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BLINKS: an Open Source GIS-based tool for the evaluation of economic loss due to flood events

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An Open Source GIS-based plug-in (BLINKS - Building Loss estImation iN risK analySis) is designed and implemented to assess both the exposure and the expected degree of loss due to the occurrence of flood events. Flooding is among the most destructive natural disasters, resulting in significant damage and disruption to densely populated areas in Europe whose consequences can be local, impacting a neighborhood or community, or regional, affecting entire river basins and multiple states. The EU Directive 2007/60/EC on flood risk assessment and management aims at reducing and managing flood risk posed to human health, the environment, cultural heritage and economic activity.
BLINKS processes institutional and non-institutional thematic layers and allows decision makers first to quantify the physical and the economic exposure of the elements at risk, in a given study region, and then assess the expected degree of economic loss (in terms of reparation, rehabilitation and reconstruction costs) for different flood hazard scenarios.
BLINKS allows the end-users to get water depth values from available flood hazard maps. Otherwise, a function implemented in BLINKS allows the end-users to model these values by interpolating a high resolution DTM, within the limits of each flood hazard class (for different time periods), resulting in a distributed water depth values map.
Data from the Italian Revenue Agency and the Price List (issued by the Society of the Engineers and Architects of Milan) are used to obtain the market values of buildings and to assess the reconstruction costs respectively, for different functional and structural building components for different building types that may be potentially affected by a flood event.
The spatial intersection between flood hazard maps, census tracts and real estate market values provides both the physical and the economic exposure of the elements at risk and the expected degree of economic loss for three different flood water depths (< 0.5 m; 0.5-1.0 m; > 1.0 m in this study). To get this latter aim, external database tables provide the end-users with the reconstruction costs and the percentage of damage for different water levels and for different building types. The end-users may change both the reconstruction costs and the percentage of damage at their own convenience.
The system is implemented using QGIS Processing Framework. The GUI is built over QT multi-platform framework and, therefore, the results are consistently integrated into the QGIS system.