



A spatial data infrastructure to disseminate information on geo-hydrological hazards and risk in Italy

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Research organizations and public services that produce, maintain, and disseminate spatial (geographical) information are faced by multiple technological, functional (organizational), and conceptual (philosophical) challenges. Problems can be particularly severe where: (i) the amount and diversity of the spatial information is large, (ii) the number of users is large, (iii) the types and needs of the users are diversified, and (iv) reliable and timely delivery of multifaceted information is required. Difficulties can arise also because of the lack (or the complexity) of policies for (i) the dissemination, use, and exploitation of the information, (ii) the ownership of the information and the associated liability, and (iii) efficient maintenance and management of the SDI. These problems can result in complex (and often largely inefficient) authorization policies and associated authentication schemes.

In this work, we describe a spatial data infrastructure (SDI) designed to disseminate geographical and thematic information on geo-hydrological hazards and risk in Italy. The SDI was designed and implemented by the Research Institute for Geo-Hydrological Protection (IRPI), of the Italian National Research Council (CNR). We discuss the HW and SW architecture of the SDI, and the problems encountered in the implementation and maintenance of the infrastructure. The SDI is redundant and robust: based on eighteen virtual servers running on general-purpose, high-reliability HW, the SDI uses open source SW to manage and distribute the geographical and thematic information. Virtualization is performed using proprietary free software. Data distributed through the SDI include: (i) historical, geomorphological, and multi-temporal landslide inventory maps, (ii) landslide susceptibility, hazard, and risk maps, and (iii) catalogues of historical flood and landslide events with consequences to the population. The maps and catalogues were compiled and are distributed at different scales, and cover different geographical areas in Italy. The SDI disseminates data and information produced and maintained by CNR IRPI, and additional information on geo-hydrological hazards and risk (e.g., landslide maps) produced by other research organizations or public services. The SDI is also used to deliver to the Italian national Department for Civil Protection (DPC) forecasts for the possible occurrence of rainfall-induced landslides in Italy. CNR IRPI produces the forecasts every 12 hours exploiting rainfall measurements and forecasts and empirical rainfall thresholds for the possible occurrence of rainfall induced landslides. The DPC exploits the landslide forecasts and the geographical information available through the SDI (including information on landslide abundance, susceptibility, hazard, and risk) to prepare and disseminate daily warning bulletins to regional and local civil protection authorities.