

## **Resilience as an urban tool to mitigate seismic risk**

Traditionally, strategies aiming at seismic risk mitigation consider actions to reduce structural vulnerability of buildings and infrastructures.

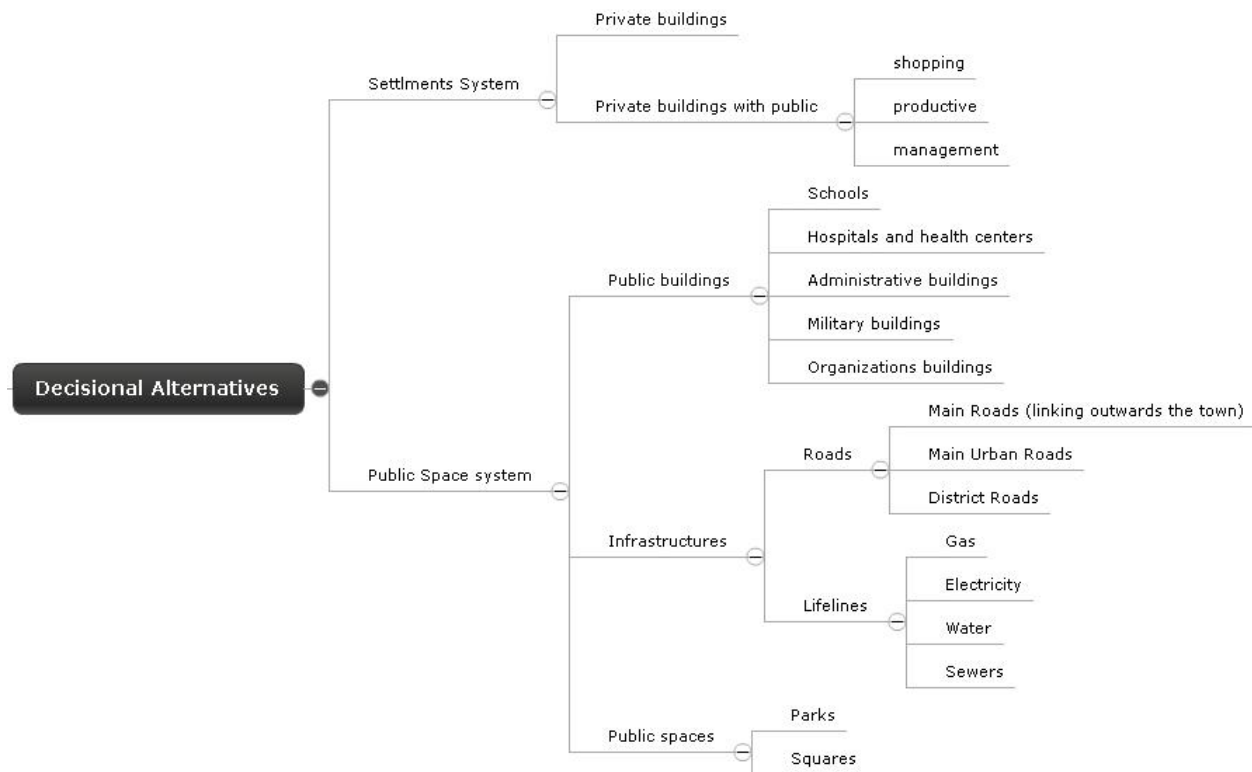
In the last years, several researchers observed that a town represents a complex network of physical systems and human communities, and introduced the concept of urban vulnerability, highlighting that structural vulnerability reduction is not enough, but it is important to identify strategies in order to reduce urban vulnerability.

A town, as each system in nature, reacts to event that modify its equilibrium, depending on its own resilience. So, resilience can be considered as the property of the system enabling to re-establish equilibrium conditions.

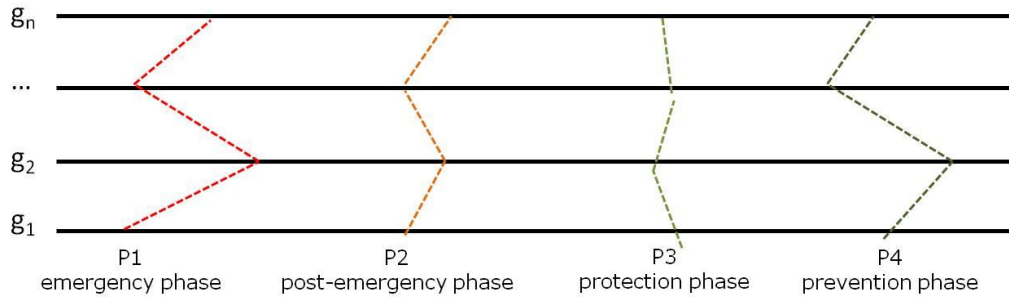
The research questions, so, are the following: how to identify this property in the town? how to use this property in order to reduce urban vulnerability? which is the relation between resilience and the main phases of risk management (emergency, post-emergency, protection, prevention)?

The main idea is that we can identify some sets of elements of the town-system as larger as we pass from the emergency phase to the prevention phase, considering that during prevention we can work in order to enhance resilience of almost all elements of town-system, but during emergency, there are a minimum set of elements necessary to deploy in order to guarantee basic emergency actions (as to rescue injured people, to help homeless people and so on).

Resilience property can be identified considering several attributes on town-system. In particular, we consider town-system as composed by two main physical systems (one concerning settlements and the other one concerning public spaces); for each of them it is possible further de-composition, and finally each set can be identified through knowledge framework phase, and characterized by proper attributes.



Adopting an ELECTRE TRI model for each of these systems, we intend to identify four main profiles in order to identify four main "resilient cities", one for each of the main phases of risk management. The following image shows an example of possible obtained profiles.



Once resilient cities have been identified, they should be integrated into the knowledge framework to which traditionally urban tools refer. So, if resilience is known, then urban strategies could integrate that one of seismic risk mitigation, that up to now is generally handled by Civil Protection.

At now, we are building knowledge framework for Marsicovetere, small town of Basilicata Region, as shown in the following figure.

This town represents the main pole of a wider area, Val d'Agri, and in the last decades it has been the scene of a development propulsion: main activities, administrative bureaus, health services, shopping centres etc., are born in Marsicovetere area; development concentrates on valley area, named Villa d'Agri, where today the main part of inhabitants live, also thanks to road network configuration.



Moreover, Val d'Agri is a seismic area, classified in the higher risk class<sup>1</sup>, and in the past has been hit by strong and devastating earthquakes.

In a second phase of research, we will build our criteria family, and clearly define resilience profiles.

<sup>1</sup> Considering in force law, Ordinanza PCM 3274, 20.03.2003 and following.