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Creation and test of a mobile GIS application to support field data collection and mapping activities

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Classical methods for field data collection on geological and geomorphological features are based on the use of relatively simple tools, such as paper notebooks, coloured pencils, base maps, plus old devices as compass, binoculars, photo cameras, ... together with the personal skills of researchers. So far, data collected on the field had to be interpreted, summarised and redrawn in order to create base geological and geomorphological maps and/or more elaborated geothematic ones.
In the last 15 years, the use of computers and other electronic devices for collection, analysis and distribution of field data had a notable development also in the Earth Sciences and their applications to environmental analysis. This originated effective improvements not only in the field activities, but also in the laboratory ones, in terms of enhancement in both rapidity and precision of data processing, interpretation, and representation. Nevertheless, many not-yet-resolved problems concern either the conceptual framework or the practical solutions for field data collection and their transposition into maps.
For a complete, faster and more suitable procedure it has been created an application called "SRG" ("Supporto al Rilevamento Geologico": Support to Geological Survey), an extension for ArcPad (ESRI GIS for Windows mobile devices), that consists in a toolbar and a series of vector files usable for surveys and fast digital geothematic mapping. The application, developed in Visual Basic, has a series of functions that allow a fast digital base representation of geological and geomorphological features. Points, polylines and polygons, drawn directly on the screen, allow a fast visualization of mapped features and their influence on civil structure or other geomorphological features. An integrated GPS is used to evaluate the position of the features drawn.
Subsequently, the passage of the ground data to a structured and organized data base is automatic, and it almost allows the immediate creation of a "final" and publishable cartography.
This way, the field survey becomes an integral part of a complete GIS, without other intermediate passages and can be adjourned in the future.
The system has been tested initially in classical geological and geomorphological survey, then adapted for drafting the urban plan of a small town in order to evaluate the geomorphological risk for present and future urbanized areas. New functions were added to survey bridges, levees and other river civil works; here the system was implemented on smartphones based on Windows platform to geotag in the GIS the photos shot during survey.
The new research development here presented is inherent geothematic applications in the study of natural heritage, in particular, they need to share, compare and exchange data between researcher and users in unambiguous and accessible ways, possibly following codified standards for map production and user-friendly technologies for results communication. In order to fulfil the above-mentioned requirements, the authors aimed to developed a new application for palm computers to support field data collection and mapping activities on geomorphosites. The paper presents and discusses the result of this research, including some considerations on essentials in mapping activities, attributes of geological/geomorphological features and characteristics of Geomatics tools and methodologies.