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The digital Earth action: an augmented knowledge of reality for risk scenarios representation and operational evaluation of damages

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In the geospatial representation of a disaster scenario we can move inside a multilevel interconnected four dimensional reality, trying to understand, predict or trace back the causes of an hazardous event. The DIGITAL EARTH ACTION (DEA) of CIMA Foundation starts from this statement in order to develop new strategies and techniques for the studies of risk reduction and environmental remediation.
The operational testing of OPERA project, an Italian Spacer Agency pilot project for flood risk prediction and management, has taught us some ways to create virtual representations of specific target areas: beginning with a "scene" we can transform it into a specific "scenario", the former being a collection of still images or maps, the latter the dynamic set of observational data linked by processes underlying physics. Starting from this experience, the DEA wants to face a new challenge, that is a scientific deep investigation of instruments and methods that can be used to represent the world. We focus on three subjects: the most important geodatabases existing in the world paired with non-conventional data; the physical modeling of affected systems; the studies at single element.
The matters are strictly connected each other: the first provides the substrate upon which we can derive the representation; different accuracies or themes can deeply change the modeling of the scene. The study of the inner behavior of exposed systems needs a lot of information and has to be represented by creating a simulation model: the dynamic response of active and passive subjects is able to identify strategic elements of the network. Studies at detailed scale are able to identify single elements and to represent them in a 3D vision, by using specific tools: manipulation of buildings and infrastructures can be performed by using conventional or non-conventional data and provides us detailed knowledges on residual functionalities of elements to the network they belong to. This point feeds the modeling of the system and helps the planners or the emergency managers to deal with on-going events.