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Geographic information systems supporting the solution of emergencies and their connection to self-actuated notification systems

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Geographic information systems represent an important tool in supporting the operation and crisis management of Integrated Rescue System (IRS) branches. The technology of geographic information systems makes it possible to localize specific information directly in the concerned area. A basic pre-requisite for efficient IRS functioning is the identification of so-called critical points in the given territory. The next step is the identification of endangered persons and properties. In these issues, emphasis is put particularly on the time scale, which represents a key aspect of the crisis management. In case of flood danger, the Early Flood Warning Service would inform flood authorities responsible for warning the population, declaring flood activity degrees, IRS activation and organization. For their decision-making, the flood authorities need data on level heights, current discharge rates and inundation areas. The information about discharge rates and height levels can be obtained from the network of recording stream gauge stations operated by the Czech Hydrometeorological Institute.
Inundation areas are plotted in the flood control plans of municipalities, which however contain default information about areas flooded at the N-year flood discharges Q5, Q20 and Q100. Because of large intervals, these three scenarios are insufficient for the crisis management of larger communities and towns. Therefore, a data store was suggested that would include maps showing flow rate fields and inundation areas for a finer scale of flood discharges at regular intervals. The scale should be based on the N-year flood discharges with a possibility of extension if required by flood authorities. The discharge interval size should be selected with regard to the dynamics of level height change in the given watercourse. The inundation areas will be then established by way of calculation using the MIKE 21C 2D hydrodynamic model.
The novel approach was applied recently in the cadastral area of Lety on the Berounka River. Two sets of certified maps were created: (1) The map of endangered properties 1 - grid of depths, and (2) The map of endangered properties 2 – grid of flow rates. The maps were created from the discharge of 500 m3/s to 1460 m3/s at intervals of 60 m3/s. Two additional discharge values were 1500 m3/s and a calibration discharge of 990 m3/s. In total, thirty-eight maps were created the foundation of which was an orthophotograph map where endangered properties were plotted together with inundation areas. The next step will now be a specific proposal for data store version. The data store will be placed on the web interface where scenarios will be possible to display according to the selected discharge. At the same time, information will be available about the current discharge in the given watercourse. The web interface will be publicly accessible and will be connected to IRS.

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