Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 223 (2016) 764 – 769

Procedia
Social and Behavioral Sciences

2nd International Symposium "NEW METROPOLITAN PERSPECTIVES" - Strategic planning, spatial planning, economic programs and decision support tools, through the implementation of Horizon/Europe2020. ISTH2020, Reggio Calabria (Italy), 18-20 May 2016

# Design and urban shape for a resilient city

Federico D'Ascanio[a,]*, Donato Di Ludovico[a], Luana Di Lodovico[a]

[a]*University of L'Aquila, Department of Civil, Construction-Architectural and Environmental Engineering, Via G. Gronchi 18, L'Aquila, Italy.*

**Abstract**

Today the themes related to urban design are lacking of appropriate legislation references in Italian urbanism, falling in between the strictly urban issues related to the city and those concerning individual building objects.

Public and private operators seek to address -and solve- the key topic of the impossibility, via ordinary tools, of developing significant parts of the city, relying on the minimum requirement in terms of standards and public areas to be sold to citizen community, given the limited economic resources available for the public Administrations. Through instruments such as Masterplan, they offer the opportunity to design new urban territories with the introduction of high -quality solutions in terms of connections between empty spaces and constructions, life quality and environmental sustainability. (Giberti, 2008). The growing complexity of the urban landscape of the Italian cities, more and more influenced by exogenous reasons (events, natural disasters, financial programs..), confirmed the dual role that the Urban Planning Project can acquire, taking into account the Project typical local resources and at the same time providing the Plan guarantees of transformation, offering a more efficient and effective response than ordinary actions. The alternatives ran in the case of the city of L'Aquila, include on one hand the application of the slogan *"where it was, as it was"*, through the accurate reconstruction of individual building, not considering the urban problems already present, and on the other hand, the Urban Regeneration Plans introduction, without any temporal certainty. The LAURAq and Laboratory AnTeAtoday experimentations are actually concentrated on the Urban Planning Project and resilience theme, particularly on the role of the network of public spaces in natural disasters. The "street" has a key role, since it is the main element of the public space in L'Aquila city, that even before the 2009 earthquake had evidents urban problems and that, post-disaster, was reorganized along a single main road, the National Road n. 17 (SS17), which moved from crossing roadtook to both distribution road and urban street.(http://www.laboratoriourbanisticoaquila.eu/index.html).

* Corresponding author. Tel.:+39 0862 434.134
*E-mail address*:dascanio.federico@gmail.com


Peer-review under responsibility of the organizing committee of ISTH2020
doi:10.1016/j.sbspro.2016.05.265

Peer-review under responsibility of the organizing committee of ISTH2020

*Keywords:*Resilience; Safety;Comprehensive Urban Project

## 1. The context of national benchmark

The Italian tradition, until a few years ago without references on the subject because it is not linked to the regeneration of urban areas and more focused on cities expansion, now relies on the Urban Design through Complex Programs and Masterplan, functional tools to redesign the morphology of those parts of the city that intends to transform, by delegating to the design of the same tools the decisions on infrastructure and routes, the size of buildings, the relationships between the parties, the public and private spaces, strongly influencing social relations among citizens.The introduction of the negotiating process has been the real news that could (or would) meet the legal vacuum of planning level, allowing multiple instances of the transformation of cities and social forces that are involved, or planning to be, to be able to take part through private investors, citizens, or social workers.

The European experience ahead of us (particulary the british tradition) is represented by many proposals for medium-level urban transformation,managed and proposed straight by private investors, in a bottom-up vision which is not easy to translate in a pyramidal vision such as that provided by our legislative system. For this discrepancy, in Italian many Public Administrations are toiling to find the righttools of control for proper development of the Urban Transformation Plans, taking the risk of managing a very efficient tool without it can enter into large-scale strategy.The consequent in this case is a growth of the city for autonomous compartments, like an independent micro-city each equipped with effective rules, but disconnected from each other and which do not promote substantial development processes, especially economic.

Public and private operators, through instruments such as Masterplan, they seek to address (and solve) the shared theme of the impossibility, through ordinary tools, to develop significant portions of the city relying on the minimum standard and public areas to be sold to the collectivity, being the limited economic resources available for the public Administrations, offering the opportunity to design new urban territories with the introduction of high quality solutions as well in terms of connections between empty and constructed fabrics as in livability and environmental sustainability (Gibelli, 2005).

The search for procedural simplifications, considered the ordinary administrative difficulties associated with traditional urbanism, made more and more frequent the use of instruments such as Masterplan, able of a governance definitely greater than the traditional plan. The research, however, should refer to the clear shortcomings of this tool that often becomes an excuse for local strategies, not included in a wide vision of urban development, not adequately supported by a cognitive framework that allows it to be inserted into a larger design and that often does not involve parts of the city that need upgrading, just because is not subject of private interest.

The risk of localism and a city development not for parts but for pieces hanging over these simplified paths and more and more represent a temptation to the Administrations beyond the assumption of territorial responsibility. To this risk, is added the outcome of the research by the earthquake of 2009 about the city of L'Aquila in the framework of the Department of Civil, Construction-Architectural and Environmental Engineering, University of L'Aquila - UNIVAq, from which you can feel that the safety of the settlement, from the point of view of physical risk, is an issue to be addressed by the project, with actions aimed to redesign the city. So, to avoid partial surgery procedures, we can not rely on the Urban Design tools or Masterplan, which relate to city's limited portions, but to the Comprehensive Urban Project, which instead regards large parts of cities having important issues that need work.

## 2. Urban project planning, urban renewal and resilient cities

The transformations and changes of the city challenge the traditional analysis tools that failed describing a complex and dynamics organization, which quickly aggregates, composes and decomposes, while the Comprehensive Urban Project, addressing the spatial and morphological appearance of the city,it confronts with the whole urban complexity.

Is important to underline, as clarified by Maurizio Morandi, that interdisciplinarity in this process is synthesized in the main core of the design of the physical space and its morphological configuration. (Morandi, 2009)

Urban resilience is now defined as the skill of a territory and of a community to prevent, address properly any matters of environmental and social ones: from natural disasters to the impacts of climate change until the poverty. A city is characterized as resilient when the city changes by building new social, economic and environmental responses make it able it to withstand in the long period to the environment and history stresses.

Today resilience has become a necessary component for sustainable development, by acting first of all on organizational and management models of urban systems. The sustainable city is a resilient city and that produces significant economic opportunities about environmental issues that today become goal and path of development of many leading European companies in the green infrastructure markets and technologies for smart cities, in the themes of the green economy and adaptation and resilient transformation of our socio-economic system.

The sustainable development is also defined as a process that suggests the relevance of the planning and procedural design theories, that informs how to achieve a desirable state and therefore also directs the construction of urban sustainability indicators (Banai R., 2013).

Urban resilience provides the transition from the *redevelopment model* to an *urban regeneration model*, which involves actively the community, environmentally and the consumption of resources friendly, aimed at reducing the human activity impact.Urban regeneration appears in Italian urban planning after the First World War with the Reconstruction Plans to get to the 90s with the development and reconstruction of historical and urban centers promoted by the State until the birth of the Public-Private Agencies in the 80s. The Reconstruction Plans in the recent past in which disastrous events (floods, tsunamis, earthquakes) have hit urban centers of greater historical and strategic value often (as in the case of L'Aquila) have lost the opportunity to reconsider the development prospects, focusing on assisted economies uncompetitive.A badly designed city or society produces wrong management of resources and waste services when it is unnecessary, while a resilient city is made up of a balanced community and little energy consuming, without unnecessary expenditures of badly planned cities (D'Ascanio, 2013).

The search for strategies able to give efficient answers to the challenges posed by the size and complexity of the contemporary city has found in the Comprehensive Urban Project a valid operative tool, with particular attention to the typical contexts of medium-sized Italian cities, with abandoned historical centers and suburbs without own form but rich in urban voids,produced by the de-industrialization and military disposals, including the resulting areas of infrastructure networks, up to the case dealt in the International Workshop of L'Aquila in April 2014 about an urban environment struck by natural disasters through the experimentation of the Urban Laboratory for the L'Aquila Reconstruction - LAURAq (National Institute of Urban Planning and National Artistic - Historical Centres Association) and of the Laboratory of Territorial and Environmental Analysis-AnTea (UniversityofL'Aquila) (Di Ludovico & Properzi, 2015).

The Comprehensive Urban Projects must provide for progressive steps of implementation, in both economic and spatial terms, having to rely on available resources and any development opportunities that could arise, also providing a valid and conscious answer to the uncertainties and variables that the contemporary city today poses.

It seems evident that, once again, it need to set a common strategy for the reconstruction of not just physical but also social and economic fabric, without relying on the architectural planning skills of the individual. Within this strategy, each stakeholder is asked to define their own assets which will be collected in theComprehensive Urban Projects of which the Atelier have represented (and keep on representing) a commendable application in post-earthquake in L'Aquila.

The growing complexity of the urban landscape of the Italian cities, more and more influenced by exogenous reasons (events, natural disasters, financial programs..), confirmed the dual role that the Comprehensive Urban Projectscan have, considering the Project typical local resources and at the same time providing the Plan guarantees of transformation, offering a more efficient and effective answer than ordinary urban actions. The alternatives ran in the case of the city of L'Aquila, include on one hand the application of the slogan *"where it was, as it was"*, through the accurate reconstruction of each building, not considering the existing urban problems, and on the other hand the Urban Regeneration Plans introduction, without any temporal certainty for the stakeholders.

In other words, we hope that the participatory trials implemented through the Urban Planning Laboratory of LAURAq and the Atelier series carried out in L'Aquila in the years after the earthquake may be a starting point that

the Government will consider actively, overcoming the conflicting and conservative positions which until now have limited the revival of our territory.

## 3. Safety as a parameter of urban transformations

The two workshops experimentations, the LAURAq and AnTeA, has considered the Urban Project as a project of shapes and designs which leaves the indefinite spatial limit and an indeterminate time dimension, a practice that includes a wide range of items to consider during the planning elaboration; while addressing the spatial and morphological appearance of the city is faced with the whole urban complexity. One of these elements is certainly the safety of the settlement, first of all vehicled by the resilient public spaces system. It'a progressive project, feasible in its strategic importance by parts of the city and in compliance with structural coherences and environmental compatibility that can guarantee (AA.VV., 2011).

The safetyissue isjoined by others which arise, for example, from the fact that there are also ecological factors and a new focus on the environment and a growing demand for quality of life in urban environments. The Energy Roadmap by the European Commission in 2011 has already been set in this regard four main paths to a more sustainable energy system, competitive and secure in 2050: energy efficiency, renewable energy, nuclear power and carbon capture and storage (https://ec.europa.eu). Among the new topics related to urban transformation, then there are also aspects of energy, and it is clear how the adaptation of cities to new demands should be implemented locally (without neglecting the broader context), studying case by case vulnerabilities, weaknesses, risks, actions to be implemented and possible solutions.

In this regard, it is noted that adaptation to climate changes, a topic linked to that of the risks, despite being an issue of which national governments and local communities have begun to deal a few years ago, in many economic sectors, such as agriculture and tourism, today affect new strategies related to the climatic conditions that are already facing the impacts of ongoing changes (also detectable changes in an ever more evident and with increasing intensity). Choose in advance adaptation actions can protect our natural resources and protect society from the impacts of climate change, which can be very expensive because it is directly related to the safety of the city. The European Commission has estimated the minimum cost of a failure to adapt to climate change at a European level in a range that would go from the 100 billion euro per year in 2020 to 250 billion euro per year in 2050 (data available on the Commission website European).Moreover, on April 16 2013 the European Commission presented the *"European strategy for adapting to climate change (COM (2013) 216 final)",* introducing in this way a regulatory framework aimed at making the European Union more and more ready to face the impacts of climate changes. Then there is the initiative *"Mayors Adapt. The Covenant of Mayors Initiative on Adaptation to Climate Change",* launched on March 19 2014 by the European Commission that aims to increase support to local actions, to provide a platform for a stronger commitment and build a network of cities, raising awareness about adaptation measures to climate changes that are necessary.

Local authorities become so key players for the implementation of adaptation measures and to strengthen the overall resilience of their territories. The Mayors Adapt program follows the model of the Pact of Mayors (voluntary participation, political involvement) and aims to support local authorities in the development of adaptation measures that are consistent and integrated with mitigation actions, aiming to promote development sustainable urban, stimulate investment and innovation at the local level and strengthen cooperation among stakeholders.

Through this shared platform, the attention of governments (even local) should be extended to any calamitous phenomenon that can affect the economy and the development of an urban area (floods, droughts, tsunamis, earthquakes, etc) to make common development strategies aimed at addressing critical issues and prevent risks related to them, thereby becoming urbanized security a prerequisite for the pursuit of urban transformations.

## 4. Project and safety: an experiment in l'aquila after the earthquake

The LAURAq and Laboratory AnTeAtoday experimentations are actually concentrated on the Urban Planning Project and resilience theme, particularly on the role of the network of public spaces in natural disasters. The "street" has a key role, since it is the main element of the public space in L'Aquila city, that even before the 2009 earthquake had evidents urban problems and that, post-disaster, was reorganized along a single main road, the National Road n.

17 (SS17), which moved from crossing roadtook to both distribution road and urban street,transforming itself into a linear settlement along 14 km (De Vico, Di Ludovico & Colagrande, 2014).

The research is focusing on the reconstruction of morphogenetic report of the Road, the settlement structure through the Comprehensive Urban Project. Wrong relationship between road and public spaces, outcome of the welfare crisis, a lack of coherence between social model of development and territorial governance tools that are expressed through functional zoning, has produced along the axis of the SS17 morphologies of settlement complex in which there are no reports of mediation between the same road and the settlement, for example through the sequence street-sidewalk-green-built, or through the aesthetic character of the urban landscape.This missed report has also highlighted the low performance of the settlement system compared to the concept of resilience and therefore the response of the settlement to disasters.

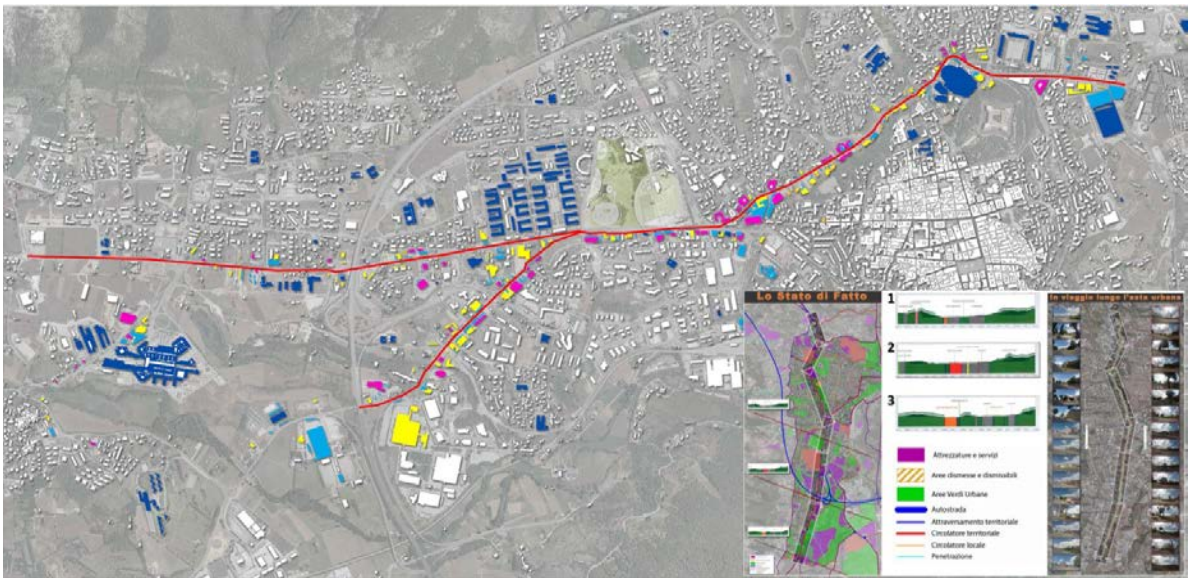


Fig. 1. The highway 17 and public urban functions (Antonella Tempesta processing).

On the issue of the safety of public spaces, and in particular the road and building, the University of Aquila is following a research path that starts from the so-called State Limit for the Emergency-CLE, that is *"the condition of the urban settlement beyond which, as a result of the occurrence of the earthquake, while concurrently with the occurrence of physical and functional damage that may lead to the interruption of almost all of urban functions present, including the residence, the urban settlement keeps however, as a whole, the operations of most of the strategic functions for emergency, their accessibility and connection with the local context"(art. 18 OCDPC 171/2014).*The research introduces the CLE as an assessment of the performance of the settlement tool in the event of a disaster but also as a reference for the design of urban public space system.

The traditional urban planning issues, related to the design and city shape, today are faced with those derived from climate change and that of safety and risk. The CLE can be considered, as well as an assessment tool, a tool to support the redesign of the urban form and then of those fragmented settlement structures typical of the modern.

Use at project level the CLE means in a reconstruction process allow to identify new rules of spatial organization /reorganization the urban fabric, able to ensure in case of catastrophic event, the safe exodus to the emergency areas and stacking, to ensure access to first aid equipment (hospitals, first aid, gathering areas, etc) and to the strategic buildings included in the Civil Protection Plans.The research aims to improve the analysis of urban and regional vulnerability of the CLE, as provided by the Department of Civil Protection (DPC), considering, at local and regional level, new quantitative and qualitative currently not included in the CLE cards of the DPC.In particular, the analysis allows to evaluate:

- At the local level: the value of Handworks and spaces (private and public) to keep (the cultural value and identity); the site's geological and morphological analysis (micro-zoning - local effects); the relationship between Handworks and urban systems (hierarchical level and percentage covered by the standard); the amount of users and their daily or periodic movements; vulnerability (physical) component manufactured each system (classification and identification of building aggregates); the amount of negative interactions between elements (building aggregates) and systems due to urban morphology and the formation process of the building fabric; the interaction of the various components and systems with basic hazard and local, hazard hydrogeological and hydraulic, the status of underground storage; the land use decisions of local strategic location of buildings.
- A Territorial level: the distribution of the various functions in the municipality systems (Performance Level); the hierarchy of functional systems (networks and buildings); It estimates the consequent resource flows (people and goods); vulnerability assessment and explanation of the system built with respect to natural hazards (floods, earthquakes, etc), the land use decisions of localization of territorial strategic buildings.

By this new CLE analysis model and integrating it with the system of spatial planning (urban and architectural) will be able to redesign urban spaces more accessible, safe and with high flexibility (use in emergency phase, reconstruction and ordinary). We talk about urban resilient spaces result of an integrated multidisciplinary design as, for example, the draft of Tasinge Plands Square Copenhagen in Saint Kjelds district, inaugurated at the end 2015, fruit of the multidisciplinary design which aims to be a resilient to the climate changes.This kind of approach aims to ensure that the problems (reconstruction, climate change, earthquake risk, flood risk, etc) become opportunities to improve the quality of life in cities, making them more secure, usable, *smart* and resilient (Di Lodovico & Di Ludovico, 2015).

## References


AA.VV. (2011) I Materiali del LAURAq online, *Spazi urbani strategici per la ricostruzione*, INU Edizioni, Roma.

Banai R. (2013) *Cities and Regions: The Urban Sustainability, Planning, Pedagogy, and Technology Nexu.*Journal of Sustainability Education, Vol. 5, May 2013.

D'Ascanio F. (2013)*La rigenerazione urbana come modello di sviluppo. Il laboratorio aquilano.*in: Atti della XVI Conferenza Nazionale Società Italiana degli Urbanisti, Urbanistica per una diversa crescita, Napoli, 9-10 maggio 2013, in Planum. The Journal of Urbanism, n.27.

De Vico B., Di Ludovico D., Colagrande S. (2014). *A new infrastructural-relation model for the post-earthquake city of L'Aquila*. In: (a cura di): Marchettini N, Brebbia C A, Pulselli R, Bastianoni S, The Sustainable City IX, Urban Regeneration and Sustainablity. Wit Transactions on Ecology and the Environment, vol. 191, p. 221-232, Siena, doi: 10.2495/SC140191

Di Lodovico L, Di Ludovico D (in stampa) (2015) *La Vulnerabilità del Territorio. Dalla Condizione Limite per l'emergenza Locale a quella Intercomunale*. In: XVIII Conferenza Nazionale SIU: Italia '45-'45. Radici, Condizioni, Prospettive, Venezia 11-13 Giugno 2015.

Di Ludovico D. (2013). *New Landscape and Comprehensive Urban Project in the Reconstruction Process. The case of L'Aquila (Italy).* Sabiedriba, Integracija, Izglitiba, vol. III, p. 99-108.

Di Ludovico D., Properzi P. (a cura di) (2015), I Materiali del LAURAq on-line. Progetti Urbanistici per la ricostruzione. INU Edizioni, Roma.

European Commission: *https://ec.europa.eu/energy/en/topics/energy-strategy/2050-energy-strategy*

Gabellini P. (2014), in *ECOSCIENZA*, Rivista di Arpae (Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna) Numero 5, Anno 2014, Bologna, p.86-87.

Gibelli M. C. (2005), *Flessibilità e regole nella pianificazione strategica: buone pratiche alla prova in ambito internazionale*, in Martinelli F. 2005 (cur.), *La pianificazione strategica in Italia e in Europa. Metodologie ed esiti a confronto*, Milano, Franco Angeli

Giberti M. (2008), *Masterplan. La trasformazione di una parte di città*, Alinea Editrice.

Laboratorio Urbanistico per la Ricostruzione dell'Aquila: *http://www.laboratoriourbanisticoaquila.eu/index.html*

Macchi Cassia C (1999), *Il progetto del territorio urbano*, Franco Angeli, Milano.

Morandi M. (2009), *Progetto urbano e progetto urbanistico: riferimenti e considerazioni*, in Macramè n.3/2009, Rivista on.line dell'Università degli Studi di Firenze, pp. 85-88.

Wheeler, S. M. (2000). *Planning for metropolitan sustainability*. Journal of Planning Education and Research, 20 (2), pp.133-145.