WISKI 7
Water Information System – Kisters
@ RHMS of Serbia

Republic Hydrometeorological Service of Serbia
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MEETING ON ENHANCING HYDROLOGICAL DATA MANAGEMENT AND EXCHANGE PROCEDURES IN THE SAVA RIVER BASIN

IPA PROJECT:
Building Resilience to Disaster in Western Balkans and Turkey
EU • UNISDR • WMO • ISRBC

RHMS of Serbia - Organization

SECTOR FOR HYDROLOGICAL OBSERVATION SYSTEM AND ANALYSES

• DIVISION FOR HYDROLOGICAL STATION NETWORK
• DIVISION FOR GROUNDWATER
• DIVISION FOR HYDROLOGICAL ANALYSIS

BELGRADE – SAVA RIVER

HPP BAJINA BASTA – DRINA RIVER

Banja Luka, 15. – 16.04.2014.

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CONTENT

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Introduction

• Why WISKI?
• System Architecture
• Installation, Configuration & Training
• Production, User Administration & Data migration
• Modules: WISKI, SKED, BIBER & KiDSM
• Experiences in practice - Examples

Future Plans
Introduction - projects:
Partnership with NVE, Norwegian Water Resources and Energy Directorate

Project I
Title: Hydrological system for flood forecasting in small and medium basins in Serbia

Objective: Modernization of Hydrological sector through the introduction of operational practices known and proven hydrological models for flood forecasting in small and medium large basins in Serbia and the modernization of the entire hydrological information system for collecting, processing, storing, analysing and dissemination of historical and real-time hydrological data, information, hydrological forecasts and warnings

Project II
Title: Further development and improvement of services hydrological forecast in Serbia

Objective: To capitalize on the achievements of the previous project and proceed with further development and improvement of hydrological services in general, and especially hydrological forecasts in Republic Hydrometeorological Service of Serbia

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Why WISKI?
System for Water Resources Management

WISKI philosophy:

- **Transfer of information:**
  the area of water resources -> field of computer data and information
- **Storage of data and information describing the status and changes in water resources while providing high performance and efficiency of the system – time series technology**
- **Post-processing, analysis, synthesis, and make decisions based on reliable and verifiable information**

Basic features:

- The ability to process large amounts of data
- The flexibility and expandability of the system
- Safety and reliability
- Knowledge Base - Thesaurus: 250 + Experts
- User Base: 300 + worldwide
Why WISKI?

System for Water Resources Management

Key Features - details:

- Reliable, scalable and adaptive system - multi-tier (multi-layered) architecture
- Provides an environment for the management of time series for all types of parameters in hydrology and meteorology
- Provides requirements: acquisition, storage, validation, analysis, integration and dissemination
- Kisters meet the stringent requirements of data management:
  - U.S. Geological Survey
- The possibility of preparing different types of reports, graphics ...
- Transfer data (import <-> export)
- Quality control data and user management
- Tools for advanced statistical processing and analysis in hydrology

The aim of implementation: Integration of data collection, data processing and data management
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Why WISKI?
Basic functionalities:

- **Telemetry**
- **Real-time data import**
- **Historical data import**
- **Flow measurements**
- **Processing**
- **Reports**
- **Graphs & Charts**
- **GIS integration**
- **Statistical tools**

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Why WISKI?

References:

Resources water & air
• Bavarian State Agency for Water Management, Germany
• Coca Cola Germany
• DDE Dordogne, France
• Hydro Tasmania, Australia
• Ministerie van de Vlaamse Gemeenschap – AMINAL, Belgium
• Ministry of Natural Resources, Ontario, Canada
• Ruhr Association, Germany
• Shanghai Pudong Hydrology & Water Resource Administration, China
• Swedish Meteorological and Hydrological Institute, Sweden
• Tyrol Gydro Power, Inc., Austria
• German Federal Waterways and Shipping Administration, Germany
• Environment Agency for England & Wales, England
**System architecture: the basic level**

**Front End**
- Desktop application offering
  - WISKI7, WISKI Reporting, WISKI Modelling,
  - BIBER and SKED;
  - Handheld applications

**Business Logic**
- Time Series Management managing:
  - Imports, Calculation, Autovalidations, Exports
  - As well as integration to other systems (API, Files)

**Backend**
- Storage (Relational Database Systems such as ORACLE, MSSQL; optional File System for Time Series Data)
- Backup and Housekeeping, integration to other systems on Database level (Views, Links, Replications)

**Basic Architecture KITSM and WISKI 7**
- (Storage Layer, Business Logic, Application and Presentation Layer)
Meeting on Enhancing Hydrological Data Management and Exchange Procedures in the Sava River Basin

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System Architecture - Advanced Level - Example 1:

- KISTERS
- Stable

Basic Architecture: KitSM and WISKI 7
(Storage Layer, Business Logic, Application and Presentation Layer)

Outer World

Front End

Business Logic

Backend

KISTSM Server

WISKI Database

SCADA

KIALARM Manager

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System Architecture - Advanced Level - Example 2:

BASIC ARCHITECTURE KITSM AND WISKI 7
(Storage Layer, Business Logic, Application and Presentation Layer)
Installation & configuration:

- **Hardware:**
  - HP ProLiant DL380R05 Intel Xeon E5450, 2 processors, 8 GB RAM, 5 x 147 GB SAS HD - Oracle DBMS Server
  - HP ProLiant DL380R05 Intel Xeon E5450, 2 processors, 16 GB RAM, 3 x 147 GB SAS HD - TSM Server
  - HP Workstation XW 4600 Series - KiDSM Server
  - HP Workstation XW 4600 Series - WISKI Clients

- **Software:**
  - Oracle DBMS Server 11g Release 11.2.0.1.0 - OS Oracle Enterprise Linux 5
  - TSM Server - OS Oracle Enterprise Linux 5, TSM Version 3-40-7
  - KiDSM Server - OS Windows XP, Distributed Service Manager Version 5.60.5
  - WISKI Clients - OS Windows, Version 7.3.1.15 11 Release

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Installation & configuration:

Metadata setting up:
- Basins (12) →
  Stations (180 active + 200 inactive) →
  Parameters →
  Time series → Agents
- Time series for parameters:
  - H - water level (cm) - 18
  - Q - flow – discharge (m³/s) - 13
  - Tν - water temperature (°C) - 16
  - Cp – sediment concentrations in point (gr/l) - 13
  - Cpr – sediment concentrations in profile (gr/l) - 13
  - P - sediment transport (kg/s) - 13
  - L – ice phenomena - 2

Trainings:
- At RHMS
- WISKI Academy in Aachen
- WISKI User Conference

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Production mode – 01.01.2011.
User administration:
- Users, Roles
- Object permission & functional groups

Data migration from old database:

Time series
- H - water level, Q - flow, Tv - water temperature, Cp - the concentration of sediment in the point, CPR - sediment concentration profile, P – sediment transport, L – ice phenomena
- Flow measurement
- Cross sections
- Rating curves & Reduction curves

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WISKI 7 @ RHMZ - Modules

Modules:

- WISKI client
- BIBER
- SKED
- KiDSM

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WISKI client application:

- **Treeview**
- **System view**
- **Content**
- **System messages**

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WISKI 7 @ RHMS of Serbia - BIBER

BIBER – tool for hydrometric measurement processing

Tools for flow measurement data input and processing:
- Could be used locally and in the field
- Creating a database of hydrometric equipment
- Easy data measurements input
- Procedures for measurement evaluation
SKED – rating curve editor (tool for non-linear conversion):

- Tool for rating curve management in graphical and tabular mode
- View all BIBER measurements
- Supports for various methods of rating curves construction:
  - Linear regression
  - Degree function
  - Logarithmic regression
  - Polynomial functions from 1st to 5th order
  - Exponential functions

Typical workflow:
- Selection of control mode
- Loading curves and measurements
- Setting regression options
- Changing the settings of regression
- Re-iteration of the regression analysis
- Save the data
- Displaying stored Data
KiDSM Distributed Service Manager

Basic Concepts

- KiDSM provides data transfer tools to import, synchronize and export data from different locations to be monitored like local or remote directories, web servers, FTP servers, time series import and export servers, mail locations and even locations on mobile devices.
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Application: input and processing of metadata

GIS functionality

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Application: data control and processing
Application: SKED

- Second degree polynomial
- Power law
- Shifted power law according Lauffer
Application: BIBER – Showing the results of hydrometric measurements
Applications: Tools for advanced statistical analysis

Showing the probability of occurrence of maximum annual flow
Period 01/01/1950-31/12/2013
River Danube, Hydrological station Bezdan
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Application: Reports - Yearbook

<table>
<thead>
<tr>
<th>Date</th>
<th>Water Level (m)</th>
<th>Water Level (m)</th>
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</thead>
<tbody>
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<td>Water Level (m)</td>
<td>Water Level (m)</td>
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<tr>
<td></td>
<td>Water Level (m)</td>
<td>Water Level (m)</td>
</tr>
</tbody>
</table>

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### Application: KiDSM tool

**Example:**
Export data for VITUKI (Hungary) format for the last 3 days started at 08 AM every day

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>WMO - HYDRA station code</th>
<th>WMO - water level</th>
<th>WMO - discharge</th>
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Future plan:

- **KiScript** – tool for scripts writing
- **Reports** – for internal and external customers
- **Web input mask - data input application**
- **WISKI Web - online data access application**
Thank you for your attention

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