Applied open standards in integrated water information management

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Keywords: OpenMI, SOS, WaterML2, Interoperability Experiment, HydroDomain Working Group, Global Runoff Data Centre

Since 20 years KISTERS is developing and delivering off the shelf solutions responding to requirements of a demanding water industry. The requirements on data acquisition, storage, organization, validation, analysis and integration and dissemination from the international market have been included in a reliable, scalable and controlled open multi-tier architecture. KiTSM is developed in JAVA and is designed to organize, compute and share time series mass data.

Today the KISTERS user community consist worldwide of more than 3000 active users processing water domain meta data, gaugings, rating curves, water quality samples, time series and derived time series data products. The size of the hydrometric networks managed with KISTERS Solutions range from 10 to 100 000 measurement stations.

Acting for their customers KISTERS continuously contributes to standardisation processes and products. Since 2005 KISTERS contributes and adopts standards developed by the CUASHI initiative. Since two years -as a member of the OGC HydroDomain working group- KISTERS is working closely together with the Australian CSIRO to develop and enhance WaterML 2.0 and its implementation into the Sensor Observation Service SOS.

KISTERS is contributing to the surface water interoperability experiment 1 (cross border use case, international exchange of Water Levels on the River Rhine between SANDRE (France) and WSV (Germany)). In addition KISTERS is leading the interoperability experiment 3 (publishing fluxes to the ocean from the Global Runoff Data Centre (GRDC)).

Global data centres such as the GRDC are benefiting from the advances in open standards for the acquisition and dissemination of hydrological data and information. To date hydrological data are provided in a multitude of formats necessitating the development of complex import tools and converters. With the advent of open standards, the transfer and exchange of hydrological data amongst users such as the GRDC can be streamlined or even automated. The management and manipulation of hydrological data is done with commercially available software systems, such as WISKI provided KISTERS, used by a large community. The

provision of the data and data products to the users is utilising open standards as tested in the surface water interoperability experiments. The combination of domain specific software with open standards is welcomed by the GRDC as it ultimately contributes to a more efficient operation of the data centre.

The KISTERS Web Interoperability Solution "KIWIS" has been developed as a contribution to both interoperability experiments. KIWIS offers combined services such as SOS, WOF, WMS and WFS for different data sources in one instance.
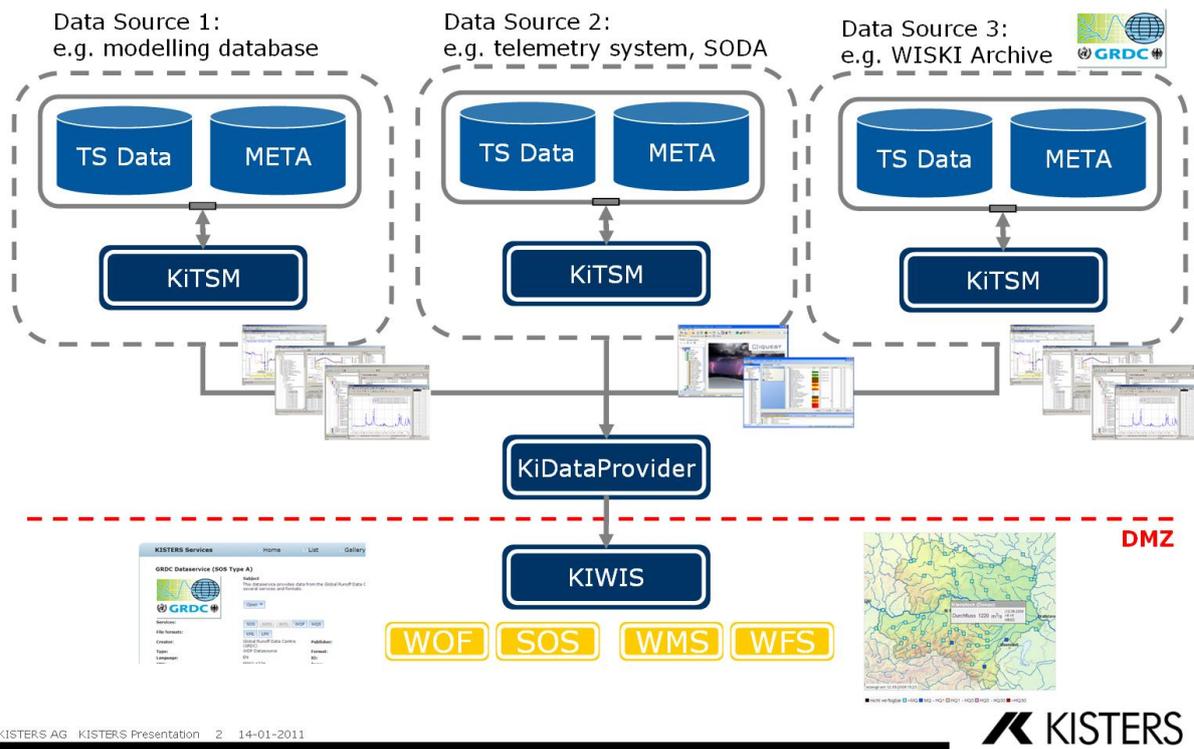
As a standard requirement the KISTERS archives have to serve data to a range of modeling applications. In the majority of cases this data transfer is scheduled in time and is based upon a variation of model specific ASCII file formats. To ease this process and to provide the advantage of linking models to our customers the KISTERS time series server became OpenMI compliant by the end of 2010.

With the KISTERS OpenMI wrapper, local and/or remote modeling users can establish the communication to a KISTERS time series server, search and identify the appropriate input time series and retrieve data through the internet directly into a chain of integrated modeling applications. Time series data from a KISTERS time series server located in Germany has been successfully feed into a model application in Denmark.
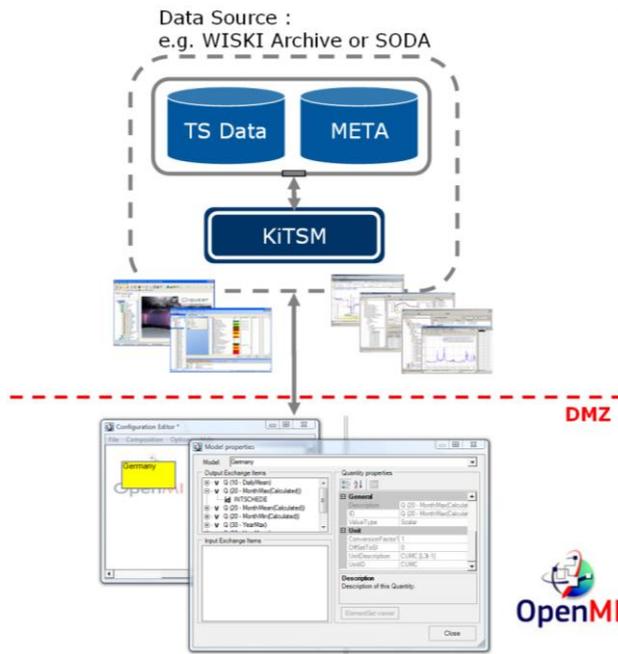
The technology and quality of open standards are steadily enhanced. This paper outlines the experience made during the harmonisation and implementation process and discusses the potential of applied open standards in integrated water information management.