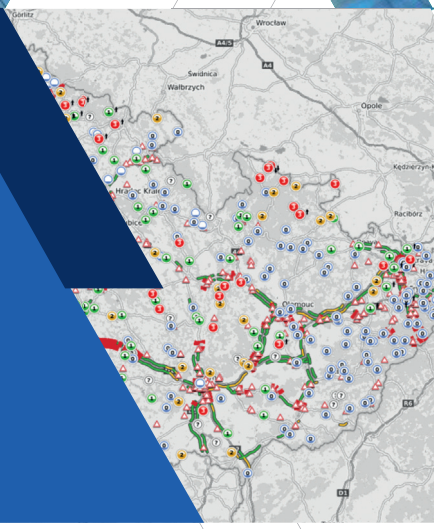
VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

Floreon+

SUPPORTING INFORMED DECISION-MAKING WITH DATA-DRIVEN SIMULATIONS AND ANALYSES



The Floreon+ system is being developed for monitoring, modelling, prediction, and support in disaster management, primarily for the Czech Republic. As a web-based platform, its modularity and responsiveness allow easy integration of various thematic domains, regions, and data. Its main goal is to support operational and tactical disaster management processes by providing and integrating real-time information and simulations from several thematic domains into one global overview.

The System Supports the Following Thematic Domains

- **HYDROLOGY** Hydrological situation monitoring and flood predictions
- **TRAFFIC** Traffic monitoring and modelling
- **AIR QUALITY** Monitoring of air quality and modelling of the spread of hazardous substances
- **LANDSLIDES AND LAND DEPRESSION** Tracking the movements of elevation points

Web Interface and Map Component

Users interact with the system through a web interface with a map component. This solution consolidates real-time information, modelling results, and predictions from all integrated thematic domains into one complex geographical framework and, therefore, delivers a detailed overview of the current situation as well as an archive of historical events.

www.floreon.eu

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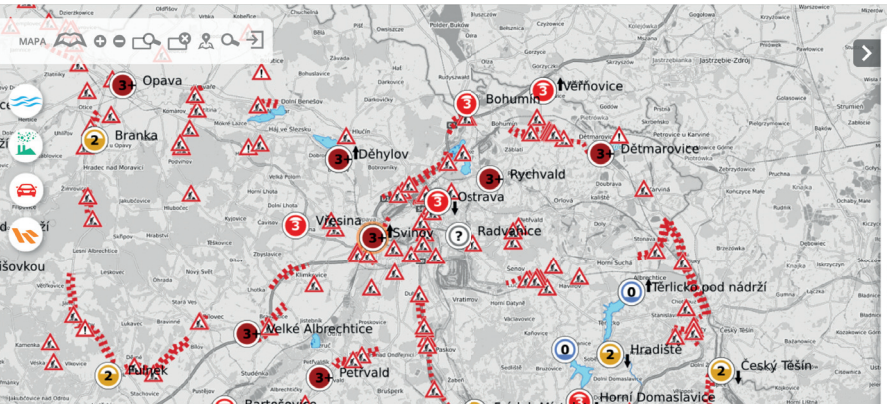
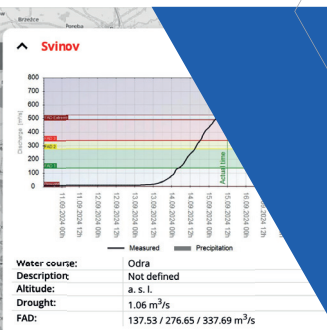
THE FLOREON+ SYSTEM





Floreon+ GUI

High-Performance Computing (HPC) Systems

The complexity of the simulation increases along with the required computing power when more simulation scenarios are included, or the inputs' inaccuracies and uncertainties are considered. The use of supercomputers for simulations in the modelled domains reduces the time needed to obtain results, allowing flexible responses to the situation at hand.

Domain Interaction and Data Analysis

The integration of multiple thematic domains into one system provides an opportunity for domain interaction use cases. Specialised data analysis scenarios and simulations can be developed to show, for example, how the traffic situation changes when major roads are flooded or how flooded areas affect the arrival times of emergency services. Because all data collected, simulation runs, and their inputs are stored, the system can analyse historical data and use it to identify patterns of behaviour.

Main Contributions of the Floreon+ System

The integration of several disaster management domains into one tool provides a detailed overview of the modelled situation and its short-term development.

Unified data management ensures data sharing between different models and domains. As all data is archived in the database, it is also possible to run simulations for historical events.

A web interface with the map component visualises aggregated information from all domains in different time steps and locations. Web services are provided to facilitate the use of outputs in other software products.

Exploiting the HPC infrastructure ensures much faster processing of large datasets and provides more accurate simulation results in near real-time.

The interaction of thematic domains provides a comprehensive overview of the situation from different perspectives and allows the creation of specialised data analysis scenarios and simulations.

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