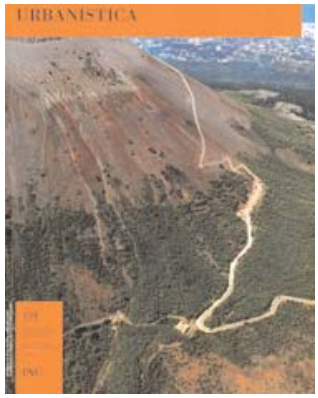

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The test on a town of average size: Forlì

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In the test carried out for the Sisma project in the historical centre of Forlì, the method for the seismic urban vulnerability assessment defined by the Emilia-Romagna region since 1990 and until now tested just on the smaller villages, has been used in order to verify its applicability to a settlement with more than 108.000 inhabitants.
In this method, urban risk is not only connected to seismic regional hazard, to exposure and vulnerability of buildings and networks, but also to the internal organisation of functional systems (the sub-systems which are most important for urban quality and the sub-systems for emergency service) and to their levels of performance.
Not only the physical damages are taken into account, but also the consequent modification of spatial and organisational patterns, as well as the modification of the flow of resources which characterize the urban system.
A computerized evaluation procedure (2004) allows us to create an aggregate index of physical and functional vulnerability for each sub-system in each territorial unit (Tu) of the settlement, also emphasizing the importance of each single factor.
The method allows us even to foresee the consequences of land use planning choices on the seismic risk levels (Strategical environmental assessment).
The adaptation of the method to the town of Forlì, required:
- the use of existing data-bases, reducing the number of new specific surveys (for example the use of investigations carried out for the Masterplan in order to estimate the average vulnerability of buildings);
- the setting up of a fast procedure for estimating the probable structural interactions between adjacent buildings (average induced vulnerability in the each Tu);
- the identification, through a fast process, based on the comparison of historical maps, of recurring vulnerability (direct and induced) due to the historical development of the urban fabric. The previous regional approach to the technological networks system has been changed in order to include detailed evaluation of exposure, standard of performance and vulnerability (direct and induced) of this system. An existing geological study indicates the presence, in the historical centre of Forlì, of paleo river-beds, whose probable 'local effects' have been considered in the evaluation of the urban systems risk in a qualitative way.

Land use planning choices to reduce the urban systems' vulnerability
The role of the historical centre in the urban structure of Forlì is emphasized by the number of city users: for this reason it is necessary to improve performance and to reduce vulnerability both of the lifelines and of the system of accessibility to the innermost areas of the historical centre, to improve the performance of the system of escape and rescue routes (e.g. increasing safety spaces and alternative escape routes) where it is possible, urban morphology permitting. It is also necessary to hypothesize an agreement between the municipality of Forlì and the providers of utilities (energy, methane, etc.) for an intervention programme aimed at reducing, in some small sized areas, foreseeable induced damage from networks.
To reduce the high induced vulnerability in the aggregates of Forlì, some urban and building rules have been defined, based on the above mentioned fast method for analyzing the historical development of the urban fabric.