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Design and implementation of visualization methods for the CHANGES Spatial Decision Support System

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The CHANGES Spatial Decision Support System (SDSS) is a web-based system aimed for risk assessment and the evaluation of optimal risk reduction alternatives at local level as a decision support tool in long-term natural risk management. The SDSS use multidimensional information, integrating thematic, spatial, temporal and documentary data. The role of visualization in this context becomes of vital importance for efficiently representing each dimension.
This multidimensional aspect of the required for the system risk information, combined with the diversity of the end-users imposes the use of sophisticated visualization methods and tools.
The key goal of the present work is to exploit efficiently the large amount of data in relation to the needs of the end-user, utilizing proper visualization techniques.
Three main tasks have been accomplished for this purpose: categorization of the end-users, the definition of system's modules and the data definition. The graphical representation of the data and the visualization tools were designed to be relevant to the data type and the purpose of the analysis. Depending on the end-users category, each user should have access to different modules of the system and thus, to the proper visualization environment.
The technologies used for the development of the visualization component combine the latest and most innovative open source JavaScript frameworks, such as OpenLayers 2.13.1, ExtJS 4 and GeoExt 2. Moreover, the model–view–controller (MVC) pattern is used in order to ensure flexibility of the system at the implementation level.
Using the above technologies, the visualization techniques implemented so far offer interactive map navigation, querying and comparison tools. The map comparison tools are of great importance within the SDSS and include the following: swiping tool for comparison of different data of the same location; raster subtraction for comparison of the same phenomena varying in time; linked views for comparison of data from different locations and a time slider tool for monitoring changes in spatio-temporal data. All these techniques are part of the interactive interface of the system and make use of spatial and spatio-temporal data. Further significant aspects of the visualization component include conventional cartographic techniques and visualization of non-spatial data.
The main expectation from the present work is to offer efficient visualization of risk-related data in order to facilitate the decision making process, which is the final purpose of the CHANGES SDSS.

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