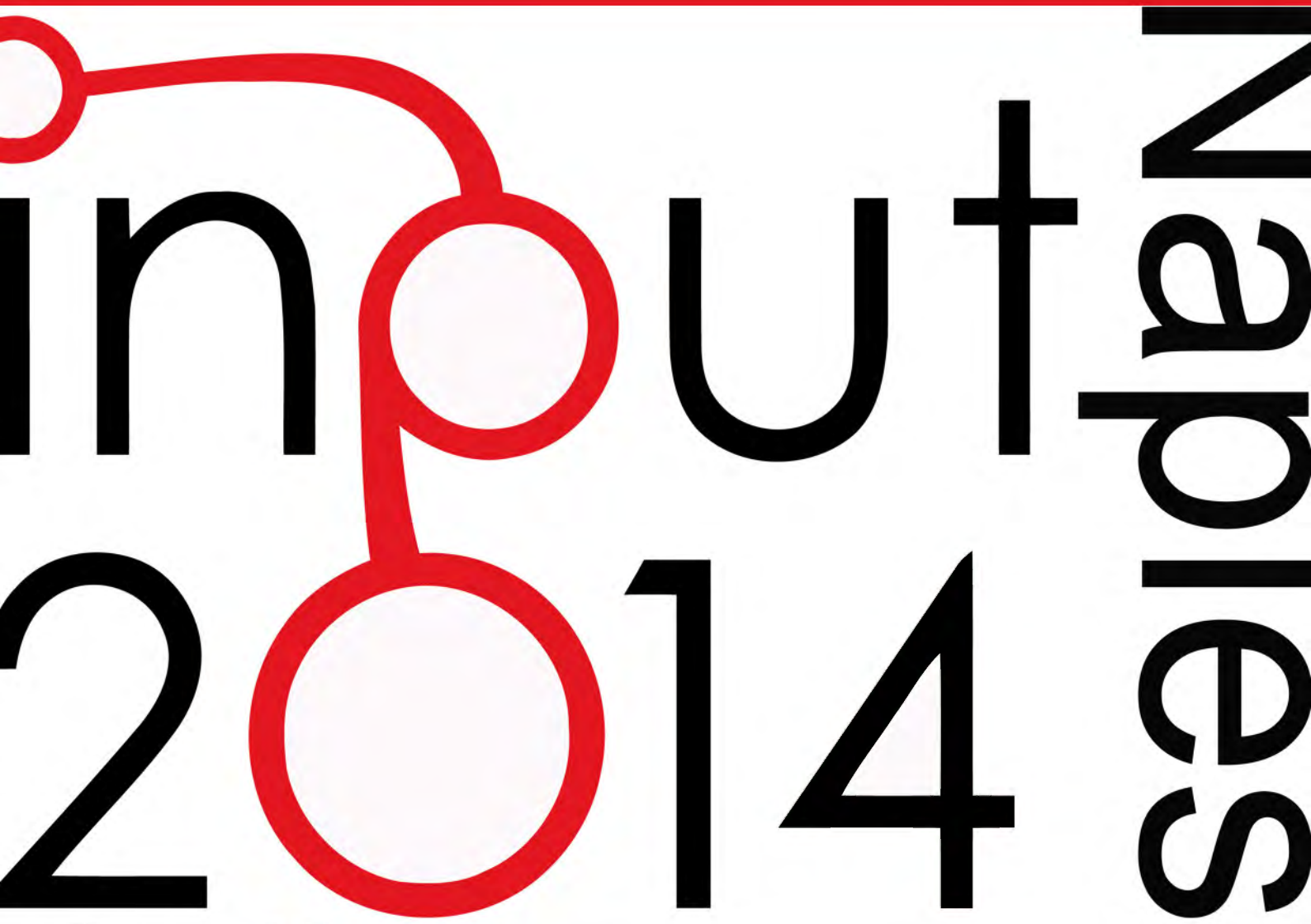
TeMA

Journal of
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal 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 City

planning for energy, transportation and sustainability of the urban system

Special issue, June 2014

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TeMA Journal of Land Use, Mobility and Environment

SMART CITY

PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

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TeMA Journal of Land Use, Mobility and Environment

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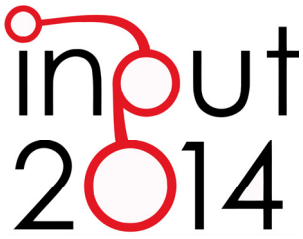
TeMA Journal of Land Use, Mobility and Environment

This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



TeMA Journal of Land Use, Mobility and Environment

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EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website www.input2014.it . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website (www.tema.unina.it). The codex is not present on the pdf version of the papers.

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SPECIAL ISSUE

Eighth International Conference INPUT
Smart City - Planning for Energy, Transportation and Sustainability of the Urban System

Naples, 4-6 June 2014

URBAN LABELLING:

RESILIENCE AND VULNERABILITY AS KEY CONCEPTS FOR A SUSTAINABLE PLANNING

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ABSTRACT

Planning and implementation of sustainable urban neighborhoods has led in Europe and in other countries to the development of some recognized best practices. Each of these cases has followed specific aims and methodologies but it is still far the systematization of the results and the translation of the good practices into action lines.

The paper involves the necessity of new tools for local planning directed to the overall sustainability of the city. Sustainable energy, reduction of the climate-change causes, waste reduction, attention to water resources and to the natural ones are specific operational elements. A possible way to face this challenge is to consider the potentialities of executive plans addressed to increase the sustainability of urban areas starting from limited portions of they. These plans should foresee the minimum impact of volumes and functions to be set up, will provide for the realization of public spaces with zero or almost zero impact, will promote the integration of all the technologies to reduce consumption and encourage energy generation, in order to increase the resilience of the city reducing its vulnerability.

On this basis, aim of the paper is to deepen the issue of the measure of the expected results. To this purpose it is necessary to structure a new certification system (Urban Labelling) that can be able to assign a specific sustainability level to a plan using both traditional and new indexes. The same system can also be applied to existing urban areas and as a basis for evaluating reward operations. The impact of the new tool will be cultural (to switch by a description to the facts in relation to urban sustainability), economic (to involve the supply chain from design, implementation, and urban transformation) and technological (the sustainability of urban areas requires the use of advanced technologies not only for the buildings but also in the control of green areas, public spaces and mobility).

KEYWORDS

Urban labelling, Sustainability, Resilience, Vulnerability, Action plans

1 INTRODUCTION

The paper involves the necessity of new action planning tools directed to the overall sustainability of the city. Alternative energies, lowering of the climate-change causes, waste reduction, attention to natural resources are specific operative elements of this type of new planning. The push towards this change of paradigm derives from the assumption that any serious attempt must be tempted to shift from "fossil planning" to "sustainable planning", also if this shift demands greater global efforts.

It is possible to consider a variety of opportunities to reduce the anthropic impact on the environment. New technologies for the production and the use of energy, but also the awareness of new behaviours and the construction of new regulative perspectives are the factors for acting on urban planning, on building project, on urban design and on a more sustainable mobility. «The new framework demands a renovated mission and a new tool-kit for urban planning focusing on increasingly complex and urgent issues» (Moccia 2013, 12). In this way there is a change of attitude, from a defensive to an attack position.

One of the possible ways is to deepen the potentialities of an evolution of the local plan, a sustainable action plan (SAP), extended to limited sections of urban areas and directed to their sustainability. The SAP will foresee the minimum impact of volumes and functions to be set up, will provide for the realization of public spaces with zero or almost zero impact, will promote the integration of the technologies that reduce consumption and encourage energy generation.

Starting from SAP, the paper want to deepen the possibility to measure expected and real results through the formulation of a new system of certification tool, the Urban Labelling. In addition for the action plans, the same assessment will be applied to existing and/or new construction/conversion of urban areas. Another potential use of the Urban Labelling is its application to reward's actions that are in need of assessments.

In Europe and around the world the realization of sustainable urban neighbourhoods has led to the creation of some recognized best practices. Each of these projects has followed specific aims and methodologies. The step forward is the systematization of the results and the translation of the good practices into action lines.

In relation to urban sustainability the expected impact of the combination among SAP and Urban Labelling will be cultural (to switch from the analyses to the facts), economic (to involve the supply chain formed by design, implementation and urban transformation) and technological (the sustainability of urban areas requires the use of innovations and advanced technologies not only for the buildings but also for the control of green areas, public spaces and mobility). In other word a concrete possibility to implement a real intelligent city in place of the ordinary current city (Mazzeo 2013).

2 PRELIMINARY QUESTIONS

The need to address the consequences of the phenomena of unsustainability, for example the global warming, is internationally recognized as one of the priorities of development's policies in the medium/long term. Similarly, it is recognized the negative impact of urban and metropolitan areas on the evolution of these phenomena (Rosensweig and Solecki 2001; EEA 2012).

The reason of the considerable negative influence of the cities on the environment derives from its being in every country the main economic hearth, a place where the exchanges reach their maximum degree of force. For this reason the city shows a concentrations of interests that have one of their main outcomes in the intensive consumption of resources.

Two are the preliminary matter to emphasize:

1. in theoretical terms there is now a global awareness on the assertion that the urban phenomenon has reached a global importance and, for this reason, it is necessary to face it. Indeed, however, in many

countries are in place great speed and impact's actions on urban expansion without attention to the environmental issues that seem to be secondary. This is true, in particular, in the countries with emerging economies and with high rates of development;

2. the cities are not equal among themselves also because they show notable differences in terms of satisfaction of the citizens' primary rights. This means that they must often recover historical delays, and for this reason they are forced to allocate significant resources on the implementation of basic services rather than on the deployment of environmental policies. The historical delays of the cities of Southern Italy in relation to the Central and Northern Italy get a plastic confirmation of this statement.

From these two matters could derive a robust skepticism on the real application of environmentally sustainable policies to the city. Despite this temptation is strong, it is necessary to face with the problems resulting from ecological changes: to adapt the anthropic activities to these changes is increasingly a vital issue.

2 FITTING CITIES AND PLANS

One of the fields in which enforcement and adaptation's actions to the sustainability principles may lead to significant results is the transformation of the urban systems to address the problems arising from the climate changes. The reason lies in the observation that the current city is unsustainable and that its unsustainability will not slow down, given the rates of increase of the world/urban population (UN 2013) (Figure 1). To reverse this trend a primary role can be assumed by an urban planning finally conscious of their duties with respect to environmental issues.

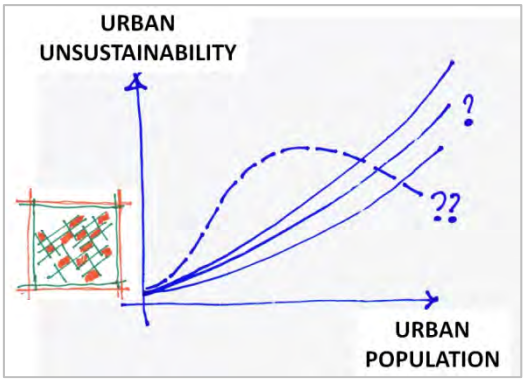


Figure 1 Growing of urban population and unsustainability theoretical trend

In relation to the attitude towards the environment it is to emphasize some distance between the attention to the principles and their actual application to the planning actions. While the first is constantly evolving because exposed to research's results, the second seems to settle on bureaucratized procedures and methodologies, with some liveliness found only at the level of territorial strategic assessment (Di Ludovico 2011). The result is a lack of effectiveness of the assessments which seem pay more attention to procedural requirements instead the concreteness of the solutions.

It follow that the urban and regional planning has the problem of adapting models and techniques to the reality of an unsustainable trend, in order to formalize new governance tools (Stone 2005).

For this purpose it is necessary to identify the key concepts that should guide the processes towards a really sustainable planning. In this regard the paper proposes to consider that the key concepts of resilience and

vulnerability can represent the basis on which to build a new planning model addressed to sustainability and climate adaptation (Fabietti 1999; Medd and Marvin 2005; Tyler and Moench 2012).

Both these key concepts are, at this moment, very fashionable, even though, by their intrinsic nature and by the large number of sectors using them, they are not uniquely defined.

If we consider resilience as a design principle, we can find it as a fundamental part of traditional construction knowledge. Before the 19th century resilience was based, principally, on oversizing of components and on reparability (Schön 1983). In 19th, the deepening of material technology leaded to modern concept of resilience, with formal rules of calculations used to optimize structural safety with a reduced consumption of materials. It is evident that in some situations the two interpretations can be in contradiction (Hassler and Kohler 2014).

The concept's evolution is also reflected in other meanings. In particular, it is possible to recognize the shift from an approach to conserve stability, as in the elastic behaviour of materials, to one that accepts a dynamic system changing over times and involving multiple equilibria and an adaptive change notion.

Over the last 40 years, a number of different branches of knowledge have used and applied the term "resilience". The wide use has transformed the original definition and now there isn't one single definition, to the point that it can defined as a "boundary object" widely used in the studies on complexity.

For example, the disaster management and the sustainability science are two fields in which the notion of resilience have a greater use. The core of the notion is the ability to respond, fit and evolve to different types of pressure, without assuming the return to a static, idealized future.

The concept of resilience is connected with that of "built environment". Initially coined by social scientists (Rapoport 1976), it includes all the elements that constitute the physical, economic, natural, social and cultural capital, at its different scales and with their different times, actors and institutional structures. Another field of analysis are the relations between built and unbuilt part of environment. If we consider the built environment we can say that the speed of transformation is not linear but it could be seen as a succession of slow or rapid changes, as well as a risk may be characterized by a slow or a rapid evolution (Figure 2).

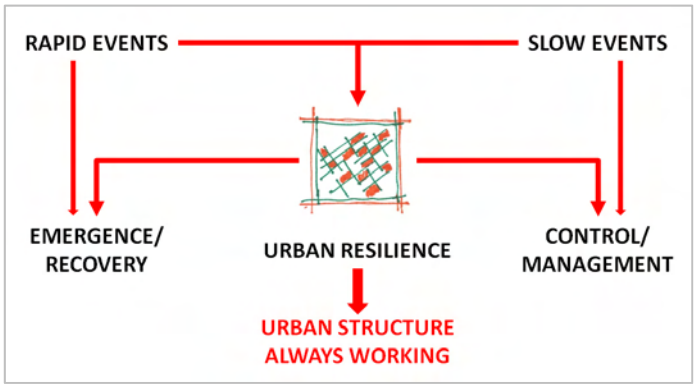


Figure 2 Urban resilience and speed of events

The resilience approach concentrates on these processes with a wide opening. «The fact that resilience has not only developed in different disciplinary fields but also that it is considered as a possible bridge between the implementation of sustainability targets and adaptation to climate change offers a transdisciplinary field of research with high societal importance» (Hassler and Kohler 2014, 120).

Vulnerability refers to the inability to withstand the effects of a hostile environment, as reported in a popular website (Wikipedia). It is possible to say that this inability is related to pre-existing conditions. Their social, economic, physical and environmental conditions can be so weak to have a low resistance when triggers a

catastrophic natural (earthquake, flood, landslide, ...) or technical (explosion, fire, spill, ...) event. In a more technical way we can say that «... a disaster is preceded by at least two predispositions: the possibility that the triggering event takes place, usually called a hazard at this potential state; and a pre-existing vulnerability; the pre-disposition of people, processes, infrastructure, services, organizations, or systems to be affected, damaged, or destroyed by the event» (Villagran De Leon 2006).

The basic mathematical expression for risks (R) connects hazards (H) and vulnerability (V), with a function (here pointed with *) that describes the different possible combinations:

$$R = H * V.$$

The simplest formula uses the simple product, as proposed by ISDR (2004). Other functions were prepared by other researcher, involving elements as the coping capacity, the exposure, the deficiency in preparedness, and so on.

Another thing to consider is that vulnerability is a term used with different meanings by different groups, each one with their aims. Research groups are interested in analysing all issues concerning to the term (social, environmental, technical, ...), while disaster reduction and development agencies are interested to simplify the meaning for addressing the attention to the intervention phase. In general, the meaning of vulnerability varies from a particular state of a system before a disaster triggered by an event, to a direct consequence of the exposure to an hazard, or to the possibility that a system have a consequence from an exposure to an external event.

3 URBAN LABELLING AS PROPOSAL

The evolution towards a more risky urban environment can be summarized by few trends: warmer atmosphere, more extreme weather events, increasing of the greenhouses gas concentration, reduction of water quality, high food handling, difficulty to the access to fossil energy sources.

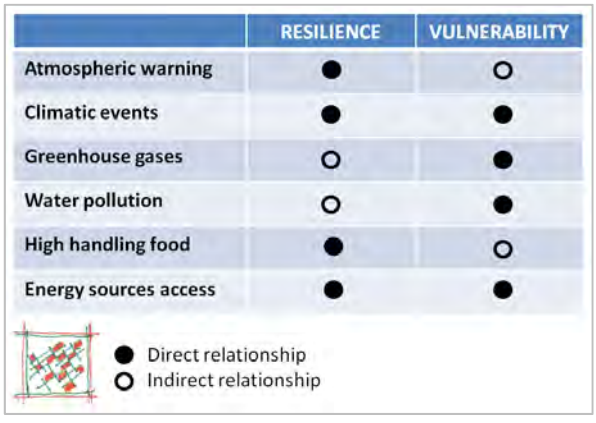


Figure 3 Environmental factors influencing urban resilience and vulnerability

The listed phenomena have an increasing impact on urban systems also if, for their characteristics, they are associated with a “slow” evolutionary process which excludes from the analysis the “speed” phenomena belonging to other types of researches. On the other hand, even on the concept of “slowness” the recent scientific literature has highlighted elements of acceleration, indicating a greater speed of trends compared to previous periods (Loarie *et al.* 2009).

Each of these trends impacts both on urban resilience and on its vulnerability, even if in different manner. Their uncontrolled variation may tend to make the cities more vulnerable reducing their response’s capacity.

It is therefore evident the need to affect such trends in order to reduce the urban vulnerability and to increase the urban resilience. Discriminating factor in such processes is the dimension of the urban population. We can assume that urban systems with low or high population can be difficult to control in relation to the levels of resilience an vulnerability. In particular, a strong criticality is to be associated with high population centres, while a weaker criticality is to associate with low population centres, where could occur mostly a problem of slowness in response to events. Consequently it is conceivable the existence of an ideal size of population, such as to ensure an optimal management in case of occurrence of specific risks (Figure 4). This statement is, at this stage, only hypothetical and should be deepened and checked.

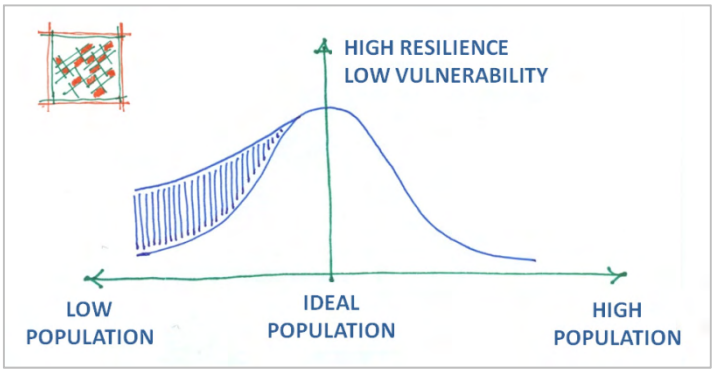


Figure 4 Population as key factor to measure levels of resilience and vulnerability

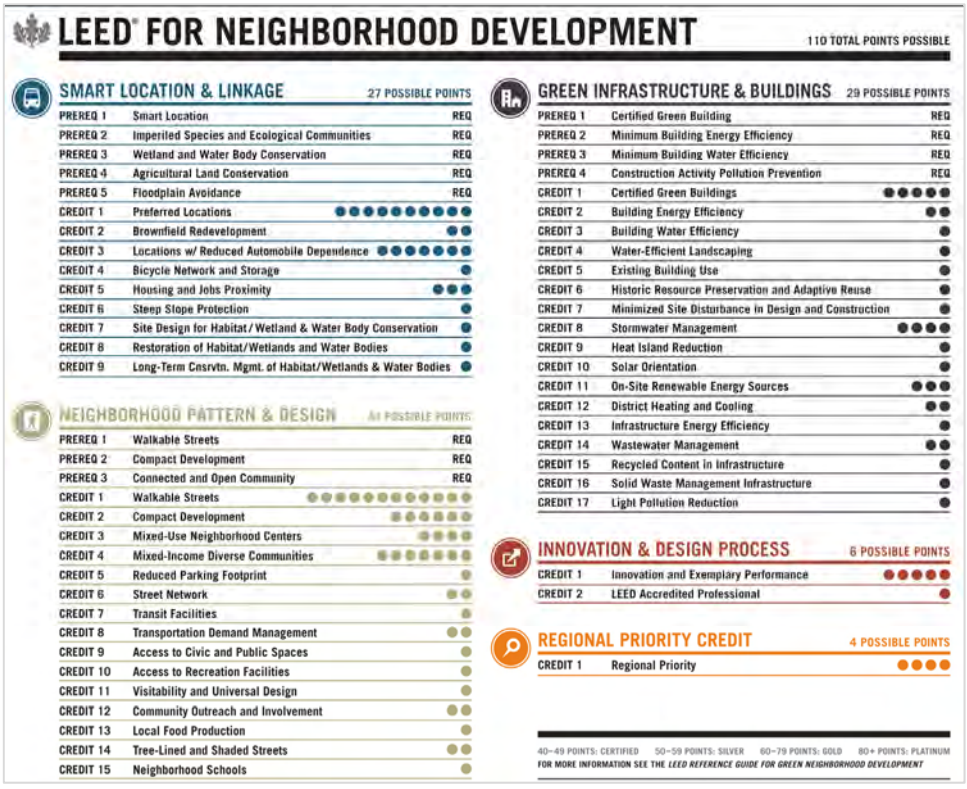
From the aforegoing it is clear the extension of the meanings attributed to the concepts of resilience and vulnerability. Our goal is rather to define the perimeter of their better utilization. It is necessary to understand, in fact, that their inclusion in the planning practice will be effective only when will be possible to translate them into analytical and measurable indicators, like other traditional indexes. In other words, it is necessary that the practice of planning remains anchored to the physical dimension of the territory and that new concepts and ideas are translated into indicators to use in the construction of urban and regional models. It is through numbers and patterns, in fact, that the need to continue to think the city as a physical and manageable structure is realized.

On the other hand, the city can be considered as a changeable space for physical and functional relationships, and the spatial influence of the sustainability development is uncertain. For this it is necessary, above all, to define the appropriate scale in an evaluation, with the awareness that the appropriate boundaries should be adopted case by case, also if the neighbourhood level seem to be the best solution.

In the last years, cities have increasingly recognized their role for sustainability, as shown by several documents as the Charter of European Cities and Town Towards Sustainability (Aalborg, 1994), Leipzig Charter on Sustainable European Cities (2007), Local Governments for Sustainability Preparing for Tomorrow Strategy 2010-2015 (ICLEI, 2010), World Sustainable Capitals, http://www.c40.org/ (2010).

Assessment systems at the neighbourhood and city levels are currently under development for several systems (Cole 2011). Main cases are the LEED for Neighbourhood Development (LEED ND), recently proposed by US Green Building Council, and the Japanese systems CASBEE for Urban Development (CASBEE-UD) in 2006 and CASBEE-City in 2011.

LEED ND starts from the consideration that land use and neighbourhood design patterns create a particular physical reality and force behaviours that have a significant effect on the environmental performance of a place. A neighbourhood planned for the car use, or for pedestrian and for the public transport use have two different consequences on the environment. This is noticeable not only in the more developed countries, because all the world is interested by negative impacts of the urbanized space on the wide spaces.



LEED® FOR NEIGHBORHOOD DEVELOPMENT — 110 TOTAL POINTS POSSIBLE

SMART LOCATION & LINKAGE — 27 POSSIBLE POINTS

PREREQ 1	Smart Location	REQ
PREREQ 2	Imperiled Species and Ecological Communities	REQ
PREREQ 3	Wetland and Water Body Conservation	REQ
PREREQ 4	Agricultural Land Conservation	REQ
PREREQ 5	Floodplain Avoidance	REQ
CREDIT 1	Preferred Locations	●●●●●●●●●●
CREDIT 2	Brownfield Redevelopment	●●
CREDIT 3	Locations w/ Reduced Automobile Dependence	●●●●●●
CREDIT 4	Bicycle Network and Storage	●
CREDIT 5	Housing and Jobs Proximity	●●●
CREDIT 6	Steep Slope Protection	●
CREDIT 7	Site Design for Habitat / Wetland & Water Body Conservation	●
CREDIT 8	Restoration of Habitat/Wetlands and Water Bodies	●
CREDIT 9	Long-Term Cnsrvtn. Mgmt. of Habitat/Wetlands & Water Bodies	●

NEIGHBORHOOD PATTERN & DESIGN — 40 POSSIBLE POINTS

PREREQ 1	Walkable Streets	REQ
PREREQ 2	Compact Development	REQ
PREREQ 3	Connected and Open Community	REQ
CREDIT 1	Walkable Streets	●●●●●●●●●●●●
CREDIT 2	Compact Development	●●●●●●
CREDIT 3	Mixed-Use Neighborhood Centers	●●●●
CREDIT 4	Mixed-Income Diverse Communities	●●●●●●
CREDIT 5	Reduced Parking Footprint	●
CREDIT 6	Street Network	●●
CREDIT 7	Transit Facilities	●
CREDIT 8	Transportation Demand Management	●●
CREDIT 9	Access to Civic and Public Spaces	●
CREDIT 10	Access to Recreation Facilities	●
CREDIT 11	Visitability and Universal Design	●
CREDIT 12	Community Outreach and Involvement	●●
CREDIT 13	Local Food Production	●
CREDIT 14	Tree-Lined and Shaded Streets	●●
CREDIT 15	Neighborhood Schools	●

GREEN INFRASTRUCTURE & BUILDINGS — 29 POSSIBLE POINTS

PREREQ 1	Certified Green Building	REQ
PREREQ 2	Minimum Building Energy Efficiency	REQ
PREREQ 3	Minimum Building Water Efficiency	REQ
PREREQ 4	Construction Activity Pollution Prevention	REQ
CREDIT 1	Certified Green Buildings	●●●●●
CREDIT 2	Building Energy Efficiency	●●
CREDIT 3	Building Water Efficiency	●
CREDIT 4	Water-Efficient Landscaping	●
CREDIT 5	Existing Building Use	●
CREDIT 6	Historic Resource Preservation and Adaptive Reuse	●
CREDIT 7	Minimized Site Disturbance in Design and Construction	●
CREDIT 8	Stormwater Management	●●●●
CREDIT 9	Heat Island Reduction	●
CREDIT 10	Solar Orientation	●
CREDIT 11	On-Site Renewable Energy Sources	●●●
CREDIT 12	District Heating and Cooling	●●
CREDIT 13	Infrastructure Energy Efficiency	●
CREDIT 14	Wastewater Management	●●
CREDIT 15	Recycled Content in Infrastructure	●
CREDIT 16	Solid Waste Management Infrastructure	●
CREDIT 17	Light Pollution Reduction	●

INNOVATION & DESIGN PROCESS — 6 POSSIBLE POINTS

CREDIT 1	Innovation and Exemplary Performance	●●●●●
CREDIT 2	LEED Accredited Professional	●

REGIONAL PRIORITY CREDIT — 4 POSSIBLE POINTS

CREDIT 1	Regional Priority	●●●●

40–49 POINTS: CERTIFIED 50–59 POINTS: SILVER 60–79 POINTS: GOLD 80+ POINTS: PLATINUM

FOR MORE INFORMATION SEE THE *LEED REFERENCE GUIDE FOR GREEN NEIGHBORHOOD DEVELOPMENT*

Figure 5 Showing LEED-ND Criterion, Priorities and Requirements

Figure 6 Northwest Garden, Fort Lauderdale, USA. LEED ND Project V2009, LEED Gold 2012

«Environmentally responsible buildings and infrastructure are an important component of any green neighborhood, further reducing greenhouse gas emissions by decreasing energy consumption. Green buildings and infrastructure also lessen negative consequences for water resources, air quality, and natural resource consumption» (LEED 2013).

The sustainability of a ND is based on the score reached by the single case. LEED 2009 for Neighborhood Development Certification Levels have 100 base points plus 6 possible points for Innovation and Design Process and 4 possible points for Regional Priority Credit. The possible score provides 4 potential level of

sustainability: 1. Certified (40-49 points); 2. Silver (50-59 points); 3. Gold (60-79 points); and Platinum (80 points and above). The score derives from 5 categories of indicators:

– Smart Location and Linkage (27 possible points).
– Neighbourhood Pattern and Design (44 possible points).
– Green Infrastructure and Buildings (29 possible points).
– Innovation and Design Process (6 possible points).
– Regional Priority Credit (4 possible points).

The CASBEE City (Comprehensive Assessment System for Built Environment Efficiency) tool is specifically designed for city assessment. It aids local governments and other stakeholders in identifying the environmental, social and economic characteristics of their city and in quantifying the effectiveness of their city-wide policies. CASBEE-City is based on the hypothesis of environmental efficiency and it produces a combined evaluation of a city regarding two aspects: 1) the environmental load imposed by the city on the wider space outside its boundary, and 2) the quality of life (environmental, social, economic) inside the city.
A city with low environmental load and high quality presents a high BEE (Built Environment Efficiency) value and is regarded as a sustainable city within the CASBEE framework (CASBEE 2012).

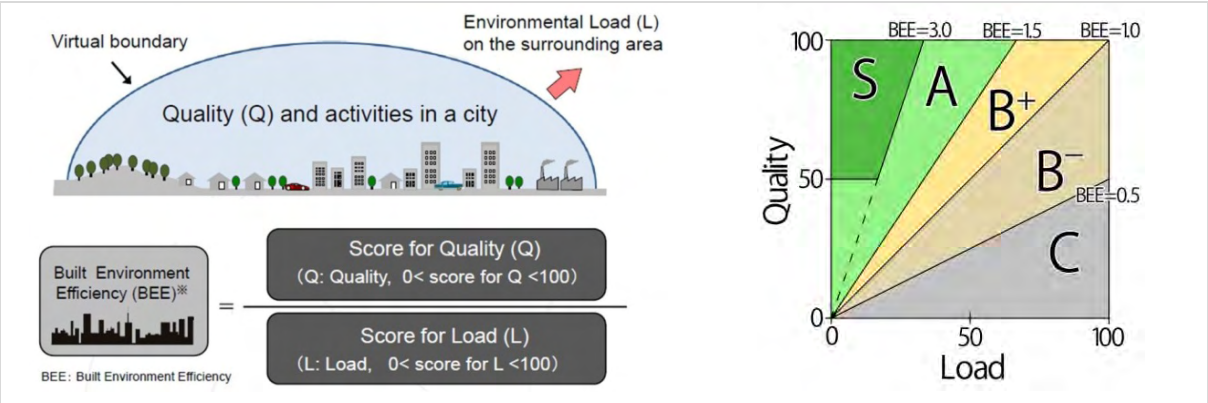


Figure 7 Hypothetical closed space in CASBEE-City and graph of the results of BEE index

The two examples above presented are addressed to the building of environmental assessment systems for urban neighbourhoods, also if they use quite different methods from other more structured environmental assessments (Environmental Impact Assessment, Strategic Environmental Assessment, …). Inside them, also, there are notable differences.

While LEED analyses a specific neighbourhood certifying the sustainability level on the basis of its physical and technological characteristics, CASBEE builds an index (BEE) that connects urban quality and urban load, extending in this way the analysis of the existing connections among city and around area. Finally, neither of the two tools seems to take into account the previous planning phase and the sustainability of the urban plans.

From these examples should be checked the possibility of building a new tool addressed to sustainability analysis.

Starting from the above mentioned concepts of resilience and vulnerability we propose the formalization of a new tool, called “Urban Labelling”. The tool can be applied on two well defined fields: 1. the action urban plans, namely the operative plans, more detailed of the urban plans, and 2. the neighbourhoods, as part of the city and as recognizable sectors of an urban structure. For specific characters, the first is connected with

the governance planning tools, the second with the physical morphology of an urban system (Mazzeo 2014) (Figure 8).

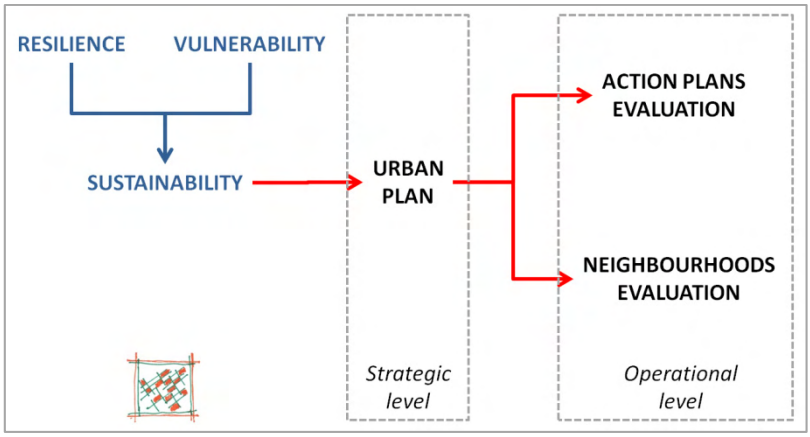


Figure 8 Sustainability as arrangement of vulnerability and resilience

We can define "Urban Labelling" as a formalized procedure for detecting the sustainability level of an urban structure, existing or planned. The environmental certification joins the object to evaluate with a set of values going from the environmental neutrality (Z/NZN – Zero/Near Zero Neighborough) to the highest environmental unsustainability.

The Urban Labelling enriches the traditional planning systems with an evaluation tool having the aim to define the urban sustainability both quantitatively and qualitatively, placing it on a default grading scale. The formalization of it will base, as said, on measurable indexes (formed by numerical data, if possible, but also by qualitative factors objectively handled) from which can derive a clear and shared assessment. This means to measure the sustainability of a plan, on the one hand, and of an urban structure (a built environment), on the other.

The formulation of this rating system derives from the identification of two categories of indexes describing vulnerability and resilience principles gathered in the sustainability concept. The first category applies to the physical and functional aspects, the second applies to the characteristics of use of urban space and on the anthropic behaviour, once achieved or transformed.

The first category encloses indexes formed by volumes, areas, highness, densities and other urban indexes, type of activity, sustainability indexes of buildings, green and permeable surfaces, origin and type of materials, colour, production of energy, recycled water, flexibility of the spaces and their adaptability to change, production of physical and not physical pollutants. Resilience and vulnerability related to spaces and volumes are redefined in measurable terms, with the identification of indicators that measure their capacity to adapt to specific situations and to improve the knowledge and reaction processes.

The second category encloses qualitative indicators related to the use of the urban spaces from citizens and users. They derive from the knowledge on the use of the city, from the process of activities' carrying out and from the time-related changes in behaviour, changes that can be read in terms of persistence or mutation (EEA 2013).

For each of these indicators are to identify minimum and maximum thresholds, using legal, practical or research values (EPA – Malaga City Council, 2012) and characterizing them in relation to the sustainable use of the space.

The two categories of indicators can be used in different ways to make a judgment for the plans and the urban areas. While for the plans it is possible the use only the first set of indicators (physical and functional),

for the analysis of urban areas we can use both set of indicators, in order to verify the physical-functional and the behavioural characters (Figure 9).

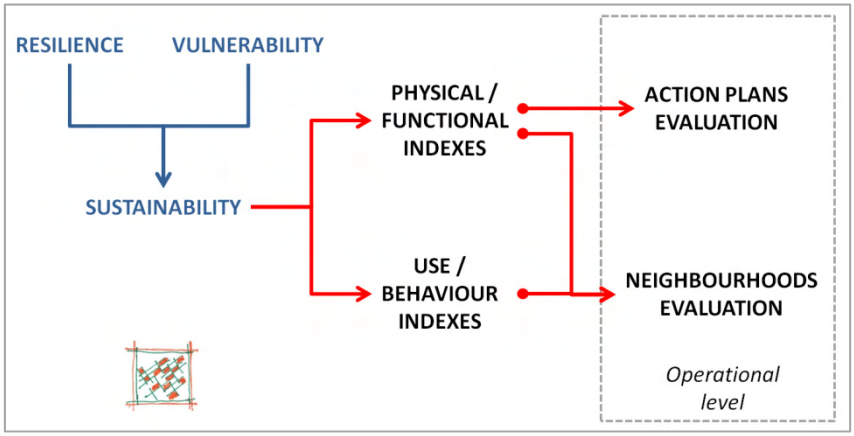


Figure 9 Type of indexes and their influence on the assessment of action plans and neighbourhoods

The characterization by labelling is achieved through a process that involves several steps (Figure 10). Once established the object of analysis (an action plan or an urban neighbourhood) and formalized their main characters, it is possible to determine the list of indicators and splitting them in the two classes (physical/functional or behavioural indexes). For each of these are to define the minimum and maximum variance thresholds, associating them with the quality (high, medium, low and/or other degrees) in terms of sustainability.

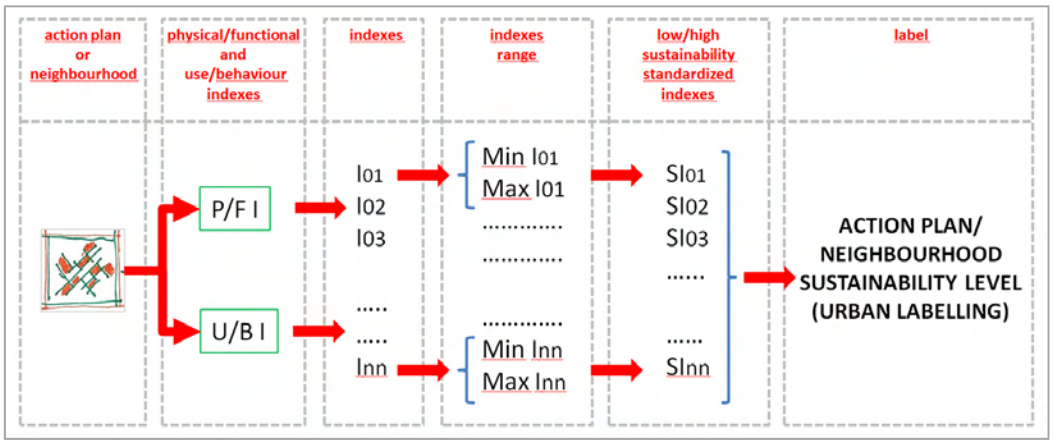


Figure 10 Procedure for the emission of the judgement (urban labelling)

This passage is fundamental for to homogenize the sustainability scale. We consider, for example, two indexes as the volumetric density and the soil sealing: while low densities are associable with low sustainability, low waterproofing is associable with high sustainability. The shift from data (I) to sustainability indexes (SI) may be implemented with the choice of a method of transformation (standardization). At this point we get a homogeneous system of indicators in a default scale for which it is possible to characterize the level of plan's or neighbourhood's sustainability.

In this way we obtain to reach the aim to define a certification system for plans/urban neighbourhoods able to define consumption values for resources and impact values for environmental elements. This certification

system must be able also to allocate to each neighbourhood a synthetic index defining its sustainability level, index to extend to the city as a whole. The pursuit of this aim could be favoured by the insertion of the urban labelling inside the procedures of plan making, in contrast to what happens for the current assessment's procedures.

Other great interest's expected result is the spreading resulting from the use of such a methodology, nearly a dissemination effect, especially if it will not be end in itself but it will become the basis for the promotion of incentive policies rewarding the overall sustainability of planning tools and their implementation.

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