

An IT infrastructure for smart levee monitoring and flood decision support

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Motivation and objectives

- **Smart levees** are gaining momentum as a flood protection technology
- **Motivating scenario:** early warning of flood threats caused by levee deterioration due to long-lasting flood waves passing down rivers
- **Challenges:** flood threat assessment of large area of levees and support for deadline-driven (urgent) computing

→ Need for a **dedicated IT infrastructure for smart levees** scalable to realistic flood scenarios



Central IT system

Data management

- Storage and access to current and archive levee sensor data

Resource management

- Dynamic allocation of computing resources

Data processing

- Urgent computing services for levee assessment and failure prediction
- Execution of data- and model-driven analyses for flood threat assessment
- Orchestration and scheduling of computations

User interface

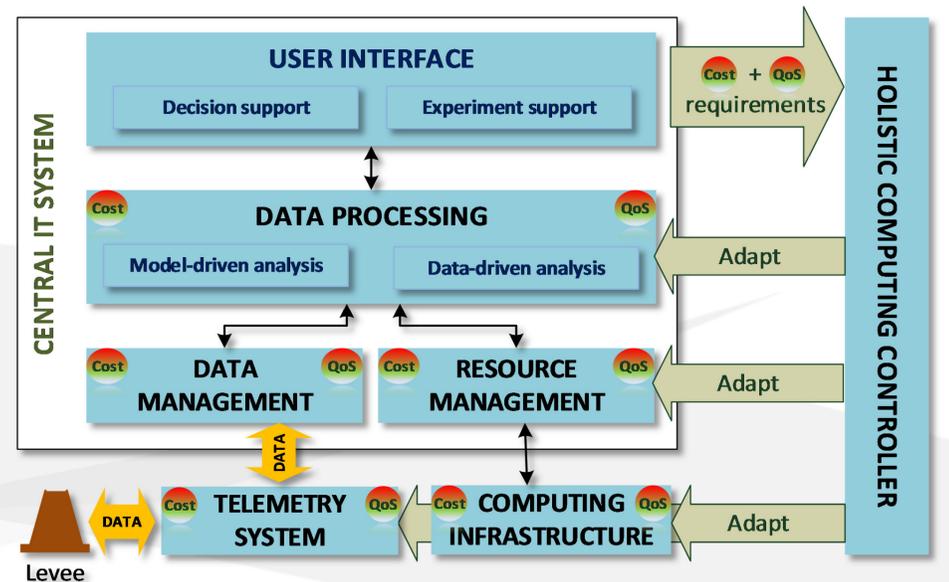
- Decision support: visualization of information supporting decision-making in emergency situations
- Experiment support: visualization of the levee state during controlled flooding experiments
- Analytics: visualization of archive scientific data from past experiments

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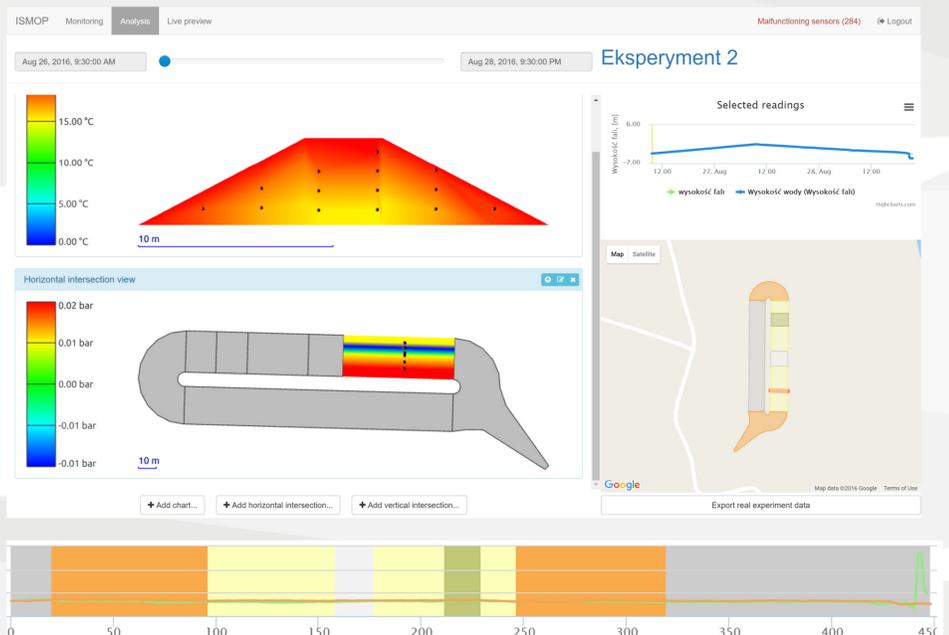
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IT infrastructure for smart levees



Visualization and decision support



Holistic approach to system optimization

Holistic Computing Controller reconfigures the IT infrastructure

- Optimizes QoS properties and cost of operation of the system given the current context (e.g. weather conditions)
- Uses multi-objective optimization in order to find best configurations for all subsystems
- Optimization goals vary depending on the mode of operation (urgent or normal)



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