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# Earthquakes, public spaces and (the social construction of) environmental disasters.

## The role of public space for risk mitigation and urban redevelopment and the role of environmental disasters for re-assessing the 'space of the Public'.

Barbara Pizzo

PhD - Researcher and Senior Lecturer in Town and Regional Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

*barbara.pizzo@uniroma1.it*

Giacomina Di Salvo
Margherita Giuffré
Piera Pellegrino

Architects, PhD in Town and Regional Planning
Research group on Urban planning & Seismic risk prevention of Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente (coord. Prof. M. Olivieri) - *Sapienza* Università di Roma

*ABSTRACT*

*This paper stems from long-lasting research dedicated to urban risk reduction through a planning approach. It focuses on public space, proposing an inversion of the usual perspective: instead of considering public spaces for risk mitigation and urban redevelopment, here the*

*imperatives of environmental safety and urban resilience can be instrumental for exploring the meaning and role of the public space from a different, rather compelling point of view. instrumental for exploring the meaning and role of the public space from a different, rather compelling point of view.*

*One starting point is the concept of SUM, Strategic Urban Structure (or Framework), from the Italian "Struttura urbana minima", which has been introduced in order to set out the contents of urban risk reduction in local administration agendas and particularly into ordinary planning processes. The SUM has been conceived both as an analytical and a normative/planning tool.*

*Public spaces are the backbone of both urban structure and of the SUM. From their features, localization, distribution within the settlement, and their systemic characters, largely depend the capacity of a town to positively react to a seismic event.*

*Six case-studies of small and medium-size historic towns in the Umbria Region (one of the many Italian Regions with a high level of seismic risk), help to understand the complexities and problems related to seismic prevention within historical centres, and the conflicts between conservation of the heritage and the imperatives of environmental safety.*

*In order to overcome possible criticalities identified in a SUM, it is necessary to provide alternatives to its functioning through redundant elements. The concept of redundancy, which is strictly related to that of uncertainty, is very interesting and promising in this field of research.*

**SUMMARY**

a. The main objective. To consider public space, urban policies and the City *through* a concept, which became a planning tool for seismic risk prevention at urban scale: the Strategic Urban Structure (SUM);
b. The problem. The 'ineffective importance' of Public Space in urban transformation processes: some unsolved questions in dealing with Public Space in Italy;
c. Our approach. Changing perspective to make use of the topic of risk for analysing and re-defining the 'public city' and public space;
d. Our argumentation. Reflecting on case studies and field experiences;
e. Conclusions. What we can learn through the SUM and its relationship with public space: functionality, identity, safety. The promising concept of redundancy.

## A. THE MAIN OBJECTIVE: TO CONSIDER PUBLIC SPACE, URBAN POLICIES AND THE CITY *TROUGH* A CONCEPT, WHICH BECAME A PLANNING TOOL FOR SEISMIC RISK PREVENTION AT URBAN SCALE: THE STRATEGIC URBAN STRUCTURE (SUM)

This contribution stemmed from the common reflection of a research group in the Dept. of Planning, Design and Technology - University La Sapienza of Rome[1] which, for more than a decade, has been working on the issue of the reduction of urban seismic risk through planning methods and tools. This

1 This paper is the result of an intense exchange between the four authors on the meaning (actual and potential) of their research activity in the field of urban seismic risk prevention in terms of public action and public space. This means that the paper intended as a whole and in its general conception is a common work, while Barbara Pizzo wrote paragraph a, b, c; Piera Pellegrino referred about the case studies of Città di Castello, Gubbio and Amelia; Giacomina Di Salvo about those of Nocera Umbra, Montone and Vallo di Nera. Graphic elaborations belongs to Margherita Giuffré, which contributed also in deepening the part about redundancy.
The authors belong to a wider research group of the Dept. of Planning, Design and Technology, (formerly – DPTU) coordinated by Prof. M. Olivieri, and composed by: M.S. Benigni, F. De Girolamo, A. De Rosa, G. Di Salvo, F. Fazzio, F. Fiorito, M. Giuffré, R. Parotto, P. Pellegrino, B. Pizzo.

research has been commissioned mainly by Umbria Region, thanks also to EU projects and funding.

It has been addressed toward the definition of a method for the reduction of urban vulnerability, that is based on the identification of the 'strategic' components of the urban structure. They are chosen for their strategic meaning and role within the urban structure, and particularly in the perspective of prevention from seismic risks, of the management of the post-seismic emergency, and of the following re-start of urban activities.

These components and their reciprocal relationships are interpreted as a system, and conceptualized as the Strategic Urban Structure (from now on: SUM, from the Italian: "Struttura Urbana Minima") - *see Box 2*.

Thanks to our long-lasting field experience we had the chance to put into practice the meaning and potentialities of the SUM concept for urban seismic risk management, turning a planning concept into a planning tool. This happened particularly through the publication of 'Guidelines for the definition of the Strategic Urban Structure (SUM) within Urban Plans'[2], to be available for local administrations. This is very important in a country, such as Italy, where local administrations are in charge of urban planning[3]. The Guidelines have been incorporated within the legislation of the Umbria region, and are regarded as a straightforward and useful tool for planners and decision makers working at urban and regional level.

Within the Guidelines, the Strategic urban structure (SUM) is defined as 'the network of routes and pathways, open spaces, buildings and urban functions intended as a system, which play a strategic role in case of emergency as well as for the re-starting and the maintenance of ordinary urban activities

2 Cfr. Regione Umbria – DPTU, Dipartimento di Pianificazione Territoriale e Urbanistica, *Sapienza* Università di Roma: F. Fazzio, M. Olivieri (Coord.), R. Parotto, B. Pizzo (eds.), *Linee guida per la definizione della Struttura urbana minima all'interno del Prg – parte strutturale (2009)*. Por-Fesr (2007-2013) funded research: 'Linee guida per l'individuazione della Struttura urbana minima e le valutazioni di vulnerabilità urbana'.

3 The Guidelines can be interpreted normatively as the implementation of the Regional Law 11/2005 (see: art. 3, comma 3, punto d), which defines the SUM as the fundamental tool for reducing urban seismic vulnerability. This goal must be realized through both the "levels" in which the Urban plan is articulated ("PRG - parte strutturale", and "PRG - parte operativa"), and also through the other planning tools (e.g. sectoral plans). The Guidelines are intended to help Public Administrations at local level to actually reach this goal.

(that is to say, socio-economic and relational), after a seismic event'. It can be imagined as a sort of 'reduction' of the urban structure into its prime and fundamental components.

The SUM constitutes the essential system for keeping the urban structure alive and active, also if and when collateral events, or side-effects, occur (such as fires, explosions, landslides, floods, etc.).

The very definition of SUM implies that it cannot include any secondary or subsidiary element: but just what is strictly necessary, so that the loss of one of its components puts the whole urban structure at risk.

The SUM has been conceived and defined as both an analytical and a normative tool: it sets out what can be expected from the urban structure in case of a seismic event or because of another kind of 'natural' catastrophe, but it can be changed, considering the planned and the on-going urban transformations, with the aim of increasing its functionality. In this sense, its content is normative and anticipatory.

This paper is a first reflection on the experience which has been gained, aiming at opening a broader perspective on the relationship between 'extraordinary policies' dedicated to safety and emergency at urban level, and ordinary urban policies.

What we wish to clarify here, is that through relating the issue of risk and seismic prevention to the city, and particularly through the concept of SUM and its site-specific definition (considering the results of the different case-studies in which we already applied this concept and method), it is possible to talk about public space, urban policies and the city in a new perspective.

When talking here about the 'public city' and its space, we intend this to represent the place where different meanings and values concentrate, belonging to different 'domains': functional, relational, that of identity, and also that of 'safety' (Watson, 2008).

The starting point of our reflection is that, if it is true that a recovery of the importance of the 'public' dimension (public and collective spaces and functions) always follows a 'natural' catastrophes, this understanding, which emerged due to the tremendous and even tragic experiences that Italy has had, should be used to re-assessing, and also to 're-orienting', ordinary urban policies, and to give new attention to the collective and public domain, and particularly to public space.

In our view, while the 'public city' and public action are at stake for their capacity to respond to the needs of security and safety, after an environmental disaster particularly, their rediscovered importance can lead to a new attention to the public and collective city in more general terms.

## B. The problem: the low level of importance attributed to public space in urban transformation processes / some unsolved questions in dealing with public space in Italy

Our argumentation about the public city and the public space, in its relation to dealing with seismic risk, starts from some problems that often emerge in the debate as "shared understandings".

Many territorial transformations in Italy happened through individual initiatives, often not arising from planned or shared decisions: the number of 'variants' from what was initially planned, particularly at Regulatory Plan level, is rather astonishing, while other transformations are illegal. It can be said that it is not the Public actor, nor the 'public space', which generates and or guides spatial transformations at urban scale.

We may say that the same 'one-by-one' approach often characterizes public intervention in Italy: until now, public policies have been not able to overcome the emergency approach and the logic which sustained it (see Box 1). From a planning perspective, prevention policies and actions for the so-called 'natural disasters' have been mostly lacking.

While discussing the characteristics of the public space, no attention is paid to the features it should have in order to positively respond to seismic or natural risks, and the general perception of what constitutes the public space does not take into account the topic of environmental safety and only in the past decade has some attention been given to "social safety" - and environmental safety is not considered as part of its fundamental quality.

The big gap between the high level of environmental risk and the high recurrence of environmental disasters (mainly earthquakes, landslides, floods) in Italy, and the lack of public policies and action addressed to *prevention*, is almost paradoxical.

Nor are ordinary planning policies aimed at territorial care, which would represent a major improvement in Public action, in its efficacy and cost-efficiency.

But, notwithstanding the idea of a diffuse and general distrust in the Public authority as a weak actor, it is precisely the Public which is advocated after any kind of 'natural' catastrophes. In our view, this contradiction represents a chance to better understand what "the Public" is expected to be, and what Public action is expected to do, which means also, what the Public and public action *can* actually be.

Looking at practices, and at the actions which are actually performed, it emerges that territorial care is not a primary issue in policy agendas, to be fulfilled through a strong commitment from the part of both the Public and private citizens. This inevitably had a strong territorial impact, also from an economic point of view. But these considerations need to be better articulated and also differentiated in the different regional contexts.

In fact, for example, the Umbria region sustains a policy of prevention from territorial disasters since long. This is thanks to some Regional Laws, and particularly through the Regional Law 11/2005 which prescribes that prevention objectives, as well as the seismic risk reduction interventions, have to be included within urban plans (both at structural and operational levels, according to the regional planning legislation). These aims should be reached also through the implementation of sectoral plans and programmes. The general aim is clearly to render actions of territorial care, of prevention and risk reduction, as part of the ordinary process of territorial planning and management.

Even if planning in itself cannot be considered as the guarantee of implementation of declared goals, it must be considered that Umbria Region fulfilled these objectives through an articulated and integrated policy addressed to increase territorial sustainability, where urban planning is a tool among many others.

Within the Guidelines mentioned above, it is the collective, and the public space, intended as the system of squares and green spaces, playgrounds and emergency areas, together with the network of streets and pathways, which assumes the role of main physical and functional structure, the back-bone which constitute the SUM.

It is the public space that connects those urban functions which are of vital importance during the post-seismic emergency. From it mostly depends the rapidity of intervention of public officials after an event, managing the

emergency and also organizing the re-start of urban activities; it assures the relationship among the different part of the city, provides reference points, escape routes and safety spaces. But the same space provides relational spaces, places for meeting and exchange where a community recognizes itself, generating a sense of belonging and of identity. After a catastrophic event it assumes a particular and fundamental meaning for the re-start of urban life and activities.

The citizens' interest in Public space is mainly related to its functional and representational role within the city; sometimes it demonstrates an aesthetic sensitivity; more recently it can be addressed to social safety, but usually its relationships with risk reduction and safety from environmental risk are missed. Moreover, we think that despite the globalization discourse, a relationship between a place and a community still exists and has a profound sense, re-emerging particularly after catastrophic events.

Overcoming an "ideological" conception of the Public and the public space, we can come to a renewed understanding of what they actually are, looking at their behaviour as well as at the reaction capacity of different towns and territories in different contexts after a seismic event.

## C. Our approach: changing perspective. Making use of the topic of risk for analysing and re-defining the 'publilc city' and the public space

Our approach tries to reverse the perspective in looking at the relationship between public space and environmental safety. If we look at the actual conditions of Italian cities, and particularly those which have been struck by an earthquake, we may say that the topic of safety, and particularly that of risk prevention, did not lead to acceptable outcomes, and that the public space together with the very concept of the Public, is subjected to an increasing erosion. This same Public actor sometimes contributes to this process[4].

4 As an example, it is quite significant that one of the fundamental decisions that has been taken after the earthquake in L'Aquila (which consisted in providing individual houses away from their original locations, whose settlement scheme ignores the community structure) erase the very concept of "public space". We must say also that only a couple of years later, the case of Emilia Romagna demonstrated a rather different approach.

In focusing on the public space in its meaning for environmental safety (which is or should be one of its fundamental meanings) we point out its criticalities.
In order to do that, we think it is necessary to overcome ideological positions as well as abstractions, and to refer to those practices which actually developed after a 'natural disaster' such as an earthquake. These practices can change perceptibly (as they changed, in fact) in different geographical contexts and in different times. They differ for their approach and their timing (how the different phases of emergency and post-seismic re-start, in the short and mid-long terms, have been managed). Anyway, what we want to establish is that the two topics of environmental safety and risk reduction at urban scale, and that of the Public City, have to be programmatically associated in order to reach more satisfying results.
Italy has always been subjected to recurrent catastrophic events, such as landslides, flows, earthquakes, etc. These events always determine a change, sometimes a radical one, in the way the settlement, and the public space in particular, is collectively perceived. In most cases, each person's home and living environment changes from the most familiar and safe place into something recognized as insecure and even dangerous. This change is a shared feeling, so that the concept of 'Landscape of fear' has been introduced (Tuan 1979).
The collective and the public dimension became central again because the fear for these events is experienced collectively, and because the Public actor, notwithstanding its increasing weakness, is still expected to give help and to find and provide solutions in these situations.
This is true, even if with some particularities, in all socio-cultural contexts. We may say that there is a re-discovery of both the collective dimension and of a Public dimension, and that the two spheres, which in other situations seem to proceed in different directions, here are still linked together.
After a catastrophic event a new need of being together, to help and to sustain each other emerges, maybe in a way never experienced before.
In these events, the importance of Public space emerges and is recognized rather instantly and in a very spontaneous way by all the people involved.
Everyone runs away down in the street, looking for an open place to be safe, where first aid and help can be then provided, and trying to meet and to stay together, to give help to others too.

In this sense, it is clear that what is newly discovered is not just the importance of public spaces for safety, but much more what we refer to as a public and a collective 'dimension', where the 'sense of community' is rooted.

After the experience of post WWII reconstruction, a well known example of collective engagement is what happened after the flood of Florence in 1966. On that occasion, volunteers from all over the world offered their help in many different ways, for saving what was (is) perceived as a common patrimony. As we can derive from direct accounts and evidence, such as documentaries, what happened there was hardly imaginable in ordinary conditions.

The earthquake which destroyed Friuli (a region in the North-East of Italy) in 1976 showed how a catastrophic event can draw the attention to the importance of the collective and the public dimension. The reaction to the earthquake's destruction consisted in an increase of the participation of the inhabitants and local authorities toward common goals. They were all deeply engaged in reconstructing not just each one's home, but their whole built environment as well, with historical centres and public and collective spaces and functions, considered for their historic and identity value. Their experience was quoted as an example for years, and was also instrumentally used as a comparison with different experiences (such as that following the strong earthquake of Irpinia in 1980), to feed the political discourse on the weak role of the Public (the State) in the Southern regions of Italy.

Among the case-studies carried out by our research group, that of Nocera Umbria (a small-mid size historical centre in the Umbria Region), which we worked on after the seismic event of 1997, is of particular importance. In fact, it can demonstrate two related issues: the re-discovery of the collective dimension, and the sense of belonging to a particular place, which is the town centre with its system of public spaces and functions, which emerged after the whole town centre was declared as fully inaccessible for public safety reasons (as happened also in L'Aquila, after the earthquake of 2009).

In the most recent case of L'Aquila, in fact, the whole town centre was closed, and its inhabitants have been forced to move away, sometimes to different towns. The inhabitants have been deprived of their homes, but also of their main public space (which in this case was represented by the city centre as a whole), almost the only place where it was possible to find high quality public spaces, and where all public and collective functions were

located. Because of the particular form of territorialization, a lot of neighbourhoods and smaller towns in the surrounding areas, lived their collective life in the city centre of L'Aquila. This means that its closure slowed down or even blocked the re-start of urban activities and of the whole urban life of almost an entire province. It is possible to say that this case demonstrated the strict relationship between space and society, from the most theoretical to the more actual point of view.

The convergence towards common intentions and goals, and the related reduction of conflicts during a post-catastrophic time which is demonstrated through the experience of many towns and regions throughout Italy, have also a theoretical basis. In 1967 Catherine Bauer Wurster observed that post-war time was characterized by an unusual convergence toward a common goal, that of reconstruction, which became the undisputed priority – a condition which was hard to imagine in different times. This can be related to the wider issue of the Public choice, of how Public choices are formed and taken, and how the democratic deliberative process works. A fundamental reference is Arrow, and his "General Possibility Theorem", also known as "Arrow's impossibility theorem". The theorem states that, in case of non-restrictive (or non-dictatorship) conditions, it is impossible to obtain a stable outcome from the preferences expressed by the majority (the so-called "voting paradox"). What Bauer Wurster pointed out can be related to that theorem, observing that emergency conditions can be interpreted as an example of Arrow's "restrictive condition", as experiences actually demonstrated. In the Bauer Wurster discourse, attention seemed to be focused particularly on efficiency: the temporal gap between choice and action is much less than in ordinary conditions.

A review of the Italian history of "natural disasters" in a public choice perspective is very interesting, since Italy is negatively known for its use of "emergency policies". What results is that, in a country with no strong political agency, nor a well-recognized political-institutional authority, and where there is no clear distinction between "technical" and "political" decisions or, better said, where technical decisions are subordinated to short-term political-administrative mandate, emergency situations, notwithstanding their controversial nature, have been often an important causal force and justification for public action to be actually implemented.

In this sense, we can say that the constant call for overcoming the "logic of emergency" can be assumed as the demonstration of the distance between political discourses and governmental action.
There is a high risk of democratic weakening in considering interests and values, both of a community and of its individuals, when subjected to the higher necessity imposed by an emergency, and we just mention that the use of emergency as a main justification of public choice and as a political tool tends to maintain the present political order. (For the relationship between democracy and emergency power see: Dryzek, Honing and Phillips, 2008; Pasquino and Ferejohn, 2004; Benigno and Scuccimarra, 2007; European Commission for Democracy through Law - Venice Commission – 1995. See also: Foucault, 2004, Swyngedouw, 2011). We cannot deepen further this debate here: what we can do is to notice that even the policies and the experiential background developed in managing post-catastrophic phases remain largely ignored and are not (even critically) reviewed for subsequent emergencies. As an example, we can refer to some laws which have been introduced for managing the reconstruction process (see Boxes 1 and 3), and which have been positively judged for their potential efficacy, which remained rather unobserved and then, after a new event, replaced with new ones, without ever being fully implemented. In our view, this is enough to demonstrate the unwillingness to turn emergency policies into ordinary governing practices.
Anyway, a low effectiveness is the general assessment of policies and actions addressed to seismic prevention and management. Now, we consider this evaluation together with an assessment of the actual conditions of the physical public space in its quantity - which means also its distribution and localization within the town; and its quality - which means also configuration and functionality. To treat the two questions together is a necessity, considering the potential role of the public space for facing the problems of environmental risk.

## D. Our argumentation. Reflecting on case studies and field experiences

Assuming the SUM (mainly composed by public or collective spaces and

functions) for treating the problem of urban safety, it will become the tool for re-organizing the settlement in the emergency phase, in the post-seismic reconstruction, for the re-start of urban activities, and also to create better towns.
We propose a reconsideration of public space as a system of places, spaces and functions which have different meanings and potentialities:

1. For an efficient response to a catastrophic event (starting from the emergency phase);
2. For providing the community with a common ground for re-constructing their living environment and their identity in the post-emergency phase;
3. For increasing the urban quality and assuring a more efficient urban structure (through the SUM) also in ordinary conditions.

To be brief, we wonder why attention is only given to Public actions and public space when responding to emergency needs, and not to recognise that such attention would produce better and more resilient cities in everyday life, improving the public sphere.
In our field experiences (small and mid size towns in the Umbria Region), our primary goal was that of contributing to reducing urban vulnerability through the use of a planning approach and tools, and mainly through the development and the testing of the concept of SUM together with vulnerability assessment methods.
Now we propose to use the needs and imperatives related to safety to pay new attention to the Public city and to consider the two issues in their reciprocal relationships.
We will reassess what we learnt from our cases in this different perspective, starting from two of them which have been struck by earthquakes and which had to actually face emergency and post-emergency management.

In the case of *Vallo di Nera* the earthquake happened in 1979, while our activity started in 2009: 30 years after the event, so that we had to refer also to indirect sources.
Vallo di Nera is a small town in the Val Nerina, a river-valley in the South-West of Umbria. It is composed of two separate parts: the historical centre at

the top of a hill, which maintained its medieval structure, and a sort of suburb in the valley, also of ancient origin, named Piedipaterno. When our research started, the post-seismic reconstruction was fully completed, so we could see the results of post-seismic plans and policies. The planning tool which was adopted was a 'Piano di recupero', a plan addressed mainly to restoration. The results of the post-seismic plan and policies consisted in the restoration of all the buildings (now used mostly as holiday homes) and a widespread change toward residential use, while all urban functions (Town Hall, school, post-office, and a few commercial, leisure and touristic facilities) moved out, mainly to the suburb of Piedipaterno. The main goal was the conservation of the historical centre as a whole, also because of its landscape value, and as a mark of territorial identity.

We defined the SUM according to the urban structure: it is composed of two main parts, connected by a road. From this case particularly derived a specific attention to questions of dimension and scale as related to the concept of SUM. More specifically, examining the case of Vallo di Nera where all the public and the strategic functions are outside the historical centre, to be able to define a 'minimal' dimension of the urban structure it is necessary to look at a broader territory, extending beyond the urban scale[5]. This means that to be able to use the SUM as a tool for seismic risk prevention, it could be necessary to change the scale, from the historic centre to the whole settlement, or even to a larger territory. Some questions arise: Is there a 'minimum' and a 'maximum' in the dimension of a town so that the SUM can be defined and usefully used without losing its very sense and meaning? Which are the operational and theoretical implications of this change? It is possible (how and why) to think of the SUM in some kind of multi-scalar perspective?

It is clear that these considerations have some important consequences on the articulation and the organization of public spaces, and on the relationship

5 In a first phase of our research, and precisely in the case of Nocera Umbra, we adopted a sort of double-scale for the definition of the SUM, so that we had a SUM defined at the town-scale, and another one defined at the territorial scale (STM, from the Italian "Struttura territoriale minima"). They were obviously related, but were defined through a so-called "telescopic" approach (a very simplistic one, where one scale is imagined to be part of the other, as a magnification - or the other way round). Differently, from the case of Vallo di Nera it emerges that sometimes the SUM cannot but be defined at the territorial scale.

between public spaces and the whole town.
Certainly we can say that the urban complexity corresponds to a complexity of the urban structure and particularly of the SUM, and that, to be a useful technique and tool, the Sum must be defined and designed considering different scales.
Another important result of our reflection on this case study is that the private space can contribute in the maintenance of a town centre only partially, while it is not able to keep it alive, maintaining its very "urban" role. The historical centre of Vallo di Nera, mainly constituted by private properties and residential functions, was the object of protection and conservation policies that determined the restoration of the built environment for its historical, architectural and landscape values, but its capacity to provide what we define as a "urban answer" to the seismic or natural risk is low. It is part of the Sum only for its historical and identity values, causing important implications at a different (larger) scale. In such a case, the fundamental difference between the reduction of vulnerability at the building scale and that at an urban scale becomes much clearer. This difference, in fact, rather than being considered as a question of approaches, methods and tools, is related to the very 'matter' it is expected to treat. In the first case, its object are the buildings, which, in some sense can be considered as "containers"; in the second case the object is even more than the whole "settlement", it is the city, which implies that the attention shifts (also) to the "content": to the complexity of urban functions, their localizations and their relational system, to the local community and society.

*Figure 2 – Vallo di Nera - frazione di Piedipaterno*

*Figure 1 – Vallo di Nera*

The case of *Nocera Umbra* represented a privileged field of research on the urban response to a seismic event. The medium-size settlement, whose centre is located on the top of an hill along the Via Flaminia, was struck by the earthquake of 1997. Because of that, the whole historical centre, where all the urban and public functions were localized, and where all the public and collective relations took place, was declared inaccessible and then closed for security reasons. This decision, which has been accepted in the emergency phase, was afterwards strongly criticized. In this way, the town was deprived of its main chance to collectively respond to the seismic event. The closure of the historical centre lasted years, and the related reconstruction process started very slowly some years after the event, affecting the restart of urban activities. When our research project started, the historical centre was largely as it was immediately after the earthquake: this permitted us to better understand the seismic effects, both at building and urban scale, and to be able to follow the process of re-organization of urban life in emergency and post-emergency conditions. This has been possible through the siting of all public and collective functions in

temporary structures outside the historical centre. It was an efficient solution, but it caused a sense of impermanency, disorientation and uprooting to the inhabitants, who lost their spatial and relational references.
A comparative analysis of these two cases, in which the historical centre which had been the public space *par excellence* but lost its potential role in the post-seismic urban reconstruction process, can be of major interest.
In the case of Vallo di Nera, the reconstruction of the built environment shows that interventions in order to make it safe represent only a partial solution, not completely satisfactory, if they do not bring about the restart of public and collective functions, and or a shared re-definition of the whole urban system and of its functioning, if necessary at a different scale.
Nocera Umbra represents a different, even an opposite case: the displacement of all the public functions and activities outside the historical centre, where they formerly were concentrated, together with most of collective values, determined a profound change in the organization as well as in the very perception of what the town is, showing its weakness, and the necessity to have towns more capable to adapt themselves to rapid or unexpected changes. From these cases we may argue that an urban structure with diffused or, to be more precise, some kind of polycentric organization of public spaces and functions could be much resilient than other functional models, while the complete relocation of those same spaces and functions outside the historical centre risks the destruction of its fundamental content, which is that of a public and communal space. This is a solution which can have sense in a very narrow civil protection perspective, but cannot be considered as a urban planning solution.
As to the other four case studies, our reflections derive essentially from what we learnt from defining and designing the SUM in different contexts.

*Montone* has a small and rather simple urban structure. It consists of a top-hill historical centre, surrounded by walls, and with some small residential and rural settlements, most of them of historical value too, distributed along the road system at territorial scale. A rather important industrial suburb is positioned at one of the main cross-roads.
The most important urban functions (commercial and public or collective

facilities), face the main square or the main urban streets. Some major buildings of public or collective importance (e.g.: former religious buildings whose use have been changed though the time), are localized on the inner side of the town walls. Accessibility from the outside is rather low, inner distribution and mobility is also reduced to pedestrian pathways. Furthermore, these pathways are strictly related, and also strongly subjected, to the very structure of the settlement and of the buildings which surrounded them, determining their physical characters, in quantitative/dimensional and qualitative terms. Their width is very narrow, their course is mostly irregular, there are many vaulted passages and underpasses, and their slope is often steep with stairs. Access for cars is limited to small areas around the town gates, where there are also the few car parking spaces.
More recent suburbs are generally similar to the historical centre from a quantitative and dimensional point of view, and they are adjacent to it.
The SUM for Montone covers its historical centre, because it is there that all the public spaces and functions are localized. It also includes the roads which connect with the civil protection structure near Perugia, determining a shift from the local to the territorial scale. The functioning of the SUM in this case is very much conditioned by the extremely low accessibility and by the few strategic urban functions.

*Amelia* is a middle size historical town, surrounded by huge walls of high historical value. There is a first suburb (from a temporal point of view, but also in terms of importance) which developed in direct connection with the historical centre, and many further expansions, while most of urban functions and spaces are located within and near the historical centre, as well as along the main roads. The industrial areas are peripheral to the town.
The SUM is composed of a main road which represents the basic and strategic connection of the historical centre to its broad territory and, conversely, the main access to the town centre from the outside. There are just a few accesses to the historical centre, through gates. The car mobility within the historical centre is limited to a double pathway which connects strategic buildings and spaces: the Town Hall, the hospital and a couple of schools. From it starts a network of smaller pathways whose width is narrow

or very narrow, while their routes are mostly irregular and characterized by steps, slopes and also built obstacles, sometimes with "cul-de-sac" endings.
The morphology of the historical centre determines also the particular character of the system of open spaces (yards and small green fields, used as collective or private gardens), which have a low accessibility, and an irregular morphology. There is only one open space which can be considered as a safe space in a risk mitigation perspective, between the Town Hall and the hospital. It is used for car parking, so it lost also its relational role in the 'ordinary' or daily conditions.
Outside the historical centre, streets and open spaces seem to have a more clear structure and functioning, and a kind of recognizable hierarchy. There are some strategic buildings and functions (such as the armed forces, health services and facilities, schools). In a strictly risk reduction perspective, a more positive general assessment could be given, due first of all to the flat and more regular morphology of the area, and also to the more recent origin of the buildings. From a different point of view, that is to say considering together risk reduction, resilience, and ordinary life quality, this configuration does not represent a satisfactory answer to the urban complex needs. First of all, it does not relate the strategic buildings reciprocally. Moreover, considering that the external suburbs are mostly residential, it does not provide public or collective spaces. These are just two among many criticalities. For these reasons, it is the historical centre which (as very often in Italy), represents the main component of the SUM. It is there that most of the meanings (from a functional, historical and artistic point of view, as well as relational and symbolical) are concentrated. It is the place where the double objective of risk reduction through a planning approach, considering together the emergency and the restart of ordinary activities and the reconstruction of ordinary conditions, can be pursued. But the problem of the particular configuration of the historical centre remains, and so the structure of Amelia was regarded as rather critical.
This means that some steps have to be made in order to have it safer, considering that the actual chances to transform and to have safer public spaces within the historic centre are rather low; that the areas outside the historic centre are not always easily accessible; often they are not in strict relation with strategic buildings, and do not connect the strategic buildings

together, so that they do not constitute a 'system'. Moreover, outside the historical centre there are no public spaces in proper terms, but mostly semi-private spaces. All these considerations make clear that there is a fundamental 'rigidity' (as an antonym of resilience) in the SUM of Amelia, which imposes some changes to improve the resilience of the town in risk reduction perspective, and in ordinary life perspective. The system of public buildings and function should be directly connected to that of public spaces and pathways, and possibly they should belong to the same rank. Were it impossible to have these connections guaranteed, it should be necessary to consider relocating some functions, starting from the most strategic ones in terms of emergency, in order to have them directly related to the system of safe spaces and pathways.

It is important to notice that this option should be explored in all its potential implications. In fact, it could empty the historic centres of their high-ranking functions, with results that would be similar to other case-studies presented here (e.g.: Vallo di Nera, and Montone).

A good example, in the case of Amelia, is that of the location of the new Hospital. This will open outside the historical centre, directly connected to the mobility system at territorial level. This solution is important because it does not respond only to risk reduction imperatives, but it has been taken (and considered as relevant) also in a broader planning perspective.

*Figure 3 – Amelia*

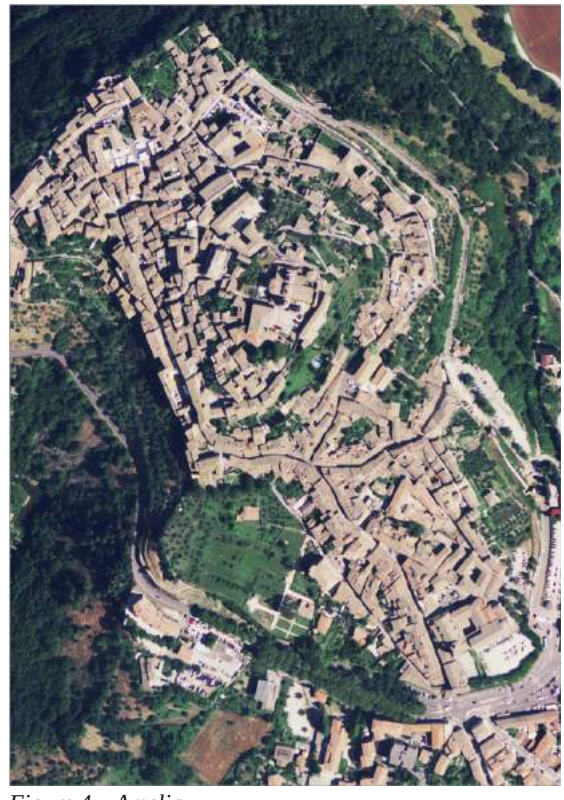


*Figure 4 – Amelia*

*Città di Castello* and *Gubbio* are the more complex among our case-studies, in dimensional, structural and functional terms. A last step in our argumentation will be made through these two examples.

*Città di Castello* has a quasi-linear structure, which developed from a valley floor route. It is possible to distinguish three main parts of the settlement: the historical centre, the residential expansions, and the industrial expansion. About the historical centre, its ancient morphology is still very clear. It is surrounded by walls, and outside we find a system of avenues which work as ring roads and broad green spaces. Because of these characteristics, it is possible to clearly distinguish the settlement's expansion.
Going east, there are the main residential suburbs, rather heterogeneous from a morphological, typological and street-plot point of view. Their

connections with the historical centre are strongly influenced by an old, unused, railroad (the 'Ferrovia centrale umbra'). The mobility system has a primary and strategic role within the SUM of Città di Castello.
Most of the public functions are inside the historical centre, including cultural and leisure activities, as well as commercial and productive activities, and many inhabitants. It is there that we find most of the collective values in terms of relational and symbolical meanings. Because there are some important functions outside the historical centre too, the efficiency of the road-system in connecting the different parts of the settlement is fundamental in a risk reduction perspective. In the outer part of the settlement, there are the major green areas such as parks and gardens, but also rural areas and lawns, which are of fundamental importance from a civil protection point of view. But because the entire historic centre is a fundamental part of the SUM the open spaces around the town walls are of strategic importance: in fact, they can be used as safe spaces during or immediately after an emergency.

*Gubbio* has a broad historical centre, surrounded by walls, with most of the urban functions (Town Hall, Sanitary services and facilities, Armed Forces, Schools, Religious and cultural structures, accommodation facilities and commercial activities…). Most of the suburbs outside the town centre are residential, with some public or collective functions and spaces heterogeneously distributed. The complexity and articulation of the urban structure considered as a whole, as well as the diffusion of functions throughout the whole territory was at the base of the definition of the SUM of Gubbio.
The SUM here is structured on two main strategic connections belonging to two different levels or scales: the first one provides connections at territorial level; the second one provides access to the historical centre, and connections at urban level.
The system of open spaces and pathways is articulated into two parts: the inner part and the outer part of the historical centre. Within the historical centre we find many public spaces, but because of their average size and the presence of buildings with a high vulnerability level, the system as a whole cannot be considered as safe. However, just outside the town walls, we find public open space with high potentialities in terms of environmental safety.

In these two last cases of Città di Castello and Gubbio, we had more complex and articulated urban structures, with productive functions which are of primary importance for the maintenance of urban life, and for its re-start in case of an environmental disaster. Public and collective spaces and functions are more diffuse, and even if also in these cases public collective functions and meanings are predominant in the historical centres, both the SUMs result more balanced than the other cases presented here.

*Figure 5 – Gubbio*

## Conclusions

### What we can learn through the SUM and its relationship with public space: Functionality, Identity, Safety

Going back to the aim of this paper, which was to assess the possibility of using the imperatives of environmental risk reduction to rethink urban structures and their transformation processes, to give new impulse and importance to the 'Public City' and to re-construct the public sphere, we may say that the six case-studies presented here permit us to draw some conclusions. We learnt many things about the role of public spaces in case of a seismic event, but also for the ordinary functioning of a town. Generally speaking, to say that a town which has a good functioning in ordinary conditions can provide also a better reaction in case of a disaster sounds obvious, but looking at the history of natural catastrophes in Italy demonstrates that it could be worth reaffirming. The concept of resilience, which is assuming a central position in planning debates, can help in understanding these phenomena. Each space and each function should be able to answer to changing needs and to changing conditions.
We may say that a public space, both in 'ordinary' conditions and in case of an environmental emergency such as an earthquake, could have three fundamental requisites, related to functionality, identity and safety. From the case-studies we analysed, we can say that we rarely find these three requisites simultaneously.

Our case-studies show that it is often the historical centre which include the most important urban functions and provides relational spaces. It tends also to represent the entire town, becoming the public space par excellence. But its vulnerability, related to its age and conservation conditions, is often high. Diversely, urban expansions and suburbs, which are generally more safe, are characterized by a minor complexity: they provide a lower number of public and collective functions, they are often weaker also from a relational point of view, and so, generally speaking, they are said to have a weaker "identity".
The main problem which emerges from our reflections can be presented as a tension between two opposite and extreme situations, which can be co-present:

- The historic centre is still the predominant part of the town, including most of the functions, as well as historic and socio-cultural values. But it has a high vulnerability because of the general conditions of its buildings, and the actual chances to improve the safety level are subjected to many practical and theoretical difficulties and criticalities.
- Outer expansions and suburbs, of more recent origins, are generally less vulnerable and more safe, but they often have fewer public spaces, and even fewer with high urban and relational quality, so that they are often subordinated to the historical centre considering both the facilities, and the way of using and living the town.

With respect to the trinomial of functionality, identity and safety mentioned before, emerges the problem of finding safe public spaces within the historic centre (which is a problem related mainly to emergency), and that of finding public spaces with higher level of functionality and identity outside the historical centre (which is a problem related mainly to the re-start and or the maintenance of ordinary urban activities in post-emergency phases).

In the recent history of the earthquakes which struck Italy, this led to unbalanced management decisions and situations; to the inhabitants, the loss of their historic centre (as in Nocera Umbra, but also in L'Aquila, after the earthquake of 2009) provoked a sense of displacement and impermanency. Because of that, it seems more difficult even to re-start the activities in the outer part of the town, which means that there is still a strong predominance of the historic centre on the settlement considered as a whole. This inevitably corresponds to a rather rigid urban structure, a structure with a low resilience, which strongly influenced the capacity to change spatial and functional organization (also for reasons which can be other than just those of risk reduction – e.g. socio-economical). This unbalance means that, in case of a seismic event, it is not just the historical centre which loses its functionality, but the entire town.

Cases such as Amelia and Montone, where the SUM is particularly unbalanced towards an historical centre with a high vulnerability level, show that it is necessary to progressively change the functioning of the town, the way the people use it – since it is impossible for a local administration to provide interventions for vulnerability reduction for all the buildings. From one side, it seems that improving a diffusion of functions and spaces could

represent a solution. From the other side, moving all the main urban functions out of the historical centre risks completely emptying it, in its meaning of 'public space'.

We think that the topic of environmental risk stresses urban and territorial planning from many different points of view, and toward many different research directions. The centrality that the concept of resilience is recently assuming is a sign of this interest. We briefly mentioned the highly problematic relationship between emergency and deliberative processes, which is surely worth developing. The influence that emergency policies related to territorial management have had in Italy is under-investigated, as is also an in-depth assessment of their costs.

As to the specific issue of the risk reduction at urban level through a planning approach, the reflections which followed the case-studies analysis, bring us to understand some issues which need to be further explored, such as:

1. The concept of redundancy and the role which it could play for urban risk prevention and mitigation. (We already introduced the concept of redundancy within our research experiences: some results are shown in the case-studies boxes);
2. The relationship between the concept of redundancy (intended as "something more than the minimal requirements") and that of SUM as we conceived and presented it here;
3. The problem of scale and of the dimensions of a settlement, as related to resilience and environmental safety, and the question of a 'minimum' (and 'maximum') dimension of the settlement and the related SUM.
4. The governance of environmental emergencies, and particularly the relationship between the State (also through the Civil Protection Service), and the local administrations, which can be articulated into two directions: inconsistency between the management of recent emergencies and the process of devolution and decentralization power which is highly claimed; and the relationship between Civil protection plans and urban planning.

## CASE STUDY OF NOCERA UMBRA

Adriana De Rosa _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Nocera Umbra (Perugia Province) |
| *Population* | 6.175 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Nocera Umbra is a middle-size settlement located along the SS 3 - Via Flaminia, at the eastern edge of the province of Perugia, near to the Marche region. Its town centre is on the top of an hill. The territorial system is characterized by a predominant linear conformation of the settlement and its mobility system, which is due to the particular shape of the valley. The historic centre is characterized by the concentration of all public functions and spaces, together with all the historical, cultural, architectonic and identity values.

*Main critical issues of the Strategic Urban Structure*

SUM (main character):
- Concentration of functions and public spaces within the historical centre

Post-seismic solutions:
- Public functions relocated outside in temporary
- Closure for security reasons
- Change the use of the city: lacks flexibility in response to catastrophic events.

Nocera Umbra, as well as the town of Vallo di Nera, having direct experience of an earthquake (1997), provides an example of the need for redundancy for risk prevention and mitigation, and for providing flexibility and adaptability to the town.

After the earthquake of 1997, the whole historical centre where all the urban and public functions were localized, and where all the public and collective relations took place, was closed for security reasons. The closure lasted many years, and all public functions were moved outside (in temporary structures), demonstrating of the lack of adaptability to the "unexpected" event and, more particularly, of the total "un-balance" of the public city that was concentrated in the town centre. The comparison of this case to smaller and larger ones allows consideration about the problem of historic centres containing all public functions, highlighting the importance of articulating and differentiating spaces and functions, as regards to type and location, both for the emergency response, and for the recovery, but also in an "ordinary" planning perspective.

## CASE STUDY OF MONTONE

Maria Sole Benigni _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Montone (Perugia Province) |
| *Population* | 1.675 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Montone is a small town in the North Tiber Valley with a relatively small and simple urban and territorial structure. The urban structure is gathered around a small-sized historical centre surrounded by walls, on top of a hill; along the main territorial road system there are several residential and rural areas, and a significant industrial / manufacturing area. Public functions, services and activities are all placed around the historical centre, where accessibility is limited and reduced. Most of the "Strategic urban structure" (SUM) corresponds to the historical centre, therefore it is quite rigid.

*Main critical issues of the Strategic Urban Structure*

- Lack of public spaces, especially outside the old town walls;
- Need better balancing of the public spaces system, connecting and giving functionality to the external open public spaces, in order to deal with various emergencies;
- Lack of redundancy concerning the territorial connections between the centre and the manufacturing area, and lack of accessibility to this zone.

It is recommended to set a structured and differentiated network of public spaces and functions in order to improve the balance of the urban structure and to facilitate the identification of redundancy's elements, which are of fundamental importance for the SUM.

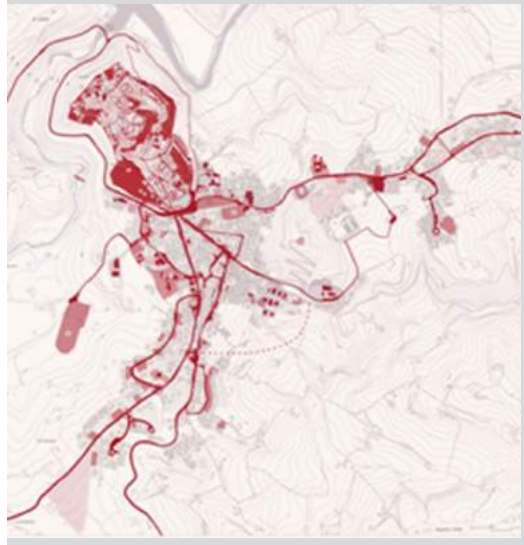
## CASE STUDY OF AMELIA

Maria Sole Benigni _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Amelia (Perugia Province) |
| *Population* | 12.000 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Amelia is structured around a middle-size historical centre surrounded by walls, around which we find its former urban growth, while further expansions (residential and industrial /manufacturing) developed along the main roads. In the town centre are located the most relevant public functions and services, with the exception of some open public spaces which are outside the walls, and some public facilities (health and education). The "Strategic urban structure" is organised around a main and strategic connection route, linking the territorial context with the town centre. Even if some



*Main critical issues of the Strategic Urban Structure*

The SUM is particularly rigid and critical because of:
- The concentration of urban functions inside the old town, and the unsafe accessibility system through gates;
- Lack of open public spaces inside the old town (where there are only private spaces);
- Weakness of accessibility and connections between the main strategic roads outside the historical centre.

The lack of redundancy in the mobility and accessibility system, highlights the need to re-organize the system of public functions and spaces relocating some of them outside the ancient walls. This should be done in order to increase connections between strategic buildings, spaces and paths, improving the urban functioning in ordinary conditions as well as in during an emergency.

## CASE STUDY OF VALLO DI NERA

Adriana De Rosa _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Vallo di Nera (Perugia Province) |
| *Population* | 428 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Vallo di Nera is a small town in the Valnerina (a river-valley in the South-West of Umbria). It is composed of two separate parts: the historical centre at the top of a hill, which maintained its medieval structure (it appears as a fortress, entirely surrounded by walls and towers, built on a hill on the left side of the river Nera); and a sort of suburb in the valley, named Piedipaterno, where all the main urban functions are located, in more direct connection with territorial infrastuctures. After the public functions moved outside, the town centre turned toward monofunctional use, which is residential. This leads to a bipolar structure. Therefore, to define the Strategic urban structure it is necessary to look at a broader territory, going beyond the urban scale. The earthquake in Vallo di Nera happened in 1979, while our research dated from 2009: 30 years after the event. When our research started, the post-seismic reconstruction was completed, so we could see the results of post-seismic plans and policies. The main goal was the conservation of the historical centre as a whole, also because of its landscape value, and as a mark of territorial identity. Despite the fact that this structure is rather problematic for the everyday life of the few inhabitants, it has been adopted for a more efficient response to the earthquake.

*Main critical issues of the Strategic Urban Structure*

- Relocation of public functions and development of commercial activity in the valley;
- Increasing the capacity of the bipolar structure to respond to the earthquake;
- The bipolar system is structured on a main and single connection, which has no redundancy;
- The basic dimension of the 'urban structure' is necessarily the territory.

*Starting from the identification of weaknesses of the SUM in different contexts, it is possible to identify those characters (and, possibly, those actions) required in order to increase its efficiency.*
*Urban structures are examined in relation to their "propensity to flexibility", in relation to environmental catastrophes but also to ordinary conditions.*

## CASE STUDY OF CITTA' DI CASTELLO

Flavia De Girolamo _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Città di Castello (Perugia Province) |
| *Population* | 40.000 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Città di Castello is a middle-size town in the Tiber Valley. By analyzing its whole urban structure, it can be noticed that the historic centre has a decentralized position. The historic centre is well preserved and surrounded by boulevards following the ancient city-walls. The business districts developed towards North. To the East of the old town we find the main residential areas, characterized by lack of homogeneity and of morphological relationship with the historic centre.

*Main critical issues of the Strategic Urban Structure*

- The main territorial and urban connections play a strategic role in the urban structure;
- The main public functions are unevenly distributed in the external settlements;
- The open spaces surrounding the ancient walls can be safe places in case of an earthquake;
- Some urban functions are situated in the suburbs; they can play a strategic role for the recovery of socio-economic and urban activities after a seismic event. However, the strategic urban structure overwhelmingly corresponds to the historic centre, because of the concentration of public functions, public spaces and historical-cultural values;
- Lack of redundancy concerning the territorial connections between the centre and the manufacturing area, and lack of accessibility to this zone;
- Lack of redundancy (ways and nodes) between the historic centre, the suburbs and the strategic buildings (elements that are necessary for the functioning of the city and the restart of urban ordinary activities after an earthquake).

## CASE STUDY OF GUBBIO

Flavia De Girolamo _PhD student in Urban Planning
Dipartimento Design, Tecnologia dell'Architettura, Territorio e Ambiente - *Sapienza* Università di Roma

| | |
|---|---|
| *Region* | Umbria (Italy) |
| *Municipality* | Gubbio (Perugia Province) |
| *Population* | 33.000 inhabitants |
| *Last earthquake* | 1997 |

*Urban Structure*

Located on a hill, North of Umbria region, Gubbio is a medium-size town with a large historic centre surrounded by ancient walls. The system of mobility is structured on two territorial roads (SS19 and SS318).Within the city walls are the main urban functions (administration, health facilities, civil defence, schools, theatre, churches, banks, shops, architectural and artistic heritage). The main urban connection runs all along the city walls, and influences the entire mobility system (radial and parallel streets), connecting the residential suburbs.

In the suburbs we find public facilities and public spaces, commercial and productive functions. Three wide business districts are located outside the ring road and a big cement factory is positioned south.

*Main critical issues of the Strategic Urban Structure*

- Strategic connections must be considered at two different levels: territorial and urban;
- Wide public open spaces may be used as safe places in case of earthquake;
- The main critical aspects of the Strategic urban structure are the complexity and the articulation of the urban system; furthermore, the territorial diffusion of urban functions and the presence of many unsafe spaces represents a critical issues;
- However, these aspects can be solved through the redundancy, which provide the flexibility and adaptability of the settlement in case of an earthquake.

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