

Building a dam monitoring system with Sensor Web Enablement components



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GEFÖRDERT VOM



Bundesministerium
für Bildung
und Forschung

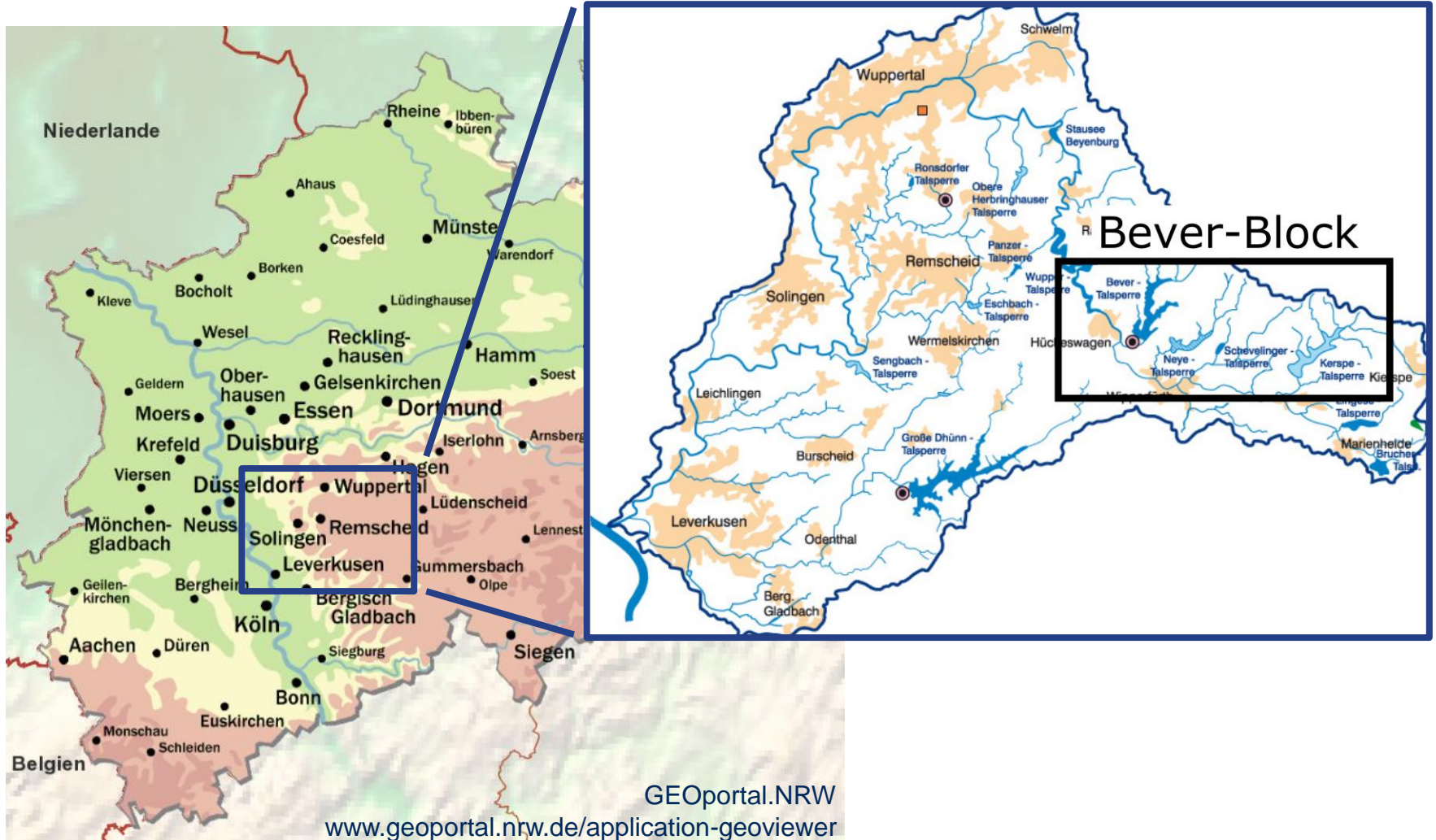
River dams as part of a critical infrastructure

Barrage de Malpasset, Provence – breach 1959

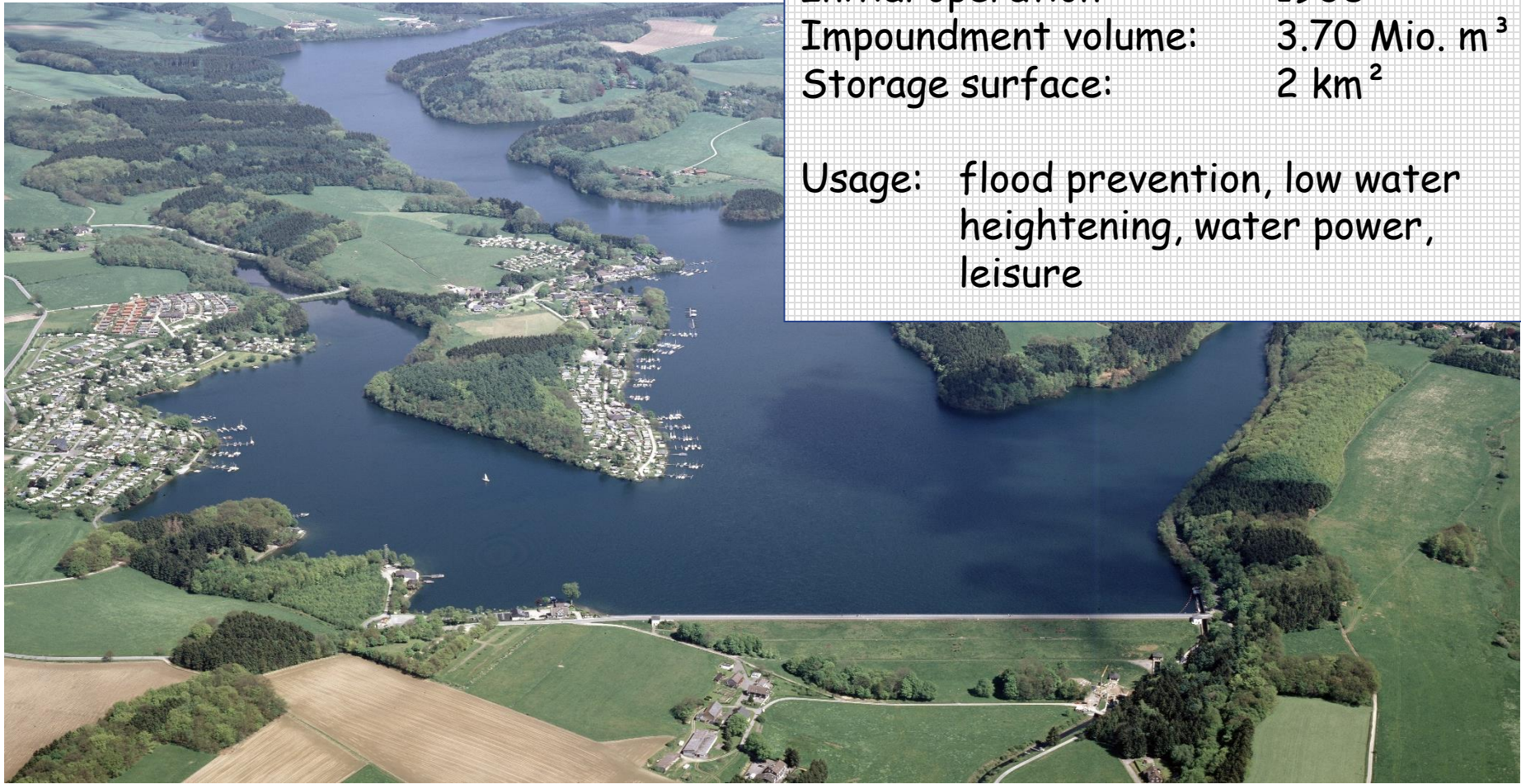


- Number of failure events relatively low
- World wide annual probability for dam failure appr. $4.1 * 10^{-4}$
- Minimization of residual risk required by German law

Area of application: Bever-Block



Feature of interest: river dam Bever

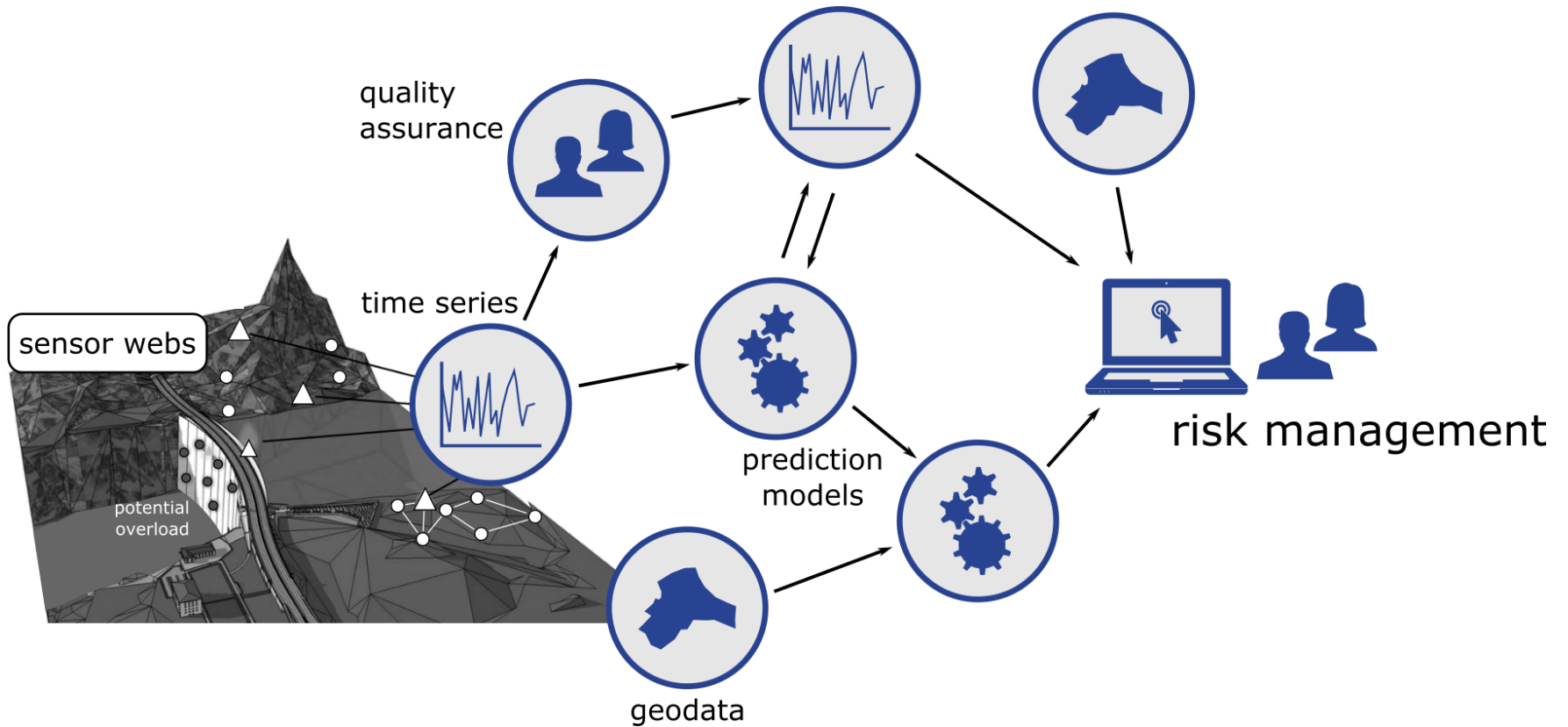


Initial operation:	1938
Impoundment volume:	3.70 Mio. m ³
Storage surface:	2 km ²

Usage: flood prevention, low water heightening, water power, leisure



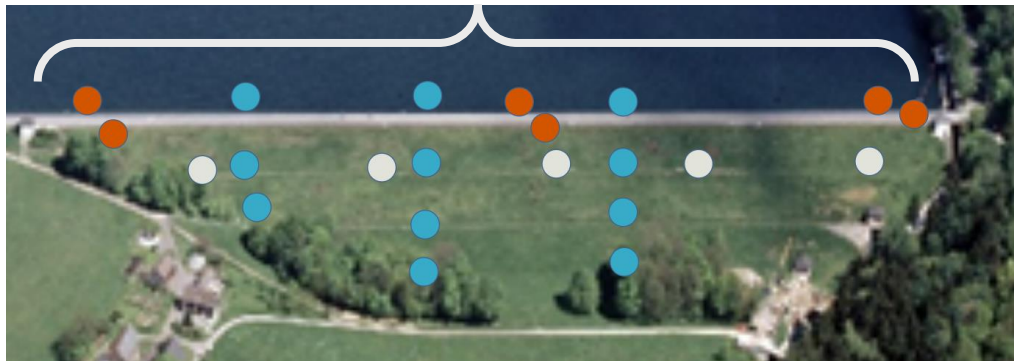
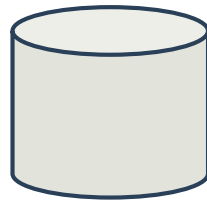
The dam monitoring system “TaMIS”



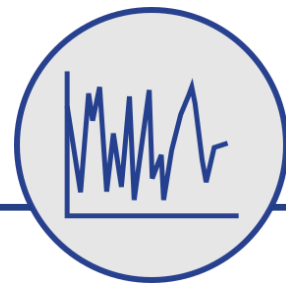
Internal Observation Data Pool



- Continuous observation data collection
- Integration of observations into homogeneous schema
- Access through SOS interface and Timeseries REST API



External Observation Data Pool



Open Weather Data

data is automatically prepared for interoperable usage in research project COLABIS



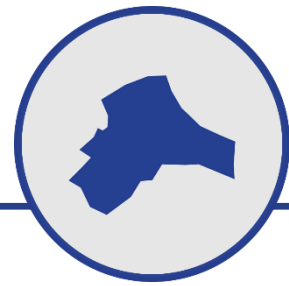
http://www.dwd.de/DE/leistungen/cdcftp/bilder/bild_leistungen_cdc-ftp_300x168px.jpg?__blob=normal&v=2

Additional sensors

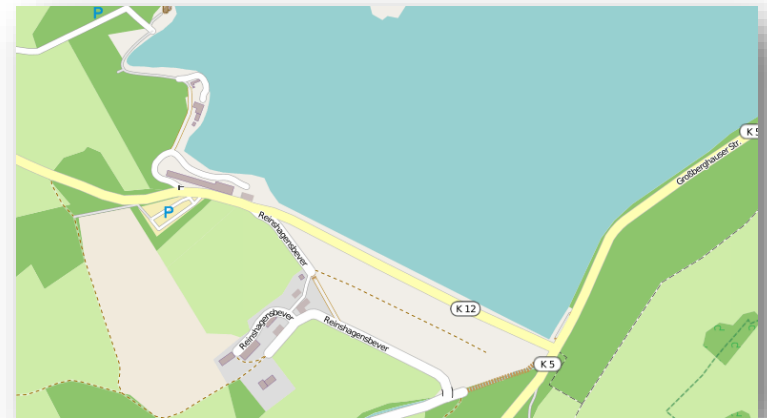
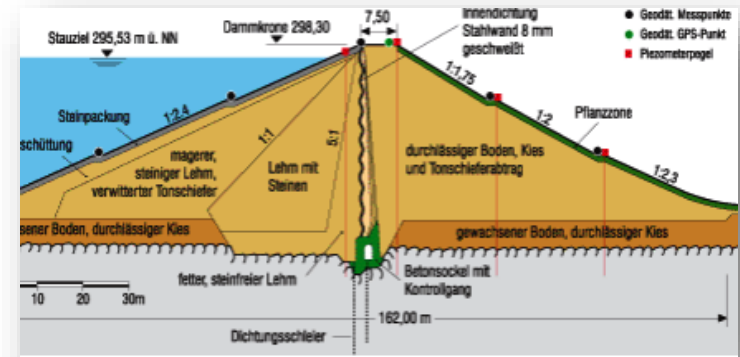
Data accessible through project partner's SOS



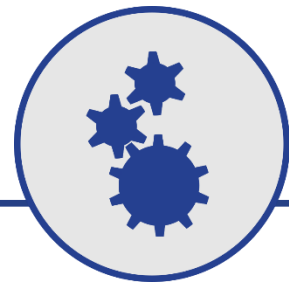
Spatial data



- Detailed survey maps / cross views
- Remote images
- 3D-Models
(Digital elevation model)
- Access via OGC interfaces when possible (WMS)

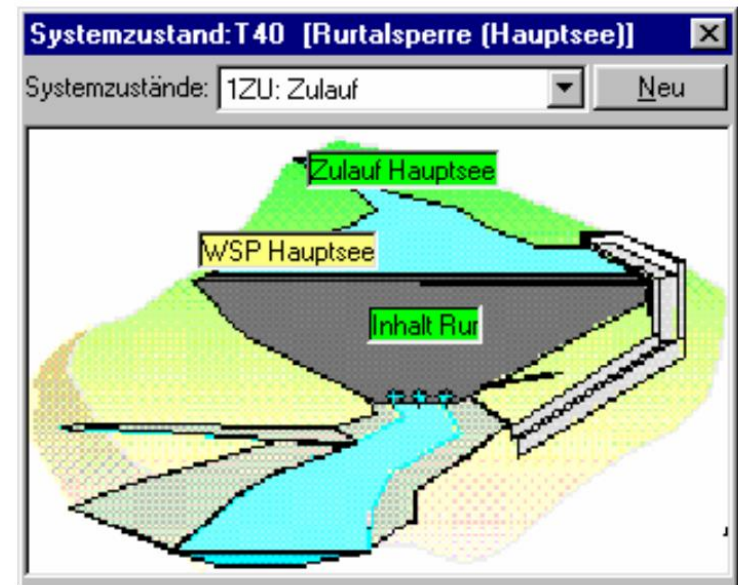


Integration of Domain Models

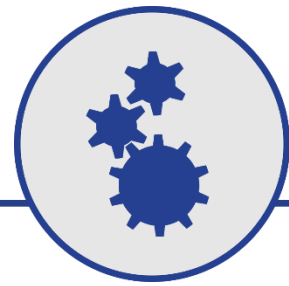


- Precipitation-Runoff models
- Web Processing Service encapsulates model

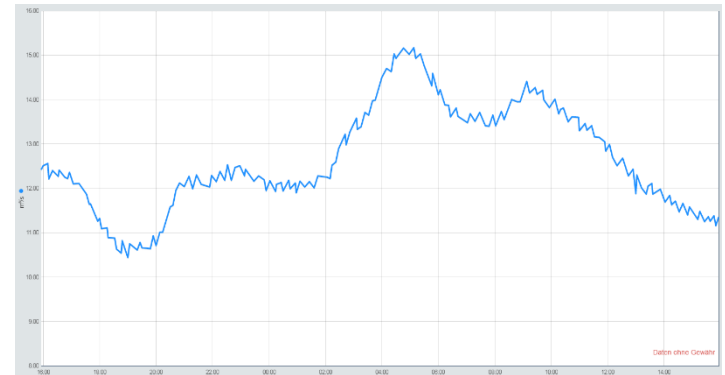
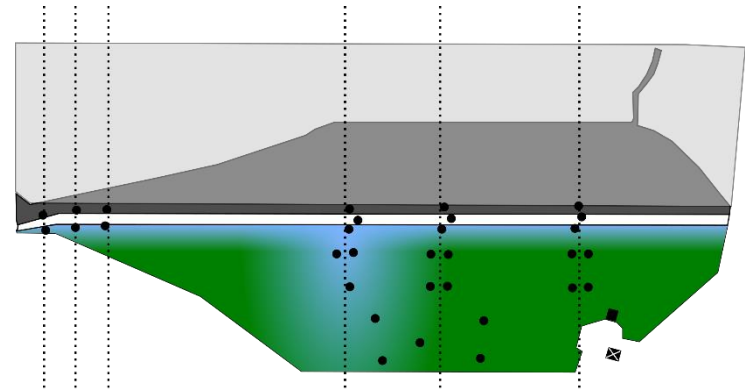
“Talsim“



Additional processing components



- Corellation models for prediction of seepage water or water level
- Calculation of water body in the dam
- Provision of processing logic via OGC WPS / REST API



Eventing



Development of an SES REST API



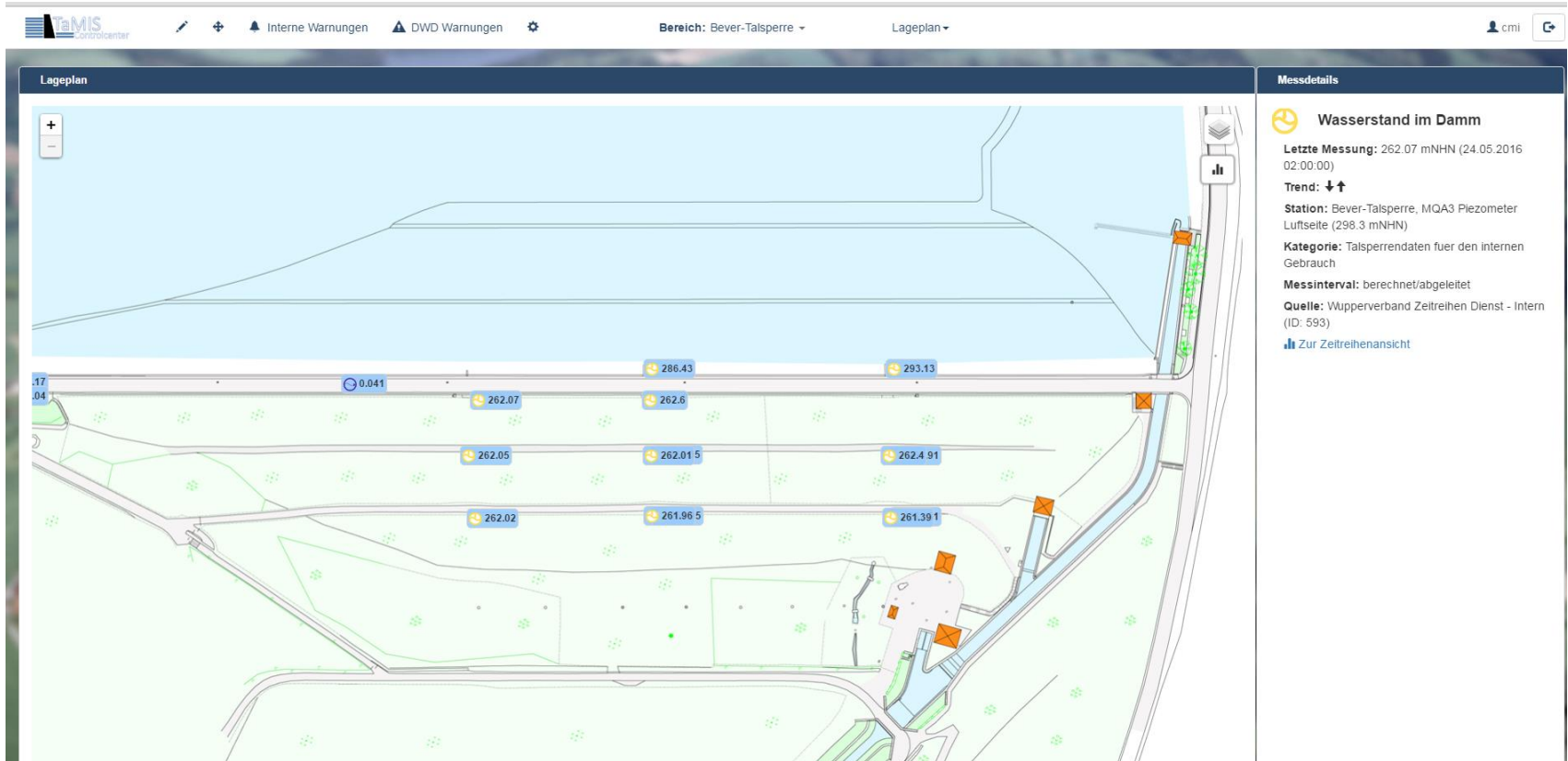
The Client: “TaMIS control centre”



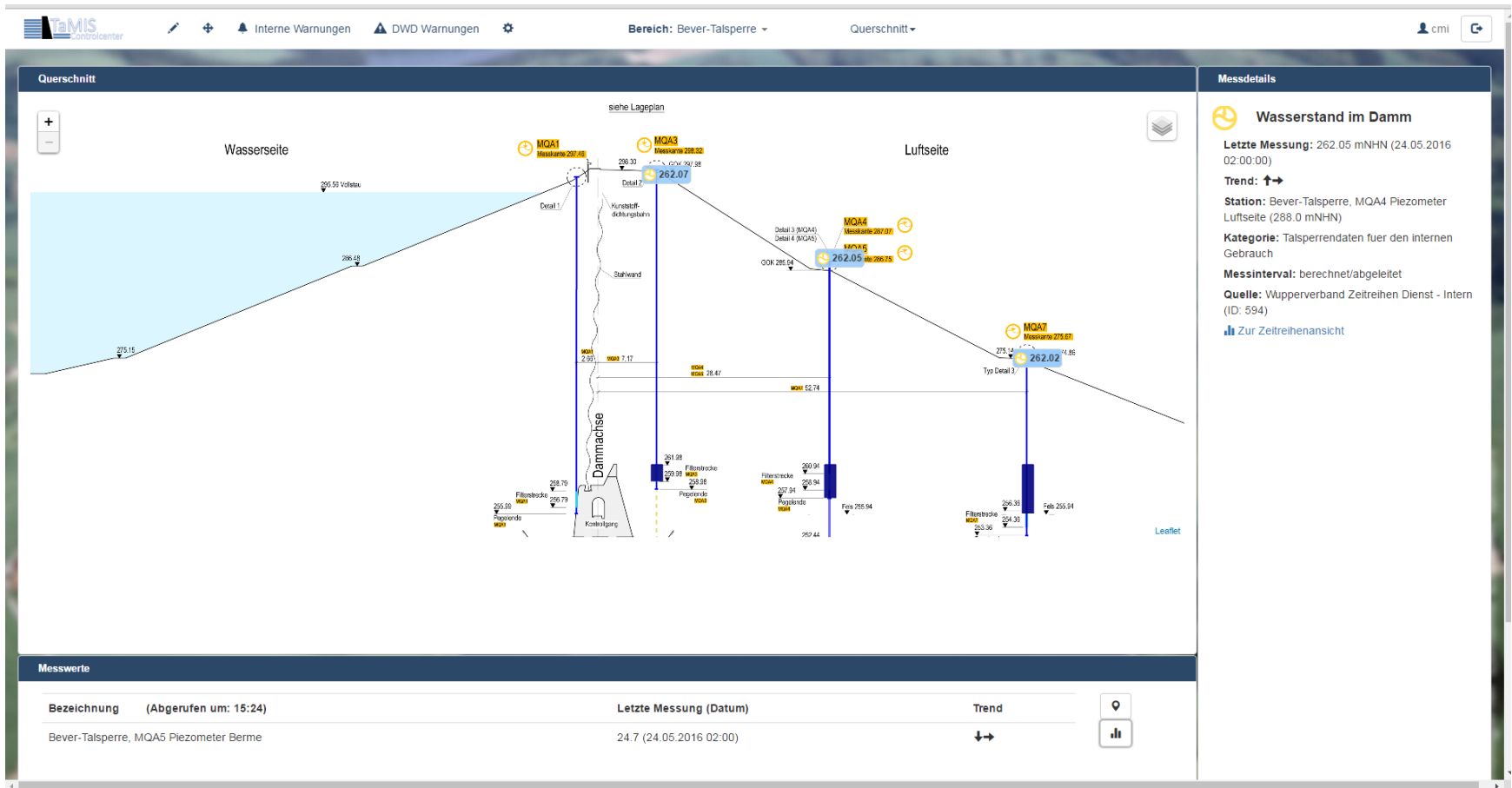
- Reuses AngularJS components from 52n SWE Client Core / Helgoland
- Defines new AngularJS components
- User management

A screenshot of a login form. The form has a light gray header with the text "Bitte einloggen". Below the header, there are two input fields: the first contains the text "tmn", and the second contains a series of dots representing a password. At the bottom of the form is a button labeled "Einloggen". The background of the screenshot is a blurred image of a globe.

Survey map view



cross view of the dam



list of current values



TaMIS
controlcenter

Interne Warnungen DWD Warnungen

Bereich: Bever-Talsperre Messwerte tmn

Messwerte

Bezeichnung (Abgerufen um:)	Letzte Messung (Datum)	Trend
Bever-Talsperre, Sickerwassermessstelle S4	0.025 l/s (27.05.2016 01:59)	↑↑→↓
Bever-Talsperre, Sickerwassermessstelle S1	0.041 l/s (27.05.2016 01:59)	↑↑↑↑
Bever-Talsperre, Sickerwassermessstelle S2	0.877 l/s (27.05.2016 01:59)	↑↑↓↓
Bever-Talsperre, Sickerwassermessstelle S2A	1.756 l/s (27.05.2016 01:59)	↑↑↓↓
Bever-Talsperre, Sickerwassermessstelle S2B	0.117 l/s (27.05.2016 01:59)	↑↑→→
Bever-Talsperre, Sickerwassermessstelle S3	0 l/s (27.05.2016 01:59)	→→→→



functionality to customize view



The screenshot displays a web application interface for monitoring water levels. A modal dialog titled "Zeitserie wählen" (Select Time Series) is open in the center. The dialog contains several categories for selection:

- Categories - Talsperrendaten fuer den internen Gebrauch** (highlighted in blue):
 - Luft
 - Niederschlag
 - Talsperrendaten fuer den internen Gebrauch
 - Vermessung
- Stations - Bever-Talsperre, GW1 Grundwasser** (highlighted in blue)
- Phenomona** (highlighted in blue)
- Procedures** (highlighted in light blue)

A "Close" button is located at the bottom right of the dialog. In the background, a table titled "Messwerte" (Measurements) is visible, listing measurement stations such as "Bever-Talsperre, Sickerwassermessstelle S4" through "S3". To the right of the table, a "Trend" column shows various arrow symbols (↑↑↑↓, ↑→↑↑, ↑↑↓↓, ↑↑↑↓, →→→→) indicating data trends. The top navigation bar includes "Interne Warnungen", "DWD Warnungen", and "Bereich: Bever-Talsperre".



3D view



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