WISKI AquAlta
Flood Warning Centre

FLOOD MANAGEMENT

TIME SERIES MANAGEMENT
KiTSM INSIDE
TIME SERIES MANAGEMENT

> In nature there is no effect without cause; understand the cause and you will have no need of the experiment.

Leonardo da Vinci | Artist and Inventor, Visionary and Engineer

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Pioneering Technologies.

Elixir of life and destructive force of nature – the duality of water

Leonardo da Vinci has been fascinated by the duality of water: an elixir of life on the one hand and a destructive force of nature on the other hand. In his technical work we find new technical solutions (flowing water body regulation, canal works, and aqueduct systems) conceived with a vision of making water beneficial to humans and their commercial activities. In his artistic oeuvre, he produced many drawings of floods and inundations represented here by the famous „Deluge of a city".
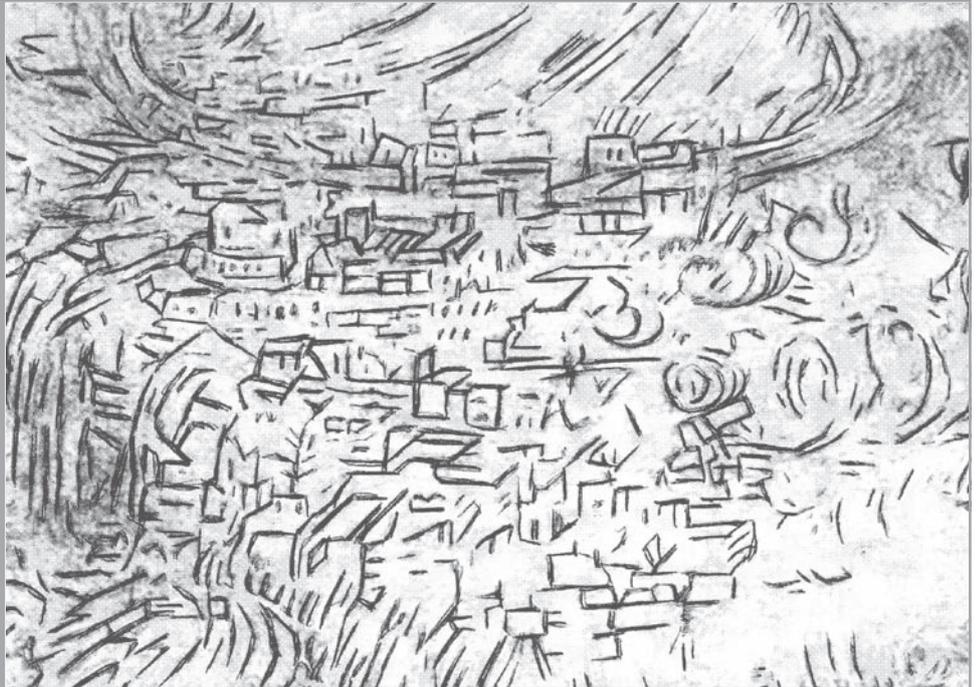
Reliable – Informative – Powerful.
Flood management relies on WISKI AquAlta.

Floods cause enormous damage to densely populated areas. Flood warning centres pursue the goal of reducing incurred loss by means of providing timely and reliable warnings. Here, a crucial factor is the time lapse between the warning issuance and the arrival of the flood. Furthermore, dependable communication of normal and pre-warning levels provides confidence with concerned citizens and authorities alike, who will peacefully go on with their normal activities until triggered to start planning and preparation.

It's easy to see what really matters in a flood warning centre during an actual flood situation: mass data processing, performance, efficiency and usability must be coupled in perfect harmony to provide for trustworthy streamlined automated and manual operations.

These challenges can only be met through the best hydrological and IT knowledge and intensive practical experience – our core competency for over 25 years. Hence WISKI AquAlta is built from existing KISTERS standard software components adapted to the specific demands and requirements of each single flood warning centre by means of customization.

Functionality of WISKI AquAlta

WISKI AquAlta copes with all tasks in the flood warning centre: remote data transfer using telemetry units, import of documents and messages, validation of incoming data, storage of data as time series in relational data bases, hydrological time series management and analysis, determination of the danger of flooding, alarm issuance and notification of the competent bodies, and synoptic presentation of both gauging levels and alarm levels in tables and on maps of the catchment area. Read more on WISKI AquAlta's functionalities:

Centralize data and documents

The flood warning centre's data base is the common sink of all relevant information such as gauging levels from the surface water monitoring network, meteorological data, precipitation data (e.g. obtained from the precipitation monitoring network and completed by weather radar data). Telemetry units are used for remote transfer of measurement data. Lo-

cal weather observers code-in data on their workstation or Smartphone using interactive browser applications programmed with KISTERS' Web technology. Measured, calculated, observed and predicted data are all stored in time series. The original values remain always available while validated copies are used for further aggregation and evaluation in KISTERS' field-proven hydrological information system WISKI using TSM, KISTERS' unique time series management technology. Incoming documents (e.g. emails, facsimiles, UMS, other data formats) provided by other bodies are stored and evaluated in the integrated content management system.

Data validation and evaluation

Incoming data are assigned to the relevant catchment areas. They are manually or automatically validated. Time series analysis is applied to produce hydrological information. Stage-discharge relationships are calculated using individual rating curves for each measurement station.

Hysteresis applied to oscillating water levels increase the reliability of both the alarm issuance and the triggering of the corresponding actions such as sending messages and notifications.

Synoptic Displays

WISKI AquAlta provides extensive support in the human appraisal of potential flood situations by means of clearly arranged views and displays.
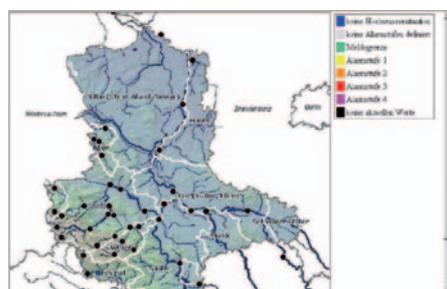
The intuitive user interface uses colours, context sensitive help, and flyovers on maps with links to higher-resolution numeric data. The short-term history of measurements at individual stations is just a few mouse clicks away from the general map of the whole surface water catchment area.

Alarms and notifications can be issued automatically or manually either when thresholds are exceeded or when other relevant events occur.
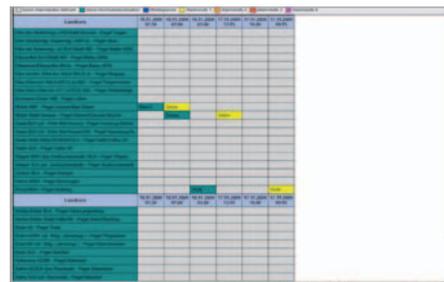
WISKI AquAlta provides support for tiled views, large-format screens and even for multiple monitors connected to a single computer.

Alarm levels and notifications

Rising levels in bodies of flowing waters are early indicators of impending floods. The lower thresholds are exceeded and corresponding alarm levels are activated. Activated alarm levels are raised or lowered depending on the evolution of the measured water levels. Subsequently warnings or clearances are issued. Corresponding notifications are sent to local administrations, to civil protection units, to police and fire brigades, and – last but not least – to interested citizens.

Warnings and clearances are not necessarily linked to levels monitored at the same monitoring stations: a station located upstream of a municipality may be used to issue alerts and clearances may be triggered by levels

measured downstream.

Recipients will either be created by the administrator (i.e. public authorities and emergency services) or can enrol using interactive forms published on web portals (i.e. citizens). To further enhance the notification process, recipients can be grouped to produce e.g. a group of all emergency services, or a group of all recipients that need/want to be notified only when a given alarm level is activated.

Documents

Monitoring and observational data are completed with information contained in documents (files) received from third parties. Each single incoming document is analyzed. Relevant information are automatically or manually screened, confirmed and extracted. All reports and notifications are stored as outbound documents.

A content management system stores all documents and provides comfortable means to process them (link with metadata, management, search, extract, read, edit).

Data publication

The increasing demand of the general public for reliable and unambiguous information is nurtured by the threat potential of flooding events. This information is based on and derived from a combination of monitored and forecasted data (water levels and precipitation). A system of incremental issuance of warnings helps to maintain quiet and peace in normal situations and provides the time buffer essential to get prepared when the unavoidable arrives.

WISKI AquAlta helps you publish information using a wide range of media such as web portals, SMS, videotext and voice portals.

Information distribution lists will be used in both normal and high water situations

to disseminate water level reports periodically. Documents of general interest can be forwarded to any number of recipients.

Architecture and modules

WISKI AquAlta's consistent implementation of a modern modular multi-user, multi-tier architecture provides both high investment security and technical advantages:

- flexibility: customisation, maintainability and changeability, multiple interfaces to existing and future resources
- scalability: grows with data volume and number of users while maintaining a stable performance level
- reliability: stability and fault tolerance by means of distributed processing and redundant installations
- efficiency: optimized use of available resources

KISTERS standard software modules

KiMoVA is the unified user interface. The user controls the whole system from within a friendly, clearly structured user interface with synoptic and individually configurable views on the data alongside the open water bodies.

WISKI acts as the central hydrological information system, where the entire monitoring network is defined including stations, parameters and metadata. All incoming measured, observed, calculated and predicted data are validated, organized, aggregated, analyzed with WISKI. Results are made available to KiMoVA in graphical and tabular views. All processing steps in the network are automated including aggregation and reporting.

SODA consists of hardware and software for remote data transfer and supports between

WISKI AquAlta
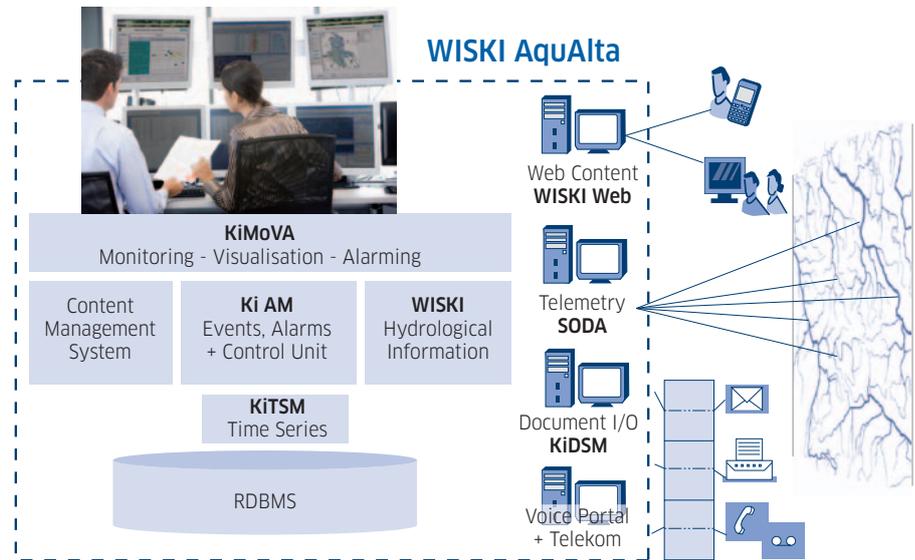
4 and 64 communication lines. It takes care of calling off data from automated monitoring stations as well as from other data sources using telephone lines, ISDN, mobile standards, satellite or internet connections.

KiTSM stores, manages, processes and archives the incoming large amounts of monitoring data in time series. It provides fast and secure access to the data and represents the application layer providing all services necessary for time series management and calculation to applications built upon it.

KiAM is the central application for information and message management in exceptional situations. It handles incoming event messages, classifies them, and reacts accordingly. Alarm messages are created based on templates, then filled with additional information, and are distributed to recipients via several media types.

WISKI Web generates dynamic content and input masks for Web portals and mobile apps.

KiDSM is a highly configurable backend for automated execution of distinct tasks such as importing of documents or cyclical provision of updated measurement data or documents.

Content management and voice portal are integrated in line with user demand and specifications.

„WISKI AquAlta is a highly practice-oriented, professionally designed and managed product resulting from projects in several flood warning centres. KISTERS standard software components build the backbone of the system controlled from within the GUI KiMoVA: the operation centre for monitoring, alarming, visualisation, message dissemination and content management provides both support to the expert in the flood warning centre and compatibility with the applicable regulations."

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