

Distributed and Sensor Based Spatial Data Infrastructure for Dike Monitoring

Ralf Becker, Stefan Herle, Rainer Lehfeldt, Peter Fröhle, Jürgen Jensen, Till Quadflieg, Holger Schüttrumpf and Jörg Blankenbach (Germany)

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SUMMARY

Early warning systems for floods and storm surges currently are based exclusively on water level fore-casts. Other loads such as wind, waves, currents or heavy rainfalls as well as the resistance of the flood protection structure itself (e. g. dikes, flood protection walls) are not considered. If they occur simultaneously, the flood protection structures may fail before the design load is reached. Therefore, it is absolutely necessary to develop a sensor- and risk based early warning system which includes all relevant processes and cascading effects, allows just in time warnings and provides reliable and robust real-time data. A geoportal visualizing all collected data and information should grant decision-makers access.

Our integrated approach involves the implementation of a Sensor and Spatial Data Infrastructure (SSDI) enabling the concept of open access to all relevant data, models and simulations. For the real-time data collection at spatially distributed locations on-site, geotextiles are installed in the dike structure and mounted to sensor nodes for monitoring of deformations inside the dike. Furthermore, the nodes are equipped with environmental sensors capturing additional required data (e.g. soil temperature, humidity).

By using wireless communication protocols, a highly scalable and flexible wireless geo sensor network is built up enabling large scale monitoring of sea dikes. For maximizing the information effectiveness and reducing the own efforts, additional data from existing spatial-temporal data repositories (discoverable and accessible by web services) can be coupled with the sensor data. This fusion and integration of all relevant information facilitates a holistic analysis for early warning. The use of (geo) standards ensures integration of such heterogeneous data sources and interoperability. Current missing (geospatial) standards for mandatory new functionalities will be specified and developed. This gateway to the early warning system enables access to the real-time

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sensor, other existing data resources as well as to methods and results of hydro engineering simulation tools. Thus, the geoportal allows user access to all information via Internet with stationary or mobile clients at any time and any place.

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