (art. 17 - 27)

Many measures are introduced to stimulate the activity of the building sector and to steer development towards sustainable choices: administrative streamlining; incentives to the enhancement and restoration of existing buildings stock, both public and private, rather than its further extension; facilities for the support of the rental market. The main changes are made to DPR 380/2001 and concern:

- the possibility to split an apartment in more apartments or merge more apartments with a simple "Comunicazione di Inizio Lavori" (CIL), and no longer on request of the building permit, thereby shortening time and costs;
- the issuance of the building permit notwithstanding planning instruments for building renovations and urban restructuring implemented in abandoned industrial areas, and not only for buildings and public facilities;

With regard to the tax benefits, for those who buy accommodation and places it to rent for the next 8 years there will be a deduction on taxable personal income tax equal to 20% of the purchase price of the property.

Measures on environment and energy

Chapter VIII of the law introduces a series of measures aimed at regulating the procedure for environment reclamation and urban areas regeneration that are defined by their characteristics of "national interest" (eg. the areas of the ex industrial site in Bagnoli Coroglio). First of all, the regulatory text specifies that the provisions related to the process of reclamation and of the transfer of the areas, as well as the process of development, approval and implementation of the program of environmental rehabilitation and urban regeneration, are the exclusive competence of the State as stated by the Article. 117 of the Constitution.
The identification of the areas of national interest takes place by resolution of the Council of Ministers. For each area will be prepared a document of strategic urban regeneration and a specific program of environmental reclamation whose development and implementation concern to a Special Commissioner of the Government and an Actuator Subject. To accelerate the implementation of the programs the new law also provides for the halving of the terms of Legislative Decree no. 163/2006 for the completion of the public procurement procedure and the transfer of the areas of national interest to the implementing body.
In the same Chapter, a special attention is given to measures aimed at the construction of energy recovery starting from municipal and special waste, considered strategic infrastructure of national relevance in order to implement an integrated and modern waste management, achieve self-sufficiency at national level and overcome the European infringement procedures.
The legislator's attention to the measures on energy (Chapter IX) is justified by the growing political instability in some of the countries that are among the main Italian suppliers of energy commodities.
From the energy point of view, in fact, the measure recognizes as strategic the prospecting, the exploration and the production of hydrocarbons and the underground storage of natural gas in order to reduce the national energy dependence. It is expected that when those activities involve the change of planning tools, the authorization is granted to take effect in urban variant.
The legal provision also carries the revision of incentives for the purchase of low-emission vehicles overall provided for in Articles 17 to 17-k-decies of Decree. 83/2012, and the thresholds for recognition of the contribution.
In conclusion, the legislative initiative continues in the footsteps of many previous regulatory interventions that have introduced punctual and episodic measures related to different sectors and not framed in an organic reform plan. As noted in a recent report by the Chamber of Deputies., the most delicate phase will cover "the enactment of the second rank legislation to which the law refers the implementation of many measures; in the recent past this stage it is in fact proved to be one of the main weaknesses of the reform interventions" (Camera dei Deputati 2014).

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IMAGE SOURCES

The image of page 2 is taken from www.mit.gov.it.

04

SMART CITIES CHALLENGES: PLANNING FOR
SMART CITIES. DEALING WITH NEW URBAN CHALLANGES

REVIEW PAGES: URBAN PRACTICES

GENNARO ANGIELLO
TeMALab – Università Federico II di Napoli, Italy
e-mail: gennaro.angiello@unina.it

In this number
URBAN DENSIFICATION: THREE CASE-STUDIES

According to the United Nations Population Fund, in 2009 the proportion of the global population living in urban settings exceeded 50% for the first time in history, with an estimated 3.4 billion people living in urban areas, more than the entire global population in 1960. This trend is expected to continue, with urban areas absorbing all of the expected population growth over the next four decades (UNFPA, 2014).

The city's population growth is naturally related to the world's general growth in population. Lower rate of mortality and a higher level of fertility are the principal drivers of growing of the population. However, statistics do not only indicate a general growth in cities' population due to the natural increase, the share of urban dwellers related to the total world population is increasing at another pace, not proportional to the natural growth but higher (UNFPA 2013). Indeed a growing share of population is moving to cities and towns in search of employment, educational opportunities and higher standards of living. These demands of living standards require an urban society where conditions like density, scale and economies of scale exist, conditions that are not present in rural areas (UNFPA 2013). While cities are attracting a growing population, they have become a source of environmental concerns. Cities are responsible for 67% of the total global energy consumption and more than 70% of greenhouse gas emissions and these trends significantly intensify the severity of some of the two great challenges of our time: climate change and energy security (Hoornweg et al., 2010). These trends in urban demographics impose a new challenge for contemporary cities: the need to accommodate a diverse and growing population within a limited land area in a more sustainable and resource efficient way. This challenge is even greater for those cities characterized by a strong economy, a culture of innovation, or a high quality of life, as the ones described in this contribution, whose population is growing at a faster rate, especially following the recent economic crisis.

In order to answer to this new urban challenge, many European cities have promoted the concept of 'compact city', which promotes high density and mixed land-use, on the basis of environmental arguments. Advocates of this approach present several attributes of the compact city (Dempsey et al., 2010; Vallance et al., 2010; La Rocca, 2010). It contributes to the preservation of rural areas outside of the city like farmlands and forests. In addition, it improves efficiency of transport systems and its profit due to an increase in the public transportation use (Newman & Kenworthy, 1989). Furthermore, in a compact city, the closeness enables people to live near their workplaces. This is believed to reduce the overall transport emissions, as movement by foot or bike becomes a realistic alternative (La Rocca, 2011).

Many cities are currently promoting policy initiatives aimed at creating high-density mixed-use urban forms as a means to ensuring more sustainable development patterns. In this contribution, we present three European case studies: i) Helsinki (Finland); ii) Munich (Germany) and iii) Amsterdam (the Netherlands).

HELSINKI (FINLAND)

Helsinki, the capital of Finland, has a population of approximately 620,000 and an urban population of 1.2 million, making it the most populous municipality in Finland and the world's northernmost urban area among those with a population of over one million ((www.scb.se). The surface area of Helsinki is 214 square kilometre, spreading across a number of bays and peninsulas, and encompassing a number of islands. The inner city area occupies a southern peninsula where the population density in certain parts can be as high as 16,500 inhabitants per square kilometres but, as a whole, Helsinki's population density of 3,050 per square kilometre ranks it as quite sparsely populated in comparison to other European capital cities. Indeed, much of Helsinki outside the inner city area consists of post-war suburbs separated from each other by patches of forest. Helsinki has experienced strong growth from the end of World War II up until the 1970s consisting in a massive exodus of people moving from the countryside to the city. After that period, due to an increasing scarcity of housing and the higher costs of living in the city, many residents began to move to neighbouring Espoo and Vantaa, where population growth has since soared. This dramatic movement of people from the city to the satellite neighbourhoods pushed the municipalities of greater Helsinki into more intense cooperation in such areas as public transportation, land use planning and waste management.

Today Helsinki is one of the fastest growing urban regions in Europe (IGEAT, 2010). The City of Helsinki pursues an explicit densification policy both through the assigning of brownfield sites to new development and by the promotion of smaller infill projects where practicable. These measures are often referred to as ‘consolidation’ or ‘defragmentation’ in a similar manner to the national level guidelines where the respective principle can be translated as either. These consolidation strategies have been defined in a number of planning documents. The principle of consolidation/defragmentation was agreed upon by the City Council in its Strategic Programme in 2009. It is also one of the key principles in the agreement that the municipalities of the Helsinki region made with the Finnish Government in 2012 in order to improve coordination of the land use relevant decisions made within the region. The principle of consolidation is also the fundament of the New City Plan, a long-term land use target condition extending to 2050. According to it, the population forecast for 2050 is 850,000 people, that means that the city will accommodate in the next years about 250.000 people and about 130.000job, which equals, according to the plan provisions, to about 18 million square meters to be built, i.e. 350,000 square meters a year. The Helsinki of 2050 will be more densely populated in all areas than that of today. New construction will be mainly located around the suburban railway stations. The downtown area will also expanded from its current size. Space for new construction in the downtown area will be taken from along the motorways and motorway-like streets of today. Some parts of the motorways may have been covered or turned into tunnels. A strict system of planning rules and a particular situation in land owning are the key successful factors that are paving the way to a more compact and sustainable city. Indeed, the city of Helsinki owns about 65 % of the land within the municipal area of Helsinki. In addition to this, the state owns about 13.6 %, which means that nearly 80 % of the land in Helsinki is owned by the public sector. The municipality can use the power derived from preserved ownership and strict guidelines to ensure for example infilling projects by demanding the developer to do a certain amount of infilling as a condition for building there, which might not be done if the developer owned the land since it is not always feasible for the developer.

Finally, another important successful conditions is the coordination of all the densification initiatives under the same project called “Densification project” which is a project aiming to coordinate all projects in Helsinki that are being developed inside the existing building structure.

AMSTERDAM

Amsterdam, the capital and most populous city of the Kingdom of the Netherlands, has a population of approximately 814,000 within the city-proper, 1.1 million in the urban region and 1,6 million in the greater metropolitan area (www.cbs.nl). It comprises much of the northern part of the Randstad, one of the larger conurbations in Europe, with a population of approximately 7 million as well as one of the top financial centers in Europe.

The city surface area is 219 square kilometre, spreading across 90 islands, which are linked by more than 1,200 bridges, crossing about 100 kilometres of canals. Despite its unique morphology, the city is intensely urbanized. Indeed, the city proper has 4,457 inhabitants per square km and 2,275 houses per square km. Parks and nature reserves make up 12% of Amsterdam's land area. Amsterdam has shown the fastest population growth rate among major Dutch cities, which in turn have grown three times faster than the 1% average of the Netherlands as a whole since 2009. Amsterdam increased by 25,000 people between 2009 and 2011, compared to an increase of less than 1,000 per year in the previous decade. (www.cbs.nl). Accelerated growth in Amsterdam is due to foreign and domestic inflow into the area.

Since the seventies, concepts for compact forms of urbanization have played a major role in the city planning system. Amsterdam's Municipality started working towards a Compact City since 1978, when the citizens contested the transformation of the city core in a central business district and the relocation of the inhabitants of the city center in the periphery (Morbelli, 1997). As a result, the City Council, which was facing with the task of finding space for new developments, switched its planning policy and opted for the promotion of a 'compact city' in opposition to the 'fragmented city'. The new City Plan promoted the mixed-use, the diversity and the intense use of space to enhance spatial and functional efficiency and to fight social imbalances and the bad economy that have influenced the attractiveness of the inner city. The concept of the compact city has been further confirmed with the publication of the report 'De compacte stad gewogen' (The Compact City Evaluated, NPPC, 1985) in 1985, which motto was 'the city in the centre', and with the 'City Central Structure Plan', that promoted the process of reversion of the de-urbanization in favor of developing a compact urban structure.

The Amsterdam Structure Plans, 1991,1996, 2003, were adopted by the City Council that implemented the 'compact city' as the basic principle by introducing also policies for social renewal that were meant to provide a solution for socially disadvantaged people. New policies to reduce the commuter traffic has been also introduced, by increasing the connections with the most important employment areas with bus, tram ad trains and by developing a new system of good urban cycle routes linked with public transports.

Urban densification represents one of the six spatial tasks contained in the new city master plan named Structural Vision Amsterdam 2040 (City of Amsterdam, 2011) . According to it, more intensive use of the space in the city will make it possible to accommodate many more people and businesses. This will increases the customer base for amenities, which will makes it possible to manage energy and transportation more efficiently and removes the need to infringe upon the landscape. In concrete terms, the plans includes measures to realize an additional 70,000 dwellings between now and 2040, with the corresponding amenities such as schools, shops and sports facilities. Furthermore, as a component of densification, various monofunctional business parks will be transformed into areas with an urban mix of residential and business functions.

MUNICH

Munich is the third largest city in Germany, after Berlin and Hamburg and represents one of the European powerhouses of the rapidly expanding knowledge economy. With a population of around 1.49 million, the city forms the core of a fast growing urban region of 5.6 million inhabitants (www.destatis.de). The city surface area is of approximately 310 square kilometers spanning across the elevated plains of Upper Bavaria. With an average population density of 4.500 inhabitants per square kilometers, Munich is the most densely populated city in Germany.

Since 1950, population in the city has grown from 823,892 to about 1.49 million. Consequently, the built-up area as well as the space taken up by infrastructure has increased considerably. Space demand per capita for both living and working has grown continually and is still increasing; at present, no limit is visible. Currently the city is experiencing the strongest population increase in Germany. The population of the city of Munich will grow further according to recent forecast by 5 percent until the year 2020, mainly by immigration from other parts of Germany and Europe; the region even more by more than 10 percent. One of the city's top priorities in housing is to annually complete 6'000 to 7'000 units (www.destatis.de).

The City of Munich pursues an integrated urban development strategy that explicitly tries to countervail urban sprawl and to densify existing build up areas. The principle of consolidation is one of the pillar of 'Perspective Munich', the city's strategic development plan. Its guidelines define new urban development aims and directions and consists of ten guidelines with objectives of economic, social, spatial and regional development. Key to countervail unwanted urban sprawl is two transversal strategies of 'Perspective Munich': "internal expansion" and "urban, compact, green". In the interest of sustainability, the use of previously undeveloped, unsealed land will be sharply reduced when new residential areas are being developed. The focus of 'internal expansion' lies on concepts designed to reuse and restructure existing build up areas fallen out of their use, for instance former industrial or railway land and former military barracks that lie within city-limits. The abundance of such type of areas close to the city center represents a big opportunity for the city to pursuit its densification objectives. Indeed, for most users it is very attractive to concentrate activities on these restructuring areas since they are embedded in existing infrastructure, available and partly reusable buildings and mostly have rather good integration into the public transport network. The already existing urban context offers the chance to ameliorate neighbouring areas by new housing, more open space and a better social infrastructure.

'Compact, urban, green' as one of Munich's key strategies for spatial development combines dense urban land use for all purposes with the promotion of mixed use developments whenever possible instead of mono-functional commercial or housing areas. Together with the polycentric system of district-centers that spread over the entire city, the mixed-use approach will also secure a density of social life and short distances for many citizens to get to their jobs, schools and shops. This will help to increase walking and cycling and using public transport instead of private cars for the everyday mobility. The notion of "green" in this context implies that parks and green open spaces in the city must not only be safeguarded and enhanced, but also significantly augmented in quantity.

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The image shown in the first page is from http://www.domusweb.it. The image shown in the second page is from http://amsterdamsmartcity.com. The image shown in the third page is from http://www.wikipedia.org; the image in the fourth page is from http://www.online.wsj.com.

05

SMART CITIES CHALLENGES: PLANNING FOR
SMART CITIES. DEALING WITH NEW URBAN CHALLANGES

REVIEW PAGES: NEWS AND EVENTS

GERARDO CARPENTIERI
TeMALab – Università Federico II di Napoli, Italy
e-mail: gerardo.carpentieri@unina.it

In this number
URBAN CHALLENGES

In the recent decades the urban areas, especially the metropolises are interested to the growing of the resident population. According to data provided by the Department of Economic and Social Affairs of the United Nations Secretariat (UN DESA), the resident population of the urban areas is increased every year approximately of the sixty million. Currently there are some countries, like the US, Brazil, Mexico, France, Argentina and Belgium, in which the rate of the urban population is already over 75%. The UN DESA expected that by 2050 the resident population of the urban areas will be over six billion. One of the continents affected to the high rates of urban population is the Europe, where according to the Statistical Office of the European Union (Eurostat), more than 70% percent of the population lives in urban areas. So in the near future will be greater the necessity of the new physical spaces and energy demand, that are essential for the conduct of all economic and social activities. The European authorities have introduced a series of political and financial instruments so the cities of the future will be able to: Adopt a global model for sustainable urban development; Solve those challenges by an integrated and comprehensive approach; Combine the approaches based on land and people; Alongside the formal structures the governance, other structures more flexible and informal reflecting the level at which the various challenges present themselves; Develope a governance system capable to create a lot of shared visions and goals reconcile conflicting and divergent patterns of development; Work together to ensure territorial development consistent and efficient use of resources (Gargiulo et al., 2013).

In this perspective of sustainable use of resources is part of the new vision of the Smart City, thanks to what makes it differ from 'sustainable cities' or 'ECO cities' is the use of Information and Communication Technologies (ICTs) in the process of creating a more sustainable city, but also the availability and quality of knowledge communication and social infrastructure (Papa, 2013).

So through the use of ICTs, which will allow to collect and analyze large amounts of data and information, it will be possible to better understand the needs of those who live and use the city. So to start the planning process that can improve the efficiency, equity and quality of life of citizens and the ability to cope the future challenges.

In this issue were selected some international events taking place in the coming months and that highlight the importance of paying particular attention to the analysis of the phenomena affecting the development of urban areas in view of the smart city.

7TH INTERNATIONAL CONFERENCE ON SUSTAINABLE DEVELOPMENT AND PLANNING

Where: Istanbul - Turkey
When: 19 - 21 May 2015
http://www.wessex.ac.uk/15-conferences/sustainable-development-and-planning-2015.html

The Seventh International Conference of Sustainable Development and Planning addresses issues of regional development in an integrated way and in accordance with the principles of sustainability and builds upon a series that started in 2003 in Skiathos, Greece, followed by other meetings in Bologna (2005), Algarve (2007), Cyprus (2009), New Forest, UK (2011), and Kos, Greece (2013). One of the main arguments discussed in this series of conferences was to give primary importance to all those studies that focus on how to encourage the development of new types of integrated planning between the different subsystems that affect the urban and rural development, and also the different subjects involved in decision making.
The accelerated urbanization has brought to the environmental degradation and the loss of quality of life. The urban development may also aggravate the problems afflicting in rural areas, such as forests, the mountain areas and the coastal areas, among many others. Taking into consideration the interaction between the different regions and the development of new methodologies for monitoring, planning and implementation of new strategies to avoid solutions that promote environmental pollution and unsustainable use of natural resources. The energy saving and eco-building approaches have become an important part of modern development that places special emphasis to the optimization of resources. The Urban Planning has a key role to ensure that these solutions and processes are incorporated in the most efficient. The Seventh International Conference on Sustainable Development and Planning aims to bring together scientists and other stakeholders from around the world to discuss the latest scientific advances in this field. The conference will also seek to highlight developments in management strategies and assessment tools for policy and decision makers.

ICURHR 2015: XIII INTERNATIONAL CONFERENCE ON URBAN RENEWAL AND HOUSING REHABILITATION

Where: Venice - Italy
When: 13 - 14 April 2015
https://www.waset.org/conference/2015/04/venice/ICURHR

The XIII International Conference on Urban Renewal and Housing Rehabilitation, organized by the World Academy of Science, Engineering and Technology. It addresses to major academic scientists, researchers and scholars to present the experiences and results of their research on the issues that concern the urban renewal and housing rehabilitation. Also this constitutes an excellent opportunity for researchers, practitioners and educators to discuss with an interdisciplinary and multidisciplinary approach, the innovations, the trends and the issues on these themes.

REGEN 2015
Where: Liverpool – United Kingdom
When: 18 - 19 March 2015
http://www.regen-2015.com/

The Annual Urban Regeneration conference and exhibition, now in its second edition, it becomes one of the main events on the themes of regeneration and economic development in the UK. During the two-day conference will deal the latest issues in urban regeneration policy and implementation, highlighting the key successes made in major towns and cities, in areas such as city centre redevelopment and the development of the tourist industry. The theme of regeneration concerns about the people, the places, the economic growth and the investment that can create sustainable and resilient communities. The Conference will examine the challenges that face towns and cities, in terms of economic development and neighbourhood renewal, and will bring delegates to compare with the policy experts and the industry leaders on real-life case studies.

INTERNATIONAL CONFERENCE ON TRANSPORTATION AND CIVIL ENGINEERING
Where: London – United Kingdom
When: 21 - 22 March 2015
http://ictce.org/

The International Conference on Transportation and Civil Engineering is opened to scientists, scholars, engineers and students from around the world and industry, and is an opportunity to present the researches in progress, and help start collaborations between the world of university research and industry. This conference provides an opportunity for the exchange of new ideas and experiences, to establish business relations or search and find new partners to start new collaboration. The main topics to be discussed during the two days of the conference concern the accessibility, the design for climate change, the designing the sustainable city of tomorrow and urban sustainability, the develop energy efficient buildings at design stage to secure long-term savings, the planning aspects for sustainable construction, the social inclusion, the transport and environment, the urban and regional planning and the urban design and development.

UITP WORLD CONGRESS & EXHIBITION 2015

Where: Milan – Italy
When: 8 - 10 June 2015
http://www.uitp.org/uitp-world-congress-exhibition-2015-call-sessions-and-papers

The International Association of Public Transport (UITP) organizes the UITP World Congress & Exhibition 2015, at Milano. This organization represents 1,300 members of transport companies giving access to over 14,000 contacts from the fields of urban, local, regional and national mobility from more than 92 countries on all continents. The UITP has set the goal of doubling the market share of public transport by 2025 compared to 2005.
The conference examines how to public transport is called to change, taking into account the needs of both internal and the socio-economic context. So the topics to be discussed at this event, from the experts in the industry, are designed to develop a public transport system can work better, be more efficient, to meet the needs of users, contribute to the growth and all 'employment, make cities more competitive, attract investors and reduce congestion.
This very ambitious challenge was included by the organizers in the slogan of Milan 2015: "Smile in the City", where "smile" is the acronym of the five key words directly related to these challenges (Sustainability, Mobility, Innovation, Lifestyle and Economy).

10TH INTERNATIONAL CONFERENCE ON URBAN REGENERATION AND SUSTAINABILITY

Where: Medellin - Colombia
When: 1 - 3 September 2015
http://www.wessex.ac.uk/15-conferences/sustainable-city-2015.html

The 10th International Conference on Urban Regeneration and Sustainability (Sustainable City) will be held at the Universidad Pontificia Bolivariana in Medellin, Colombia. The conference addresses the multidisciplinary components of urban planning, the challenges presented by the increasing size of the cities, the amount of resources and sources required and the complexity of modern society.
This event follows a series of successful conferences starting in Rio de Janeiro in 2000 and then in different locations throughout Europe and Asia. The meetings always attract a substantial number of contributions from participants from different backgrounds and countries. The variety of topics and experiences is one of the main reasons behind the success of the series. The dynamic growth of Colombia and in particular the rapid development of Medellin, which has recently been designated the most innovative city in the world, led to its choice as the venue for the Sustainable City 2015 conference.

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AUTHORS' PROFILES

Gennaro Angiello

Engineer, Ph.D. student in Civil Systems Engineering at the Federico II University of Naples. His research interests are in the field of accessibility analysis and modeling, land-use and transport interactions and sustainable mobility. He is currently involved in the research project Smart Energy Master and in the COST Action TU1002 accessibility Instruments for Planning Practice in Europe.

Gerardo Carpentieri

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. He received a master's degree in Environmental and Land Engineering with a thesis on the integrated government of land use and mobility for environmental sustainability in the metropolitan areas. In July 2013 he won a scholarship within the PRIN project on the "Impacts of mobility policies on urban transformability, environment and property market". He is currently involved in the research project "Smart Energy Master" at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II.

Valentina Pinto

Engineer, Ph.D. student in Hydraulic, Transport and Territorial Systems Engineering at the University of Naples Federico II. Her research activity at DICEA department of the University of Naples Federico II is aimed at studying the relation among city, mobility, and environment and consists in setting up a support tool for the public decision-maker in individuating the possible influences of the urban planning policies on mobility tools.

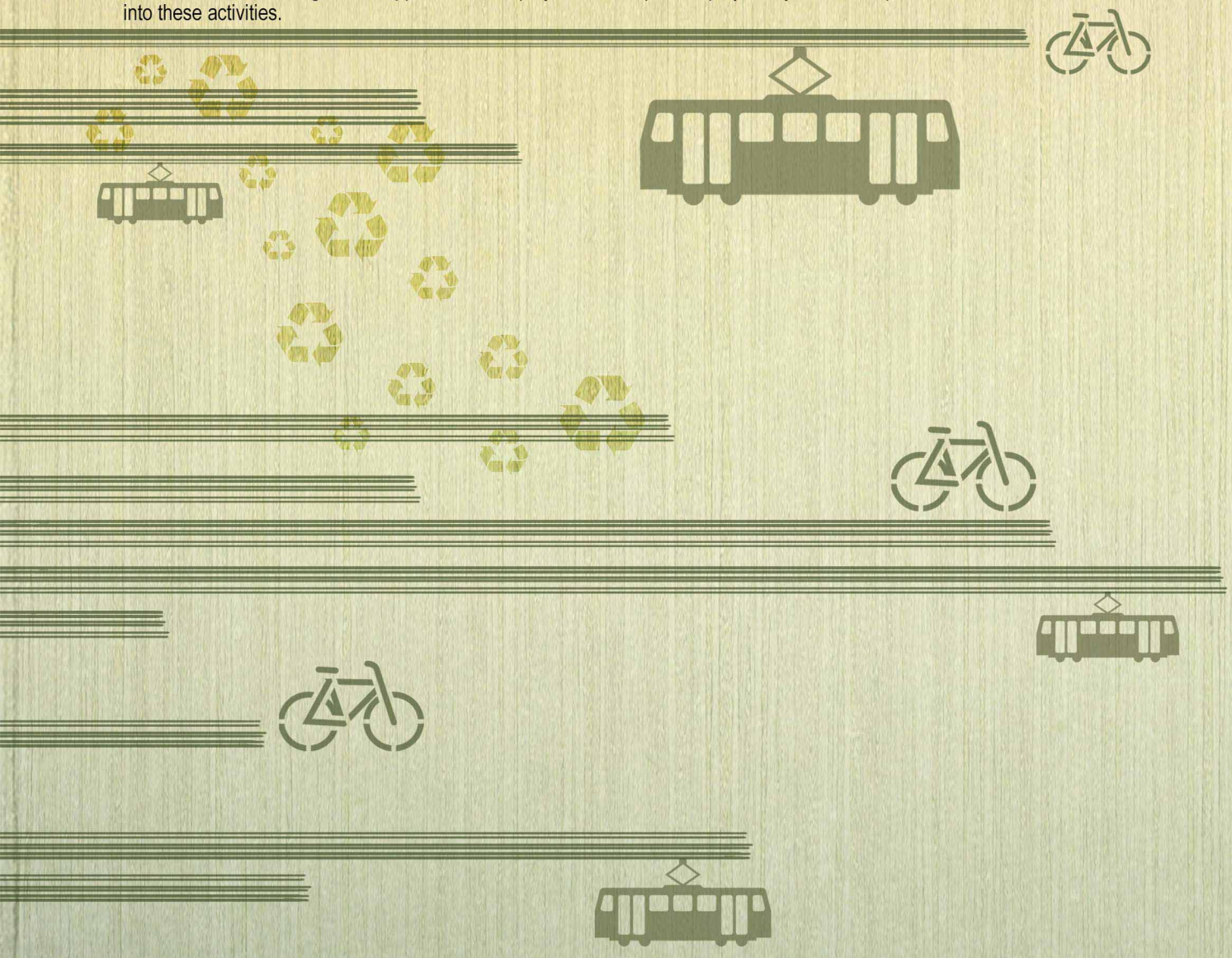
Laura Russo

Engineer, Ph.D. student in Civil Systems Engineering at University of Naples Federico II. She received a master's degree in Architecture and Building Engineering with a thesis on urban expansion and the sprawl phenomena, with particular attention for Campania. Since 2014, she works at the Department of Civil, Architectural and Environmental Engineering – University of Naples Federico II – within the European project "Smart Energy Master" and her research activity is focused on the complex and multidimensional relationship between the city and energy consumption.

Floriana Zucaro

Engineer, graduated in Environmental and Territorial Engineering at the University of Naples Federico II with a specialization in management of urban and territorial transformations. Since 2012 she has been a PhD student in Hydraulic, Transport and Territorial Systems Engineering at the Department of Civil, Building and Environmental Engineering – University of Naples Federico II. Since 2014 she has been a scholarship holder within the Project Smart Energy Master for the energy management of territory financed by PON 04A2_00120 R&C Axis II, from 2012 to 2015. Her research activity is focused on the integration of land use planning, sustainable mobility and energy saving policies in urban contests.

The Project *Smart Energy Master (SEM) for energy management of territory* has been co-financed by the National Operational Programme for Research and Competitiveness 2007- 2013 Smart Cities and Communities "Integrated Action for the sustainable development - Energy Efficiency and Low Carbon Technologies". According to the latest trends of the European and National research (Horizon 2020, Hit 2020), targeted to improve the research-innovation and production cycle and to increase the Italian and European competitiveness worldwide, this Project is supported by a big partnership which includes universities, firms, research institutions and public administrations. The SEM Project, started in November 2012 and expected to be concluded in May 2015, is divided into Research and Experimental Development and Training activities. The Research and Experimental Development activities aim at working out a model of governance for the territorial energy efficiency, with particular reference to the management of urban areas as well as of high "humanized" buildings (schools, offices, hospitals, museums, theatres, stations). The Post-Graduate High Training Course is addressed to train expert researchers, with competences in the field of the management of urban systems and mobility, energy control and efficiency, innovative technologies. The driving force of the project SEM is the overcoming of the sectorbased and low-effective approach mainly referred to the building scale in order to propose a system approach addressed to integrated policies for the management of land, mobility and energy consumption control. Within the SEM project, the TeMALab team of the University of Naples Federico II plays a twofold role, since it is engaged in the research and experimentation activities as well as in the training ones. Among those activities, the dissemination and divulgation of approaches and project's developments play a major role. The publication of this volume can be framed into these activities.



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